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Volume 3, Chapter 7

# DAMAGE TOLERANT DESIGN HANDBOOK

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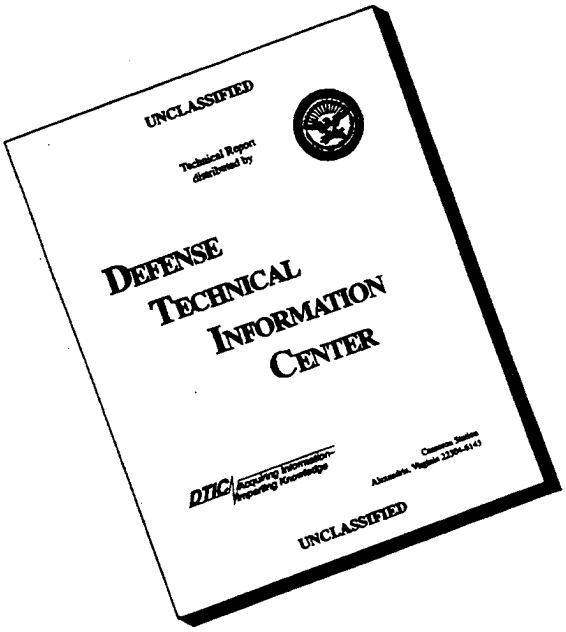


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This report presents a compilation of mechanical property data that are useful for damage tolerant design and analyses. The data of this handbook combines the old data that were previously presented in MCIC-HB-OIR (Damage Tolerant Design Handbook, December 1983) and more recent data that were collected from various sources. The fracture toughness, crack growth, R-curve, sustained load and threshold data are for alloy and stainless steels, nickel based super alloys, titanium alloys and aluminum alloys.

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# *Foreword*

This report summarizes the results of a damage tolerant, material property data collection and reporting program conducted under USAF Contract F33615-91-C-5610. The work was sponsored by the Materials Directorate of Wright Laboratory with Mr. Jack Coate of the Systems Support Division serving as the project monitor. The technical effort was conducted between June 1991 and January 1994. The work was performed by the University of Dayton Research Institute under the general supervision of Dr. Joseph P. Gallagher with Dr. Alan P. Berens serving as Principal Investigator.

This final report comprises eight chapters which are presented in five volumes as follows:

| VOLUME | CHAPTER | DESCRIPTION |
|---|---|---|
| 1 | 1 | Handbook organization and content |
| | 2 | Methods of calculation |
| | 3 | Alloy Steels |
| | 4 | Stainless Steels |
| 2 | 5 | Nickel Based Super Alloys |
| | 6 | Titanium Alloys |
| 3 | 7 | Aluminum 2000/6000 Series Alloys |
| 4 & 5 | 8 | Aluminum 7000/8000 Series Alloys |

A detailed listing of the materials represented in the Handbook is contained in the preceding Table of Contents. In the body of the Handbook, the pages are numbered within chapters and the relevant portion of the table of contents is repeated at the beginning of each chapter.

# CHAPTER 7
# ALUMINUM 2000/6000 SERIES ALLOYS SECTIONS


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# TABLE 7.0.1



## AVAILABLE DATA FOR ALUMINUM 2000/6000 SERIES ALLOYS

| Alloy | Condition/ Heat Treatment | Product Form | $K_{Ic}$ | $K_c$ | R Curve | da/dN | da/dt | $K_{Iscc}$ |
|---|---|---|---|---|---|---|---|---|
| 2014 | T451 | Plate | | | | | 1 | |
| | T6 | Sheet | | 111 | | 40 | | |
| | | Plate | | 4 | | | | |
| | | Forging | 22 | | | 4 | | 1 |
| | | Forged Bar | 6 | | | | | |
| | | Rolled Bar | | | | 4 | | |
| | T61 | Forging | 4 | | | | | |
| | T611 | Forging | 6 | | | | | |
| | T651 | Plate | 52 | 12 | | | 1 | 3 |
| | T652 | Forging | 28 | | | | | |
| 2020 | T6 | Sheet | | 19 | | 4 | | |
| | | Plate | 3 | | | | | |
| | | Extrusion | 1 | | | | | |
| | T651 | Sheet | | 12 | | | | |
| | | Plate | 20 | 33 | | 12 | | 1 |
| 2020 (ALCLAD) | T6 | Sheet | | 21 | | | | |
| 2021 | T81 | Plate | 3 | | | | | 3 |
| | T81 OVERHEATED WELD | Plate | | | | | | 1 |
| | T81 REPAIR WELD + AGE WITH 2319 FILLER WIRE | Plate | 6 | | | | | |
| | T81 REPAIRED WELD AGED 16HR 325F HEAT AFFECTED ZONE | Plate | | | | | | 1 |

# TABLE 7.0.1 (CONTINUED)

## AVAILABLE DATA FOR ALUMINUM 2000/6000 SERIES ALLOYS

| Alloy | Condition/ Heat Treatment | Product Form | $K_{Ic}$ | $K_c$ | R Curve | da/dN | da/dt | $K_{Iscc}$ |
|---|---|---|---|---|---|---|---|---|
| 2021 (Cont'd) | T81 REPAIRED WELD AGED 16HR 325F WELD CENTER LINE | Plate | | | | | | 1 |
| | T81 REPAIRED WELD AGED 16HR 325F WELD FUSION LINE | Plate | | | | | | 1 |
| | T81 WELD + AGE WITH 2319 FILLER WIRE | Plate | 9 | | | | | |
| | T81 WELDED AGED 16HR 325F FUSION LINE | Plate | | | | | | 1 |
| | T81 WELDED AGED 16HR 325F HEAT AFFECTED ZONE | Plate | | | | | | 1 |
| | T81 WELDED AGED 16HR 325F WELD CENTER LINE | Plate | | | | | | 1 |
| | T8151 | Plate | 3 | | | | | |
| 2024 | T3 | Unspecified | | | | 68 | | |
| | | Sheet | | 142 | 6 | 57 | | |
| | | Plate | | 15 | | 3 | | |
| | T351 | Sheet | | | 7 | 9 | | |
| | | Plate | 18 | 19 | 25 | 64 | 5 | 4 |
| | | Extrusion | 12 | | | | | |
| | | Forged Bar | 8 | | | | | |
| | T3511 | Extrusion | 8 | | | 18 | | |
| | T352 | Forging | | | | | | 1 |
| | T36 | Sheet | | 4 | | | | |
| | T4 | Sheet | | 48 | | | | |
| | | Forging | | | | | 1 | |
| | T42 | Plate | | | | 4 | | |

# TABLE 7.0.1 (CONTINUED)

## AVAILABLE DATA FOR ALUMINUM 2000/6000 SERIES ALLOYS

| Alloy | Condition/ Heat Treatment | Product Form | $K_{Ic}$ | $K_c$ | R Curve | da/dN | da/dt | $K_{Iscc}$ |
|---|---|---|---|---|---|---|---|---|
| 2024 (Cont'd) | T6 | Sheet | | 6 | | | | |
| | T62 | Sheet | | | | 15 | | |
| | T62 (GQ) | Sheet | | 5 | | | | |
| | | Plate | | | 5 | | | |
| | T62 (WQ) | Sheet | | 5 | | | | |
| | | Plate | | | 5 | | | |
| | T81 | Sheet | | 64 | | 41 | | |
| | | Plate | | | 6 | | | |
| | T851 | Sheet | | 30 | | | | |
| | | Plate | 204 | 42 | | 74 | | 7 |
| | T8510 | Extrusion | 9 | | | | | |
| | T8511 | Extrusion | 6 | | | | | |
| | T852 | Forging | 69 | | | 15 | | 12 |
| | T86 | Sheet | | 30 | | | | |
| | T861 | Sheet | | | | 44 | | |
| | | Plate | | | | 9 | | |
| 2024 (ALCLAD) | T3 | Sheet | | 295 | | 6 | | |
| | T86 | Sheet | | 4 | | | | |
| 2048 | T851 | Plate | 64 | | | 15 | | |
| 2091 | T3 | Sheet | | | 6 | 2 | | |
| | T351 | Plate | | | 3 | 2 | | |
| | T6 | Forging | | | | 2 | | |

# TABLE 7.0.1 (CONTINUED)

## AVAILABLE DATA FOR ALUMINUM 2000/6000 SERIES ALLOYS

| Alloy | Condition/ Heat Treatment | Product Form | $K_{Ic}$ | $K_c$ | R Curve | da/dN | da/dt | $K_{Iscc}$ |
|---|---|---|---|---|---|---|---|---|
| 2091 (Cont'd) | T8 275F 12HRS | Sheet | | | | 8 | | |
| | | Plate | | | | 8 | | |
| | T81 335F 32HRS | Sheet | | | | 2 | | |
| | T851 335F 16HRS | Plate | | | | 3 | | |
| 2124 | T351 (417) | Plate | 1 | | | | | |
| | T851 | Plate | 1138 | 44 | 10 | 69 | | 8 |
| | T851 (417) | Plate | 164 | | | | | |
| | T851 (SP) | Plate | 27 | | | | | |
| 2214 | T651 | Plate | 25 | | | | | |
| | T651 (417) | Plate | 45 | | | | | |
| 2219 | T37 | Plate | | | | | 1 | 3 |
| | T81 | Sheet | | 4 | | | | |
| | T851 | Unspecified | | | | 9 | | |
| | | Sheet | | 23 | | | | |
| | | Plate | 151 | 24 | | 72 | | 11 |
| | | Forging | 112 | | | | | |
| | T8511 | Extruded Bar | | | | 5 | | |
| | T852 | Forging | 142 | | | 16 | | |
| | | Billet | | | | 1 | | |
| | T87 | Sheet | | 75 | | | | |
| | | Plate | 29 | 24 | | | | 3 |
| | T87-300F 100HRS | Plate | 2 | | | | | |

# TABLE 7.0.1 (CONCLUDED)

## AVAILABLE DATA FOR ALUMINUM 2000/6000 SERIES ALLOYS

| Alloy | Condition/ Heat Treatment | Product Form | $K_{Ic}$ | $K_c$ | R Curve | da/dN | da/dt | $K_{Iscc}$ |
|---|---|---|---|---|---|---|---|---|
| 2324 | T39 | Plate | | | | 3 | | |
| 2419 | T851 | Plate | 95 | | | 2 | | |
| 2618 | T61 | Sheet | | 6 | | | | |
| | T651 | Plate | 15 | | | | | |
| | T81 | Sheet | | | | 2 | | |
| 6061 | T6 | Sheet | | 22 | | | | 5 |
| | T651 | Plate | 13 | 4 | | 1 | | 3 |
| | | Forged Bar | 3 | | | | | |
| | T652 | Forging | 1 | | | | | 2 |
| A201 | T7 | Casting | | | | 20 | | |
| A357 | T6 | Casting | | | | 16 | | |
| | T6; SOL. HEAT TREAT 1010F 24HRS; H2O Q AT 160F WITH 9 SEC QUENCH DELAY | Casting | | | | 8 | | |
| AL905XL | Unspecified | Forging | | | | 15 | | |
| IN905XL | Unspecified | Forging | | | | 19 | | |
| | 850F 2HRS; 665F 2HRS; WARM H20 Q; 230F 24HRS | Forging | | | | 2 | | |

# TABLE 7.0.2



## PLANE STRAIN FRACTURE TOUGHNESS VALUES OF ALUMINUM 2000/6000 SERIES ALLOYS AT ROOM TEMPERATURE

| Alloy | Condition/ Heat Treatment | Product Form | Range of Product Thickness (in.) | $K_{Ic}$ ($Ksi\sqrt{in}$) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Specimen Orientation | | | | | | | | | | | |
| | | | | L-T | | | | T-L | | | | S-L | | | |
| | | | | Min Spec Thk | n | Mean | Std Dev | Min Spec Thk | n | Mean | Std Dev | Min Spec Thk | n | Mean | Std Dev |
| 2014 | T6 | Forging | 0.89-8.00 | 0.71 | 2 | 27.9 | 0.8 | 0.25 | 4 | 17.4 | 1.7 | 0.75 | 5 | 16.9 | 1.9 |
| | | Forged Bar | 4.50 | --- | --- | --- | --- | 0.25 | 2 | 16.7 | 0.6 | --- | --- | --- | --- |
| | T611 | Forging | 1.00 | --- | --- | --- | --- | --- | --- | --- | --- | 0.75 | 2 | 17.8 | 0.6 |
| | T651 | Plate | 1.00-5.00 | 1.00 | 10 | 23.3 | 1.0 | 1.00 | 19 | 21.4 | 1.2 | 0.50 | 2 | 17.8 | 0.1 |
| | T652 | Forging | 2.00-6.00 | 0.75 | 12 | 28.8 | 3.6 | 0.75 | 13 | 21.9 | 3.2 | 0.50 | 3 | 18.1 | 1.4 |
| 2020 | T651 | Plate | 1.37 | 1.00 | 8 | 23.0 | 2.4 | 1.00 | 4 | 17.2 | 0.3 | --- | --- | --- | --- |
| 2021 | T81 | Plate | 1.00 | 0.99 | 3 | 27.0 | 0.5 | --- | --- | --- | --- | --- | --- | --- | --- |
| | T81 REPAIR WELD + AGE WITH 2319 FILLER WIRE | Plate | 1.00 | --- | --- | --- | --- | 1.00 | 6 | 15.8 | 0.7 | --- | --- | --- | --- |
| | T81 WELD + AGE WITH 2319 FILLER WIRE | Plate | 1.00 | --- | --- | --- | --- | 1.00 | 9 | 19.4 | 2.7 | --- | --- | --- | --- |
| 2024 | T351 | Plate | 1.00-3.00 | 1.00 | 5 | 33.4 | 3.9 | --- | --- | --- | --- | --- | --- | --- | --- |
| | | Extrusion | 3.00-5.00 | --- | --- | --- | --- | 1.50 | 5 | 25.0 | 0.9 | --- | --- | --- | --- |
| | T3511 | Extrusion | --- | 1.20 | 4 | 38.0 | 2.6 | --- | --- | --- | --- | --- | --- | --- | --- |
| | T851 | Plate | 0.37-4.00 | 0.38 | 65 | 23.3 | 2.4 | 0.38 | 63 | 20.7 | 1.9 | --- | --- | --- | --- |
| | T8510 | Extrusion | 2.76-4.50 | 1.86 | 3 | 30.4 | 2.7 | 2.00 | 3 | 16.5 | 1.0 | 1.00 | 3 | 15.7 | 1.4 |
| | T8511 | Extrusion | 3.50 | 1.00 | 2 | 24.1 | 0.4 | 1.00 | 2 | 16.0 | 0.0 | --- | --- | --- | --- |
| | T852 | Forging | 2.00-6.00 | 0.75 | 24 | 29.2 | 5.2 | 0.75 | 16 | 18.9 | 2.6 | 0.25 | 8 | 15.9 | 0.8 |

# TABLE 7.0.2 (CONCLUDED)

## PLANE STRAIN FRACTURE TOUGHNESS VALUES OF ALUMINUM 2000/6000 SERIES ALLOYS AT ROOM TEMPERATURE

| Alloy | Condition/ Heat Treatment | Product Form | Range of Product Thickness (in.) | $K_{Ic}$ ($Ksi\sqrt{in}$) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Specimen Orientation | | | | | | | | | | | |
| | | | | L-T | | | | T-L | | | | S-L | | | |
| | | | | Min Spec Thk | n | Mean | Std Dev | Min Spec Thk | n | Mean | Std Dev | Min Spec Thk | n | Mean | Std Dev |
| 2048 | T851 | Plate | 1.00-4.00 | 1.00 | 22 | 37.9 | 1.9 | 1.00 | 24 | 30.6 | 2.5 | 0.75 | 18 | 25.4 | 1.9 |
| 2124 | T851 | Plate | 0.62-6.00 | 0.50 | 364 | 29.7 | 2.8 | 0.50 | 362 | 25.1 | 2.3 | 0.50 | 393 | 21.7 | 2.1 |
| | T851 (417) | Plate | 1.57-5.50 | 0.50 | 27 | 28.9 | 2.8 | 0.50 | 28 | 23.8 | 2.4 | 0.50 | 19 | 21.3 | 2.0 |
| | T851 (SP) | Plate | 2.00-6.00 | 0.75 | 10 | 27.2 | 4.7 | 0.75 | 7 | 23.1 | 2.7 | 0.75 | 10 | 21.4 | 3.2 |
| 2214 | T651 | Plate | 1.50-2.37 | 1.00 | 11 | 35.3 | 2.7 | 1.00 | 10 | 31.8 | 0.9 | --- | --- | --- | --- |
| | T651 (417) | Plate | 1.50-3.93 | 1.50 | 10 | 36.0 | 3.4 | 1.49 | 15 | 29.4 | 1.8 | 1.00 | 2 | 26.6 | 1.8 |
| 2219 | T851 | Plate | 1.00-3.25 | 0.97 | 48 | 33.4 | 2.3 | 0.75 | 78 | 29.7 | 3.2 | 0.50 | 14 | 23.0 | 2.4 |
| | | Forging | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1.00 | 85 | 25.6 | 3.1 |
| | T852 | Forging | 2.00-7.50 | 1.50 | 25 | 39.2 | 3.2 | 1.50 | 24 | 27.1 | 2.2 | 0.75 | 60 | 25.3 | 3.1 |
| | T87 | Plate | 1.00-2.00 | 1.00 | 6 | 28.0 | 3.0 | 0.97 | 2 | 22.0 | 0.4 | --- | --- | --- | --- |
| | T87-300F 100HRS | Plate | 1.50 | 1.47 | 2 | 34.8 | 0.4 | --- | --- | --- | --- | --- | --- | --- | --- |
| 2419 | T851 | Plate | 1.75-3.00 | 1.50 | 23 | 42.6 | 5.3 | 1.40 | 52 | 37.2 | 4.2 | 1.00 | 3 | 24.8 | 2.5 |
| 2618 | T651 | Plate | 3.34 | --- | --- | --- | --- | --- | --- | --- | --- | 1.00 | 12 | 14.9 | 1.2 |
| 6061 | T651 | Plate | 1.50-2.50 | --- | --- | --- | --- | 1.00 | 5 | 26.6 | 0.9 | 1.00 | 2 | 21.5 | 0.4 |

# TABLE 7.0.3.1



## PLANE STRESS AND TRANSITIONAL FRACTURE TOUGHNESS OF ALUMINUM 2000/6000 SERIES ALLOYS (WITHOUT BUCKLING CONSTRAINTS)

| Alloy | Condition/ Heat Treatment | Test Temp (°F) | Specimen | | Yield Strength (Ksi) | $K_c$ ($Ksi\sqrt{in}$) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Specimen Thickness (in.) n - Sample size μ - Mean σ - Standard Deviation | | | | | | | | | | | |
| | | | Orient | Width (in.) | | 0.063 | | | 0.125 | | | 0.250 | | | 1.0 | | |
| | | | | | | n | μ | σ | n | μ | σ | n | μ | σ | n | μ | σ |
| 2014 | T6 | -423. | T-L | 4.0 | 81.8 | 5 | 59.1 | 3.4 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | R.T. | T-L | 16.0 | 65.4 | 5 | 58.4 | 2.7 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2020 | T6 | R.T. | L-T | 2.0 | 75.9-77.0 | 5 | 34.6 | 7.0 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | 3.0 | 75.9 | 2 | 30.1 | 1.2 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | 16.0 | 76.9 | 4 | 36.9 | 2.9 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | T-L | 2.0 | 75.8-76.0 | 5 | 30.4 | 6.6 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | 3.0 | 75.8 | 2 | 27.7 | .8 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | T651 | R.T. | L-T | 3.0 | 77.4 | --- | --- | --- | --- | --- | --- | 2 | 26.4 | .4 | --- | --- | --- |
| | | | | 4.0 | 77.4 | --- | --- | --- | --- | --- | --- | 3 | 24.2 | 2.3 | --- | --- | --- |
| | | | | 20.0 | 76.1-77.5 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 11 | 30.5 | 2.5 |
| | | | T-L | 3.0 | 77.4-78.4 | --- | --- | --- | 12 | 23.5 | 2.4 | 3 | 17.2 | 2.5 | --- | --- | --- |
| | | | | 4.0 | 78.0 | --- | --- | --- | --- | --- | --- | 2 | 20.8 | .1 | --- | --- | --- |
| | | | | 20.0 | 77.4-78.4 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 12 | 19.4 | .8 |
| 2020 (ALCLAD) | T6 | R.T. | L-T | 3.0 | 68.6 | --- | --- | --- | 7 | 40.2 | 3.3 | --- | --- | --- | --- | --- | --- |
| | | | | 16.0 | 68.0 | 2 | 34.1 | 1.8 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | T-L | 3.0 | 68.4 | --- | --- | --- | 7 | 30.4 | 5.0 | --- | --- | --- | --- | --- | --- |
| | | | | 16.0 | 67.2 | 2 | 33.9 | 1.2 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2024 | T351 | R.T. | L-T | 20.0 | 58.2 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 2 | 107.1 | 1.7 |
| | T81 | R.T. | T-L | 6.0 | 62.0 | 2 | 57.8 | 3.2 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | 9.0 | 62.0 | 3 | 61.2 | 5.0 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | 15.0 | 62.0 | 2 | 54.6 | .0 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | 18.0 | 62.0 | 2 | 54.6 | .6 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | 21.0 | 62.0 | 2 | 55.8 | 2.9 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | 24.0 | 62.0 | 2 | 52.1 | .8 | --- | --- | --- | --- | --- | --- | --- | --- | --- |

# TABLE 7.0.3.1 (CONCLUDED)

## PLANE STRESS AND TRANSITIONAL FRACTURE TOUGHNESS OF ALUMINUM 2000/6000 SERIES ALLOYS (WITHOUT BUCKLING CONSTRAINTS)

| Alloy | Condition/ Heat Treatment | Test Temp (°F) | Specimen | | Yield Strength (Ksi) | $K_c$ ($Ksi\sqrt{in}$) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Specimen Thickness (in.) n - Sample size μ - Mean σ - Standard Deviation | | | | | | | | | | | |
| | | | Orient | Width (in.) | | 0.063 | | | 0.125 | | | 0.250 | | | 1.0 | | |
| | | | | | | n | μ | σ | n | μ | σ | n | μ | σ | n | μ | σ |
| 2024 (Cont'd) | T851 | R.T. | L-T | 20.0 | 65.8-66.1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 12 | 48.4 | 3.8 |
| | | | T-L | 3.0 | 66.6-65.4 | --- | --- | --- | 8 | 44.8 | 1.8 | 6 | 31.2 | 2.5 | --- | --- | --- |
| | | | | 4.0 | 65.8-68.0 | --- | --- | --- | --- | --- | --- | 7 | 47.1 | 8.0 | --- | --- | --- |
| | | | | 20.0 | 64.4-65.4 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 12 | 33.6 | 1.9 |
| | T86 | R.T. | L-T | 16.0 | 72.9 | 5 | 52.9 | 4.7 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | T-L | 2.0 | 70.8-72.6 | 4 | 42.4 | .5 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | 16.0 | 71.2 | 5 | 45.8 | 3.1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2124 | T851 | R.T. | T-L | 3.0 | 57.4-62.9 | --- | --- | --- | --- | --- | --- | 6 | 38.1 | 2.7 | --- | --- | --- |
| 2219 | T851 | R.T. | L-T | 20.0 | 50.6-52.0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 10 | 84.6 | 9.0 |
| | | | T-L | 20.0 | 49.3-51.2 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 12 | 66.3 | 4.2 |
| | T87 | R.T. | L-T | 16.0 | 57.7 | 3 | 77.0 | 2.1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |

# TABLE 7.0.3.2

## PLANE STRESS AND TRANSITIONAL FRACTURE TOUGHNESS OF ALUMINUM 2000/6000 SERIES ALLOYS (WITH BUCKLING CONSTRAINTS)

| Alloy | Condition/ Heat Treatment | Test Temp (°F) | Specimen | | Yield Strength (Ksi) | $K_c$ ($Ksi\sqrt{in}$) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Specimen Thickness (in.) n - Sample size μ - Mean σ - Standard Deviation | | | | | | | | | | | |
| | | | Orient | Width (in.) | | 0.063 | | | 0.1 | | | 0.125 | | | | | |
| | | | | | | n | μ | σ | n | μ | σ | n | μ | σ | n | μ | σ |
| 2014 | T6 | -320. | L-T | 4.0 | 74.1 | 2 | 59.2 | 1.1 | --- | --- | --- | --- | --- | --- | | | |
| | | | | 18.0 | 74.1 | 4 | 74.1 | 3.2 | --- | --- | --- | --- | --- | --- | | | |
| | | | T-L | 3.0 | 75.9 | 9 | 46.5 | 5.3 | --- | --- | --- | --- | --- | --- | | | |
| | | | | 6.0 | 75.9 | 5 | 48.2 | 4.5 | --- | --- | --- | --- | --- | --- | | | |
| | | | | 12.0 | 75.9 | 15 | 49.7 | 3.8 | --- | --- | --- | --- | --- | --- | | | |
| | | R.T. | L-T | 16.0 | 68.4 | 5 | 64.9 | 3.4 | --- | --- | --- | --- | --- | --- | | | |
| | | | | 18.0 | 65.2 | 5 | 71.9 | 3.4 | --- | --- | --- | --- | --- | --- | | | |
| 2024 | T62 (GQ) | R.T. | T-L | 6.0 | 57.0 | --- | --- | --- | --- | --- | --- | 2 | 63.0 | 1.4 | | | |
| | T62 (WQ) | R.T. | L-T | 6.0 | --- | --- | --- | --- | --- | --- | --- | 2 | 77.1 | 5.8 | | | |
| | | | T-L | 6.0 | --- | --- | --- | --- | --- | --- | --- | 2 | 72.3 | 2.0 | | | |
| | T81 | R.T. | L-T | 6.0 | 64.8 | --- | --- | --- | --- | --- | --- | 2 | 65.4 | 3.8 | | | |
| | | | T-L | 6.0 | 62.0-64.1 | --- | --- | --- | --- | --- | --- | 3 | 57.3 | 1.9 | | | |
| 2219 | T87 | -423. | L-T | 16.0 | 73.8 | 2 | 90.6 | 3.2 | --- | --- | --- | --- | --- | --- | | | |

# TABLE 7.0.4.1



## FATIGUE CRACK GROWTH RATE (FCGR) COMPARISON AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK FOR ALUMINUM 2000/6000 SERIES ALLOYS IN LAB AIR AT ROOM TEMPERATURE

**ORIENTATION: Unspecified** **STRESS RATIO: -1.0 - 0.8** **FREQUENCY: 5-30 Hz**

| ALLOY | CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level (Ksi/in) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| 2219 | T851 | UNSPECIFIED | -1 | 5 | | | 4.31 | 29.14 | | |
| | | | 0.1 | 5 | | 0.48 | 7.07 | | | |
| | | | 0.3 | 30 | | 0.7 | 6.81 | | | |
| | | | 0.5 | 30 | | | 8.29 | | | |
| | | | 0.8 | 5 | 0.12 | 3.08 | | | | |
| A201 | T7 | CASTING | 0.1 | 25 | | 0.31 | 2.86 | 21.26 | | |
| A357 | T6 | CASTING | 0.1 | 25 | | | 2.82 | 309.7 | | |
| | T6; SOL. HEAT TREAT 1010F 24HRS; H2O Q AT 160F WITH 9 SEC QUENCH DELAY | CASTING | 0.2 | 25 | | | 1.09 | 158.8 | | |

# TABLE 7.0.4.2

## FATIGUE CRACK GROWTH RATE (FCGR) COMPARISON AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK FOR ALUMINUM 2000/6000 SERIES ALLOYS IN LAB AIR AT ROOM TEMPERATURE

**ORIENTATION: L-T** **STRESS RATIO: -1.0 - 0.8** **FREQUENCY: 0.1 - 30 Hz**

| ALLOY | CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level (Ksi√in) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| 2014 | T6 | SHEET | 0.05 | 2 | | | 6.39 | | | |
| | | | 0.05 | 2 | | | 6.12 | | | |
| | | | 0.25 | 2 | | | 8.73 | | | |
| | | | 0.25 | 2 | | | 10.39 | | | |
| | | | 0.4 | 2 | | 1.31 | 13.69 | | | |
| | | | 0.4 | 2 | | 1.41 | | | | |
| | | | 0.5 | 2 | | 1.6 | | | | |
| | | | 0.57 | 2 | | 1.03 | | | | |
| 2020 | T6 | SHEET | 0. | 13.3 | | | | 103.95 | | |
| | T651 | PLATE | -0.5 | 5.2 | | | 3.4 | | | |
| | | | 0. | 5.2 | | | 3.41 | | | |
| 2024 | T3 | SHEET | 0. | 13.3 | | | | 28.56 | | |
| | | | 0.05 | 5 | 0.04 | 0.44 | 5.11 | 37.22 | | |
| | | | 0.05 | 5 | | 0.23 | 4.34 | 94 | | |
| | | | 0.05 | 10 | | 0.27 | 4.1 | 31.19 | | |
| | | | 0.2 | 10 | | 0.24 | 10.21 | 29.54 | | |

# FATIGUE CRACK GROWTH RATE (FCGR) COMPARISON AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK FOR ALUMINUM 2000/6000 SERIES ALLOYS IN LAB AIR AT ROOM TEMPERATURE

**ORIENTATION: L-T** **STRESS RATIO: -1.0 - 0.8** **FREQUENCY: 0.1 - 30 Hz**

| ALLOY | CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level (Ksi√in) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| 2024 (Cont'd) | T3 (Cont'd) | SHEET (Cont'd) | 0.33 | 3.33 | | | | 196.72 | | |
| | | | 0.4 | 5 | 0.09 | 0.47 | 8.19 | 108.59 | | |
| | | | 0.4 | 5 | 0.09 | 0.65 | 9.28 | 84.19 | | |
| | | | 0.4 | 8-15 | | 0.45 | 9.34 | 134.24 | | |
| | | | 0.8 | 10 | 0.16 | 1.89 | 29.04 | | | |
| | | | 0.8 | 10-15 | 0.15 | 1.12 | 18.49 | | | |
| | | PLATE | -1 | 20 | | | 10.37 | 72.53 | | |
| | | | -0.5 | 20 | | 0.17 | 12.2 | 68.27 | | |
| | | | 0.05 | 20 | | | 9.8 | | | |
| | T351 | SHEET | 0. | 6 | | | 6.14 | 44.18 | | |
| | | | 0.4 | 3 | | | | 165.36 | | |
| | | | 0.8 | 6 | | | 39.33 | | | |
| | | PLATE | -1 | 2-3 | | | | 108.2 | | |
| | | | -1 | 5 | | 0.27 | 8.6 | 43.66 | | |
| | | | -1 | 3-6 | | | | 62.29 | | |
| | | | -1 | 2-10 | | 0.5 | 10.3 | 152.02 | | |

## FATIGUE CRACK GROWTH RATE (FCGR) COMPARISON AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK FOR ALUMINUM 2000/6000 SERIES ALLOYS IN LAB AIR AT ROOM TEMPERATURE

**ORIENTATION: L-T** **STRESS RATIO: -1.0 - 0.8** **FREQUENCY: 0.1 - 30 Hz**

| ALLOY | CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level (Ksi√in) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| 2024 (Cont'd) | T351 (Cont'd) | PLATE (Cont'd) | -0.5 | 3-5 | | 0.3 | 6.24 | 45.67 | | |
| | | | 0. | 1-6 | | | | | | |
| | | | 0. | 10-20 | | 0.16 | | | | |
| | | | 0.01 | 2-5 | | 0.22 | 5.84 | 49.75 | | |
| | | | 0.01 | 20 | | | 5.96 | 52.12 | | |
| | | | 0.05 | 5 | | | | | | |
| | | | 0.05 | 5 | | | | 65.03 | | |
| | | | 0.05 | 10 | | 0.35 | 7.28 | 42.32 | | |
| | | | 0.05 | 5-15 | | 0.17 | 6.04 | 45.39 | | |
| | | | 0.1 | 3 | | | | 54.97 | | |
| | | | 0.1 | 20 | | | 8.51 | | | |
| | | | 0.3 | 20 | | | 10.52 | | | |
| | | | 0.33 | 25 | | | 8.21 | | | |
| | | | 0.4 | 3 | | | | 241.62 | | |
| | | | 0.4 | 5 | | 0.69 | 11.71 | | | |
| | | | 0.4 | 10 | | 0.55 | 6 | 83.87 | | |

# FATIGUE CRACK GROWTH RATE (FCGR) COMPARISON AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK FOR ALUMINUM 2000/6000 SERIES ALLOYS IN LAB AIR AT ROOM TEMPERATURE

**ORIENTATION: L-T** **STRESS RATIO: -1.0 - 0.8** **FREQUENCY: 0.1 - 30 Hz**

| ALLOY | CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level (Ksi√in) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| 2024 (Cont'd) | T351 (Cont'd) | PLATE (Cont'd) | 0.4 | 10 | | 0.52 | | | | |
| | | | 0.4 | 12 | 0.04 | 0.57 | 10.72 | | | |
| | | | 0.5 | 20 | | | 13.16 | | | |
| | | | 0.6 | 10 | | 0.81 | 12.69 | | | |
| | | | 0.6 | 20 | | | 14.67 | | | |
| | | | 0.8 | 1-5 | | 1.65 | 32.4 | | | |
| | | | 0.8 | 5-10 | | 1.42 | | | | |
| | | | 0.8 | 5-10 | | | 27.69 | | | |
| | | | 0.8 | 15 | 0.12 | 1.19 | | | | |
| | | | 0.8 | 3-16 | | | 56.84 | | | |
| | | | 0.8 | 20 | 0.13 | 1.79 | | | | |
| | T3511 | EXTRUSTION | 0.05 | 9 | | 0.13 | | | | |
| | | | 0.1 | 20 | | 0.14 | 5.32 | 72.99 | | |
| | | | 0.5 | 9 | 0.08 | | | | | |
| | | | 0.5 | 20 | 0.04 | 0.46 | 12.95 | | | |
| | | | 0.8 | 20 | | 1.3 | | | | |
| | | | 0.8 | 25 | 0.13 | | | | | |

# FATIGUE CRACK GROWTH RATE (FCGR) COMPARISON AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK FOR ALUMINUM 2000/6000 SERIES ALLOYS IN LAB AIR AT ROOM TEMPERATURE

**ORIENTATION: L-T** **STRESS RATIO: -1.0 - 0.8** **FREQUENCY: 0.1 - 30 Hz**

| ALLOY | CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level (Ksi√in) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| 2024 (Cont'd) | T42 | PLATE | -1 | 10 | | | 6.41 | 43.76 | | |
| | | | 0.02 | 10 | | | 4.41 | 20.66 | 998.91 | |
| | | | 0.5 | 10 | | 0.43 | 7.79 | 43.92 | | |
| | T81 | SHEET | 0.05 | 2 | | | | 63.62 | | |
| | | | 0.4 | 2 | | | | 100.13 | | |
| | T851 | PLATE | 0.02 | 10 | | | 3.59 | 43.67 | | |
| 2091 | T3 | SHEET | 0.02 | 1-10 | | | 3.46 | 11.27 | | |
| | T81 335F 32HRS | SHEET | 0.1 | 5 | | | 6.18 | 37.78 | | |
| | T851 335F 16HRS | PLATE | 0.1 | 5 | | | 6.36 | 56.32 | | |
| 2219 | T851 | PLATE | -1 | 6 | | | 6.96 | | | |
| | | | -1 | 1-20 | | | 5.68 | 48.49 | | |
| | | | -0.5 | 5.2 | | | 6.89 | | | |
| | | | -0.3 | 6 | | | 7.01 | 51.71 | | |
| | | | -0.1 | 6 | | | 6.87 | 43.87 | | |
| | | | 0. | 5.2 | | | 8.31 | 53.58 | | |
| | | | 0. | 6 | | | 4.29 | 33.74 | | |

# FATIGUE CRACK GROWTH RATE (FCGR) COMPARISON AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK FOR ALUMINUM 2000/6000 SERIES ALLOYS IN LAB AIR AT ROOM TEMPERATURE

**ORIENTATION: L-T** **STRESS RATIO: -1.0 - 0.8** **FREQUENCY: 0.1 - 30 Hz**

| ALLOY | CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level (Ksi√in) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| 2219 (Cont'd) | T851 (Cont'd) | PLATE (Cont'd) | 0.01 | 3 | | | | 43.24 | | |
| | | | 0.01 | 6 | | | | 46.17 | | |
| | | | 0.04 | 1-20 | | | 4.05 | | | |
| | | | 0.05 | 1-20 | | | 3.58 | | | |
| | | | 0.05 | 1-20 | | | 2.47 | 33.87 | | |
| | | | 0.05 | 1-20 | | | 5.18 | 48.49 | | |
| | | | 0.08 | 6 | | | 5.19 | | | |
| | | | 0.1 | 1-20 | | | | 44.89 | | |
| | | | 0.2 | 6 | | | | 91.24 | | |
| | | | 0.3 | 6 | | 0.7 | 7.7 | 75.84 | | |
| | | | 0.5 | 1-20 | | | 10.13 | | | |
| | | | 0.6 | 1-20 | | | 12.81 | | | |
| | | | 0.7 | 6 | | 1.37 | 17.57 | | | |
| 2419 | T851 | PLATE | 0.1 | 30 | | | 6.5 | 51.72 | | |
| 2618 | T81 | SHEET | 0.4 | 2 | | | 7.77 | | | |
| 6061 | T651 | PLATE | 0.1 | --- | | | 55.48 | | | |

# TABLE 7.0.4.2 (CONCLUDED)

## FATIGUE CRACK GROWTH RATE (FCGR) COMPARISON AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK FOR ALUMINUM 2000/6000 SERIES ALLOYS IN LAB AIR AT ROOM TEMPERATURE

**ORIENTATION: L-T** **STRESS RATIO: -1.0 - 0.8** **FREQUENCY: 0.1 - 30 Hz**

| ALLOY | CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level (Ksi√in) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| AL905XL | Unspecified | FORGING | 0.1 | 10 | 0.3 | 2.68 | | | | |
| | | | 0.1 | 25 | 0.85 | 4.15 | | | | |
| | | | 0.1 | 30 | 0.33 | 4.46 | | | | |
| | | | 0.1 | --- | | | 11.1 | 49.74 | | |
| IN905XL | 850F 2HRS; 665F 2HRS; WARM H20 Q; 230F 24HRS | FORGING | 0.1 | 3 | | | 11.9 | | | |
| | | | 0.1 | 3 | | | | 82.03 | | |
| | Unspecified | FORGING | 0.02 | 1-15 | | 3.54 | 22 | 268.45 | | |
| | | | 0.02 | 1-20 | 0.32 | 1.33 | 11.21 | | | |

# TABLE 7.0.4.3

## FATIGUE CRACK GROWTH RATE (FCGR) COMPARISON AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK FOR ALUMINUM 2000/6000 SERIES ALLOYS IN LAB AIR AT ROOM TEMPERATURE

**ORIENTATION: T-L** **STRESS RATIO: 0.0 - 0.8** **FREQUENCY: 0.1 - 30 Hz**

| ALLOY | CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) *ΔK Level (Ksi√in)* | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| 2014 | T6 | SHEET | 0.05 | 2 | | | 6.34 | | | |
| | | | 0.05 | 2 | | | 7.7 | | | |
| | | | 0.25 | 2 | | | 11.44 | | | |
| | | | 0.25 | 2 | | | 10.65 | | | |
| | | | 0.4 | 2 | | 1.28 | 14.32 | | | |
| | | | 0.4 | 2 | | | 19.29 | | | |
| | | | 0.5 | 2 | | 1.69 | | | | |
| | | | 0.57 | 2 | | 1.32 | | | | |
| | | | 0.57 | 2 | | 1.16 | | | | |
| | | FORGING | 0.05 | 9 | | | 1.87 | | | |
| 2024 | T3 | SHEET | 0.05 | 3-10 | | 0.34 | 4.55 | 42.37 | | |
| | | | 0.05 | 30 | | 0.26 | | | | |
| | | | 0.4 | 0.5-15 | 0.08 | 0.78 | 12.68 | 107.66 | | |
| | | | 0.4 | 30 | | 0.95 | | | | |
| | | | 0.6 | 30 | | 1.24 | | | | |
| | | | 0.8 | 2-10 | 0.17 | 1.65 | 28.91 | | | |

## TABLE 7.0.4.3 (CONTINUED)

## FATIGUE CRACK GROWTH RATE (FCGR) COMPARISON AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK FOR ALUMINUM 2000/6000 SERIES ALLOYS IN LAB AIR AT ROOM TEMPERATURE

**ORIENTATION: T-L** **STRESS RATIO: 0.0 - 0.8** **FREQUENCY: 0.1 - 30 Hz**

| ALLOY | CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-4}$ in/cycle) ΔK Level (Ksi√in) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| 2024 (Cont'd) | T852 | FORGING | 0.33 | 5.17 | | | 5.53 | | | |
| | T861 | SHEET | 0.08 | 0.1-0.3 | | | | 666.53 | | |
| | | | 0.08 | 10-15 | | 0.68 | 7.97 | | | |
| | | | 0.1 | 0.1-0.4 | | | | 792.88 | | |
| | | | 0.1 | 2-3 | | | | 92.68 | | |
| | | | 0.1 | 5 | | | | 108.72 | | |
| | | | 0.1 | 4-9 | | | 7.84 | | | |
| | | | 0.1 | 10 | | | 9.92 | | | |
| | | | 0.1 | 3-10 | | | | 790.1 | | |
| | | | 0.1 | 13 | | 1 | | | | |
| | | | 0.1 | 10-15 | | 1.07 | 9.82 | | | |
| | | | 0.4 | 10-15 | | 1.26 | 31.84 | | | |
| | | PLATE | 0.1 | 1 | | | | 153.61 | | |
| | | | 0.1 | 1.5-5 | | | | 173.27 | | |
| | | | 0.1 | 10 | | | 6.94 | | | |

## TABLE 7.0.4.3 (CONCLUDED)

## FATIGUE CRACK GROWTH RATE (FCGR) COMPARISON AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK FOR ALUMINUM 2000/6000 SERIES ALLOYS IN LAB AIR AT ROOM TEMPERATURE

**ORIENTATION: T-L** **STRESS RATIO: 0.0 - 0.8** **FREQUENCY: 0.1 - 30 Hz**

| ALLOY | CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level (Ksi√in) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| 2024 (ALCLAD) | T3 | SHEET | 0. | 13.3 | | | 3.52 | 21.01 | | |
| | | | 0.33 | 13.3 | | | 7.14 | 62.46 | | |
| 2091 | T3 | SHEET | 0.02 | 1-25 | | 0.46 | 2.42 | 28.28 | | |
| | T81 335F 32HRS | SHEET | 0.1 | 5 | | 0.41 | 3.76 | 40.5 | | |
| | T851 335F 16HRS | PLATE | 0.1 | 5 | | 0.58 | 7.59 | 61.17 | | |
| 2419 | T851 | PLATE | 0.1 | 30 | | | 5.32 | | | |
| AL905XL | Unspecified | FORGING | 0.1 | 10 | 0.28 | 3.05 | | | | |
| | | | 0.1 | 30 | 0.34 | 2.56 | | | | |
| | | | 0.1 | --- | | 0.98 | 8.07 | 43.62 | | |
| | | | 0.33 | --- | | 3.15 | 19.17 | | | |
| IN905XL | 850F 2HRS; 665F 2HRS; WARM H20 Q; 230F 24HRS | FORGING | 0.1 | 6 | | | 17.71 | 171.44 | | |
| | | | 0.1 | 6 | | 3.69 | | | | |
| | Unspecified | FORGING | 0.02 | 0.1-20 | 1.24 | 18.92 | | | | |
| | | | 0.02 | 0.1-25 | 0.07 | 1.68 | 14.82 | 149.84 | | |

# FATIGUE CRACK GROWTH RATE (FCGR) COMPARISON AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK FOR ALUMINUM 2000/6000 SERIES ALLOYS IN LAB AIR AT ROOM TEMPERATURE

**ORIENTATION: S-T** **STRESS RATIO: 0.1 - 0.33** **FREQUENCY: 10 - 30 Hz**

| ALLOY | CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | *ΔK Level (Ksi√in)* | | | | | |
| | | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| AL905XL | Unspecified | FORGING | 0.1 | 10 | 0.31 | 2.96 | | | | |
| | | | 0.1 | 25 | 0.52 | 3.86 | 11.25 | | | |
| | | | 0.1 | 30 | | 4.86 | | | | |
| | | | 0.1 | --- | | 0.07 | 0.05 | 103.53 | | |
| | | | 0.33 | --- | | 1.28 | 7.64 | | | |

# TABLE 7.0.5



## STRESS CORROSION CRACKING THESHOLD DATA FOR ALUMINUM 2000/6000 SERIES ALLOYS AT ROOM TEMPERATURE

| Alloy | Condition/ Heat Treatment | Product Form | Specimen Orientation | $K_{Iscc}$ Ksi$\sqrt{in}$ | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Environment | | | | |
| | | | | 3.5% NaCl | Industrial ATM | Sump Tank Water | Salt-Dichromate Acetate | Seacoast ATM |
| 2014 | T651 | Plate | S-L | 7 | 7 | 7 | | |
| 2020 | T651 | Plate | S-L | | | | 9 | |
| 2021 | T81 | Plate | S-L | 19 | 19 | 19 | | |
| | T81 OVERHEATED WELD | Plate | S-L | | | | 11.3 | |
| | T81 REPAIRED WELD AGED 16HR 325F HEAT AFFECTED ZONE | Plate | S-L | | | | 11.9 | |
| | T81 REPAIRED WELD AGED 16HR 325F WELD CENTER LINE | Plate | S-L | | | | 10.3 | |
| | T81 REPAIRED WELD AGED 16HR 325F WELD FUSION LINE | Plate | S-L | | | | 7.7 | |
| | T81 WELDED AGED 16HR 325F FUSION LINE | Plate | S-L | | | | 8.5 | |
| | T81 WELDED AGED 16HR 325F HEAT AFFECTED ZONE | Plate | S-L | | | | 13.3 | |
| | T81 WELDED AGED 16HR 325F WELD CENTER LINE | Plate | S-L | | | | 7.2 | |
| 2024 | T351 | Plate | S-L | 10 | 9 | 10 | 10 | |
| | T851 | Plate | L-T | | | | 21.5 | |
| | | | S-L | 16 | 15 | 16 | | |
| | T852 | Forging | L-T | | | | | 22.8(3) |
| | | | T-L | | | | | 20.6(4) |
| | | | S-L | | | | | 16.8(2) |

# TABLE 7.0.5 (CONCLUDED)



## STRESS CORROSION CRACKING THESHOLD DATA FOR ALUMINUM 2000/6000 SERIES ALLOYS AT ROOM TEMPERATURE

| Alloy | Condition/ Heat Treatment | Product Form | Specimen Orientation | $K_{Iscc}$ $Ksi\sqrt{in}$ | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Environment | | | | |
| | | | | 3.5% NaCl | Industrial ATM | Sump Tank Water | Salt-Dichromate Acetate | Seacoast ATM |
| 2124 | T851 | Plate | L-T | | | | | 26.4(4) |
| | | | S-L | | | | | 23.3(4) |
| 2219 | T37 | Plate | S-L | 13 | 9 | 13 | | |
| | T851 | Plate | L-T | | | | | 34.5(2) |
| | | | T-L | | | | | 27 |
| | | | S-L | | | | 18 | 29.5(2) |
| | T87 | Plate | S-L | 19 | 19 | 19 | | |
| 6061 | T651 | Plate | S-L | 20 | 20 | 20 | | |

# TABLE 7.1.1.1



## MEAN PLANE STRAIN FRACTURE TOUGHNESS FOR ALUMINUM 2000/6000 SERIES ALLOY 2014 AT ROOM TEMPERATURE

| Product Form | Condition/Heat Treatment | $K_{Ic}$ ($ksi\sqrt{in}$) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Specimen Orientation | | | | | | | | |
| | | L-T | | | T-L | | | S-L | | |
| | | Mean $K_{Ic}$ | Std Dev | n | Mean $K_{Ic}$ | Std Dev | n | Mean $K_{Ic}$ | Std Dev | n |
| Plate | T651 | 23.3 | 1. | 10 | 21.4 | 1.2 | 19 | 17.8 | 0.1 | 2 |
| Forging | T6 | 27.9 | 0.8 | 2 | 17.4 | 1.7 | 4 | 16.9 | 1.9 | 5 |
| | T611 | --- | --- | --- | --- | --- | --- | 17.8 | 0.6 | 2 |
| | T652 | 28.8 | 3.6 | 12 | 21.9 | 3.2 | 13 | 18.1 | 1.4 | 3 |
| Forged Bar | T6 | --- | --- | --- | 16.7 | 0.6 | 2 | --- | --- | --- |

TABLE 7.1.1.2.1



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2014 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: H.H.A.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T6 | FORGING | -1 | 9 | | 0.73 | 9.01 | 47.65 | | |

TABLE 7.1.1.2.2



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK
## 2014 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level (Ksi√in) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T6 | SHEET | 0.05 | 2 | | | 6.39 | | | |
| | | 0.05 | 2 | | | 6.12 | | | |
| | | 0.25 | 2 | | | 8.73 | | | |
| | | 0.25 | 2 | | | 10.39 | | | |
| | | 0.4 | 2 | | 1.31 | 13.69 | | | |
| | | 0.4 | 2 | | 1.41 | | | | |
| | | 0.5 | 2 | | 1.6 | | | | |
| | | 0.57 | 2 | | 1.03 | | | | |

TABLE 7.1.1.2.3



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2014 AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: H.H.A.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T6 | FORGING | -1 | 9 | | 1.21 | 16.93 | | | |
| | | 0.05 | 9 | | 1.21 | 21.88 | | | |

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2014 AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level (Ksi√in) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T6 | SHEET | 0.05 | 2 | | | 6.34 | | | |
| | | 0.05 | 2 | | | 7.7 | | | |
| | | 0.25 | 2 | | | 11.44 | | | |
| | | 0.25 | 2 | | | 10.65 | | | |
| | | 0.4 | 2 | | 1.28 | 14.32 | | | |
| | | 0.4 | 2 | | | 19.29 | | | |
| | | 0.5 | 2 | | 1.69 | | | | |
| | | 0.57 | 2 | | 1.16 | | | | |
| | | 0.57 | 2 | | 1.32 | | | | |
| | FORGING | 0.05 | 9 | | | 1.87 | | | |

# TABLE 7.1.2.1



## ALUMINUM 2014 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T6 | Forging | 0.89 | R.T. | L-T | 63.8 | 1.500 | 0.714 | NB | 0.798 | 0.50 | 28.50 | 27.9 | 0.8 | 1973 | 86213 |
| | | 0.89 | | | 63.8 | 1.500 | 0.713 | NB | 0.778 | 0.46 | 27.30 | | | 1973 | 86213 |
| T6 | Forging | 0.89 | R.T. | T-L | 62.4 | 0.500 | 0.249 | NB | 0.266 | 0.15 | 15.50 | 17.4 | 1.7 | 1973 | 86213 |
| | | 0.89 | | | 62.4 | 0.500 | 0.249 | NB | 0.269 | 0.17 | 16.50 | | | 1973 | 86213 |
| | | 0.89 | | | 63.0 | 0.490 | 0.249 | NB | 0.258 | 0.23 | 19.20 | | | 1973 | 86213 |
| | | 0.89 | | | 63.0 | 0.500 | 0.249 | NB | 0.266 | 0.21 | 18.20 | | | 1973 | 86213 |
| T6 | Forging | 8.00 | R.T. | S-T | 61.0 | 2.000 | 1.000 | NB | --- | 0.24 | 19.00 | 19.1 | 0.1 | 1972 | 82675 |
| | | 8.00 | | | 61.0 | 2.000 | 1.000 | NB | 1.000 | 0.24 | 19.10 | | | 1972 | 82675 |
| | | 8.00 | | | 61.0 | 2.000 | 1.000 | NB | --- | 0.24 | 19.10 | | | 1972 | 82675 |
| | | 8.00 | | | 61.0 | 2.000 | 1.000 | NB | 1.000 | 0.24 | 19.00 | | | 1972 | 82675 |
| T6 | Forging | 8.00 | R.T. | S-L | 61.0 | 1.000 | 1.000 | NB | 0.500 | 0.17 | 15.70 | 16.9 | 1.9 | 1972 | 82675 |
| | | 8.00 | | | 61.0 | 1.000 | 1.000 | NB | 0.500 | 0.18 | 16.40 | | | 1972 | 82675 |
| | | 8.00 | | | 61.0 | 1.000 | 1.000 | NB | --- | 0.17 | 15.70 | | | 1972 | 82675 |
| | | 8.00 | | | 61.0 | 1.000 | 1.000 | NB | --- | 0.18 | 16.40 | | | 1972 | 82675 |
| | | 1.00 | | | 63.8 | 1.500 | 0.749 | CT | 0.778 | 0.25 | 20.30 | | | 1973 | 86213 |
| T6 | Forging | --- | R.T. | L-C | 63.8 | 1.500 | 0.750 | NB | 0.750 | 0.50 | 28.50 | 27.9 | 0.8 | 1972 | 82879 |
| | | --- | | | 63.8 | 1.500 | 0.750 | NB | 0.750 | 0.46 | 27.30 | | | 1972 | 82879 |
| T6 | Forging | --- | R.T. | C-L | 62.7 | 0.500 | 0.250 | NB | 0.250 | 0.21 | 18.20 | 16.7 | 2.4 | 1972 | 82879 |
| | | --- | | | 62.7 | 1.500 | 0.750 | CT | 0.750 | 0.13 | 14.30 | | | 1972 | 82879 |
| | | --- | | | 62.7 | 1.500 | 0.750 | CT | 0.750 | 0.14 | 15.10 | | | 1972 | 82879 |
| | | --- | | | 62.7 | 0.500 | 0.250 | NB | 0.250 | 0.23 | 19.20 | | | 1972 | 82879 |
| T6 | Forging | 0.89 | 84 | T-L | 62.4 | 1.500 | 0.750 | CT | 0.753 | 0.14 | 14.90 | --- | --- | 1973 | 86213 |

# TABLE 7.1.2.1 (CONTINUED)



| ALUMINUM 2014 $K_{Ic}$ | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ MEAN | STAN DEV | | |
| T6 | Forged Bar | 4.50 | R.T. | L-T | 64.2 | 1.490 | 0.689 | NB | 0.737 | 0.49 | 28.40 | --- | --- | 1973 | 86213 |
| T6 | Forged Bar | 4.50 | R.T. | T-L | 62.4 | 0.500 | 0.249 | NB | 0.258 | 0.19 | 17.10 | 16.7 | 0.6 | 1973 | 86213 |
| | | 4.50 | | | 62.4 | 0.500 | 0.249 | NB | 0.267 | 0.17 | 16.30 | | | 1973 | 86213 |
| T6 | Forged Bar | 4.50 | 82 | T-L | 62.4 | 1.500 | 0.749 | CT | 0.762 | 0.19 | 17.40 | --- | --- | 1973 | 86213 |
| T6 | Forged Bar | 4.50 | 85 | T-L | 62.4 | 1.500 | 0.750 | CT | 0.783 | 0.21 | 17.90 | 17.3 | 0.9 | 1973 | 86213 |
| | | 4.50 | | | 62.4 | 1.500 | 0.751 | CT | 0.749 | 0.18 | 16.60 | | | 1973 | 86213 |
| T61 | Forging | 1.50 | R.T. | S-T | 56.6 | 1.000 | 0.500 | CT | 0.486 | 0.31 | 19.90 | 19.9 | 0.0 | 1973 | 86213 |
| | | 1.50 | | | 56.6 | 1.000 | 0.500 | CT | 0.508 | 0.31 | 19.90 | | | 1973 | 86213 |
| T61 | Forging | 1.95 | 82 | S-L | 62.4 | 1.000 | 0.499 | CT | 0.491 | 0.22 | 18.70 | 18.2 | 0.7 | 1973 | 86213 |
| | | 1.95 | | | 62.4 | 1.000 | 0.499 | CT | 0.479 | 0.20 | 17.70 | | | 1973 | 86213 |
| T611 | Forging | 1.00 | R.T. | S-L | 60.2 | 1.490 | 0.750 | CT | 0.783 | 0.23 | 18.20 | 17.8 | 0.6 | 1973 | 86213 |
| | | 1.00 | | | 60.2 | 1.490 | 0.749 | CT | 0.771 | 0.21 | 17.30 | | | 1973 | 86213 |
| T611 | Forging | 1.00 | 86 | S-L | 61.3 | 1.500 | 0.749 | CT | 0.778 | 0.24 | 19.00 | 18.7 | 0.2 | 1973 | 86213 |
| | | 1.00 | | | 61.3 | 1.500 | 0.749 | CT | 0.767 | 0.23 | 18.60 | | | 1973 | 86213 |
| | | 1.00 | | | 62.0 | 1.500 | 0.747 | CT | 0.797 | 0.22 | 18.50 | | | 1973 | 86213 |
| | | 1.00 | | | 62.0 | 1.500 | 0.749 | CT | 0.802 | 0.23 | 18.80 | | | 1973 | 86213 |
| T651 | Plate | 1.00 | -320 | T-L | 75.0 | 2.000 | 1.018 | NB | 1.008 | 0.30 | 26.10 | 26.1 | 0.0 | 1973 | 86213 |
| | | 1.00 | | | 75.0 | 2.000 | 1.020 | NB | 1.010 | 0.30 | 26.10 | | | 1971 | 84288 |

# TABLE 7.1.2.1 (CONTINUED)



## ALUMINUM 2014 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T651 | Plate | 5.00 | R.T. | L-T | 58.6 | 2.000 | 0.999 | NB | 0.975 | 0.37 | 22.40 | 23.3 | 1.0 | 1973 | 86213 |
| | | 2.50 | | | 64.4 | 1.990 | 1.001 | CT | 0.970 | 0.33 | 23.30 | | | 1973 | 86213 |
| | | 2.50 | | | 64.4 | 2.000 | 1.000 | CT | 0.966 | 0.34 | 23.60 | | | 1973 | 86213 |
| | | 1.00 | | | 66.4 | 2.000 | 1.020 | NB | 0.966 | 0.35 | 24.70 | | | 1973 | 86213 |
| | | 1.00 | | | 66.4 | 2.000 | 1.018 | NB | 0.970 | 0.32 | 23.60 | | | 1973 | 86213 |
| | | 1.00 | | | 66.4 | 2.000 | 1.019 | NB | 0.961 | 0.35 | 24.80 | | | 1973 | 86213 |
| | | 1.00 | | | 66.4 | 2.000 | 1.020 | NB | 1.000 | 0.33 | 24.00 | | | 1973 | 86213 |
| | | 1.75 | | | 68.4 | 2.000 | 0.999 | NB | 0.957 | 0.26 | 21.90 | | | 1973 | 86213 |
| | | 1.75 | | | 68.4 | 2.000 | 0.998 | NB | 0.960 | 0.27 | 22.40 | | | 1973 | 86213 |
| | | 1.75 | | | 68.4 | 1.990 | 0.999 | NB | 0.960 | 0.27 | 22.30 | | | 1973 | 86213 |
| T651 | Plate | 5.00 | R.T. | T-L | 57.8 | 2.000 | 1.000 | NB | 0.997 | 0.27 | 19.10 | 21.4 | 1.2 | 1973 | 86213 |
| | | 1.00 | | | 65.8 | 2.000 | 1.016 | NB | 0.989 | 0.26 | 20.90 | | | 1971 | 84288 |
| | | 1.00 | | | 65.8 | 2.000 | 1.022 | NB | 1.008 | 0.27 | 21.80 | | | 1973 | 86213 |
| | | 1.00 | | | 65.8 | 2.000 | 1.016 | NB | 0.985 | 0.26 | 20.90 | | | 1971 | 84288 |
| | | 1.00 | | | 65.8 | 2.000 | 1.016 | NB | 0.966 | 0.24 | 20.30 | | | 1973 | 86213 |
| | | 1.00 | | | 65.8 | 2.000 | 1.000 | CT | 1.084 | 0.26 | 21.20 | | | 1973 | 86213 |
| | | 1.00 | | | 65.8 | 2.000 | 1.016 | NB | 0.970 | 0.25 | 21.00 | | | 1971 | 84288 |
| | | 1.00 | | | 65.8 | 2.000 | 1.023 | NB | 0.980 | 0.28 | 21.90 | | | 1973 | 86213 |
| | | 1.00 | | | 65.8 | 2.000 | 1.022 | NB | 1.023 | 0.29 | 22.30 | | | 1973 | 86213 |
| | | 1.00 | | | 65.8 | 2.000 | 1.023 | NB | 0.997 | 0.28 | 22.10 | | | 1973 | 86213 |
| | | 1.00 | | | 65.8 | 2.000 | 1.016 | NB | 0.961 | 0.25 | 20.70 | | | 1973 | 86213 |
| | | 1.00 | | | 65.8 | 1.990 | 1.023 | NB | 1.000 | 0.28 | 22.00 | | | 1973 | 86213 |
| | | 1.00 | | | 65.8 | 2.000 | 1.016 | NB | 0.998 | 0.29 | 22.60 | | | 1971 | 84288 |

# TABLE 7.1.2.1 (CONTINUED)



## ALUMINUM 2014 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T651 Cont'd | Plate Cont'd | 1.00 | R.T. Cont'd | T-L Cont'd | 65.8 | 2.000 | 1.016 | NB | 0.960 | 0.24 | 20.20 | Cont'd | Cont'd | 1973 | 86213 |
| | | 1.00 | | | 65.8 | 2.000 | 1.016 | NB | 0.981 | 0.23 | 20.10 | | | 1973 | 86213 |
| | | 1.00 | | | 65.8 | 2.000 | 1.016 | NB | 1.001 | 0.24 | 20.70 | | | 1971 | 84288 |
| | | 1.75 | | | 66.2 | 2.000 | 1.000 | NB | 0.980 | 0.29 | 22.50 | | | 1973 | 86213 |
| | | 1.75 | | | 66.2 | 2.000 | 0.997 | NB | 1.058 | 0.32 | 23.60 | | | 1973 | 86213 |
| | | 1.75 | | | 66.2 | 2.000 | 1.000 | NB | 1.010 | 0.32 | 23.60 | | | 1973 | 86213 |
| T651 | Plate | 5.00 | R.T. | S-L | 55.0 | 1.000 | 0.501 | NB | 0.529 | 0.26 | 17.90 | 17.8 | 0.1 | 1973 | 86213 |
| | | 5.00 | | | 55.0 | 1.000 | 0.498 | NB | 0.522 | 0.26 | 17.70 | | | 1973 | 86213 |
| T651 | Plate | 1.00 | 84 | L-T | 62.7 | 2.000 | 1.001 | CT | 1.006 | 0.39 | 24.90 | 22.7 | 1.6 | 1973 | 86213 |
| | | 1.00 | | | 63.5 | 2.000 | 1.002 | CT | 0.966 | 0.26 | 20.30 | | | 1973 | 86213 |
| | | 1.00 | | | 66.4 | 2.000 | 1.002 | CT | 0.960 | 0.29 | 22.70 | | | 1973 | 86213 |
| | | 1.00 | | | 66.4 | 2.000 | 1.002 | CT | 0.973 | 0.29 | 22.50 | | | 1973 | 86213 |
| | | 1.00 | | | 66.4 | 2.000 | 1.002 | CT | 0.949 | 0.30 | 23.00 | | | 1973 | 86213 |
| T651 | Plate | 1.00 | 84 | T-L | 63.5 | 2.000 | 1.002 | CT | 0.981 | 0.27 | 20.70 | 20.0 | 0.5 | 1973 | 86213 |
| | | 1.00 | | | 65.8 | 2.000 | 1.000 | CT | 0.984 | 0.22 | 19.50 | | | 1973 | 86213 |
| | | 1.00 | | | 65.8 | 2.000 | 1.001 | CT | 0.978 | 0.23 | 20.00 | | | 1973 | 86213 |
| | | 1.00 | | | 65.8 | 2.000 | 1.001 | CT | 0.964 | 0.22 | 19.60 | | | 1973 | 86213 |
| T651 | Plate | 1.50 | 88 | L-S | 66.7 | 1.000 | 0.500 | CT | 0.490 | 0.31 | 23.40 | 23.8 | 0.5 | 1973 | 86213 |
| | | 1.50 | | | 66.7 | 1.000 | 0.499 | CT | 0.503 | 0.33 | 24.10 | | | 1973 | 86213 |
| T651 | Plate | 1.50 | 88 | L-T | 66.7 | 1.000 | 0.501 | CT | 0.495 | 0.21 | 19.50 | 19.3 | 0.2 | 1973 | 86213 |
| | | 1.50 | | | 66.7 | 1.000 | 0.501 | CT | 0.499 | 0.21 | 19.20 | | | 1973 | 86213 |
| | | 1.50 | | | 66.7 | 1.000 | 0.501 | CT | 0.491 | 0.21 | 19.30 | | | 1973 | 86213 |

# TABLE 7.1.2.1 (CONTINUED)



## ALUMINUM 2014 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T651 | Plate | 1.50 | 88 | T-S | 63.2 | 1.000 | 0.500 | CT | 0.504 | 0.33 | 22.80 | 22.4 | 0.5 | 1973 | 86213 |
| | | 1.50 | | | 63.2 | 1.000 | 0.501 | CT | 0.510 | 0.32 | 22.50 | | | 1973 | 86213 |
| | | 1.50 | | | 63.2 | 1.000 | 0.500 | CT | 0.506 | 0.30 | 21.80 | | | 1973 | 86213 |
| T651 | Plate | 1.50 | 88 | T-L | 63.2 | 1.000 | 0.500 | CT | 0.500 | 0.22 | 18.70 | 19.2 | 0.7 | 1973 | 86213 |
| | | 1.50 | | | 63.2 | 1.000 | 0.500 | CT | 0.519 | 0.24 | 19.70 | | | 1973 | 86213 |
| T652 | Forging | 5.00 | R.T. | L-T | 60.7 | 3.000 | 1.500 | NB | 1.498 | 0.62 | 30.20 | 28.8 | 3.6 | 1970 | 77720 |
| | | 5.00 | | | 60.7 | 3.000 | 1.500 | NB | 1.460 | 0.54 | 28.20 | | | 1970 | 77720 |
| | | 5.00 | | | 60.7 | 3.000 | 1.500 | NB | 1.530 | 0.58 | 29.20 | | | 1970 | 77720 |
| | | 4.00 | | | 62.5 | 3.000 | 1.502 | NB | 1.485 | 0.75 | 34.20 | | | 1970 | 77720 |
| | | 4.00 | | | 62.5 | 3.000 | 1.502 | NB | 1.577 | 0.80 | 35.40 | | | 1970 | 77720 |
| | | 4.00 | | | 62.5 | 3.000 | 1.502 | NB | 1.442 | 0.69 | 32.80 | | | 1970 | 77720 |
| | | 3.00 | | | 66.2 | 2.000 | 1.000 | NB | 0.925 | 0.39 | 26.30 | | | 1970 | 77720 |
| | | 3.00 | | | 66.2 | 1.990 | 1.000 | NB | 0.970 | 0.40 | 26.50 | | | 1970 | 77720 |
| | | 3.00 | | | 66.2 | 2.000 | 1.000 | NB | 0.968 | 0.42 | 27.10 | | | 1970 | 77720 |
| | | 2.00 | | | 66.5 | 1.500 | 0.750 | NB | 0.688 | 0.35 | 24.90 | | | 1970 | 77720 |
| | | 2.00 | | | 66.5 | 1.500 | 0.752 | NB | 0.728 | 0.33 | 24.30 | | | 1970 | 77720 |
| | | 2.00 | | | 66.5 | 1.500 | 0.751 | NB | 0.752 | 0.41 | 26.90 | | | 1970 | 77720 |

# TABLE 7.1.2.1 (CONCLUDED)



| ALUMINUM 2014 $K_{Ic}$ | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ MEAN | STAN DEV | | |
| T652 | Forging | 5.00 | R.T. | T-L | 57.3 | 3.000 | 1.500 | NB | 1.662 | 0.24 | 17.90 | 21.9 | 3.2 | 1970 | 77720 |
| | | 5.00 | | | 57.3 | 3.000 | 1.500 | NB | 1.597 | 0.33 | 20.70 | | | 1970 | 77720 |
| | | 5.00 | | | 57.3 | 3.000 | 1.500 | NB | 1.612 | 0.31 | 20.10 | | | 1970 | 77720 |
| | | 6.00 | | | 57.7 | 4.000 | 2.005 | NB | 2.092 | 0.49 | 25.40 | | | 1970 | 77720 |
| | | 6.00 | | | 57.7 | 4.000 | 2.004 | NB | 2.215 | 0.39 | 22.80 | | | 1970 | 77720 |
| | | 6.00 | | | 57.7 | 4.000 | 2.003 | NB | 1.987 | 0.66 | 29.80 | | | 1970 | 77720 |
| | | 4.00 | | | 59.2 | 3.000 | 1.502 | NB | 1.562 | 0.37 | 22.70 | | | 1970 | 77720 |
| | | 4.00 | | | 59.2 | 3.000 | 1.502 | NB | 1.497 | 0.38 | 23.00 | | | 1970 | 77720 |
| | | 4.00 | | | 59.2 | 3.000 | 1.502 | NB | 1.642 | 0.40 | 23.70 | | | 1970 | 77720 |
| | | 2.00 | | | 64.9 | 1.500 | 0.754 | NB | 0.748 | 0.22 | 19.20 | | | 1970 | 77720 |
| | | 2.00 | | | 64.9 | 1.500 | 0.753 | NB | 0.727 | 0.22 | 19.30 | | | 1970 | 77720 |
| | | 3.00 | | | 65.1 | 2.000 | 0.999 | NB | 1.030 | 0.24 | 20.30 | | | 1970 | 77720 |
| | | 3.00 | | | 65.1 | 1.990 | 0.999 | NB | 1.025 | 0.22 | 19.50 | | | 1970 | 77720 |
| T652 | Forging | 5.00 | R.T. | S-L | 56.1 | 1.000 | 0.500 | NB | 0.467 | 0.25 | 17.80 | 18.1 | 1.4 | 1970 | 77720 |
| | | 5.00 | | | 56.1 | 1.000 | 0.501 | NB | 0.470 | 0.31 | 19.60 | | | 1970 | 77720 |
| | | 5.00 | | | 56.1 | 1.000 | 0.498 | NB | 0.510 | 0.22 | 16.80 | | | 1970 | 77720 |

# TABLE 7.1.2.2



## ALUMINUM 2014 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{Max}$ | $K_{app}$ ($K_{si}\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($K_{si}\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T6 | Sheet | 0.06 | -423 | L-T | 83.4 | 4.000 | 0.062 | 1.220 | 1.700 | --- | 41.80 | 61.43 | 59.9 | 2.9 | 77.08* | --- | --- | 1963 | 51527 |
| | | 0.06 | | | 83.4 | 4.000 | 0.062 | 1.240 | 1.620 | --- | 42.00 | 62.35 | | | 74.70* | | | 1963 | 51527 |
| | | 0.06 | | | 83.4 | 4.000 | 0.062 | 1.240 | 1.650 | --- | 41.20 | 61.16 | | | 74.28* | | | 1963 | 51527 |
| | | 0.06 | | | 83.4 | 4.000 | 0.062 | 1.290 | 1.700 | --- | 36.10 | 54.95 | | | 66.57 | | | 1963 | 51527 |
| | | 0.06 | | | 83.4 | 4.000 | 0.063 | 1.230 | 1.650 | --- | 40.50 | 59.82 | | | 73.02* | | | 1963 | 51527 |
| T6 | Sheet | 0.06 | -320 | L-T | 74.1 | 3.950 | 0.062 | 1.230 | 1.660 | --- | 40.70 | 60.21 | 56.8 | 2.8 | 73.95* | 59.2 | 1.1 | 1963 | 51527 |
| | | 0.06 | | | 74.1 | 3.990 | 0.063 | 1.230 | 1.420 | --- | 37.00 | 54.67 | | | 60.02 | | | 1963 | 51527 |
| | | 0.06 | | | 74.1 | 3.990 | 0.063 | 1.230 | 1.740 | --- | 39.80 | 58.80 | | | 74.77* | | | 1963 | 51527 |
| | | 0.06 | | | 74.1 | 3.990 | 0.063 | 1.240 | --- | --- | 38.20 | 56.73 | | | --- | | | 1963 | 51527 |
| | | 0.06 | | | 74.1 | 3.990 | 0.063 | 1.230 | 1.410 | --- | 36.20 | 53.49 | | | 58.44 | | | 1963 | 51527 |
| T6 | Sheet | 0.06 | -320 | L-T | 74.1 | 18.040 | 0.063 | 5.490 | 7.300 | --- | 19.40 | 60.46 | 61.8 | 1.9 | 73.23 | 74.2 | 3.2 | 1963 | 51527 |
| | | 0.06 | | | 74.1 | 18.040 | 0.063 | 5.480 | 7.100 | --- | 19.40 | 60.39 | | | 71.77 | | | 1963 | 51527 |
| | | 0.06 | | | 74.1 | 18.060 | 0.063 | 5.480 | 7.400 | --- | 20.70 | 64.43 | | | 78.91 | | | 1963 | 51527 |
| | | 0.06 | | | 74.1 | 18.040 | 0.064 | 5.480 | 6.980 | --- | 19.90 | 61.95 | | | 72.73 | | | 1963 | 51527 |
| | | 0.06 | | | 74.1 | 18.050 | 0.064 | 5.480 | --- | --- | --- | --- | | | --- | | | 1963 | 51527 |
| T6 | Sheet | 0.06 | R.T. | L-T | 67.5 | 2.000 | 0.064 | 0.625 | 0.970 | --- | 38.60 | 40.68* | --- | --- | 56.01* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 67.5 | 2.000 | 0.064 | 0.625 | 1.020 | --- | 38.30 | 40.37* | | | 58.11* | | | 1973 | 86213 |
| | | 0.06 | | | 67.6 | 2.000 | 0.064 | 0.623 | 0.840 | 38.90 | 38.90 | 40.92* | | | 50.27* | | | 1973 | 86213 |
| | | 0.06 | | | 67.6 | 2.000 | 0.064 | 0.624 | 0.950 | --- | 38.90 | 41.00* | | | 55.45* | | | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.1.2.2 (CONTINUED)



## ALUMINUM 2014 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_C$ (Ksi$\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T6 Cont'd | Sheet Cont'd | 0.06 | R.T. Cont'd | L-T Cont'd | 67.6 | 2.000 | 0.064 | 0.622 | 0.850 | --- | 39.50 | 41.55* | Cont'd | Cont'd | 51.50* | Cont'd | Cont'd | 1973 | 86213 |
| | | 0.06 | | | 67.5 | 2.000 | 0.065 | 0.624 | 0.860 | --- | 39.80 | 41.95* | | | 52.36* | | | 1973 | 86213 |
| | | 0.06 | | | 67.5 | 2.000 | 0.065 | 0.620 | 0.860 | --- | 40.10 | 42.09* | | | 52.76* | | | 1973 | 86213 |
| | | 0.06 | | | 67.5 | 2.000 | 0.065 | 0.622 | 0.890 | --- | 40.10 | 42.18* | | | 54.19* | | | 1973 | 86213 |
| | | 0.06 | | | 66.2 | 2.000 | 0.067 | 0.625 | 0.980 | --- | 38.10 | 40.16* | | | 55.78* | | | 1973 | 86213 |
| T6 | Sheet | 0.06 | R.T. | L-T | 65.2 | 3.980 | 0.063 | 1.240 | 1.600 | --- | 38.10 | 56.60* | --- | --- | 67.23* | --- | --- | 1963 | 51527 |
| | | 0.06 | | | 65.2 | 3.990 | 0.063 | 1.240 | 1.540 | --- | 38.20 | 56.73* | | | 65.64* | | | 1963 | 51527 |
| | | 0.06 | | | 65.2 | 3.990 | 0.063 | 1.230 | 1.540 | --- | 36.90 | 54.52* | | | 63.31* | | | 1963 | 51527 |
| | | 0.06 | | | 65.2 | 3.990 | 0.063 | 1.230 | 1.550 | --- | 37.80 | 55.85* | | | 65.15* | | | 1963 | 51527 |
| | | 0.06 | | | 65.2 | 4.000 | 0.063 | 1.250 | 1.550 | --- | 37.90 | 56.55* | | | 65.29* | | | 1963 | 51527 |
| T6 | Sheet | 0.06 | R.T. | L-T | 68.4 | 15.810 | 0.063 | 6.000 | 7.020 | --- | 16.40 | 55.35 | 56.5 | 3.3 | 62.20 | 65.0 | 3.4 | 1973 | 86213 |
| | | 0.06 | | | 68.4 | 15.810 | 0.064 | 3.010 | 3.570 | --- | 27.40 | 60.95 | | | 67.00 | | | 1973 | 86213 |
| | | 0.06 | | | 68.4 | 15.810 | 0.064 | 4.000 | 5.230 | --- | 22.50 | 58.73 | | | 69.22 | | | 1973 | 86213 |
| | | 0.06 | | | 68.4 | 15.820 | 0.064 | 6.000 | 7.000 | --- | 16.10 | 54.33 | | | 60.92 | | | 1973 | 86213 |
| | | 0.06 | | | 68.4 | 15.820 | 0.064 | 1.000 | 1.520 | --- | 42.10 | 52.89 | | | 65.43 | | | 1973 | 86213 |
| T6 | Sheet | 0.06 | R.T. | L-T | 65.2 | 18.040 | 0.063 | 5.490 | 6.350 | --- | 20.70 | 64.51 | 65.2 | 1.4 | 70.87 | 72.0 | 3.4 | 1963 | 51527 |
| | | 0.06 | | | 65.2 | 18.040 | 0.063 | 5.490 | 6.110 | --- | 20.60 | 64.20 | | | 68.75 | | | 1963 | 51527 |
| | | 0.06 | | | 65.2 | 18.050 | 0.063 | 5.490 | 6.400 | --- | 20.80 | 64.82 | | | 71.58 | | | 1963 | 51527 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.1.2.2 (CONTINUED)



## ALUMINUM 2014 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($K_{app}$ (Ksi$\sqrt{in}$)) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($K_C$ (Ksi$\sqrt{in}$)) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T6 Cont'd | Sheet Cont'd | 0.06 | R.T. Cont'd | L-T Cont'd | 65.2 | 18.060 | 0.063 | 5.490 | 6.800 | --- | 21.70 | 67.62 | Cont'd | Cont'd | 77.84 | Cont'd | Cont'd | 1963 | 51527 |
| | | 0.06 | | | 65.2 | 18.060 | 0.063 | 5.480 | 6.300 | --- | 20.80 | 64.74 | | | 70.82 | | | 1963 | 51527 |
| T6 | Sheet | 0.06 | -320 | T-L | 75.9 | 3.000 | 0.058 | 0.130 | 0.210 | --- | 63.70 | 28.82* | 38.1 | 2.9 | 36.70* | 46.6 | 5.3 | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 3.000 | 0.058 | 0.130 | 0.160 | --- | 63.30 | 28.64* | | | 31.79* | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 3.000 | 0.058 | 0.300 | 0.410 | --- | 49.90 | 34.47 | | | 40.51 | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 3.000 | 0.059 | 0.300 | 0.430 | --- | 49.70 | 34.33 | | | 41.37 | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 3.000 | 0.059 | 0.300 | 0.420 | --- | 50.40 | 34.81 | | | 41.44 | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 3.000 | 0.060 | 1.000 | 1.400 | --- | 30.50 | 41.08 | | | 52.47 | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 3.000 | 0.060 | 0.500 | 0.730 | --- | 44.20 | 39.86 | | | 49.14 | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 3.000 | 0.061 | 0.500 | 0.850 | --- | 43.40 | 39.13 | | | 52.79 | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 3.000 | 0.061 | 0.500 | 0.580 | --- | 42.10 | 37.96 | | | 41.14 | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 3.000 | 0.061 | 1.010 | 1.300 | --- | 30.40 | 41.21 | | | 49.28 | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 3.000 | 0.061 | 0.130 | 0.190 | --- | 66.50 | 30.09* | | | 36.42* | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 3.010 | 0.061 | 1.000 | 1.390 | --- | 29.90 | 40.25 | | | 51.08 | | | 1967 | 68908 |
| T6 | Sheet | 0.06 | -320 | T-L | 75.9 | 6.000 | 0.060 | 0.130 | 0.180 | --- | 65.90 | 29.79* | 39.4 | 4.4 | 35.06* | 48.3 | 4.6 | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 6.000 | 0.060 | 0.130 | 0.200 | --- | 66.80 | 30.19* | | | 37.47* | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 6.000 | 0.061 | 0.250 | 0.380 | --- | 56.20 | 35.26 | | | 43.53 | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 6.000 | 0.061 | 0.250 | 0.370 | --- | 56.50 | 35.44 | | | 43.17 | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 6.000 | 0.061 | 0.130 | 0.200 | --- | 64.90 | 29.34* | | | 36.40* | | | 1967 | 68908 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.1.2.2 (CONTINUED)



| ALUMINUM 2014 $K_C$ | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($Ksi\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($Ksi\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
| BUCKLING OF CRACK EDGES RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T6 Cont'd | Sheet Cont'd | 0.06 | -320 Cont'd | T-L Cont'd | 75.9 | 6.000 | 0.061 | 2.000 | 2.540 | --- | 22.30 | 42.47 | Cont'd | Cont'd | 50.21 | Cont'd | Cont'd | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 6.000 | 0.061 | 2.000 | 2.550 | --- | 22.90 | 43.62 | | | 51.72 | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 6.000 | 0.061 | 2.000 | 2.580 | --- | 23.10 | 44.00 | | | 52.64 | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 6.000 | 0.061 | 0.250 | 0.400 | --- | 56.80 | 35.63 | | | 45.15* | | | 1967 | 68908 |
| T6 | Sheet | 0.06 | -320 | T-L | 75.9 | 12.000 | 0.058 | 0.500 | 0.690 | --- | 43.40 | 38.50 | 41.4 | 4.7 | 45.28 | 49.7 | 3.9 | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 12.000 | 0.058 | 0.500 | 0.690 | --- | 44.50 | 39.48 | | | 46.42 | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 12.000 | 0.058 | 0.500 | 0.910 | --- | 43.50 | 38.59 | | | 52.19 | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 12.000 | 0.059 | 0.130 | 0.240 | --- | 65.20 | 29.47* | | | 40.04* | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 12.000 | 0.059 | 0.260 | 0.400 | --- | 57.50 | 36.76 | | | 45.61 | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 12.010 | 0.059 | 0.250 | 0.440 | --- | 53.90 | 33.79 | | | 44.85 | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 12.000 | 0.060 | 1.000 | 1.530 | --- | 35.30 | 44.43 | | | 55.28 | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 12.000 | 0.060 | 4.000 | 4.920 | --- | 16.70 | 44.98 | | | 51.92 | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 12.000 | 0.060 | 4.000 | 4.800 | --- | 15.90 | 42.83 | | | 48.54 | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 12.000 | 0.060 | 0.250 | 0.450 | --- | 56.30 | 35.29 | | | 47.38 | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 12.000 | 0.060 | 0.130 | 0.250 | --- | 66.20 | 29.92* | | | 41.50* | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 12.000 | 0.060 | 0.130 | 0.240 | --- | 65.80 | 29.74* | | | 40.41* | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 12.000 | 0.060 | 4.000 | 4.650 | --- | 17.00 | 45.79 | | | 50.72 | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 12.000 | 0.060 | 2.000 | 2.610 | --- | 27.60 | 49.78 | | | 57.57 | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 12.000 | 0.061 | 4.000 | 4.760 | --- | 17.30 | 46.60 | | | 52.49 | | | 1967 | 68908 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.1.2.2 (CONTINUED)



## ALUMINUM 2014 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_C$ (Ksi$\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BUCKLING OF CRACK EDGES RESTRAINED** | | | | | | | | | | | | | | | | | | | |
| T6 Cont'd | Sheet Cont'd | 0.06 | -320 Cont'd | T-L Cont'd | 75.9 | 12.000 | 0.061 | 2.000 | 2.220 | --- | 25.10 | 45.27 | Cont'd | Cont'd | 47.89 | Cont'd | Cont'd | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 12.000 | 0.061 | 1.000 | 1.560 | --- | 33.30 | 41.92 | | | 52.68 | | | 1967 | 68908 |
| | | 0.06 | | | 75.9 | 12.000 | 0.061 | 1.000 | 1.610 | --- | 29.10 | 36.63 | | | 46.80 | | | 1967 | 68908 |
| **BUCKLING OF CRACK EDGES NOT RESTRAINED** | | | | | | | | | | | | | | | | | | | |
| T6 | Sheet | 0.12 | R.T. | L-T | 64.0 | 3.000 | 0.126 | 1.120 | 1.760 | --- | 33.30 | 48.40* | --- | --- | 71.21* | --- | --- | 1973 | 86213 |
| | | 0.12 | | | 64.0 | 3.000 | 0.126 | 1.090 | 1.900 | --- | 34.90 | 49.78* | | | 81.70* | | | 1973 | 86213 |
| T6 | Plate | 0.25 | R.T. | L-T | 65.0 | 3.000 | 0.247 | 1.100 | 1.720 | --- | 31.60 | 45.36 | 45.2 | 0.2 | 65.90* | --- | --- | 1973 | 86213 |
| | | 0.25 | | | 65.0 | 3.000 | 0.247 | 1.220 | 1.810 | --- | 29.20 | 45.11 | | | 64.45* | | | 1973 | 86213 |
| T6 | Sheet | 0.06 | -423 | T-L | 81.8 | 4.000 | 0.063 | 1.230 | 1.370 | --- | 36.00 | 53.17 | 53.1 | 1.8 | 56.99 | 59.1 | 3.5 | 1963 | 51527 |
| | | 0.06 | | | 81.8 | 4.000 | 0.063 | 1.210 | 1.550 | --- | 36.30 | 53.07 | | | 62.53 | | | 1963 | 51527 |
| | | 0.06 | | | 81.8 | 4.000 | 0.063 | 1.230 | 1.250 | --- | 37.80 | 55.83 | | | 56.40 | | | 1963 | 51527 |
| | | 0.06 | | | 81.8 | 4.000 | 0.063 | 1.230 | 1.450 | --- | 34.30 | 50.66 | | | 56.41 | | | 1963 | 51527 |
| | | 0.06 | | | 81.8 | 4.000 | 0.064 | 1.230 | 1.620 | --- | 35.60 | 52.58 | | | 63.32 | | | 1963 | 51527 |
| T6 | Sheet | 0.06 | -320 | T-L | 69.3 | 4.000 | 0.062 | 1.230 | --- | --- | 35.30 | 52.14 | 51.6 | 3.9 | --- | --- | --- | 1963 | 51527 |
| | | 0.06 | | | 69.3 | 4.000 | 0.063 | 1.230 | --- | --- | 30.30 | 44.75 | | | --- | | | 1963 | 51527 |
| | | 0.06 | | | 69.3 | 4.000 | 0.063 | 1.230 | 1.740 | --- | 35.90 | 53.03 | | | 67.40* | | | 1963 | 51527 |
| | | 0.06 | | | 69.3 | 4.000 | 0.063 | 1.240 | 1.800 | --- | 36.30 | 53.89 | | | 70.00* | | | 1963 | 51527 |
| | | 0.06 | | | 69.3 | 4.000 | 0.063 | 1.230 | 1.860 | --- | 36.70 | 54.21 | | | 72.68* | | | 1963 | 51527 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.1.2.2 (CONTINUED)



## ALUMINUM 2014 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($K_{si}\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($K_{si}\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T6 | Sheet | 0.06 | R.T. | T-L | 64.3 | 2.000 | 0.064 | 0.625 | 0.930 | --- | 36.30 | 38.26* | 37.3 | 0.4 | 50.83* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 64.3 | 2.000 | 0.064 | 0.625 | 0.910 | --- | 36.20 | 38.16* | | | 49.80* | | | 1973 | 86213 |
| | | 0.06 | | | 65.6 | 2.000 | 0.064 | 0.621 | 0.820 | --- | 37.00 | 38.84* | | | 46.96* | | | 1973 | 86213 |
| | | 0.06 | | | 64.3 | 2.000 | 0.065 | 0.624 | 0.790 | --- | 36.90 | 38.89* | | | 45.57* | | | 1973 | 86213 |
| | | 0.06 | | | 64.3 | 2.000 | 0.065 | 0.623 | 0.850 | --- | 37.60 | 39.55* | | | 49.03* | | | 1973 | 86213 |
| | | 0.06 | | | 64.3 | 2.000 | 0.065 | 0.623 | 0.900 | --- | 37.40 | 39.34* | | | 50.99* | | | 1973 | 86213 |
| | | 0.06 | | | 65.6 | 2.000 | 0.065 | 0.623 | 0.830 | --- | 37.50 | 39.45* | | | 48.02* | | | 1973 | 86213 |
| | | 0.06 | | | 65.6 | 2.000 | 0.067 | 0.625 | 0.760 | --- | 35.60 | 37.52 | | | 42.77* | | | 1973 | 86213 |
| | | 0.06 | | | 65.6 | 2.000 | 0.067 | 0.625 | 0.860 | --- | 35.10 | 37.00 | | | 46.18* | | | 1973 | 86213 |
| T6 | Sheet | 0.12 | R.T. | T-L | 62.2 | 3.000 | 0.126 | 1.130 | 1.620 | --- | 29.40 | 42.99 | 42.8 | 0.3 | 57.67* | --- | --- | 1973 | 86213 |
| | | 0.12 | | | 62.2 | 3.000 | 0.126 | 1.110 | 1.580 | --- | 29.50 | 42.61 | | | 56.49* | | | 1973 | 86213 |
| T6 | Sheet | 0.06 | R.T. | T-L | 63.2 | 3.970 | 0.063 | 1.230 | 1.620 | --- | 34.20 | 50.56 | 49.0 | 2.0 | 60.94* | --- | --- | 1963 | 51527 |
| | | 0.06 | | | 63.2 | 3.970 | 0.063 | 1.240 | 1.480 | --- | 33.60 | 49.93 | | | 56.12* | | | 1963 | 51527 |
| | | 0.06 | | | 63.2 | 3.970 | 0.063 | 1.240 | 1.650 | --- | 32.80 | 48.74 | | | 59.25* | | | 1963 | 51527 |
| | | 0.06 | | | 63.2 | 3.980 | 0.063 | 1.230 | 1.680 | --- | 33.80 | 49.96 | | | 61.85* | | | 1963 | 51527 |
| | | 0.06 | | | 63.2 | 3.980 | 0.063 | 1.240 | 1.650 | --- | 30.70 | 45.61 | | | 55.42* | | | 1963 | 51527 |
| T6 | Sheet | 0.06 | R.T. | T-L | 65.4 | 15.810 | 0.063 | 3.000 | 3.550 | --- | 24.10 | 53.51 | 51.2 | 2.2 | 58.75 | 58.4 | 2.7 | 1973 | 86213 |
| | | 0.06 | | | 65.4 | 15.810 | 0.064 | 4.000 | 4.830 | --- | 20.40 | 53.25 | | | 59.66 | | | 1973 | 86213 |
| | | 0.06 | | | 65.4 | 15.820 | 0.064 | 1.020 | 1.620 | --- | 38.40 | 48.73 | | | 61.66 | | | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.1.2.2 (CONCLUDED)



## ALUMINUM 2014 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_C$ (Ksi$\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T6 Cont'd | Sheet Cont'd | 0.06 | R.T. Cont'd | T-L Cont'd | 65.4 | 15.820 | 0.064 | 6.010 | 6.860 | --- | 14.60 | 49.32 | Cont'd | Cont'd | 54.38 | Cont'd | Cont'd | 1973 | 86213 |
| | | 0.06 | | | 65.4 | 15.830 | 0.064 | 6.000 | 7.000 | --- | 15.20 | 51.28 | | | 57.50 | | | 1973 | 86213 |
| T6 | Plate | 0.25 | R.T. | T-L | 62.8 | 3.000 | 0.247 | 1.130 | 1.590 | --- | 24.60 | 35.97 | 35.9 | 0.2 | 47.39* | --- | --- | 1973 | 86213 |
| | | 0.25 | | | 62.8 | 3.000 | 0.247 | 1.160 | 1.640 | --- | 24.00 | 35.75 | | | 47.65* | | | 1973 | 86213 |
| T651 | Plate | 0.25 | R.T. | L-T | 62.2 | 4.000 | 0.248 | 1.400 | 2.310 | --- | 32.00 | 51.39 | 51.7 | 0.6 | 77.66* | --- | --- | 1973 | 86213 |
| | | 0.25 | | | 62.2 | 4.000 | 0.249 | 1.330 | 2.120 | --- | 32.80 | 50.92 | | | 72.96* | | | 1973 | 86213 |
| | | 0.25 | | | 64.3 | 4.000 | 0.251 | 1.330 | 2.260 | --- | 33.90 | 52.63 | | | 80.38* | | | 1973 | 86213 |
| | | 0.25 | | | 64.3 | 4.000 | 0.252 | 1.400 | 2.380 | --- | 32.10 | 51.55 | | | 80.52* | | | 1973 | 86213 |
| | | 0.25 | | | 64.3 | 4.000 | 0.252 | 1.330 | 2.140 | --- | 33.50 | 52.01 | | | 75.20* | | | 1973 | 86213 |
| T651 | Plate | 1.00 | R.T. | L-T | 66.4 | 20.000 | 1.000 | 6.950 | 9.950 | --- | 14.50 | 51.82 | --- | --- | 68.04 | --- | --- | 1973 | 86213 |
| T651 | Plate | 0.25 | R.T. | T-L | 60.7 | 4.000 | 0.250 | 1.420 | 2.110 | --- | 26.20 | 42.48 | 42.2 | 0.3 | 58.02* | --- | --- | 1973 | 86213 |
| | | 0.25 | | | 60.7 | 4.000 | 0.250 | 1.330 | 1.960 | --- | 27.20 | 42.23 | | | 56.32* | | | 1973 | 86213 |
| | | 0.25 | | | 62.2 | 4.000 | 0.252 | 1.330 | 1.840 | --- | 27.10 | 42.07 | | | 53.20* | | | 1973 | 86213 |
| | | 0.25 | | | 62.2 | 4.000 | 0.252 | 1.410 | 2.140 | --- | 25.90 | 41.79 | | | 58.14* | | | 1973 | 86213 |
| | | 0.25 | | | 62.2 | 4.000 | 0.252 | 1.330 | 1.900 | --- | 27.20 | 42.23 | | | 54.84* | | | 1973 | 86213 |
| T651 | Plate | 1.00 | R.T. | T-L | 65.8 | 20.000 | 1.000 | 6.940 | 9.370 | --- | 9.10 | 32.49 | --- | --- | 40.55 | --- | --- | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

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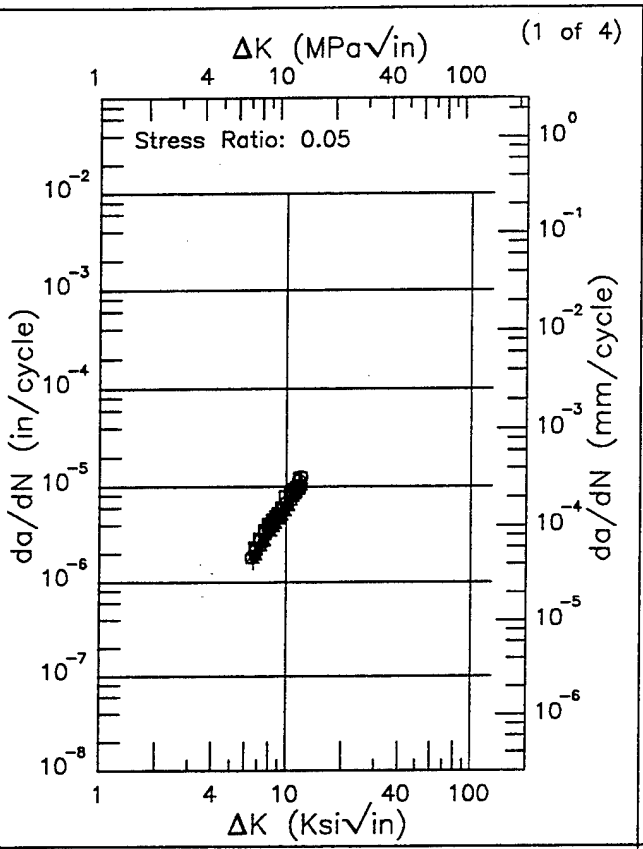
## 2014

R

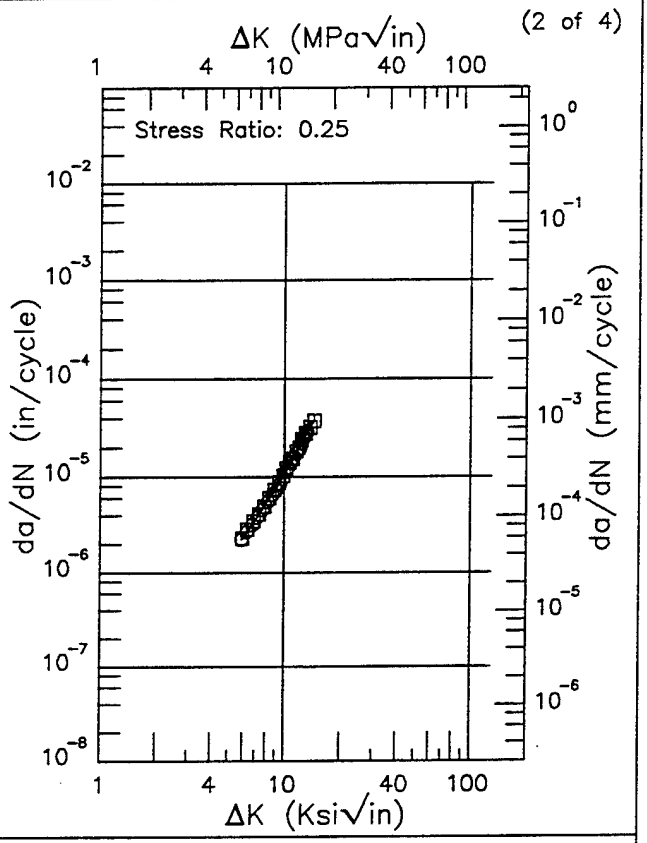
Condition/Ht: T6
Form: 0.06 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 2 Hz
Environment: LAB AIR; RT

Yield Strength: 67 ksi
Ult. Strength: 74 ksi
Specimen Thk: 0.063 – 0.064 in.
Specimen Width: 6 in.
Ref: 86734




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.54 (min) | 1.62 |
| 7. | 2.21 |
| 8. | 3.51 |
| 9. | 4.83 |
| 10. | 6.39 |
| 11.98 (max) | 12.0 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 7.71 | 0. .5 .8 1.25 2. |




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.88 (min) | 2.21 |
| 6. | 2.34 |
| 7. | 3.59 |
| 8. | 5.21 |
| 9. | 7.39 |
| 10. | 10.4 |
| 13. | 26.6 |
| 14.47 (max) | 37.4 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 2.71 | 0. .5 .8 1.25 2. |

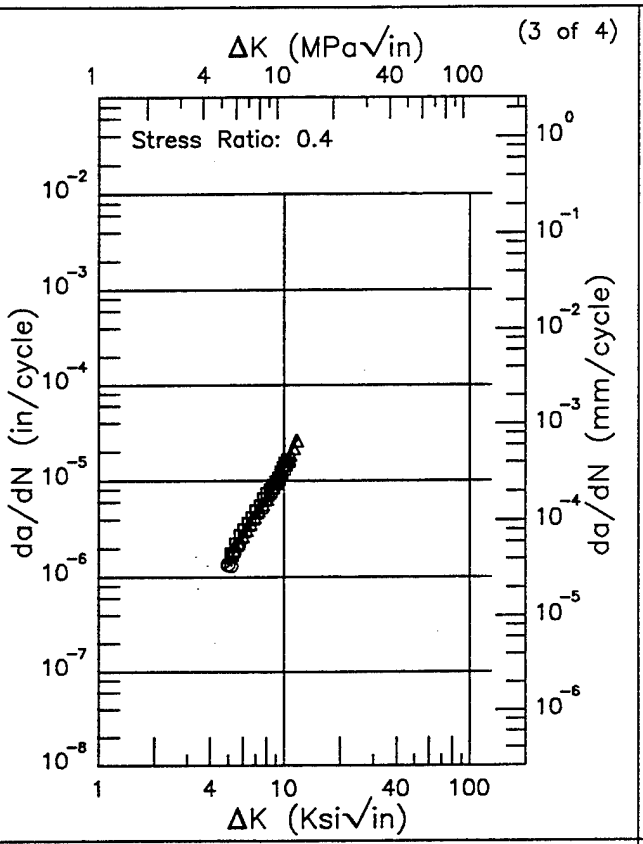
**Figure 7.1.3.1.1**

2014 R

Condition/Ht: T6
Form: 0.06 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 2 Hz
Environment: LAB AIR; RT

Yield Strength: 67 ksi
Ult. Strength: 74 ksi
Specimen Thk: 0.063 – 0.064 in.
Specimen Width: 6 in.
Ref: 86734

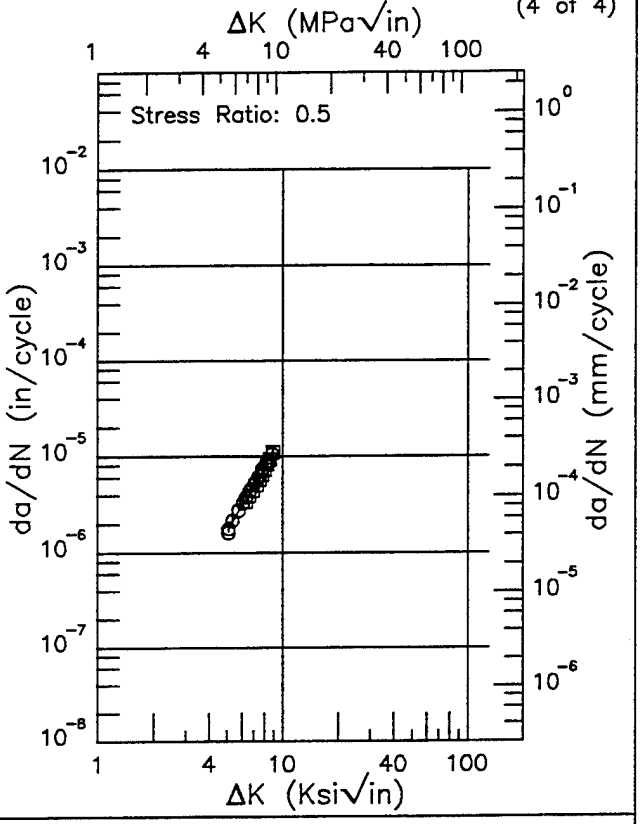
(3 of 4)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.97 (min) | 1.27 |
| 5. | 1.31 |
| 6. | 2.75 |
| 7. | 4.49 |
| 8. | 6.64 |
| 9. | 9.51 |
| 10. | 13.7 |
| 11.62 (max) | 25.9 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 4.20 | 0. .5 .8 1.25 2. |

(4 of 4)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 5.08 (min) | 1.77 |
| 6. | 3.10 |
| 7. | 4.83 |
| 8. | 7.38 |
| 8.87 (max) | 11.1 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 4.89 | 0. .5 .8 1.25 2. |

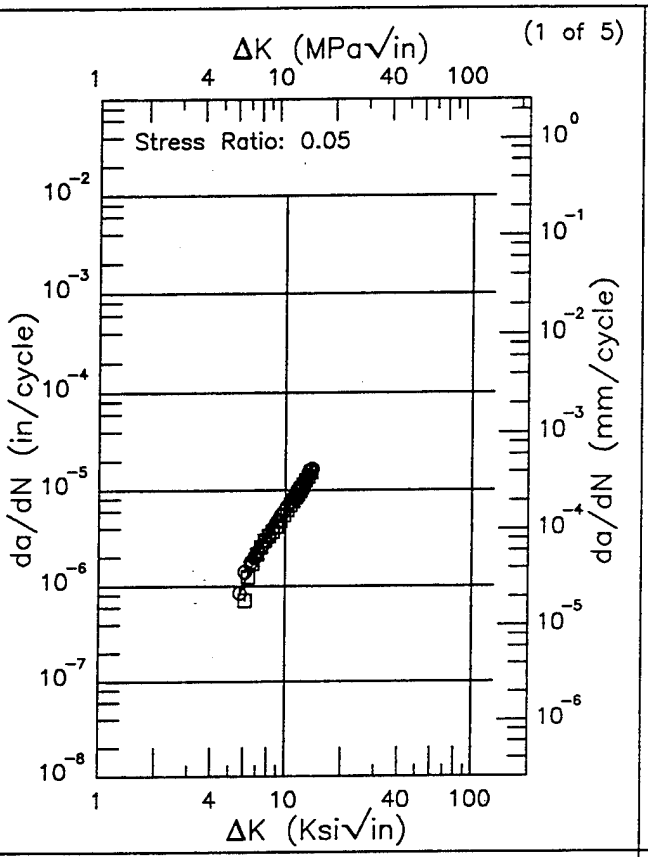
**Figure 7.1.3.1.1 (Concluded)**

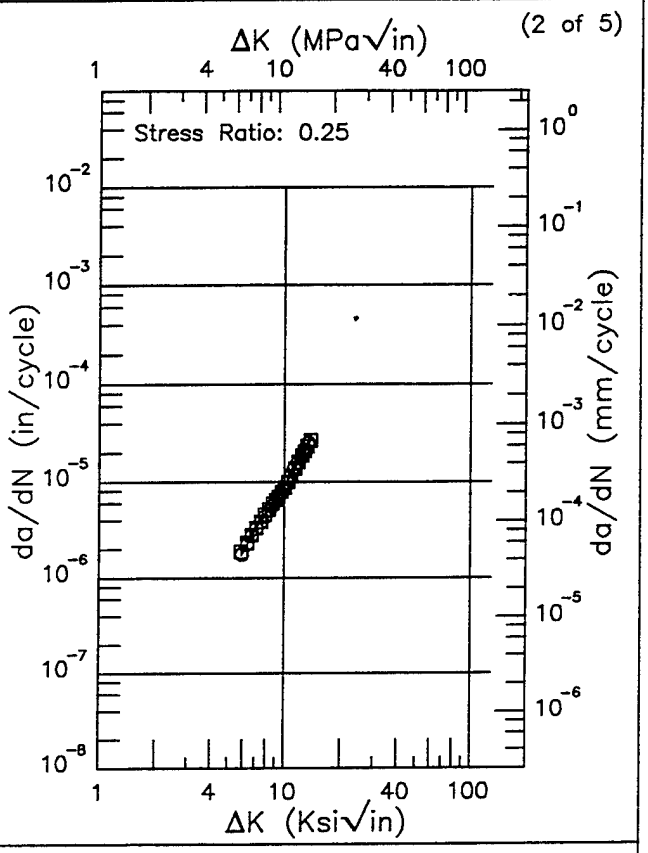
## 2014

R

Condition/Ht: T6
Form: 0.04 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 2 Hz
Environment: LAB AIR; RT

Yield Strength: 67 ksi
Ult. Strength: 74 ksi
Specimen Thk: 0.04 in.
Specimen Width: 6 in.
Ref: 86734




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.69 (min) | 0.791 |
| 6. | 1.06 |
| 7. | 2.07 |
| 8. | 3.20 |
| 9. | 4.51 |
| 10. | 6.12 |
| 13. | 13.5 |
| 13.77 (max) | 16.2 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.86 (min) | 1.72 |
| 6. | 1.88 |
| 7. | 3.15 |
| 8. | 4.59 |
| 9. | 6.35 |
| 10. | 8.73 |
| 13. | 21.8 |
| 13.71 (max) | 26.0 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 8.10 | □ ○ 0. .5 .8 1.25 2. |

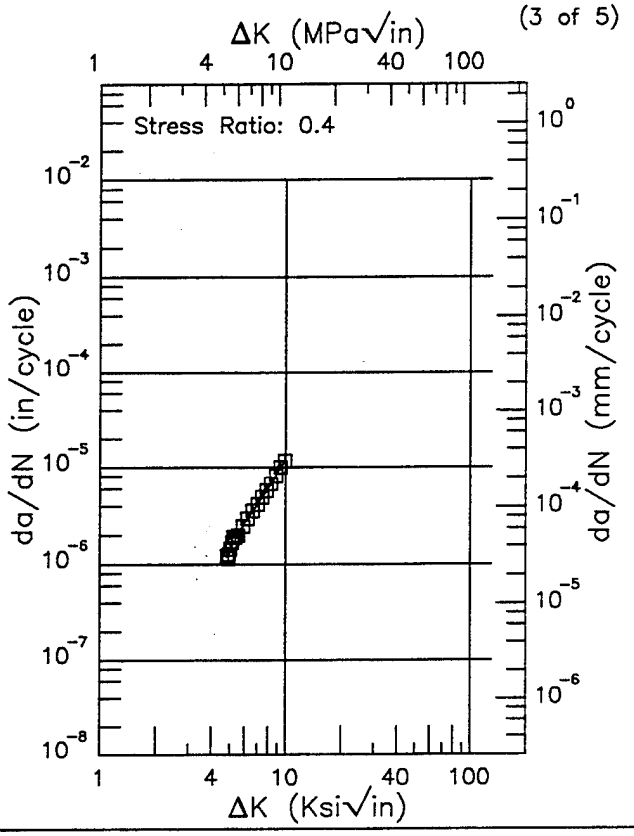
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 2.23 | ◘ 0. .5 .8 1.25 2. |

**Figure 7.1.3.1.2**

Condition/Ht: T6
Form: 0.04 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 2 Hz
Environment: LAB AIR; RT

Yield Strength: 67 ksi
Ult. Strength: 74 ksi
Specimen Thk: 0.04 in.
Specimen Width: 6 in.
Ref: 86734

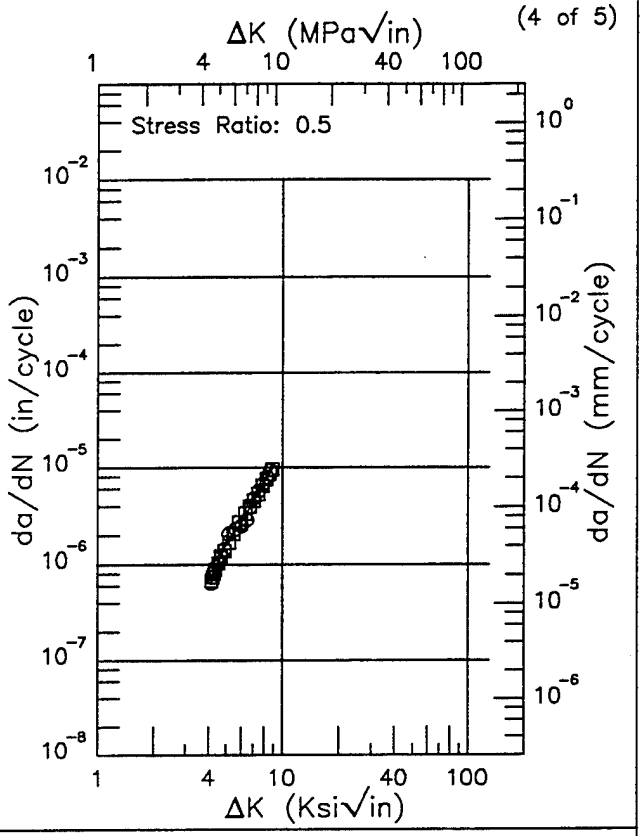
(3 of 5)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.82 (min) | 1.19 |
| 5. | 1.41 |
| 6. | 2.68 |
| 7. | 4.09 |
| 8. | 6.01 |
| 9. | 8.68 |
| 9.85 (max) | 11.5 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 5.11 | 0. .5 .8 1.25 2. |

(4 of 5)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.13 (min) | 0.683 |
| 5. | 1.60 |
| 6. | 2.68 |
| 7. | 4.43 |
| 8. | 7.04 |
| 8.79 (max) | 9.81 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 5.17 | 0. .5 .8 1.25 2. |

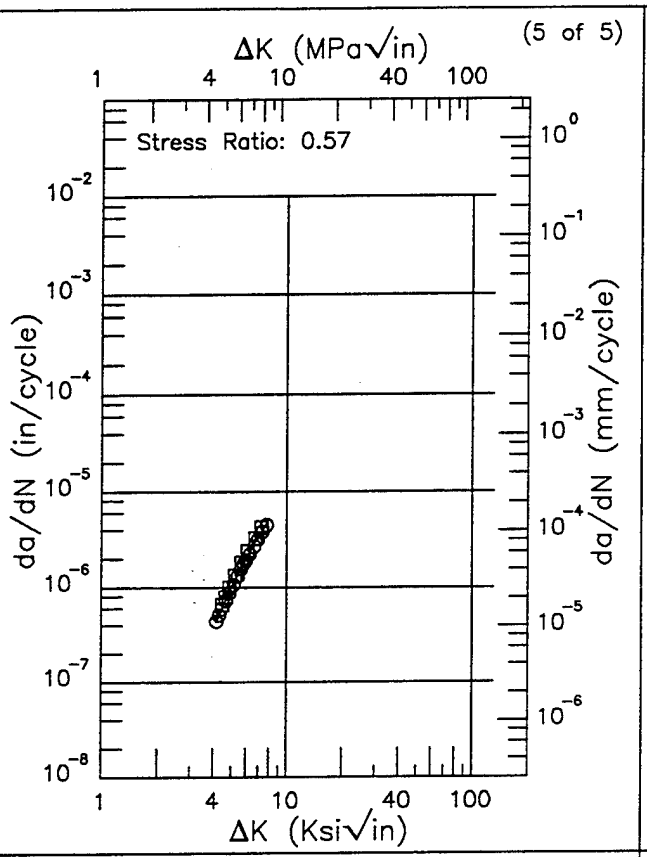
**Figure 7.1.3.1.2 (Continued)**

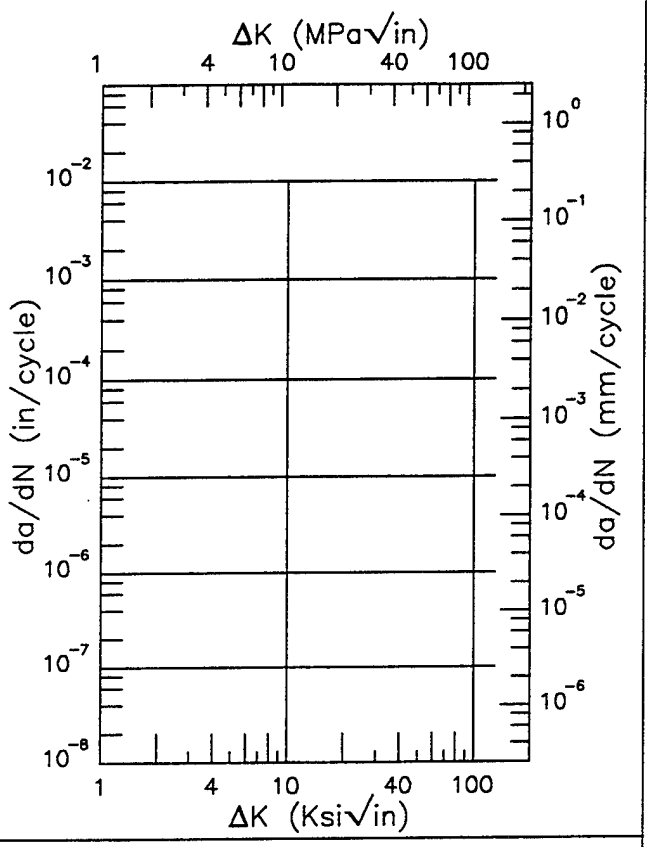
2014

R

Condition/Ht: T6
Form: 0.04 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 2 Hz
Environment: LAB AIR; RT

Yield Strength: 67 ksi
Ult. Strength: 74 ksi
Specimen Thk: 0.04 in.
Specimen Width: 6 in.
Ref: 86734




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.14 (min) | 0.430 |
| 5. | 1.03 |
| 6. | 1.99 |
| 7. | 3.39 |
| 7.73 (max) | 4.46 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

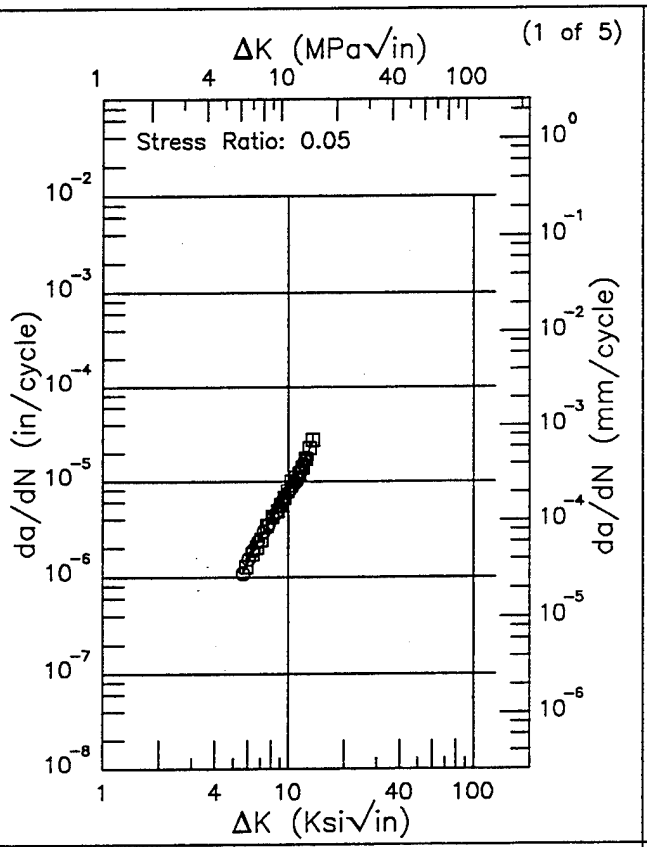
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 6.48 | 0. .5 .8 1.25 2. |

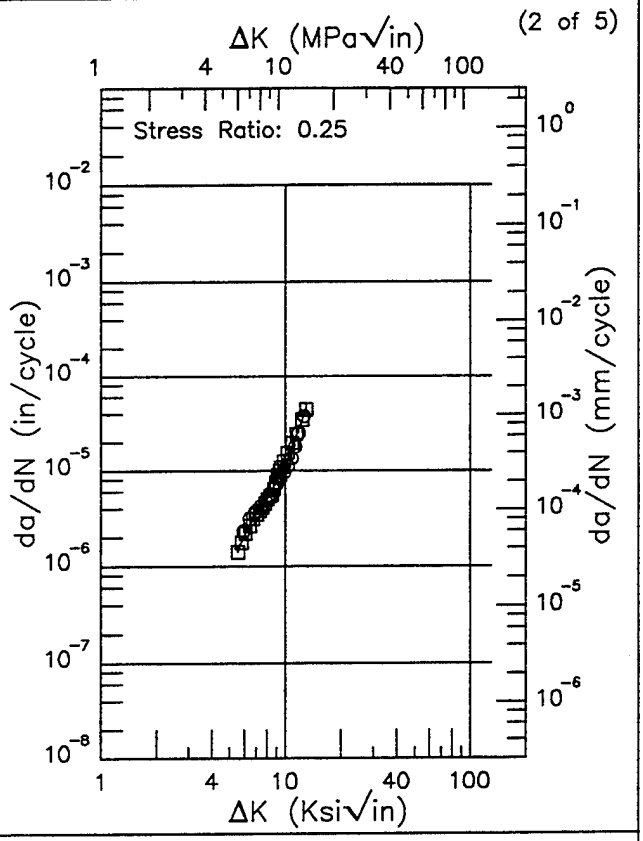
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.1.3.1.2 (Concluded)**

Condition/Ht: T6
Form: 0.06 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 2 Hz
Environment: LAB AIR; RT

Yield Strength: 67 ksi
Ult. Strength: 74 ksi
Specimen Thk: 0.063 in.
Specimen Width: 6 in.
Ref: 86734




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.65 (min) | 1.07 |
| 6. | 1.40 |
| 7. | 2.50 |
| 8. | 3.84 |
| 9. | 5.51 |
| 10. | 7.70 |
| 13. | 21.7 |
| 13.51 (max) | 26.3 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.54 (min) | 1.48 |
| 6. | 2.09 |
| 7. | 3.52 |
| 8. | 5.21 |
| 9. | 7.59 |
| 10. | 11.4 |
| 12.91 (max) | 43.6 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 5.43 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 9.96 | 0. .5 .8 1.25 2. |

**Figure 7.1.3.1.3**

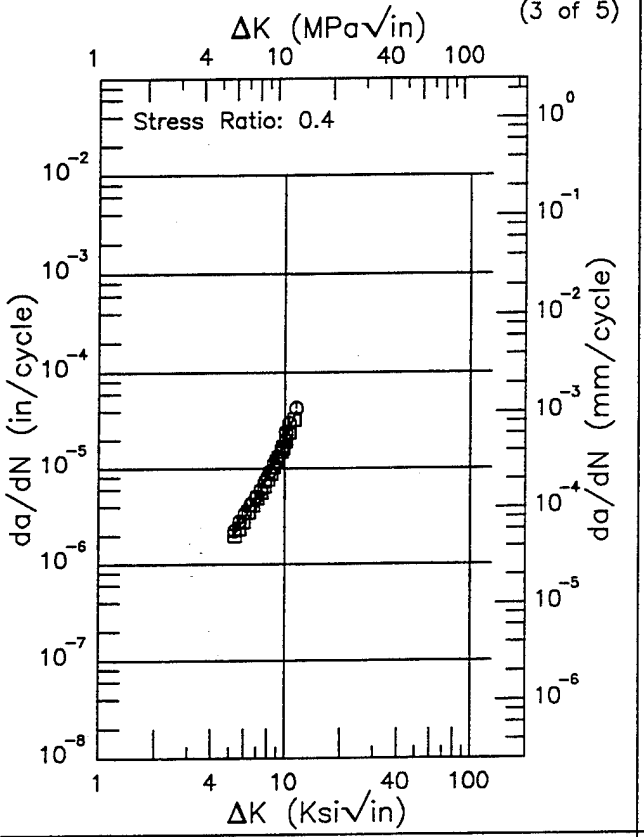
2014

R

Condition/Ht: T6
Form: 0.06 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 2 Hz
Environment: LAB AIR; RT

Yield Strength: 67 ksi
Ult. Strength: 74 ksi
Specimen Thk: 0.063 in.
Specimen Width: 6 in.
Ref: 86734

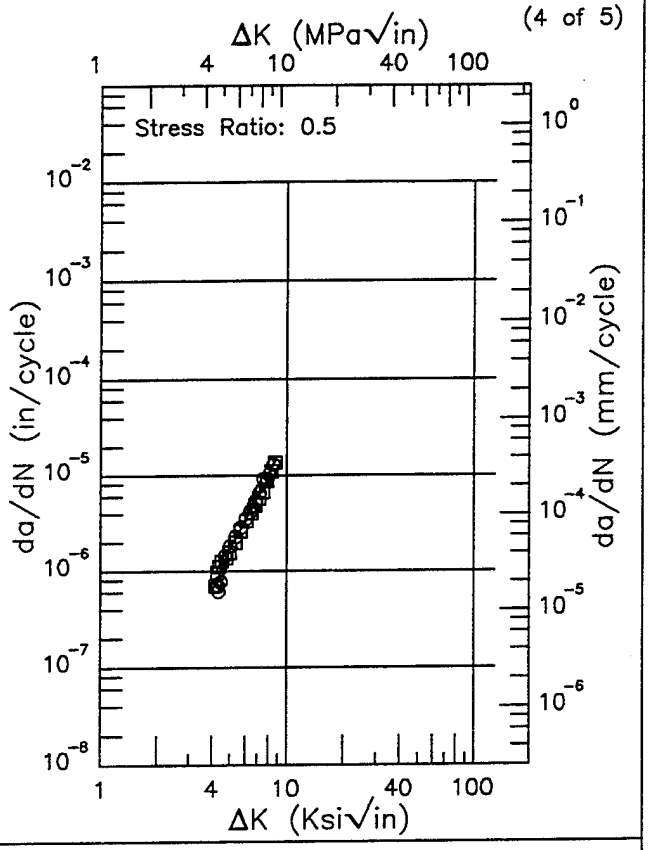
(3 of 5)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.33 (min) | 2.03 |
| 6. | 2.99 |
| 7. | 4.88 |
| 8. | 7.68 |
| 9. | 12.1 |
| 10. | 19.3 |
| 11.48 (max) | 40.4 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 7.10 | 0. .5 .8 1.25 2. |

(4 of 5)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.17 (min) | 0.699 |
| 5. | 1.69 |
| 6. | 3.32 |
| 7. | 5.68 |
| 8. | 9.73 |
| 8.66 (max) | 14.3 |

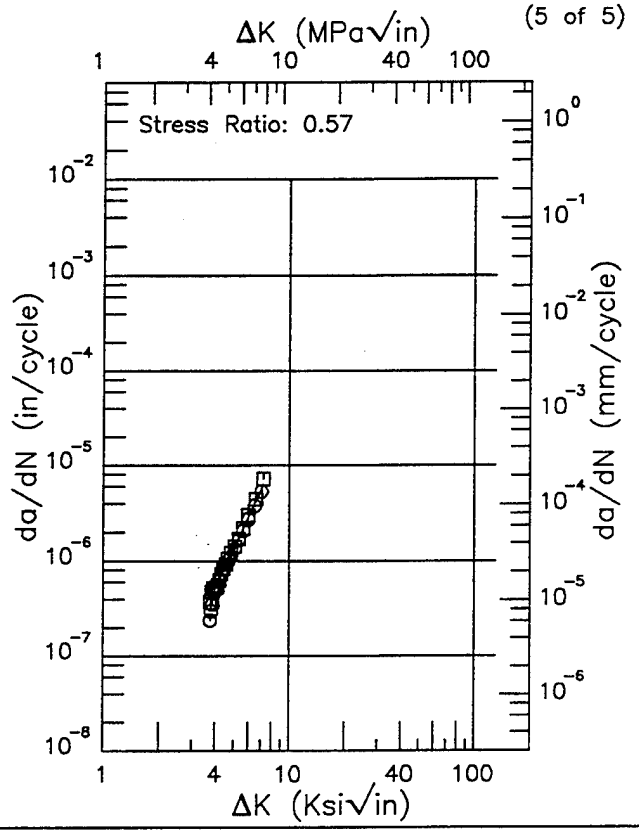
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 11.06 | 0. .5 .8 1.25 2. |

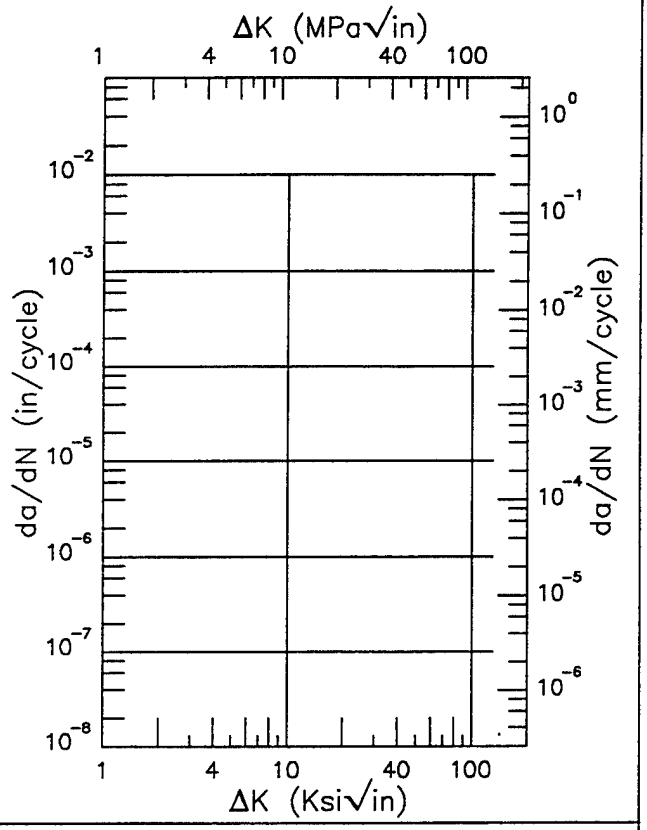
**Figure 7.1.3.1.3 (Continued)**

Condition/Ht: T6
Form: 0.06 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 2 Hz
Environment: LAB AIR; RT

Yield Strength: 67 ksi
Ult. Strength: 74 ksi
Specimen Thk: 0.063 in.
Specimen Width: 6 in.
Ref: 86734

(5 of 5)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.74 (min) | 0.347 |
| 4. | 0.517 |
| 5. | 1.32 |
| 6. | 2.87 |
| 7. | 5.53 |
| 7.19 (max) | 6.27 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 9.78 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.1.3.1.3 (Concluded)**

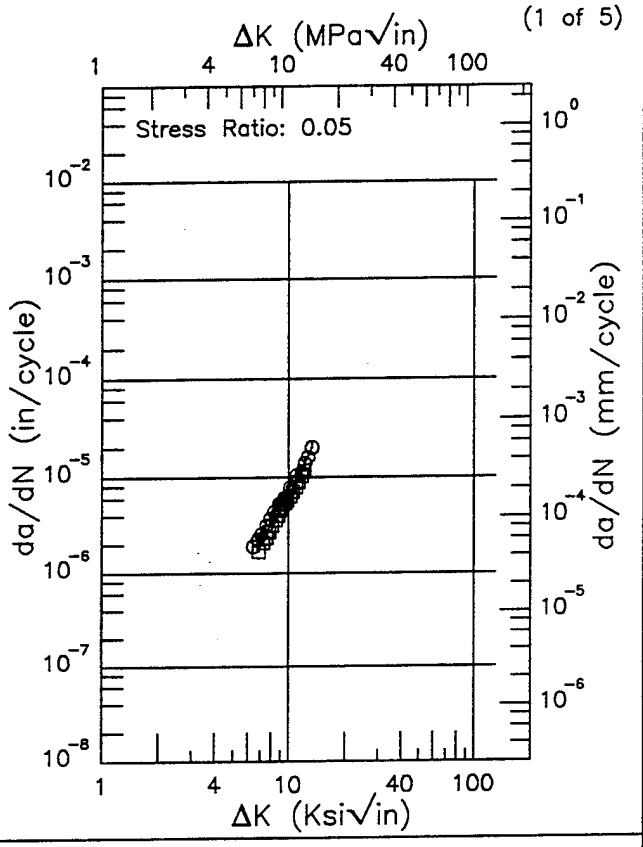
## 2014

R

Condition/Ht: T6
Form: 0.04 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T-L
Frequency: 2 Hz
Environment: LAB AIR; RT

Yield Strength: 67 ksi
Ult. Strength: 74 ksi
Specimen Thk: 0.04 in.
Specimen Width: 6 in.
Ref: 86734

(1 of 5)



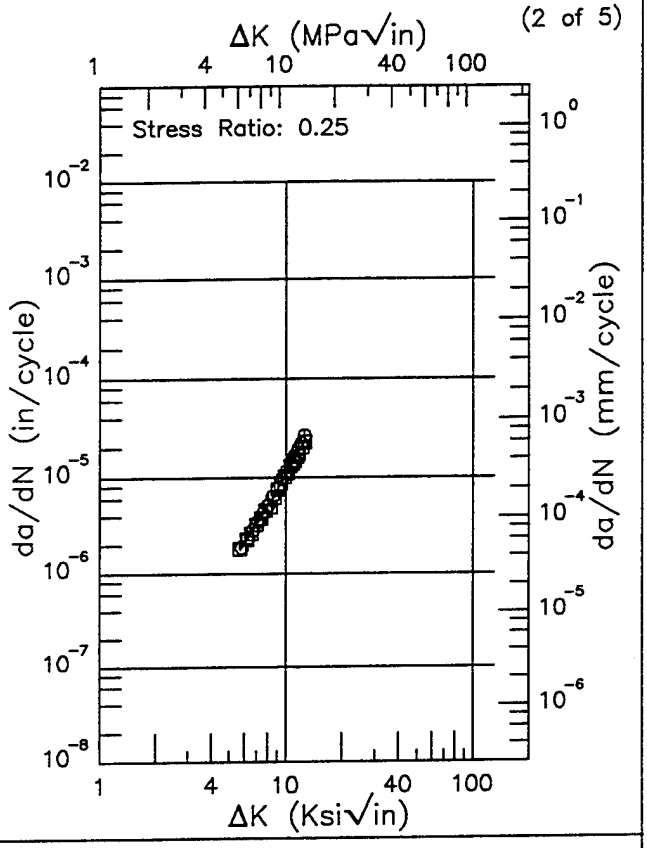

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 6.40 (min) | 1.93 |
| 7. | 2.13 |
| 8. | 3.21 |
| 9. | 4.77 |
| 10. | 6.34 |
| 13. | 17.7 |
| 13.31 (max) | 20.1 |

| RMS % Error |
|---|
| 11.28 |

Life Prediction Ratio Summary

0. .5 .8 1.25 2.

(2 of 5)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 5.68 (min) | 1.77 |
| 6. | 2.07 |
| 7. | 3.28 |
| 8. | 5.02 |
| 9. | 7.42 |
| 10. | 10.7 |
| 12.67 (max) | 24.5 |

| RMS % Error |
|---|
| 4.66 |

Life Prediction Ratio Summary

0. .5 .8 1.25 2.

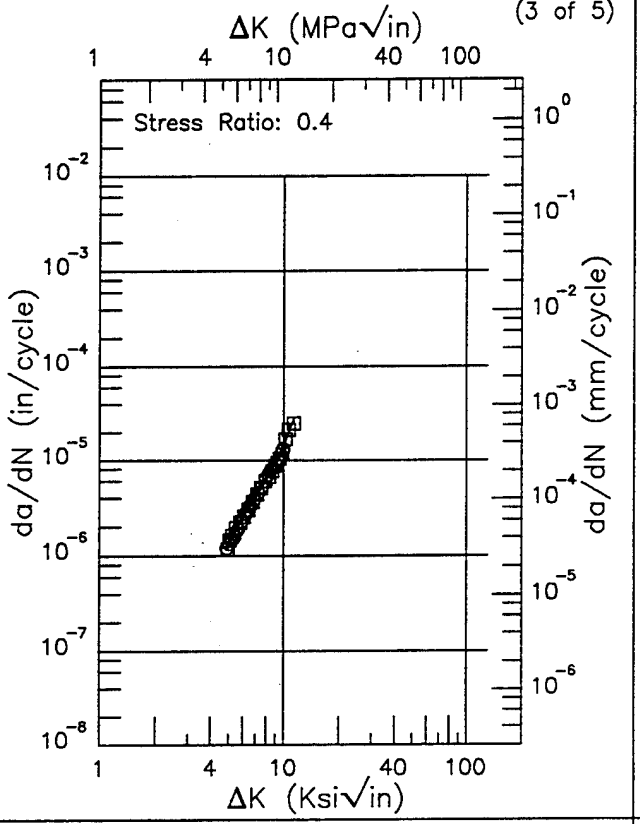
**Figure 7.1.3.1.4**

2014 R

Condition/Ht: T6
Form: 0.04 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 2 Hz
Environment: LAB AIR; RT

Yield Strength: 67 ksi
Ult. Strength: 74 ksi
Specimen Thk: 0.04 in.
Specimen Width: 6 in.
Ref: 86734

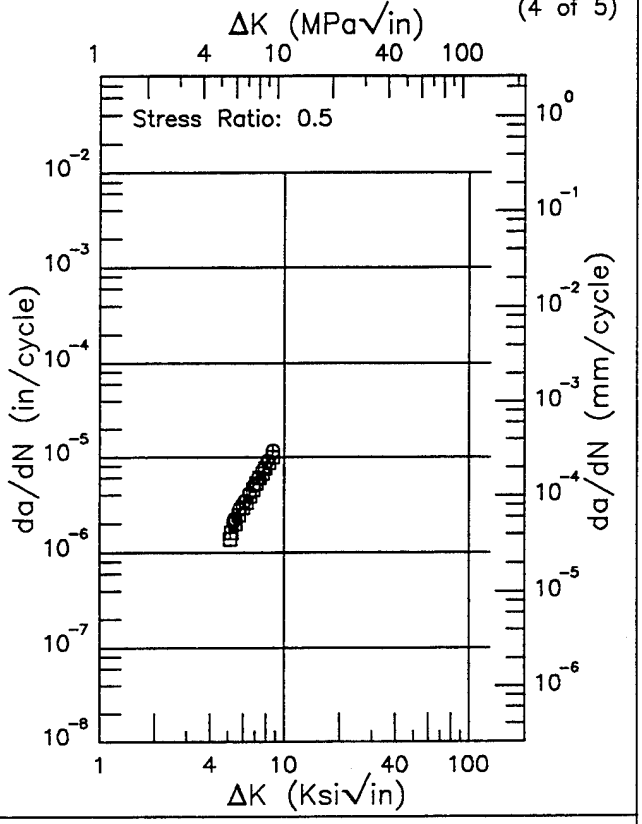
(3 of 5)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.88 (min) | 1.16 |
| 5. | 1.28 |
| 6. | 2.45 |
| 7. | 4.01 |
| 8. | 6.13 |
| 9. | 9.24 |
| 10. | 14.3 |
| 11.25 (max) | 26.7 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 4.74 | 0. .5 .8 1.25 2. |

(4 of 5)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 5.13 (min) | 1.60 |
| 6. | 3.01 |
| 7. | 5.13 |
| 8. | 7.90 |
| 8.66 (max) | 10.2 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 6.95 | 0. .5 .8 1.25 2. |

**Figure 7.1.3.1.4 (Continued)**

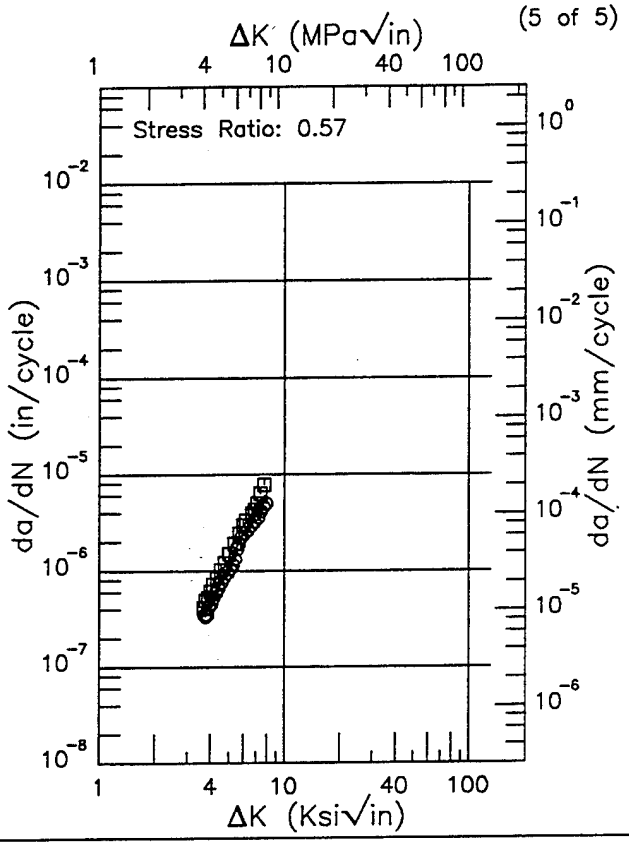
2014

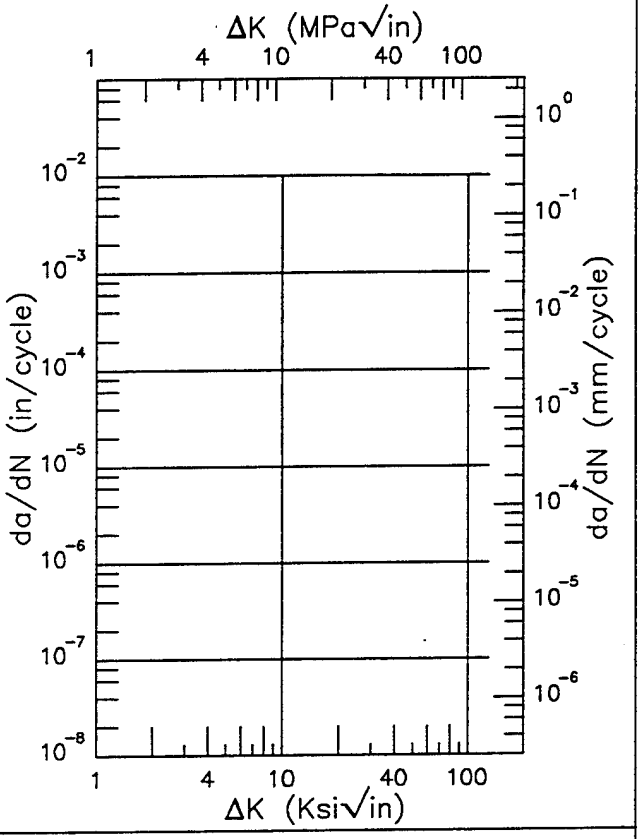
R

Condition/Ht: T6
Form: 0.04 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 2 Hz
Environment: LAB AIR; RT

Yield Strength: 67 ksi
Ult. Strength: 74 ksi
Specimen Thk: 0.04 in.
Specimen Width: 6 in.
Ref: 86734

(5 of 5)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.66 (min) | 0.338 |
| 4. | 0.510 |
| 5. | 1.16 |
| 6. | 2.46 |
| 7. | 4.05 |
| 7.88 (max) | 6.11 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 17.91 | 0. .5 .8 1.25 2. |

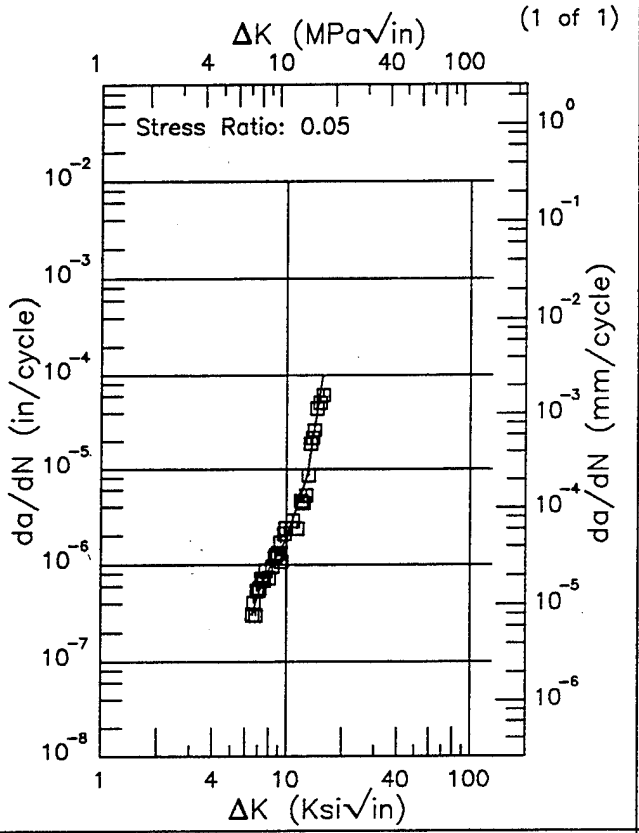
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

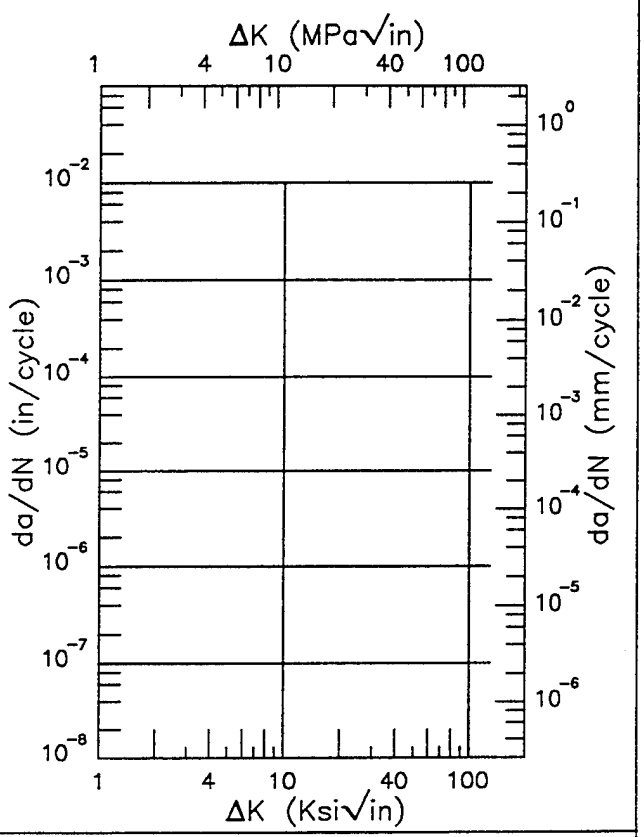
**Figure 7.1.3.1.4 (Concluded)**

2014 R

Condition/Ht: T6
Form: 5 in. Forging
Specimen Type: CT
Orientation: T–L
Frequency: 9 Hz
Environment: LAB AIR; RT

Yield Strength: 64.1 ksi
Ult. Strength: 68.2 ksi
Specimen Thk: 0.4 in.
Specimen Width: 4 in.
Ref: BW001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.53 (min) | 0.313 |
| 7. | 0.485 |
| 8. | 0.883 |
| 9. | 1.30 |
| 10. | 1.87 |
| 13. | 9.14 |
| 15.67 (max) | 99.7 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 20.82 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.1.3.1.5**

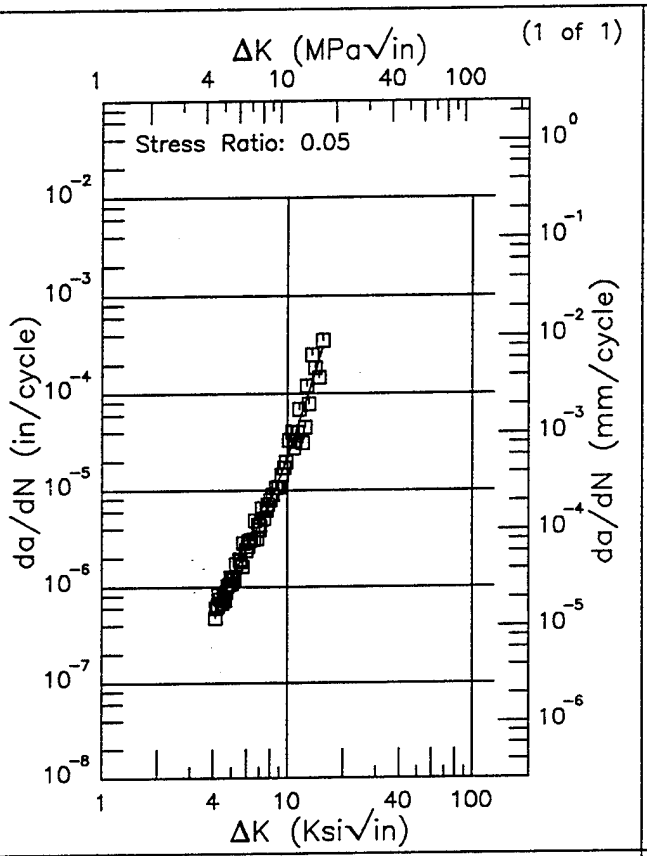
2014

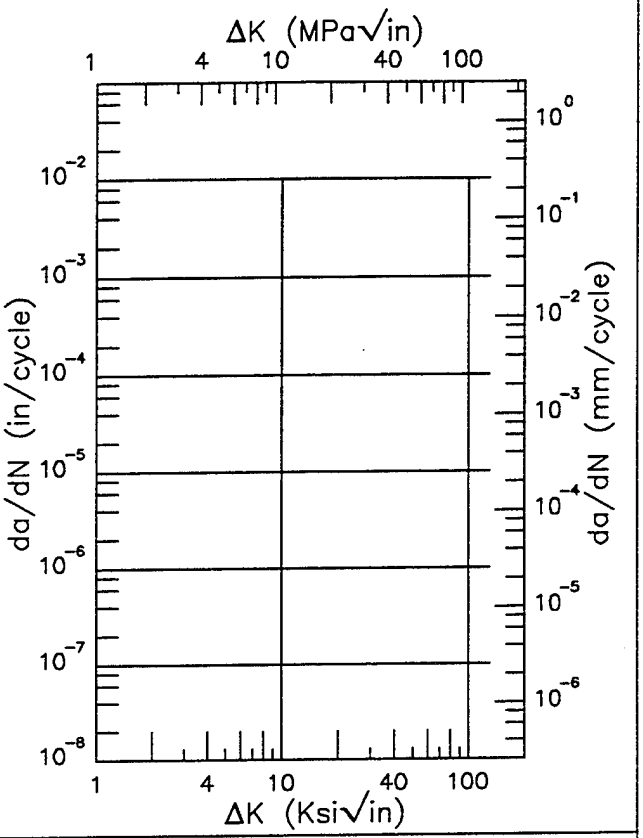
R

Condition/Ht: T6
Form: 5 in. Forging
Specimen Type: CT
Orientation: T–L
Frequency: 9 Hz
Environment: H.H.A.; RT

Yield Strength: 64.1 ksi
Ult. Strength: 68.2 ksi
Specimen Thk: 0.4 in.
Specimen Width: 2 in.
Ref: BW001

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.08 (min) | 0.529 |
| 5. | 1.21 |
| 6. | 2.43 |
| 7. | 4.40 |
| 8. | 7.63 |
| 9. | 13.0 |
| 10. | 21.9 |
| 13. | 99.4 |
| 15.39 (max) | 294. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 22.51 | 0. .5 .8 1.25 2. |

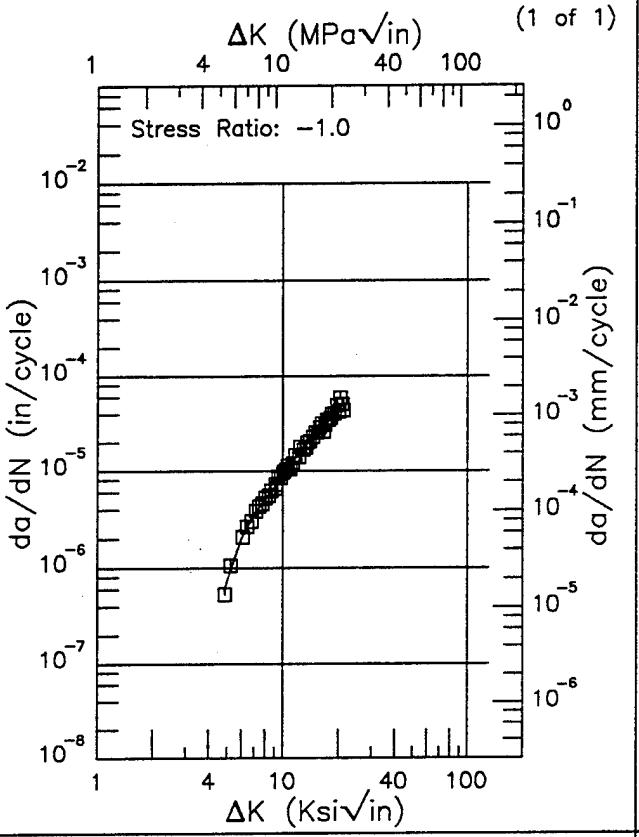
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

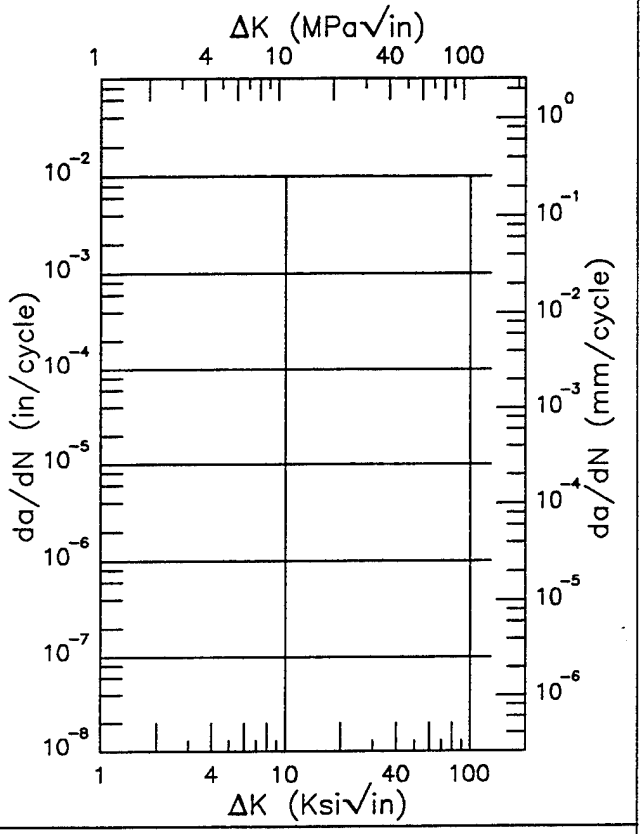
**Figure 7.1.3.1.6**

Condition/Ht: T6
Form: 5 in. Forging
Specimen Type: CCP (max stress specified)
Orientation: L–T
Frequency: 9 Hz
Environment: H.H.A.; RT

Yield Strength:
Ult. Strength:
Specimen Thk: 0.4 in.
Specimen Width: 2 in.
Ref: BW001

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.85 (min) | 0.581 |
| 5. | 0.727 |
| 6. | 2.04 |
| 7. | 3.55 |
| 8. | 5.07 |
| 9. | 6.80 |
| 10. | 9.01 |
| 13. | 17.8 |
| 16. | 27.7 |
| 20. | 47.6 |
| 21.09 (max) | 52.4 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 7.20 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

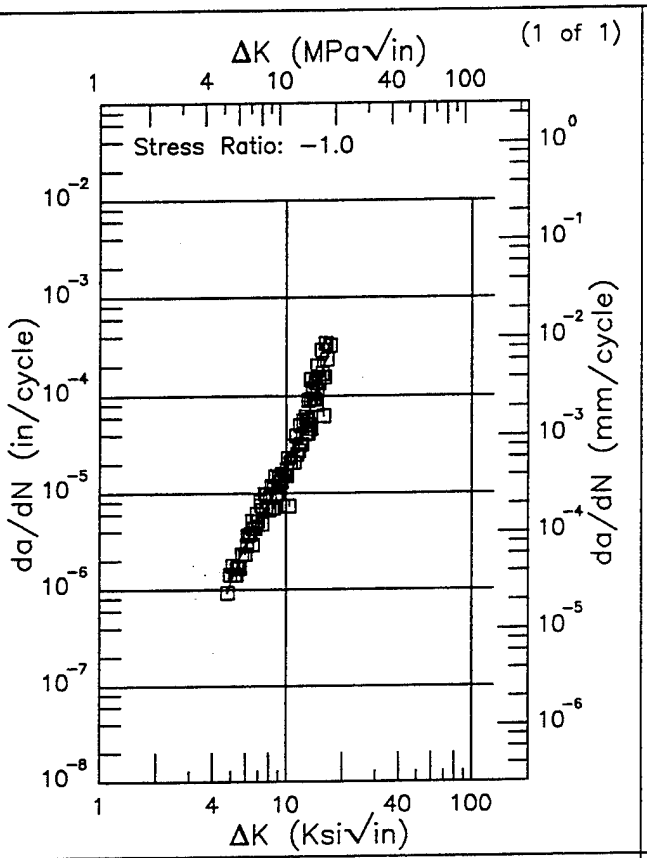
**Figure 7.1.3.1.7**

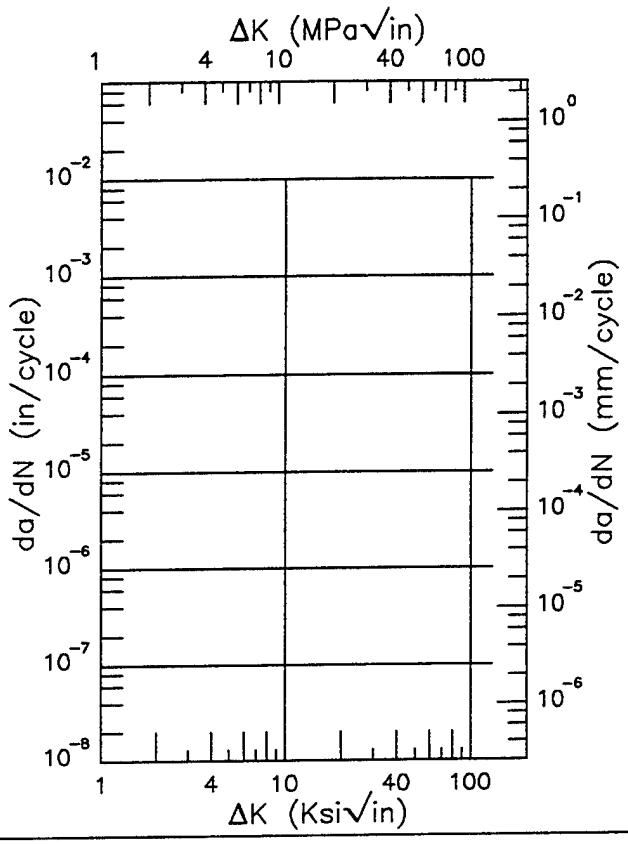
2014

R

Condition/Ht: T6
Form: 5 in. Forging
Specimen Type: CCP (max stress specified)
Orientation: T–L
Frequency: 9 Hz
Environment: H.H.A.; RT

Yield Strength: 64.1 ksi
Ult. Strength: 68.2 ksi
Specimen Thk: 0.4 in.
Specimen Width: 4 in.
Ref: BW001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.79 (min) | 0.925 |
| 5. | 1.21 |
| 6. | 2.99 |
| 7. | 5.23 |
| 8. | 7.95 |
| 9. | 11.6 |
| 10. | 16.9 |
| 13. | 61.9 |
| 16. | 212. |
| 17.10 (max) | 309. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 27.78 | 0. .5 .8 1.25 2. |

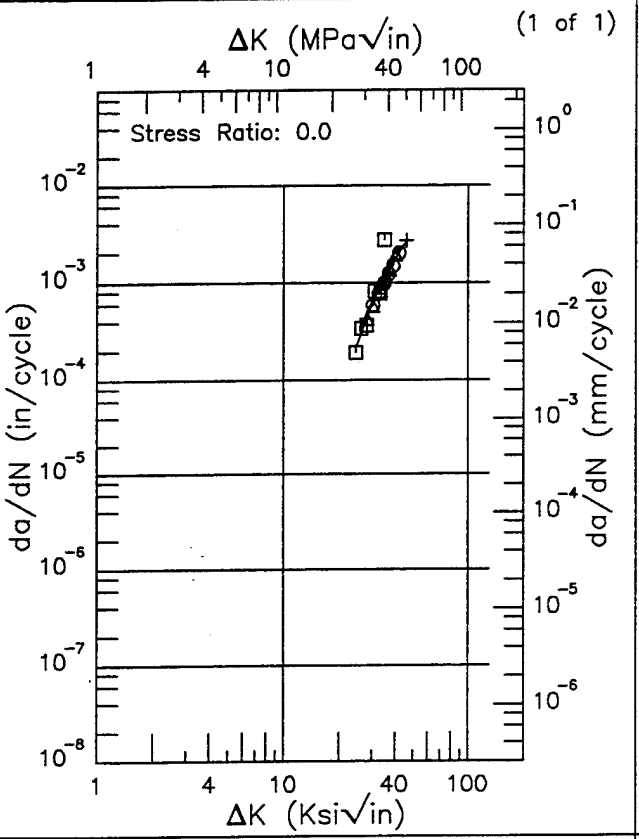
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

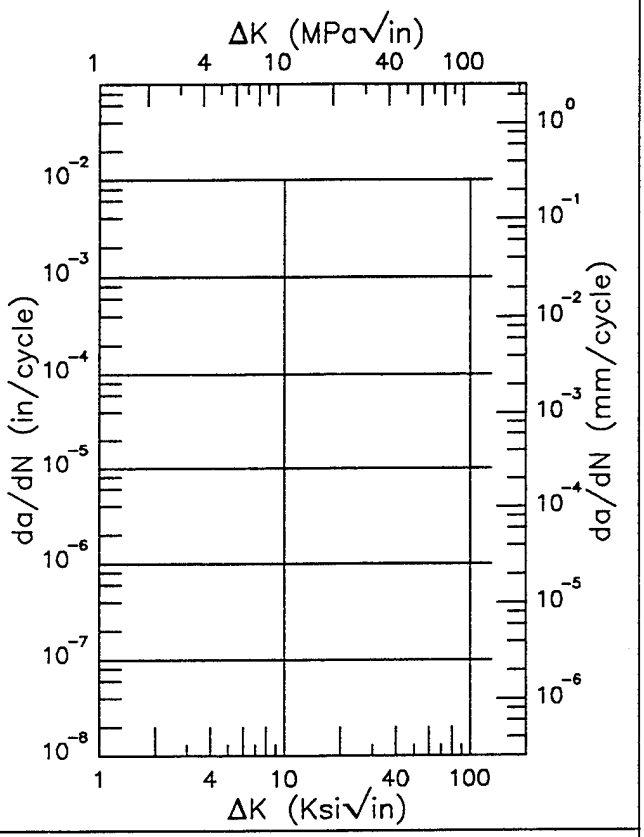
**Figure 7.1.3.1.8**

Condition/Ht: T6
Form: 1 in. Rolled Bar
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 5.2 Hz
Environment: LAB AIR; RT

Yield Strength: 60.2 – 60.5 ksi
Ult. Strength: 66 – 67.3 ksi
Specimen Thk: 0.253 – 0.26 in.
Specimen Width: 7.5 – 7.517 in.
Ref: 86213

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 24.55 (min) | 216. |
| 25. | 234. |
| 30. | 594. |
| 35. | 1183. |
| 40. | 1715. |
| 46.11 (max) | 2684. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 31.06 | 0. .5 .8 1.25 2. |

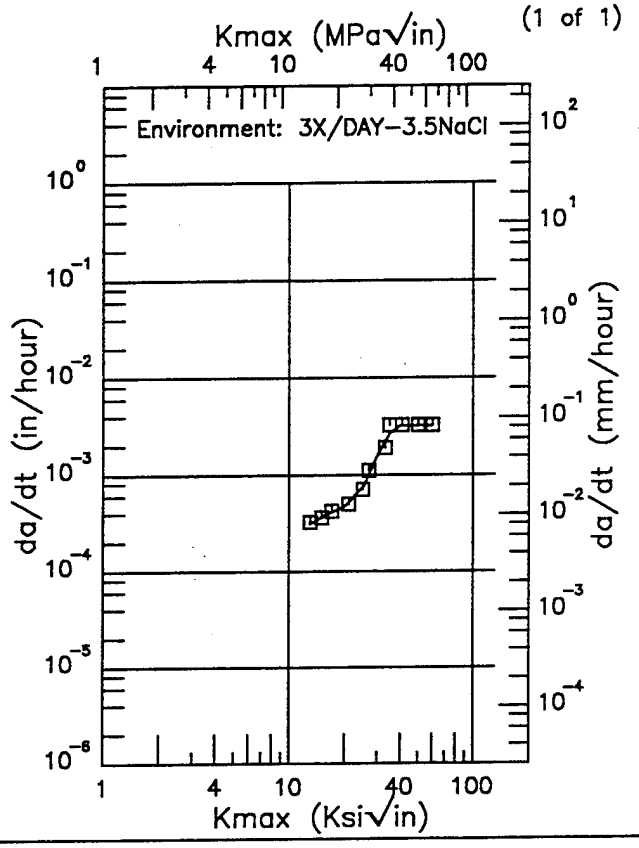
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

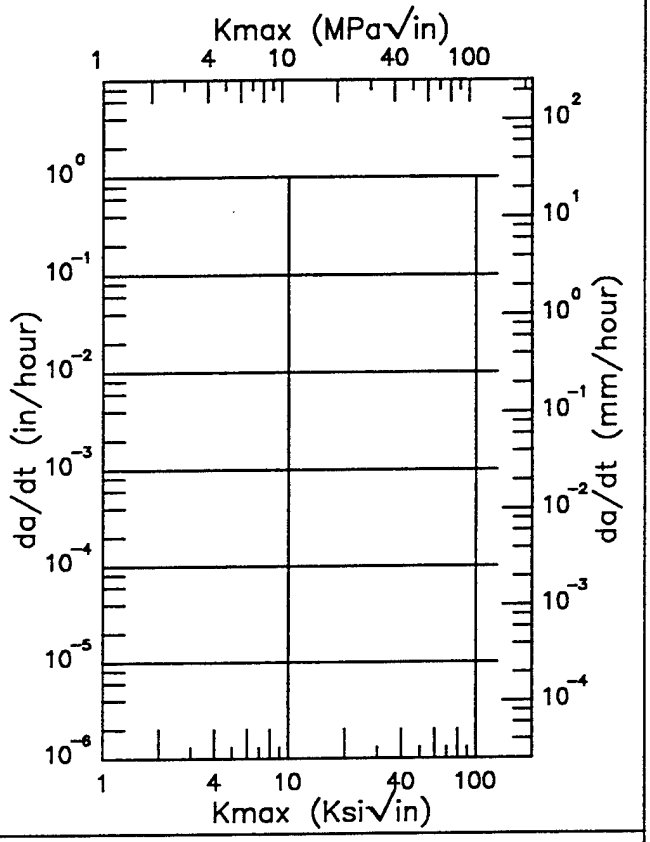
**Figure 7.1.3.1.9**

## 2014

Condition/Ht: T451
Form: 1.5 in. Plate
Specimen Type: DCB
Orientation: S–L
Yield Strength:
Ult. Strength:

Specimen Thk: 1 in.
Specimen Width: 5 in.
$A_o$:
$K_{Iscc}$:
Ref: 78313




| Kmax (Ksi√in) | da/dt ($10^{-3}$in/hour) |
|---|---|
| 13.00 (min) | 0.314 |
| 16. | 0.392 |
| 20. | 0.468 |
| 25. | 0.752 |
| 30. | 1.56 |
| 35. | 2.68 |
| 40. | 3.23 |
| 50. | 3.20 |
| 60.00 (max) | 3.20 |

| Kmax (Ksi√in) | da/dt ($10^{-3}$in/hour) |
|---|---|

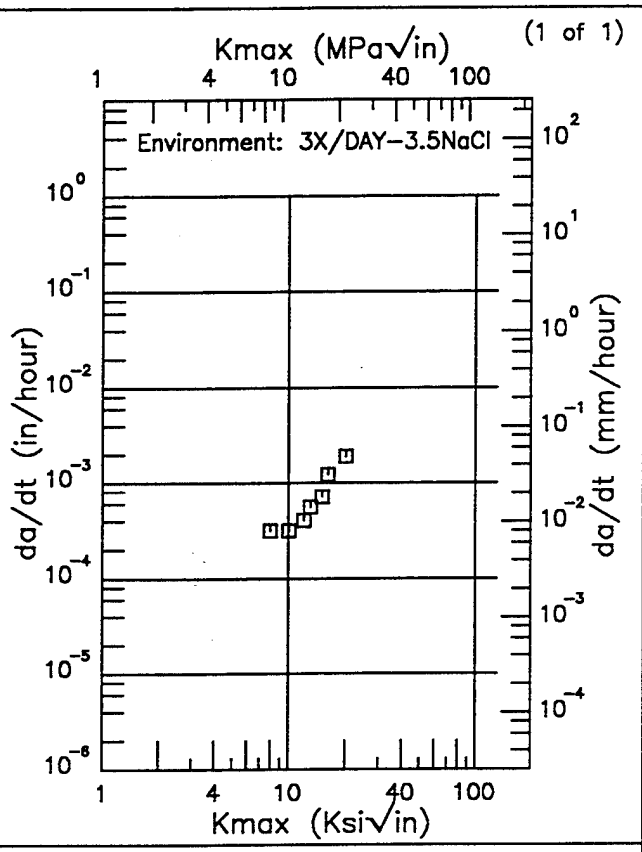
| RMS % Error | |
|---|---|
| 7.78 | |

| RMS % Error | |
|---|---|
| | |

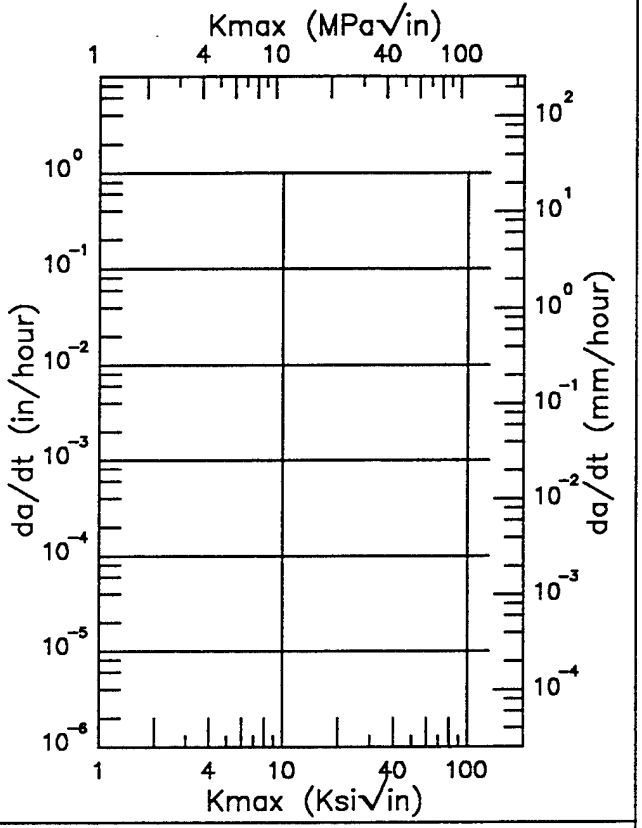
**Figure 7.1.3.2.1**

Condition/Ht: T651
Form: 2 in. Plate
Specimen Type: DCB
Orientation: S–L
Yield Strength:
Ult. Strength:

Specimen Thk: 1 in.
Specimen Width: 5 in.
$A_O$:
$K_{Iscc}$:
Ref: 78313




Kmax (Ksi√in) da/dt ($10^{-3}$in/hour)




Kmax (Ksi√in) da/dt ($10^{-3}$in/hour)

| RMS % Error | | RMS % Error | |
|---|---|---|---|

**Figure 7.1.3.2.2**

# TABLE 7.1.3.3



## $K_{Iscc}$ SUMMARY FOR ALUMINUM ALLOY 2014

| Condition/ Heat Treat | Prod Form | Test Temp (°F) | Spec Or. | Yield Str (Ksi) | Envir. | Specimen | | | Prod Thk (in) | Crack (in) | $K_Q$ (Ksi√in) | $K_{Iscc}$ (Ksi√in) | Test Time (min) | Test Date | Refer |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Design | Width (in) | Thick (in) | | | | | | | |
| T6 | F | R.T. | S-L | 61 | S.S.W. | CANT | 2 | 1 | 8 | --- | 19 | 16 | --- | 1972 | 82675 |
| T651 | P | R.T. | S-L | 59.6 | Industrial Atm | CT | 2 | 1 | 2.5 | --- | 18.7 | 7 | --- | 1973 | 86688 |
| | | | | | Salt-Dichromate-Acetate | CT | 2 | 1 | 2.5 | --- | 18.7 | 7 | --- | 1973 | 86688 |
| | | | | | Seacoast Atm | CT | 2 | 1 | 2.5 | --- | 18.7 | 7 | --- | 1973 | 86688 |

# TABLE 7.2.1.1



## MEAN PLANE STRAIN FRACTURE TOUGHNESS FOR ALUMINUM 2000/6000 SERIES ALLOY 2020 AT ROOM TEMPERATURE

| Product Form | Condition/Heat Treatment | $K_{Ic}$ ($ksi\sqrt{in}$) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Specimen Orientation | | | | | | | | |
| | | L-T | | | T-L | | | S-L | | |
| | | Mean $K_{Ic}$ | Std Dev | n | Mean $K_{Ic}$ | Std Dev | n | Mean $K_{Ic}$ | Std Dev | n |
| Plate | T651 | 23 | 2.4 | 8 | 17.2 | 0.3 | 4 | --- | --- | --- |

TABLE 7.2.1.2.1



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2020 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T6 | SHEET | 0. | 13.3 | | | | 103.95 | | |
| T651 | PLATE | -0.5 | 5.2 | | | 3.4 | | | |
| | | 0. | 5.2 | | | 3.41 | | | |

TABLE 7.2.1.2.2



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK
## 2020 AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: H.H.A.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T651 | PLATE | 0.33 | 25 | | 0.7 | 18.5 | | | |

# TABLE 7.2.2.1



## ALUMINUM 2020 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 • $(K_{Ic}/TYS)^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ (Ksi • $\sqrt{in.}$)) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T6 | Plate | 0.78 | 86 | L-T | 75.5 | 1.500 | 0.751 | CT | 0.745 | 0.18 | 20.50 | 20.1 | 0.3 | 1973 | 86213 |
| | | 0.78 | | | 75.5 | 1.500 | 0.752 | CT | 0.728 | 0.17 | 19.90 | | | 1973 | 86213 |
| | | 0.78 | | | 75.5 | 1.500 | 0.752 | CT | 0.697 | 0.18 | 20.00 | | | 1973 | 86213 |
| T6 | Extrusion | 0.69 | R.T. | L-T | 75.5 | 1.500 | 0.652 | NB | 0.747 | 0.22 | 22.40 | --- | --- | 1973 | 86213 |
| T651 | Plate | 1.37 | R.T. | L-T | 76.3 | 3.000 | 1.376 | NB | 1.413 | 0.17 | 19.70 | 23.0 | 2.4 | 1973 | 86213 |
| | | 1.37 | | | 77.0 | 3.000 | 1.355 | NB | 1.390 | 0.18 | 20.90 | | | 1973 | 86213 |
| | | 1.37 | | | 77.5 | 3.000 | 1.375 | NB | 1.460 | 0.24 | 23.80 | | | 1973 | 86213 |
| | | 1.37 | | | 77.5 | 2.000 | 0.999 | CT | 0.967 | 0.22 | 22.90 | | | 1973 | 86213 |
| | | 1.37 | | | 77.5 | 3.000 | 1.375 | NB | 1.400 | 0.31 | 27.20 | | | 1973 | 86213 |
| | | 1.37 | | | 77.5 | 3.000 | 1.375 | NB | 1.450 | 0.23 | 23.60 | | | 1973 | 86213 |
| | | 1.37 | | | 77.5 | 3.000 | 1.375 | NB | 1.420 | 0.26 | 24.80 | | | 1973 | 86213 |
| | | 1.37 | | | 77.5 | 2.000 | 0.999 | CT | 1.007 | 0.19 | 21.10 | | | 1973 | 86213 |
| T651 | Plate | 1.37 | R.T. | T-L | 77.4 | 3.000 | 1.379 | NB | 1.526 | 0.12 | 17.00 | 17.2 | 0.3 | 1973 | 86213 |
| | | 1.37 | | | 77.5 | 3.000 | 1.378 | NB | 1.560 | 0.12 | 16.80 | | | 1973 | 86213 |
| | | 1.37 | | | 78.4 | 1.990 | 0.999 | CT | 0.964 | 0.12 | 17.40 | | | 1973 | 86213 |
| | | 1.37 | | | 78.4 | 2.000 | 0.999 | CT | 1.024 | 0.12 | 17.50 | | | 1973 | 86213 |
| T651 | Plate | 1.37 | 84 | L-T | 76.3 | 2.000 | 1.000 | CT | 0.963 | 0.18 | 20.30 | 21.2 | 1.4 | 1973 | 86213 |
| | | 1.37 | | | 76.3 | 2.000 | 1.000 | CT | 0.943 | 0.22 | 22.80 | | | 1973 | 86213 |
| | | 1.37 | | | 76.3 | 2.000 | 1.001 | CT | 0.950 | 0.18 | 20.50 | | | 1973 | 86213 |
| T651 | Plate | 1.37 | 84 | T-L | 77.4 | 2.000 | 1.002 | CT | 1.015 | 0.12 | 17.00 | 17.3 | 0.4 | 1973 | 86213 |
| | | 1.37 | | | 77.4 | 2.000 | 1.002 | CT | 1.020 | 0.13 | 17.80 | | | 1973 | 86213 |
| | | 1.37 | | | 77.4 | 2.000 | 1.001 | CT | 1.021 | 0.12 | 17.10 | | | 1973 | 86213 |
| T651 | Plate | 1.37 | 88 | S-L | 74.4 | 0.990 | 0.500 | CT | 0.506 | 0.11 | 15.30 | 15.4 | 0.1 | 1973 | 86213 |
| | | 1.37 | | | 74.4 | 1.000 | 0.500 | CT | 0.508 | 0.11 | 15.50 | | | 1973 | 86213 |

# TABLE 7.2.2.2



## ALUMINUM 2020 $K_C$

| CONDITION HEAT TREAT | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | CRACK LENGTH | | GROSS STRESS | | $K_{app}$ | | | $K_C$ | | | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | INIT (in.) $2a_o$ | FINAL (in.) $2a_f$ | ONSET (Ksi) $\sigma_o$ | MAX (Ksi) $\sigma_{max}$ | $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ MEAN | STAN DEV | $K_C$ (Ksi$\sqrt{in}$) | $K_C$ MEAN | STAN DEV | | |
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T6 | Sheet | 0.06 | R.T. | L-T | 75.9 | 2.000 | 0.062 | 0.622 | 0.890 | --- | 30.80 | 32.40 | 29.6 | 3.1 | 41.62 | 34.6 | 7.0 | 1973 | 86213 |
| | | 0.06 | | | 75.9 | 2.000 | 0.062 | 0.622 | 0.760 | --- | 29.60 | 31.14 | | | 35.56 | | | 1973 | 86213 |
| | | 0.06 | | | 75.9 | 2.000 | 0.062 | 0.621 | 0.890 | --- | 30.40 | 31.91 | | | 41.08 | | | 1973 | 86213 |
| | | 0.06 | | | 77.0 | 2.000 | 0.064 | 0.625 | 0.650 | --- | 24.40 | 25.72 | | | 26.39 | | | 1973 | 86213 |
| | | 0.06 | | | 77.0 | 2.000 | 0.064 | 0.625 | 0.680 | --- | 25.50 | 26.88 | | | 28.41 | | | 1973 | 86213 |
| T6 | Sheet | 0.06 | R.T. | L-T | 75.9 | 3.000 | 0.061 | 1.070 | 1.140 | --- | 21.10 | 29.72 | 29.1 | 0.8 | 31.05 | 30.2 | 1.3 | 1973 | 86213 |
| | | 0.06 | | | 75.9 | 3.000 | 0.062 | 1.100 | 1.140 | --- | 19.90 | 28.56 | | | 29.28 | | | 1973 | 86213 |
| T6 | Sheet | 0.06 | R.T. | L-T | 76.9 | 15.800 | 0.063 | 3.000 | 3.480 | --- | 17.00 | 37.75 | 36.1 | 1.5 | 40.98 | 36.9 | 2.9 | 1973 | 86213 |
| | | 0.06 | | | 76.9 | 15.810 | 0.063 | 6.010 | 6.010 | --- | 10.20 | 34.46 | | | 34.46 | | | 1973 | 86213 |
| | | 0.06 | | | 76.9 | 15.810 | 0.063 | 3.020 | 3.020 | --- | 16.60 | 36.99 | | | 36.99 | | | 1973 | 86213 |
| | | 0.06 | | | 76.9 | 15.820 | 0.063 | 1.020 | 1.020 | --- | 27.80 | 35.28 | | | 35.28 | | | 1973 | 86213 |
| T6 | Sheet | 0.06 | R.T. | T-L | 75.8 | 2.000 | 0.062 | 0.622 | 0.870 | --- | 26.60 | 27.98 | 25.9 | 2.8 | 35.31 | 30.5 | 6.6 | 1973 | 86213 |
| | | 0.06 | | | 75.8 | 2.000 | 0.062 | 0.622 | 0.880 | --- | 27.20 | 28.61 | | | 36.43 | | | 1973 | 86213 |
| | | 0.06 | | | 75.8 | 2.000 | 0.062 | 0.624 | 0.870 | --- | 25.60 | 26.98 | | | 33.98 | | | 1973 | 86213 |
| | | 0.06 | | | 76.0 | 2.000 | 0.064 | 0.625 | 0.660 | --- | 21.70 | 22.87 | | | 23.71 | | | 1973 | 86213 |
| | | 0.06 | | | 76.0 | 2.000 | 0.064 | 0.625 | 0.625 | --- | 21.70 | 22.87 | | | 22.87 | | | 1973 | 86213 |
| T6 | Sheet | 0.06 | R.T. | T-L | 75.8 | 3.000 | 0.061 | 1.190 | 1.240 | --- | 17.40 | 26.40 | 26.9 | 0.8 | 27.21 | 27.8 | 0.8 | 1973 | 86213 |
| | | 0.06 | | | 75.8 | 3.000 | 0.062 | 1.070 | 1.120 | --- | 19.50 | 27.47 | | | 28.34 | | | 1973 | 86213 |
| T6 | Sheet | 0.06 | R.T. | T-L | 75.6 | 15.810 | 0.063 | 6.000 | 6.000 | --- | 9.30 | 31.39 | --- | --- | 31.39 | --- | --- | 1973 | 86213 |

# TABLE 7.2.2.2 (CONTINUED)



## ALUMINUM 2020 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_C$ (Ksi$\sqrt{in}$) | $K_C$ $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T651 | Plate | 0.25 | R.T. | L-T | 77.4 | 3.000 | 0.255 | 1.000 | 1.310 | --- | 16.40 | 22.09 | 22.3 | 0.3 | 26.74 | 26.4 | 0.4 | 1973 | 86213 |
| | | 0.25 | | | 77.4 | 3.000 | 0.256 | 1.170 | 1.420 | --- | 15.00 | 22.48 | | | 26.11 | | | 1973 | 86213 |
| T651 | Plate | 0.25 | R.T. | L-T | 77.4 | 4.000 | 0.256 | 1.330 | 1.700 | --- | 14.60 | 22.67 | 22.2 | 0.9 | 26.92 | 24.2 | 2.3 | 1973 | 86213 |
| | | 0.25 | | | 77.4 | 4.000 | 0.256 | 1.330 | 1.330 | --- | 14.70 | 22.82 | | | 22.82 | | | 1973 | 86213 |
| | | 0.25 | | | 77.4 | 4.000 | 0.256 | 1.480 | 1.660 | --- | 12.70 | 21.18 | | | 23.00 | | | 1973 | 86213 |
| T651 | Plate | 1.00 | R.T. | L-T | 76.1 | 20.000 | 1.000 | 7.000 | 8.600 | --- | 7.60 | 27.29 | 26.2 | 1.5 | 31.62 | 30.5 | 2.5 | 1973 | 86213 |
| | | 1.00 | | | 76.1 | 20.000 | 1.000 | 7.000 | 10.050 | --- | 7.00 | 25.14 | | | 33.14 | | | 1973 | 86213 |
| | | 1.00 | | | 76.1 | 20.000 | 1.000 | 7.000 | 9.040 | --- | 7.50 | 26.93 | | | 32.45 | | | 1973 | 86213 |
| | | 1.00 | | | 76.1 | 20.000 | 1.000 | 7.000 | 9.080 | --- | 7.50 | 26.93 | | | 32.57 | | | 1973 | 86213 |
| | | 1.00 | | | 76.3 | 20.000 | 1.000 | 7.000 | 7.600 | --- | 7.50 | 26.93 | | | 28.49 | | | 1973 | 86213 |
| | | 1.00 | | | 76.3 | 20.000 | 1.000 | 7.000 | 8.850 | --- | 7.60 | 27.29 | | | 32.33 | | | 1973 | 86213 |
| | | 1.00 | | | 76.3 | 20.000 | 1.000 | 7.000 | 8.500 | --- | 7.50 | 26.93 | | | 30.92 | | | 1973 | 86213 |
| | | 1.00 | | | 76.3 | 20.000 | 1.000 | 7.000 | 8.400 | --- | 7.60 | 27.29 | | | 31.06 | | | 1973 | 86213 |
| | | 1.00 | | | 77.5 | 20.000 | 1.000 | 7.000 | 8.450 | --- | 6.90 | 24.78 | | | 28.32 | | | 1973 | 86213 |
| | | 1.00 | | | 77.5 | 20.000 | 1.000 | 7.000 | 8.500 | --- | 7.30 | 26.21 | | | 30.10 | | | 1973 | 86213 |
| | | 1.00 | | | 77.5 | 20.000 | 1.000 | 7.000 | 7.910 | --- | 6.30 | 22.62 | | | 24.63 | | | 1973 | 86213 |

# TABLE 7.2.2.2 (CONTINUED)



| ALUMINUM 2020 $K_C$ | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONDITION HEAT TREAT | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | CRACK LENGTH | | GROSS STRESS | | $K_{app}$ | | | $K_C$ | | | DATE | REFER |
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | INIT (in.) $2a_o$ | FINAL (in.) $2a_f$ | ONSET (Ksi) $\sigma_o$ | MAX (Ksi) $\sigma_{max}$ | $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ MEAN | STAN DEV | $K_C$ (Ksi$\sqrt{in}$) | $K_C$ MEAN | STAN DEV | | |
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T651 | Sheet | 0.12 | R.T. | T-L | 77.4 | 3.000 | 0.126 | 1.100 | 1.140 | --- | 15.90 | 22.82 | 21.8 | 1.5 | 23.40 | 23.5 | 2.4 | 1973 | 86213 |
| | | 0.12 | | | 77.4 | 3.000 | 0.126 | 1.090 | 1.280 | --- | 15.70 | 22.39 | | | 25.15 | | | 1973 | 86213 |
| | | 0.12 | | | 77.5 | 3.000 | 0.126 | 1.080 | 1.110 | --- | 15.90 | 22.54 | | | 22.97 | | | 1973 | 86213 |
| | | 0.12 | | | 77.4 | 3.000 | 0.127 | 1.100 | 1.280 | --- | 14.50 | 20.81 | | | 23.23 | | | 1973 | 86213 |
| | | 0.12 | | | 77.5 | 3.000 | 0.127 | 1.080 | 1.180 | --- | 15.70 | 22.25 | | | 23.67 | | | 1973 | 86213 |
| | | 0.12 | | | 77.5 | 3.000 | 0.127 | 1.080 | 1.350 | --- | 17.10 | 24.24 | | | 28.56 | | | 1973 | 86213 |
| | | 0.12 | | | 77.5 | 3.000 | 0.127 | 1.090 | 1.170 | --- | 17.00 | 24.25 | | | 25.48 | | | 1973 | 86213 |
| | | 0.12 | | | 78.4 | 3.000 | 0.127 | 1.090 | 1.100 | --- | 13.30 | 18.97 | | | 19.09 | | | 1973 | 86213 |
| | | 0.12 | | | 78.4 | 3.000 | 0.127 | 1.070 | 1.150 | --- | 14.60 | 20.57 | | | 21.62 | | | 1973 | 86213 |
| | | 0.12 | | | 78.4 | 3.000 | 0.127 | 1.090 | 1.090 | --- | 14.60 | 20.83 | | | 20.83 | | | 1973 | 86213 |
| | | 0.12 | | | 78.4 | 3.000 | 0.127 | 1.080 | 1.320 | --- | 14.90 | 21.12 | | | 24.44 | | | 1973 | 86213 |
| | | 0.12 | | | 77.4 | 3.000 | 0.128 | 1.100 | 1.280 | --- | 14.80 | 21.24 | | | 23.71 | | | 1973 | 86213 |
| T651 | Plate | 0.25 | R.T. | T-L | 78.0 | 3.000 | 0.256 | 1.120 | 1.140 | --- | 10.70 | 15.55 | 17.2 | 2.6 | 15.74 | 17.2 | 2.6 | 1973 | 86213 |
| | | 0.25 | | | 78.0 | 3.000 | 0.256 | 1.000 | 1.000 | --- | 15.00 | 20.20 | | | 20.20 | | | 1973 | 86213 |
| | | 0.25 | | | 78.0 | 3.000 | 0.256 | 1.140 | 1.140 | --- | 10.70 | 15.74 | | | 15.74 | | | 1973 | 86213 |
| T651 | Plate | 0.25 | R.T. | T-L | 78.0 | 4.000 | 0.256 | 1.330 | 1.330 | --- | 13.50 | 20.96 | 20.9 | 0.1 | 20.96 | 20.9 | 0.1 | 1973 | 86213 |
| | | 0.25 | | | 78.0 | 4.000 | 0.257 | 1.330 | 1.330 | --- | 13.40 | 20.80 | | | 20.80 | | | 1973 | 86213 |

# TABLE 7.2.2.2 (CONCLUDED)



## ALUMINUM 2020 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($K_{si}\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($K_{si}\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T651 | Plate | 1.00 | R.T. | T-L | 77.4 | 20.000 | 1.000 | 7.000 | 7.000 | --- | 5.40 | 19.39 | 19.4 | 0.8 | 19.39 | 19.4 | 0.8 | 1973 | 86213 |
| | | 1.00 | | | 77.4 | 20.000 | 1.000 | 7.000 | 7.000 | --- | 5.60 | 20.11 | | | 20.11 | | | 1973 | 86213 |
| | | 1.00 | | | 77.4 | 20.000 | 1.000 | 7.000 | 7.000 | --- | 5.90 | 21.19 | | | 21.19 | | | 1973 | 86213 |
| | | 1.00 | | | 77.4 | 20.000 | 1.000 | 7.000 | 7.000 | --- | 5.60 | 20.11 | | | 20.11 | | | 1973 | 86213 |
| | | 1.00 | | | 77.5 | 20.000 | 1.000 | 7.000 | 7.000 | --- | 5.40 | 19.39 | | | 19.39 | | | 1973 | 86213 |
| | | 1.00 | | | 77.5 | 20.000 | 1.000 | 7.000 | 7.000 | --- | 5.40 | 19.39 | | | 19.39 | | | 1973 | 86213 |
| | | 1.00 | | | 77.5 | 20.000 | 1.000 | 7.000 | 7.000 | --- | 5.40 | 19.39 | | | 19.39 | | | 1973 | 86213 |
| | | 1.00 | | | 77.5 | 20.000 | 1.000 | 7.000 | 7.000 | --- | 5.50 | 19.75 | | | 19.75 | | | 1973 | 86213 |
| | | 1.00 | | | 78.4 | 20.000 | 1.000 | 7.000 | 7.000 | --- | 5.20 | 18.67 | | | 18.67 | | | 1973 | 86213 |
| | | 1.00 | | | 78.4 | 20.000 | 1.000 | 7.000 | 7.000 | --- | 5.30 | 19.03 | | | 19.03 | | | 1973 | 86213 |
| | | 1.00 | | | 78.4 | 20.000 | 1.000 | 7.000 | 7.000 | --- | 5.10 | 18.31 | | | 18.31 | | | 1973 | 86213 |
| | | 1.00 | | | 78.4 | 20.000 | 1.000 | 7.000 | 7.000 | --- | 5.10 | 18.31 | | | 18.31 | | | 1973 | 86213 |

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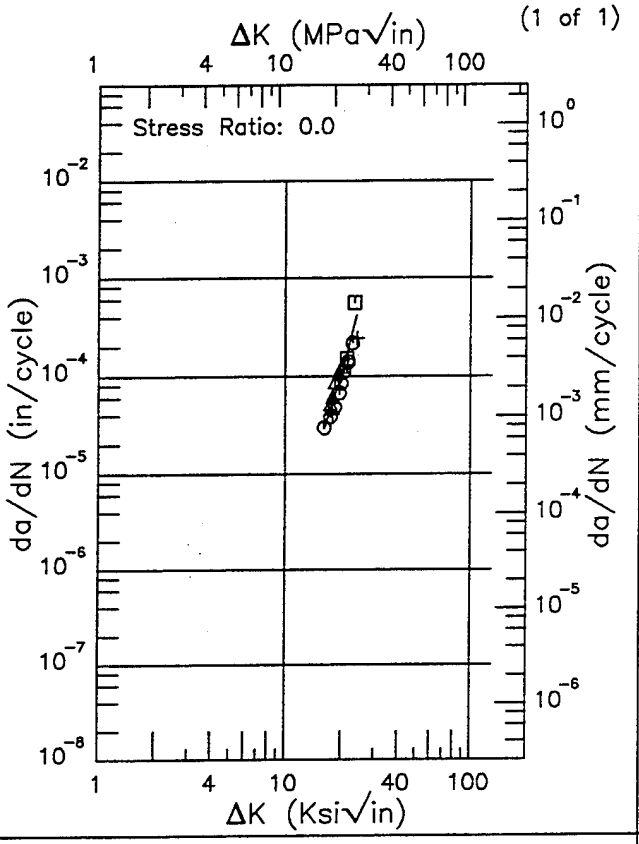
## 2020

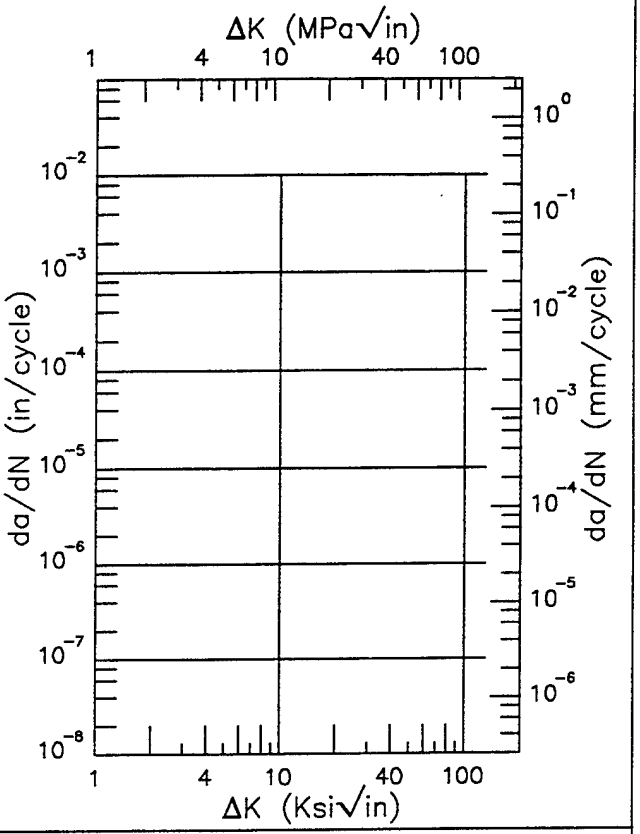
R

Condition/Ht: T6
Form: 0.13 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 13.3 Hz
Environment: LAB AIR; RT

Yield Strength: 78.4 ksi
Ult. Strength: 84.7 ksi
Specimen Thk: 0.125 – 0.126 in.
Specimen Width: 4 in.
Ref: 86213

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 16.10 (min) | 29.5 |
| 20. | 104. |
| 24.15 (max) | 415. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 25.95 | ⊕ △ ⊡ 0. .5 .8 1.25 2. |

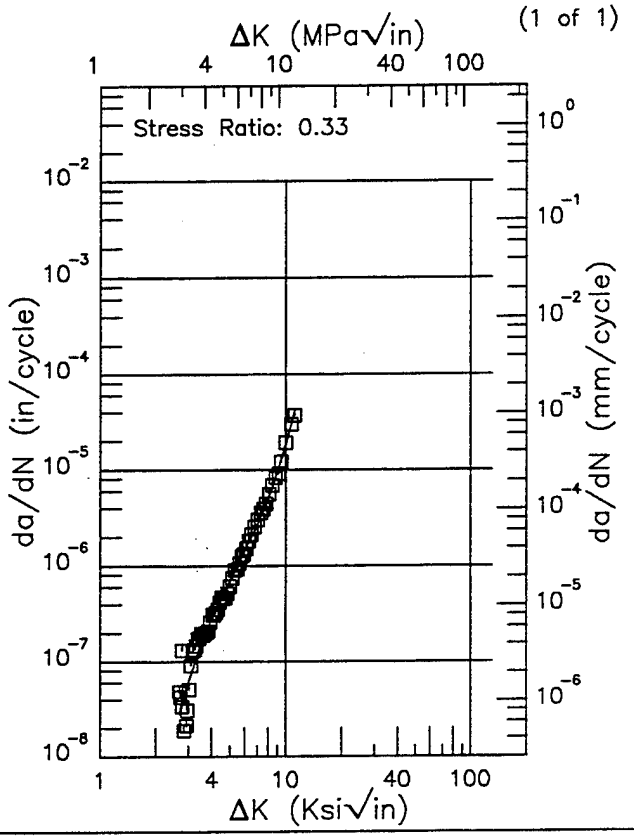
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

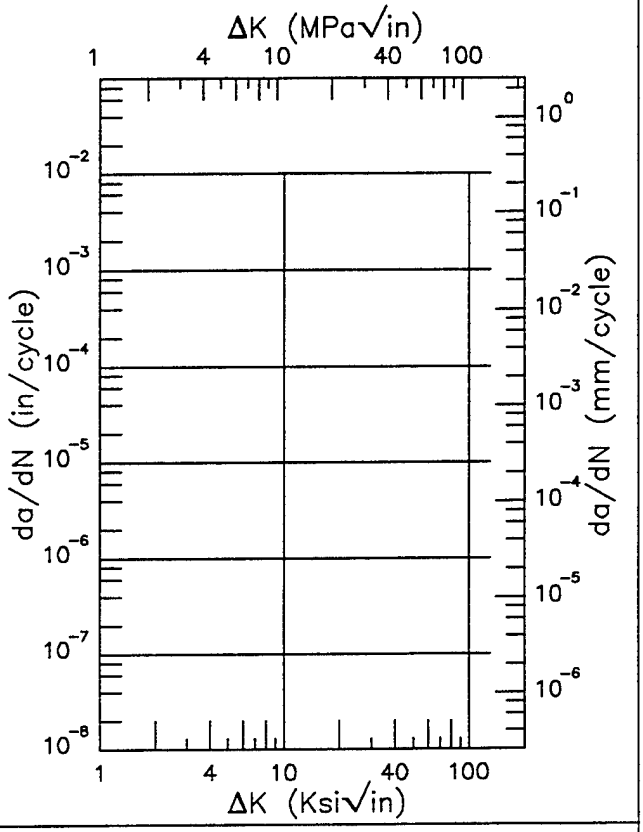
**Figure 7.2.3.1.1**

Condition/Ht: T651
Form: 1.28 in. Plate
Specimen Type: CT
Orientation: T–L
Frequency: 25 Hz
Environment: H.H.A.; RT

Yield Strength:
Ult. Strength:
Specimen Thk: 0.248 in.
Specimen Width: 2.5 in.
Ref: AL002

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.68 (min) | 0.0282 |
| 3. | 0.0612 |
| 3.5 | 0.148 |
| 4. | 0.281 |
| 5. | 0.702 |
| 6. | 1.42 |
| 7. | 2.68 |
| 8. | 5.01 |
| 9. | 9.52 |
| 10. | 18.5 |
| 11.13 (max) | 40.5 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 44.51 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.2.3.1.2**

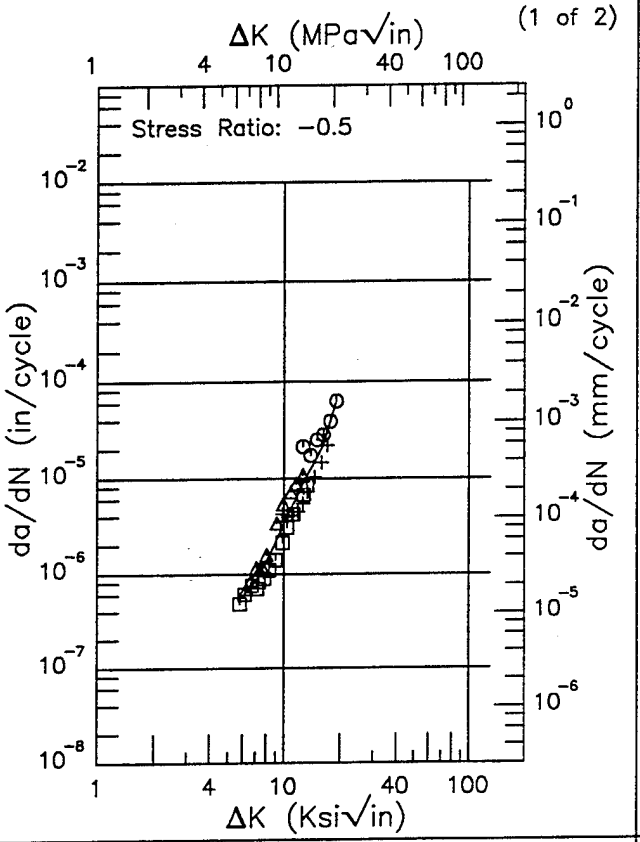
## 2020

R

Condition/Ht: T651
Form: 1.38 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 5.2 Hz
Environment: LAB AIR; RT

Yield Strength: 76.2 ksi
Ult. Strength: 81.7 ksi
Specimen Thk: 0.748 – 0.754 in.
Specimen Width: 2.997 – 3.003 in.
Ref: 86213

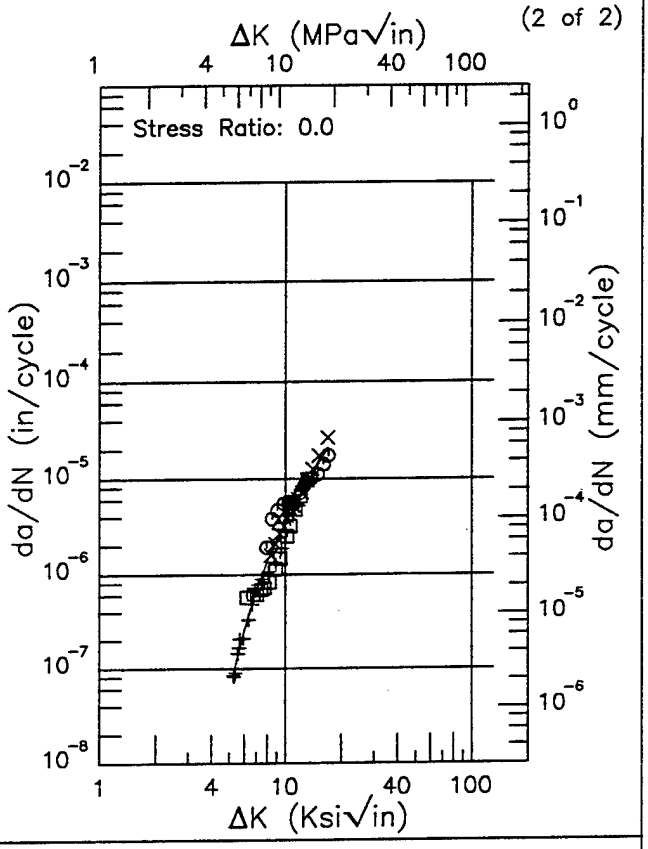
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 5.76 (min) | 0.555 |
| 6. | 0.584 |
| 7. | 0.834 |
| 8. | 1.33 |
| 9. | 2.15 |
| 10. | 3.40 |
| 13. | 9.66 |
| 16. | 21.3 |
| 18.95 (max) | 60.6 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 37.53 | □ △+ ○ — 0. .5 .8 1.25 2. |

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 5.25 (min) | 0.0892 |
| 6. | 0.255 |
| 7. | 0.678 |
| 8. | 1.35 |
| 9. | 2.26 |
| 10. | 3.41 |
| 13. | 8.64 |
| 16. | 17.3 |
| 16.95 (max) | 20.9 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 33.19 | + × △□○ — 0. .5 .8 1.25 2. |

**Figure 7.2.3.1.3**

## TABLE 7.2.3.3



## $K_{Iscc}$ SUMMARY FOR ALUMINUM ALLOY 2020

| Condition/Ht | Prod Form | Test Temp (°F) | Spec Or. | Yield Str (Ksi) | Envir. | Specimen | | | Prod Thk (in) | Crack (in) | $K_Q$ (Ksi$\sqrt{in}$) | $K_{Iscc}$ (Ksi$\sqrt{in}$) | Test Time (min) | Test Date | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Design | Width (in) | Thick (in) | | | | | | | |
| T651 | P | R.T. | S-L | 60 | 3.5% NaCl | DCB | 4 | 1 | 1 | --- | 13 | 9 | --- | 1968 | 84331 |

# TABLE 7.3.2.2



## ALUMINUM 2020 (ALCLAD) $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_C$ (Ksi$\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T6 | Sheet | 0.12 | R.T. | L-T | 68.6 | 2.980 | 0.122 | 0.988 | 1.350 | --- | 23.10 | 30.90 | 31.8 | 0.9 | 38.65 | 40.2 | 3.3 | 1973 | 86213 |
| | | 0.12 | | | 68.6 | 3.000 | 0.122 | 1.100 | 1.410 | --- | 22.50 | 32.30 | | | 38.94 | | | 1973 | 86213 |
| | | 0.12 | | | 68.6 | 3.000 | 0.122 | 1.290 | 1.610 | --- | 20.20 | 32.55 | | | 39.39 | | | 1973 | 86213 |
| | | 0.12 | | | 68.6 | 2.970 | 0.123 | 0.985 | 1.550 | --- | 23.10 | 30.83 | | | 43.63 | | | 1973 | 86213 |
| | | 0.12 | | | 68.6 | 2.970 | 0.123 | 0.990 | 1.570 | --- | 24.00 | 32.16 | | | 45.89 | | | 1973 | 86213 |
| | | 0.12 | | | 68.6 | 3.000 | 0.123 | 1.000 | 1.260 | --- | 24.50 | 33.00 | | | 38.78 | | | 1973 | 86213 |
| | | 0.12 | | | 68.6 | 3.000 | 0.123 | 1.000 | 1.250 | --- | 23.00 | 30.98 | | | 36.18 | | | 1973 | 86213 |
| T6 | Sheet | 0.06 | R.T. | L-T | 68.0 | 15.800 | 0.062 | 4.000 | 4.130 | --- | 13.30 | 34.72 | 34.6 | 2.2 | 35.38 | 34.1 | 1.8 | 1973 | 86213 |
| | | 0.06 | | | 68.0 | 15.800 | 0.062 | 3.990 | --- | --- | 14.10 | 36.76 | | | --- | | | 1973 | 86213 |
| | | 0.06 | | | 68.0 | 15.800 | 0.063 | 3.990 | 4.090 | --- | 12.40 | 32.32 | | | 32.80 | | | 1973 | 86213 |
| T6 | Sheet | 0.12 | R.T. | T-L | 68.4 | 3.000 | 0.121 | 1.100 | 1.380 | --- | 15.90 | 22.82 | 24.1 | 1.3 | 27.03 | 30.4 | 5.0 | 1973 | 86213 |
| | | 0.12 | | | 68.4 | 2.960 | 0.122 | 0.993 | 1.540 | --- | 18.90 | 25.37 | | | 35.54 | | | 1973 | 86213 |
| | | 0.12 | | | 68.4 | 2.970 | 0.122 | 0.983 | 1.500 | --- | 19.10 | 25.46 | | | 35.01 | | | 1973 | 86213 |
| | | 0.12 | | | 68.4 | 2.970 | 0.122 | 0.989 | 1.500 | --- | 18.10 | 24.22 | | | 33.17 | | | 1973 | 86213 |
| | | 0.12 | | | 68.4 | 2.970 | 0.122 | 0.997 | 1.540 | --- | 17.90 | 24.08 | | | 33.61 | | | 1973 | 86213 |
| | | 0.12 | | | 68.4 | 3.000 | 0.122 | 1.110 | 1.310 | --- | 15.00 | 21.67 | | | 24.46 | | | 1973 | 86213 |
| | | 0.12 | | | 68.4 | 3.000 | 0.123 | 1.000 | 1.000 | --- | 18.00 | 24.24 | | | 24.24 | | | 1973 | 86213 |
| | | 0.12 | | | 68.4 | 3.000 | 0.123 | 1.000 | --- | --- | 18.40 | 24.78 | | | --- | | | 1973 | 86213 |
| T6 | Sheet | 0.06 | R.T. | T-L | 67.2 | 15.800 | 0.064 | 4.020 | --- | --- | 12.10 | 31.68 | 32.2 | 0.6 | --- | 33.9 | 1.2 | 1973 | 86213 |
| | | 0.06 | | | 67.2 | 15.820 | 0.064 | 4.010 | 4.400 | --- | 12.60 | 32.94 | | | 34.80 | | | 1973 | 86213 |
| | | 0.06 | | | 67.2 | 15.820 | 0.064 | 4.000 | 4.200 | --- | 12.30 | 32.11 | | | 33.04 | | | 1973 | 86213 |

# TABLE 7.4.1.1



## MEAN PLANE STRAIN FRACTURE TOUGHNESS FOR ALUMINUM 2000/6000 SERIES ALLOY 2021 AT ROOM TEMPERATURE

| Product Form | Condition/Heat Treatment | $K_{Ic}$ ($ksi\sqrt{in}$) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Specimen Orientation | | | | | | | | |
| | | L-T | | | T-L | | | S-L | | |
| | | Mean $K_{Ic}$ | Std Dev | n | Mean $K_{Ic}$ | Std Dev | n | Mean $K_{Ic}$ | Std Dev | n |
| Plate | T81 | 27. | 0.5 | 3 | --- | --- | --- | --- | --- | --- |
| | T81 REPAIR WELD + AGE WITH 2319 FILLER WIRE | --- | --- | --- | 15.8 | 0.7 | 6 | --- | --- | --- |
| | T81 WELD + AGE WITH 2319 FILLER WIRE | --- | --- | --- | 19.4 | 2.7 | 9 | --- | --- | --- |

# TABLE 7.4.2.1



## ALUMINUM 2021 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T81 | Plate | 1.00 | R.T. | L-T | 61.2 | 1.990 | 0.996 | CT | 0.937 | 0.47 | 26.60 | 27.0 | 0.5 | 1972 | 84363 |
| | | 1.00 | | | 61.2 | 2.000 | 0.995 | CT | 0.933 | 0.50 | 27.50 | | | 1972 | 84363 |
| | | 1.00 | | | 61.2 | 2.000 | 0.993 | CT | 0.961 | 0.48 | 26.80 | | | 1972 | 84363 |
| T81 REPAIR WELD + AGE WITH 2319 FILLER WIRE | Plate | 1.00 | R.T. | T-L | --- | 2.000 | 1.000 | CT | 1.000 | 0.15 | 15.90 | 15.8 | 0.7 | 1970 | 80073 |
| | | 1.00 | | | --- | 2.000 | 1.000 | CT | 1.010 | 0.14 | 15.20 | | | 1970 | 80073 |
| | | 1.00 | | | --- | 2.000 | 1.000 | CT | 0.990 | 0.14 | 15.20 | | | 1970 | 80073 |
| | | 1.00 | | | --- | 2.000 | 1.000 | CT | 1.030 | 0.16 | 16.00 | | | 1970 | 80073 |
| | | 1.00 | | | --- | 2.000 | 1.000 | CT | 1.040 | 0.14 | 15.20 | | | 1970 | 80073 |
| | | 1.00 | | | --- | 2.000 | 1.000 | CT | 1.020 | 0.18 | 17.00 | | | 1970 | 80073 |
| T81 WELD + AGE WITH 2319 FILLER WIRE | Plate | 1.00 | R.T. | T-L | --- | 2.000 | 1.000 | CT | 1.040 | 0.19 | 17.60 | 19.4 | 2.7 | 1970 | 80073 |
| | | 1.00 | | | --- | 2.000 | 1.000 | CT | 1.030 | 0.20 | 18.40 | | | 1970 | 80073 |
| | | 1.00 | | | --- | 2.000 | 1.000 | CT | 0.990 | 0.16 | 16.40 | | | 1970 | 80073 |
| | | 1.00 | | | --- | 2.000 | 1.000 | CT | 1.020 | 0.32 | 22.90 | | | 1970 | 80073 |
| | | 1.00 | | | --- | 2.000 | 1.000 | CT | 1.080 | 0.22 | 18.90 | | | 1970 | 80073 |
| | | 1.00 | | | --- | 2.000 | 1.000 | CT | 1.050 | 0.33 | 23.20 | | | 1970 | 80073 |
| | | 1.00 | | | --- | 2.000 | 1.000 | CT | 1.040 | 0.18 | 17.20 | | | 1970 | 80073 |
| | | 1.00 | | | --- | 2.000 | 1.000 | CT | 1.010 | 0.31 | 22.60 | | | 1970 | 80073 |
| | | 1.00 | | | --- | 2.000 | 1.000 | CT | 1.040 | 0.19 | 17.50 | | | 1970 | 80073 |
| T8151 | Plate | 1.00 | 84 | L-T | 64.8 | 1.500 | 0.749 | CT | 0.706 | 0.32 | 23.10 | 22.6 | 0.8 | 1973 | 86213 |
| | | 1.00 | | | 64.8 | 1.500 | 0.749 | CT | 0.714 | 0.29 | 22.00 | | | 1973 | 86213 |
| T8151 | Plate | 1.00 | 84 | T-L | 63.4 | 1.500 | 0.751 | CT | 0.726 | 0.23 | 19.10 | --- | --- | 1973 | 86213 |

## TABLE 7.4.3.3



## $K_{Iscc}$ SUMMARY FOR ALUMINUM ALLOY 2021

| Condition/Ht | Prod Form | Test Temp (°F) | Spec Or. | Yield Str (Ksi) | Envir. | Specimen | | | Prod Thk (in) | Crack (in) | $K_Q$ (Ksi√in) | $K_{Iscc}$ (Ksi√in) | Test Time (min) | Test Date | Refer |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Thick (in) | Design | Width (in) | | | | | | | |
| T81 | P | R.T. | S-L | 59.1 | Industrial Atm | 1 | CT | 2 | 2.5 | --- | 19.6 | 19 | --- | 1973 | 86688 |
| | | | | | Salt-Dichromate-Acetate | 1 | CT | 2 | 2.5 | --- | 19.6 | 19 | --- | 1973 | 86688 |
| | | | | | Seacoast Atm | 1 | CT | 2 | 2.5 | --- | 19.6 | 19 | --- | 1973 | 86688 |
| T81 Overheated Weld | P | R.T. | S-L | 18.3 | 3.5% NaCl | 1 | WOL | 2.5 | 1 | --- | 14 | 11.3 | --- | 1970 | 80073 |
| T81 Repaired Weld Aged 16hr 325F Heat Affected Zone | P | R.T. | S-L | 28 | 3.5% NaCl | 1 | WOL | 2.5 | 1 | --- | 14 | 11.9 | --- | 1970 | 80073 |
| T81 Repaired Weld Aged 16hr 325F Weld Center Line | P | R.T. | S-L | 24.7 | 3.5% NaCl | 1 | WOL | 2.5 | 1 | --- | 14 | >10.3 | --- | 1970 | 80073 |
| T81 Repaired Weld Aged 16hr 325F Weld Fusion Line | P | R.T. | S-L | 24.7 | 3.5% NaCl | 1 | WOL | 2.5 | 1 | --- | 14 | 7.7 | --- | 1970 | 80073 |
| T81 Welded Aged 16hr 325F Fusion Line | P | R.T. | S-L | 23.4 | 3.5% NaCl | 1 | WOL | 2.5 | 1 | --- | 17 | 8.5 | --- | 1970 | 80073 |
| T81 Welded Aged 16hr 325F Heat Affected Zone | P | R.T. | S-L | 25 | 3.5% NaCl | 1 | WOL | 2.5 | 1 | --- | 14 | 13.3 | --- | 1970 | 80073 |
| T81 Welded Aged 16hr 325F Weld Center Line | P | R.T. | S-L | 23.4 | 3.5% NaCl | 1 | WOL | 2.5 | 1 | --- | 17 | 7.2 | --- | 1970 | 80073 |

# TABLE 7.5.1.1



## MEAN PLANE STRAIN FRACTURE TOUGHNESS FOR ALUMINUM 2000/6000 SERIES ALLOY 2024 AT ROOM TEMPERATURE

| Product Form | Condition/Heat Treatment | $K_{Ic}$ ($ksi\sqrt{in}$) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Specimen Orientation | | | | | | | | |
| | | L-T | | | T-L | | | S-L | | |
| | | Mean $K_{Ic}$ | Std Dev | n | Mean $K_{Ic}$ | Std Dev | n | Mean $K_{Ic}$ | Std Dev | n |
| Plate | T351 | 33.4 | 3.9 | 5 | --- | --- | --- | --- | --- | --- |
| | T851 | 23.3 | 2.4 | 65 | 20.7 | 1.9 | 63 | --- | --- | --- |
| Forging | T852 | 29.2 | 5.2 | 24 | 18.9 | 2.6 | 16 | 15.9 | 0.8 | 8 |
| Extrusion | T351 | --- | --- | --- | 25. | 0.9 | 5 | --- | --- | --- |
| | T3511 | 38. | 2.6 | 4 | --- | --- | --- | --- | --- | --- |
| | T8510 | 30.4 | 2.7 | 3 | 16.5 | 1. | 3 | 15.7 | 1.4 | 3 |
| | T8511 | 24.1 | 0.4 | 2 | 16 | 0 | 2 | --- | --- | --- |

TABLE 7.5.1.2.1



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK
## 2024 AT ROOM TEMPERATURE

**ORIENTATION: L-S** **ENVIRONMENT: H.H.A.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.1 | 20 | | 0.5 | | | | |
| | | 0.1 | 20 | | | 6.28 | | | |
| | | 0.1 | 30 | | 0.35 | | | | |

TABLE 7.5.1.2.2



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2024 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: 3.5% NaCl**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.02 | 1 | | | 9.77 | 67.6 | | |
| | | 0.02 | 10 | | | 3.23 | 73.3 | | |

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2024 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: Distilled Water**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level ($Ksi\sqrt{in}$) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T3 | SHEET | 0.05 | 1 | | | 5.35 | 46.79 | | |
| | | 0.05 | 1 | | | 6.16 | 69.97 | | |
| | | 0.05 | 1 | | | 6.35 | | | |
| | | 0.8 | 1 | | 0.99 | | | | |
| T351 | PLATE | 0.05 | 1 | | | 6.67 | 74.93 | | |
| | | 0.8 | 1 | 0.07 | 1.15 | | | | |
| T851 | PLATE | 0.08 | 1 | | | 7.03 | | | |

TABLE 7.5.1.2.4



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK
## 2014 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: Dry Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T3 | UNSPECIFIED | 0.2 | 20 | | | 3.87 | 25.62 | | |
| | | 0.2 | 20 | | | 3.61 | 22.15 | | |
| | | 0.2 | 20 | | | 3.63 | 26.99 | | |
| | | 0.2 | 20 | | | 3.61 | 25.31 | | |
| | | 0.2 | 20 | | | 3.69 | 27.38 | | |
| | | 0.2 | 20 | | | 3.72 | 26.67 | | |
| | | 0.2 | 20 | | | 3.98 | 24.48 | | |
| | | 0.2 | 20 | | | 4.06 | 24.89 | | |
| | | 0.2 | 20 | | | 3.66 | 23.05 | | |
| T81 | SHEET | -0.25 | 6 | | | 4.01 | 43.64 | | |
| | | 0.08 | 1 | | | 5.91 | 74.38 | | |
| | | 0.08 | 6 | | | 5.45 | | | |
| | | 0.1 | 6 | | | 5.81 | 54.96 | | |
| | | 0.3 | 6 | | | 9.26 | 59.55 | | |
| | | 0.3 | 6 | | | 8.65 | 206.08 | | |

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK
## 2014 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: Dry Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 6.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T81 (Cont'd) | SHEET (Cont'd) | 0.5 | 6 | | 1.36 | 14.82 | | | |
| | | 0.5 | 6 | | 1.43 | 13.78 | 258.73 | | |
| | | 0.5 | 6 | | 1.2 | 19.32 | 679.33 | | |
| T851 | PLATE | 0.08 | 1 | | | 6.36 | | | |
| | | 0.08 | 6 | | | 9.2 | | | |
| | | 0.3 | 1 | | | 12.91 | | | |
| T852 | FORGING | 0.08 | 0.1 | | | 5.8 | | | |
| | | 0.08 | 1 | | 1.1 | 9.91 | | | |
| | | 0.08 | 6 | | | 3.73 | 43.14 | | |
| | | 0.08 | 6 | | | 3.34 | 21.21 | | |

## TABLE 7.5.1.2.5



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2024 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: H.H.A.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T3 | SHEET | 0.05 | 2 | | | | 35.29 | | |
| T351 | SHEET | 0. | 9 | | | 4.18 | | | |
| | | 0.7 | 9 | | 0.64 | 8.42 | | | |
| | PLATE | 0.33 | 25 | | 0.7 | 11.63 | 94.93 | | |
| T3511 | EXTRUSTION | 0.05 | 9 | | 0.07 | 5.99 | | | |
| | | 0.5 | 9 | 0.06 | | | | | |
| | | 0.5 | 9 | | 0.47 | 10.68 | 65.82 | | |
| T62 | SHEET | 0.1 | 1 | | 0.31 | 4.6 | | | |
| | | 0.3 | 1 | | 0.46 | 10.06 | 96.42 | | |
| T81 | SHEET | -0.25 | 1 | | 0.3 | 7 | 49.16 | | |
| | | 0.1 | 0.1 | | | 43.86 | | | |
| | | 0.1 | 1 | | | 7.82 | 68.06 | | |
| | | 0.3 | 1 | | 1.04 | 14.51 | | | |
| | | 0.5 | 1 | | 1.48 | 17.19 | | | |
| T851 | PLATE | 0.33 | 25 | | 0.92 | 12.36 | | | |

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK
## 2024 ALLOYS AT ROOM TEMPERATURE

**ORIENTATION:L-T** **ENVIRONMENT: JP-4 Jet Fuel**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level (Ksi√in) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T81 | SHEET | 0.08 | 1 | | | 8.11 | 66.34 | | |
| | | 0.08 | 1 | | | 7.52 | 75.1 | | |
| T851 | PLATE | 0.02 | 10 | | | 7.85 | 42.48 | | |
| | | 0.08 | 1 | | | 8.43 | 108.16 | | |

## TABLE 7.5.1.2.7



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2024 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T3 | SHEET | 0. | 13.3 | | | | 28.56 | | |
| | | 0.05 | 5 | 0.04 | 0.44 | 5.11 | 37.22 | | |
| | | 0.05 | 5 | | 0.23 | 4.34 | 94 | | |
| | | 0.05 | 10 | | 0.27 | 4.1 | 31.19 | | |
| | | 0.2 | 10 | | 0.24 | 10.21 | 29.54 | | |
| | | 0.33 | 3.33 | | | | 196.72 | | |
| | | 0.4 | 5 | 0.09 | 0.47 | 8.19 | 108.59 | | |
| | | 0.4 | 5 | 0.09 | 0.65 | 9.28 | 84.19 | | |
| | | 0.4 | 8-15 | | 0.45 | 9.34 | 134.24 | | |
| | | 0.8 | 10 | 0.16 | 1.89 | 29.04 | | | |
| | | 0.8 | 10-15 | 0.15 | 1.12 | 18.49 | | | |
| | PLATE | -1 | 20 | | | 10.37 | 72.53 | | |
| | | -0.5 | 20 | | 0.17 | 12.2 | 68.27 | | |
| | | 0.05 | 20 | | | 9.8 | | | |

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK
## 2024 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level ($Ksi\sqrt{in}$) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T351 | SHEET | 0. | 6 | | | 6.14 | 44.18 | | |
| | | 0.4 | 3 | | | | 165.36 | | |
| | | 0.8 | 6 | | | 39.33 | | | |
| | PLATE | -1 | 2-3 | | | | 108.2 | | |
| | | -1 | 5 | | 0.27 | 8.6 | 43.66 | | |
| | | -1 | 3-6 | | | | 62.29 | | |
| | | -1 | 2-10 | | 0.5 | 10.3 | 152.02 | | |
| | | -0.5 | 3-5 | | 0.3 | 6.24 | 45.67 | | |
| | | 0. | 1-6 | | | | | | |
| | | 0. | 10-20 | | 0.16 | | | | |
| | | 0.01 | 2-5 | | 0.22 | 5.84 | 49.75 | | |
| | | 0.01 | 20 | | | 5.96 | 52.12 | | |
| | | 0.05 | 5 | | | | 65.03 | | |
| | | 0.05 | 5 | | | | | | |
| | | 0.05 | 10 | | 0.35 | 7.28 | 42.32 | | |
| | | 0.05 | 5-15 | | 0.17 | 6.04 | 45.39 | | |

## TABLE 7.5.1.2.7 (CONTINUED)



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK
## 2024 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level ($Ksi\sqrt{in}$) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T351 (Cont'd) | PLATE (Cont'd) | 0.1 | 3 | | | | 54.97 | | |
| | | 0.1 | 20 | | | 8.51 | | | |
| | | 0.3 | 20 | | | 10.52 | | | |
| | | 0.33 | 25 | | | 8.21 | | | |
| | | 0.4 | 3 | | | | 241.62 | | |
| | | 0.4 | 5 | | 0.69 | 11.71 | | | |
| | | 0.4 | 10 | | 0.52 | | | | |
| | | 0.4 | 10 | | 0.55 | 6 | 83.87 | | |
| | | 0.4 | 12 | 0.04 | 0.57 | 10.72 | | | |
| | | 0.5 | 20 | | | 13.16 | | | |
| | | 0.6 | 10 | | 0.81 | 12.69 | | | |
| | | 0.6 | 20 | | | 14.67 | | | |
| | | 0.8 | 1-5 | | 1.65 | 32.4 | | | |
| | | 0.8 | 5-10 | | | 27.69 | | | |
| | | 0.8 | 5-10 | | 1.42 | | | | |

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK
## 2024 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level ($Ksi\sqrt{in}$) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T351 (Cont'd) | PLATE (Cont'd) | 0.8 | 15 | 0.12 | 1.19 | | | | |
| | | 0.8 | 3-16 | | | 56.84 | | | |
| | | 0.8 | 20 | 0.13 | 1.79 | | | | |
| T3511 | EXTRUSION | 0.05 | 9 | | 0.13 | | | | |
| | | 0.1 | 20 | | 0.14 | 5.32 | 72.99 | | |
| | | 0.5 | 9 | 0.08 | | | | | |
| | | 0.5 | 20 | 0.04 | 0.46 | 12.95 | | | |
| | | 0.8 | 20 | | 1.3 | | | | |
| | | 0.8 | 25 | 0.13 | | | | | |
| T42 | PLATE | -1 | 10 | | | 6.41 | 43.76 | | |
| | | 0.02 | 10 | | | 4.41 | 20.66 | 998.91 | |
| | | 0.5 | 10 | | 0.43 | 7.79 | 43.92 | | |
| T81 | SHEET | 0.05 | 2 | | | | 63.62 | | |
| | | 0.4 | 2 | | | | 100.13 | | |
| T851 | PLATE | 0.02 | 10 | | | 3.59 | 43.67 | | |

TABLE 7.5.1.2.8



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2024 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: S.C.S.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 60.0 | 100.0 |
| T852 | FORGING | 0.08 | 1 | | 1.47 | 9.64 | | | |

# FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2024 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: S.T.W.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level (Ksi√in) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T351 | SHEET | 0. | 1 | | | 3.16 | | | |
| | | 0.33 | 10 | | | | 115.83 | | |
| | PLATE | 0.05 | 1 | | | 5.95 | 84.96 | | |
| | | 0.4 | 1 | | | 11.28 | | | |
| | | 0.8 | 1 | | 1 | | | | |
| T62 | SHEET | 0.1 | 1 | | 0.74 | 8.18 | | | |
| | | 0.5 | 1 | | 1.48 | | | | |
| | | 0.7 | 1 | | 1.92 | | | | |
| T81 | SHEET | -0.2 | 1 | | 0.77 | 12.72 | | | |
| | | 0.08 | 1 | | | 7.92 | 87.69 | | |
| | | 0.08 | 1 | | | 9.17 | 75.72 | | |
| | | 0.1 | 1 | | 0.37 | 8.25 | | | |
| T851 | PLATE | 0.08 | 1 | | | 7.87 | 101.73 | | |

TABLE 7.5.1.2.10



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2024 AT ROOM TEMPERATURE

**ORIENTATION: T-S** **ENVIRONMENT: 3.5% NaCl**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) ΔK *Level* (*Ksi√in*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.1 | 20 | | 1.19 | | | | |
| | | 0.1 | 20 | | | 7.07 | | | |
| | | 0.1 | 20 | | | 5.71 | | | |
| | | 0.5 | 20 | | | 9.89 | 229.11 | | |
| | | 0.5 | 20 | | 1.03 | 9.8 | | | |

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK
## 2024 AT ROOM TEMPERATURE

**ORIENTATION: T-S** **ENVIRONMENT: H.H.A.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level (Ksi√in)* | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.1 | 20 | | 0.59 | 5.14 | | | |
| | | 0.1 | 20 | | 0.57 | 5.29 | | | |
| | | 0.5 | 2 | | 0.69 | 11.71 | | | |
| | | 0.5 | 2 | | 0.95 | | | | |
| | | 0.5 | 20 | 0.07 | 1.26 | 8.43 | | | |

TABLE 7.5.1.2.12



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2024 AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: 3.5% NaCl**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* ($Ksi\sqrt{in}$) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.1 | 20 | | 1.43 | 10.37 | 130.27 | | |
| | | 0.1 | 20 | | 0.96 | 9.7 | | | |
| | | 0.5 | 20 | 0.21 | 2.28 | 22.43 | | | |

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK
## 2024 AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: Distilled Water**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level ($Ksi\sqrt{in}$) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T3 | SHEET | 0.05 | 1 | | | 5.5 | 53.56 | | |
| | | 0.05 | 1-5 | | | 3.48 | 39.11 | | |
| | | 0.8 | 1 | | 0.91 | | | | |
| | | 0.8 | 1-5 | 0.28 | 1.47 | | | | |

## TABLE 7.5.1.2.14



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2024 AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: Dry Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level (Ksi√in) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T62 | SHEET | 0.1 | 6 | | 0.8 | 11.85 | | | |
| | | 0.3 | 6 | | 0.68 | 11.37 | | | |
| | | 0.5 | 6 | 0.05 | 0.94 | 14.87 | | | |
| T81 | SHEET | -0.25 | 6 | | | 3.63 | 48.23 | | |
| | | 0.08 | 6 | | | 4.3 | 74.54 | | |
| | | 0.1 | 6 | | | 3.53 | | | |
| T851 | PLATE | 0.08 | 1 | | | 5.9 | | | |
| | | 0.08 | 6 | | | 9.54 | | | |

## TABLE 7.5.1.2.15

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2024 AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: H.H.A.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T62 | SHEET | 0.3 | 1 | | 0.79 | 11.71 | | | |
| | | 0.5 | 1 | 0.13 | 1.28 | 14.95 | | | |
| T81 | SHEET | -0.25 | 1 | | | 5.4 | 69.48 | | |
| | | 0.1 | 1 | | | 6.41 | 131.38 | | |
| | | 0.5 | 1 | | 1.58 | 21.7 | | | |
| T851 | PLATE | 0.1 | 20 | | | 8.28 | 79.17 | | |
| | | 0.1 | 20 | | 0.51 | 9.76 | | | |
| | | 0.5 | 20 | 0.12 | 1.38 | 17.74 | | | |

## TABLE 7.5.1.2.16



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2024 AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T3 | SHEET | 0.05 | 3-10 | | 0.34 | 4.55 | 42.37 | | |
| | | 0.05 | 30 | | 0.26 | | | | |
| | | 0.4 | 0.5-15 | 0.08 | 0.78 | 12.68 | 107.66 | | |
| | | 0.4 | 30 | | 0.95 | | | | |
| | | 0.6 | 30 | | 1.24 | | | | |
| | | 0.8 | 2-10 | 0.17 | 1.65 | 28.91 | | | |
| T852 | FORGING | 0.33 | 5.17 | | | 5.53 | | | |
| T861 | SHEET | 0.08 | 0.1-0.3 | | | | 666.53 | | |
| | | 0.08 | 10-15 | | 0.68 | 7.97 | | | |
| | | 0.1 | 0.1-0.4 | | | | 792.88 | | |
| | | 0.1 | 2-3 | | | | 92.68 | | |
| | | 0.1 | 5 | | | | 108.72 | | |
| | | 0.1 | 4-9 | | | 7.84 | | | |
| | | 0.1 | 3-10 | | | | 790.1 | | |
| | | 0.1 | 10 | | | 9.92 | | | |

## TABLE 7.5.1.2.16 (CONCLUDED)

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK
## 2024 AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T861 (Cont'd) | SHEET (Cont'd) | 0.1 | 13 | | 1 | | | | |
| | | 0.1 | 10-15 | | 1.07 | 9.82 | | | |
| | | 0.4 | 10-15 | | 1.26 | 31.84 | | | |
| | PLATE | 0.1 | 1 | | | | 153.61 | | |
| | | 0.1 | 1.5-5 | | | | 173.27 | | |
| | | 0.1 | 10 | | | 6.94 | | | |

TABLE 7.5.1.2.17



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2024 AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: S.T.W.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* ($Ksi\sqrt{in}$) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T62 | SHEET | -0.25 | 1 | | 0.97 | 5.33 | | | |
| | | 0.1 | 1 | | 0.82 | 5.86 | | | |
| | | 0.3 | 1 | | 1.3 | 16.22 | | | |
| | | 0.5 | 1 | 0.11 | 2.5 | 25.44 | | | |
| T81 | SHEET | 0.08 | 1 | | | 6.85 | 98 | | |
| | | 0.1 | 1 | | 0.36 | 7.39 | 130.7 | | |
| T852 | FORGING | 0.08 | 1 | | | 5.19 | | | |

# TABLE 7.5.2.1



## ALUMINUM 2024 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ (Ksi * √in.)) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T351 | Plate | 1.00 | -65 | L-T | 55.7 | 2.008 | 0.999 | CT | 0.968 | 0.97 | 34.75 | 35.3 | 0.9 | 1987 | DA005 |
| | | 1.00 | | | 55.7 | 2.005 | 0.992 | CT | 0.966 | 0.98 | 34.89 | | | 1987 | DA005 |
| | | 1.00 | | | 60.1 | 2.006 | 1.000 | CT | 1.031 | 0.91 | 36.32 | | | 1987 | DA004 |
| T351 | Plate | 2.50 | R.T. | L-T | 53.8 | 2.000 | 1.000 | CT | 0.995 | 0.78 | 30.00 | 33.4 | 3.9 | 1973 | 86213 |
| | | 1.00 | | | 54.3 | 2.009 | 0.999 | CT | 0.924 | 0.86 | 31.81 | | | 1987 | DA005 |
| | | 1.00 | | | 54.3 | 2.006 | 1.000 | CT | 0.946 | 0.83 | 31.32 | | | 1987 | DA005 |
| | | 3.00 | | | 54.5 | 4.000 | 2.000 | NB | --- | --- | 40.00 | | | 1972 | 82878 |
| | | 1.00 | | | 57.0 | 2.007 | 1.000 | CT | 0.976 | 0.88 | 33.80 | | | 1987 | DA004 |
| T351 | Plate | 2.00 | R.T. | T-L | 43.8 | 4.010 | 2.000 | CT | 2.147 | 1.51 | 34.00 | --- | --- | 1973 | 86213 |
| T351 | Plate | 3.00 | R.T. | S-T | 64.0 | 2.500 | 1.250 | CT | --- | 0.30 | 22.00 | 21.3 | 0.6 | 1974 | 90011 |
| | | 3.00 | | | 64.0 | 2.500 | 1.250 | CT | --- | 0.27 | 21.00 | | | 1974 | 90011 |
| | | 3.00 | | | 64.0 | 2.500 | 1.250 | CT | --- | 0.27 | 21.00 | | | 1974 | 90011 |
| T351 | Plate | 1.00 | 84 | T-L | 49.0 | 1.500 | 0.750 | CT | 0.755 | 0.74 | 26.60 | 26.5 | 0.2 | 1973 | 86213 |
| | | 1.00 | | | 49.0 | 1.500 | 0.749 | CT | 0.749 | 0.72 | 26.30 | | | 1973 | 86213 |
| T351 | Plate | 2.50 | 85 | L-T | 55.9 | 2.000 | 1.000 | CT | 1.032 | 0.63 | 28.10 | 27.8 | 0.5 | 1973 | 86213 |
| | | 2.50 | | | 55.9 | 2.000 | 1.000 | CT | 1.001 | 0.60 | 27.40 | | | 1973 | 86213 |
| T351 | Plate | 2.50 | 85 | S-L | 44.8 | 2.000 | 0.999 | CT | 0.928 | 0.59 | 21.80 | --- | --- | 1973 | 86213 |
| T351 | Plate | 2.50 | 90 | S-L | 42.4 | 2.040 | 1.000 | CT | 1.021 | 0.50 | 18.90 | --- | --- | 1973 | 86213 |
| T351 | Extrusion | 3.00 | R.T. | T-L | 41.8 | 2.990 | 1.498 | CT | 1.561 | 0.92 | 25.30 | 25.0 | 0.9 | 1973 | 86213 |
| | | 3.00 | | | 41.8 | 2.990 | 1.498 | CT | 1.555 | 0.93 | 25.50 | | | 1973 | 86213 |
| | | 5.00 | | | 43.4 | 2.990 | 1.500 | CT | 1.558 | 0.73 | 23.40 | | | 1973 | 86213 |
| | | 3.00 | | | 43.5 | 3.000 | 1.500 | CT | 1.579 | 0.83 | 25.10 | | | 1973 | 86213 |
| | | 3.00 | | | 43.5 | 3.000 | 1.499 | CT | 1.562 | 0.86 | 25.50 | | | 1973 | 86213 |

# TABLE 7.5.2.1 (CONTINUED)



## ALUMINUM 2024 $K_{Ic}$

| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi * √in.) | $K_{Ic}$ MEAN | STAN DEV | | |
| T351 | Extrusion | 3.50 | 82 | T-L | 38.7 | 2.000 | 1.000 | CT | 1.048 | 0.95 | 23.80 | 24.1 | 0.3 | 1973 | 86213 |
| | | 5.00 | | | 41.1 | 3.000 | 1.498 | CT | 1.528 | 0.88 | 24.40 | | | 1973 | 86213 |
| | | 5.00 | | | 41.1 | 3.000 | 1.499 | CT | 1.514 | 0.85 | 24.00 | | | 1973 | 86213 |
| T351 | Extrusion | 3.00 | 82 | S-L | 41.7 | 2.000 | 0.999 | CT | 1.017 | 0.72 | 22.40 | 22.5 | 1.1 | 1973 | 86213 |
| | | 3.00 | | | 41.7 | 2.000 | 1.000 | CT | 1.012 | 0.63 | 21.00 | | | 1973 | 86213 |
| | | 3.00 | | | 42.8 | 2.000 | 1.000 | CT | 0.988 | 0.73 | 23.20 | | | 1973 | 86213 |
| | | 3.00 | | | 42.8 | 2.000 | 1.000 | CT | 1.007 | 0.75 | 23.50 | | | 1973 | 86213 |
| T351 | Forged Bar | 3.50 | 82 | T-L | 41.5 | 2.000 | 0.999 | CT | 1.050 | 0.94 | 25.50 | 24.5 | 0.9 | 1973 | 86213 |
| | | 3.50 | | | 41.5 | 2.000 | 1.000 | CT | 1.045 | 0.92 | 25.20 | | | 1973 | 86213 |
| | | 5.00 | | | 44.5 | 3.000 | 1.500 | CT | 1.594 | 0.75 | 24.40 | | | 1973 | 86213 |
| | | 5.00 | | | 44.5 | 3.000 | 1.500 | CT | 1.506 | 0.80 | 25.10 | | | 1973 | 86213 |
| | | 3.00 | | | 45.7 | 3.000 | 1.500 | CT | 1.504 | 0.63 | 23.00 | | | 1973 | 86213 |
| | | 3.00 | | | 45.7 | 3.000 | 1.500 | CT | 1.480 | 0.69 | 24.00 | | | 1973 | 86213 |
| T351 | Forged Bar | 3.00 | 82 | S-L | 42.1 | 1.990 | 1.002 | CT | 0.963 | 0.75 | 23.00 | 22.9 | 0.2 | 1973 | 86213 |
| | | 3.00 | | | 42.1 | 1.990 | 1.001 | CT | 0.970 | 0.73 | 22.70 | | | 1973 | 86213 |
| T3511 | Extrusion | 1.00 | 0 | T-L | --- | 1.998 | 0.989 | CT | 1.070 | --- | 25.15 | 25.0 | 0.3 | 1990 | SW001 |
| | | 1.00 | | | --- | 1.996 | 0.989 | CT | 1.071 | --- | 24.94 | | | 1990 | SW001 |
| | | 1.00 | | | --- | 1.999 | 0.989 | CT | 1.095 | --- | 25.24 | | | 1990 | SW001 |
| | | 1.00 | | | --- | 1.999 | 0.989 | CT | 1.077 | --- | 24.65 | | | 1990 | SW001 |
| T3511 | Extrusion | --- | R.T. | L-T | 61.2 | --- | 1.200 | CCP Max Load | --- | 1.06 | 39.90 | 38.0 | 2.6 | 1978 | BW007 |
| | | --- | | | 61.2 | --- | 1.200 | CCP Max Load | --- | 1.03 | 39.30 | | | 1978 | BW007 |
| | | --- | | | 61.2 | --- | 1.200 | CCP Max Load | --- | 0.98 | 38.40 | | | 1978 | BW007 |
| | | --- | | | 61.2 | --- | 1.200 | CCP Max Load | --- | 0.78 | 34.20 | | | 1978 | BW007 |

# TABLE 7.5.2.1 (CONTINUED)



## ALUMINUM 2024 $K_{Ic}$

| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 * $(K_{Ic}/TYS)^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi * $\sqrt{in.}$) | $K_{Ic}$ MEAN | STAN DEV | | |
| T851 | Plate | 1.39 | -320 | T-L | 79.0 | 3.000 | 1.390 | NB | 1.490 | 0.20 | 22.10 | 22.2 | 0.1 | 1971 | 84288 |
| | | 1.39 | | | 79.0 | 3.000 | 1.390 | NB | 1.480 | 0.20 | 22.20 | | | 1971 | 84288 |
| T851 | Plate | 1.39 | -112 | T-L | 69.2 | 3.000 | 1.390 | NB | 1.520 | 0.24 | 21.30 | 22.0 | 1.0 | 1971 | 84288 |
| | | 1.39 | | | 69.2 | 3.000 | 1.390 | NB | 1.570 | 0.27 | 22.70 | | | 1971 | 84288 |
| T851 | Plate | 3.00 | -65 | L-S | 64.4 | 1.500 | 0.750 | CT | 0.750 | 0.55 | 30.30 | 30.3 | 1.1 | 1972 | 83243 |
| | | 3.00 | | | 64.4 | 1.500 | 0.750 | CT | 0.750 | 0.59 | 31.40 | | | 1972 | 83243 |
| | | 3.00 | | | 64.4 | 1.500 | 0.750 | CT | 0.750 | 0.52 | 29.30 | | | 1972 | 83243 |
| T851 | Plate | 3.00 | -65 | L-T | 66.8 | 1.500 | 0.750 | CT | 0.750 | 0.43 | 27.60 | 26.2 | 1.6 | 1972 | 83243 |
| | | 3.00 | | | 66.8 | 1.500 | 0.750 | CT | 0.750 | 0.33 | 24.40 | | | 1972 | 83243 |
| | | 3.00 | | | 66.8 | 1.500 | 0.750 | CT | 0.750 | 0.39 | 26.50 | | | 1972 | 83243 |
| T851 | Plate | 3.00 | -65 | T-L | 66.5 | 1.500 | 0.750 | CT | 0.750 | 0.31 | 23.30 | --- | --- | 1972 | 83243 |
| T851 | Plate | 3.00 | 0 | L-S | 63.3 | 1.500 | 0.750 | CT | 0.750 | 0.63 | 31.70 | 31.6 | 0.2 | 1972 | 83243 |
| | | 3.00 | | | 63.3 | 1.500 | 0.750 | CT | 0.750 | 0.62 | 31.40 | | | 1972 | 83243 |
| T851 | Plate | 3.00 | 0 | L-T | 65.5 | 1.500 | 0.750 | CT | 0.750 | 0.37 | 25.20 | 27.5 | 2.2 | 1972 | 83243 |
| | | 3.00 | | | 65.5 | 1.500 | 0.750 | CT | 0.750 | 0.45 | 27.90 | | | 1972 | 83243 |
| | | 3.00 | | | 65.5 | 1.500 | 0.750 | CT | 0.750 | 0.51 | 29.50 | | | 1972 | 83243 |
| T851 | Plate | 3.00 | 0 | T-L | 65.5 | 1.500 | 0.750 | CT | 0.750 | 0.30 | 22.90 | 21.9 | 1.5 | 1972 | 83243 |
| | | 3.00 | | | 65.5 | 1.500 | 0.750 | CT | 0.750 | 0.25 | 20.80 | | | 1972 | 83243 |
| T851 | Plate | 3.00 | R.T. | L-S | 61.0 | 1.500 | 0.750 | CT | 0.750 | 0.69 | 32.20 | 27.5 | 4.5 | 1972 | 83243 |
| | | 3.00 | | | 61.0 | 1.500 | 0.750 | CT | 0.750 | 0.61 | 30.00 | | | 1972 | 83243 |
| | | 3.00 | | | 61.0 | 1.500 | 0.750 | CT | 0.750 | 0.67 | 31.70 | | | 1972 | 83243 |
| | | 1.37 | | | 66.1 | 1.006 | 0.499 | CT | 0.493 | 0.28 | 22.90 | | | 1978 | MPC01 |

# TABLE 7.5.2.1 (CONTINUED)



## ALUMINUM 2024 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 • ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi • √in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 1.37 | R.T. Cont'd | L-S Cont'd | 66.1 | 1.006 | 0.499 | CT | 0.513 | 0.27 | 21.90 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 1.50 | | | 67.5 | 1.200 | 0.602 | CT | 0.623 | 0.38 | 26.20 | | | 1973 | 86429 |
| T851 | Plate | 3.20 | R.T. | L-T | 59.3 | 2.500 | 1.254 | CT | 1.226 | 0.25 | 18.60 | 23.3 | 2.4 | 1971 | 84360 |
| | | 3.20 | | | 59.3 | 2.500 | 1.243 | CT | 1.206 | 0.25 | 18.70 | | | 1971 | 84360 |
| | | 2.50 | | | 60.0 | 1.990 | 1.000 | CT | 1.005 | 0.40 | 23.90 | | | 1973 | 86213 |
| | | 4.00 | | | 62.4 | 2.000 | 1.020 | NB | --- | 0.39 | 24.60 | | | 1974 | 90981 |
| | | 4.00 | | | 62.4 | 2.000 | 1.020 | NB | --- | 0.38 | 24.40 | | | 1974 | 90981 |
| | | 3.00 | | | 63.4 | 1.500 | 0.750 | CT | 0.750 | 0.45 | 26.90 | | | 1972 | 83243 |
| | | 3.00 | | | 63.4 | 1.500 | 0.750 | CT | 0.750 | 0.47 | 27.30 | | | 1972 | 83243 |
| | | 2.00 | | | 63.8 | 2.500 | 1.251 | CT | 1.311 | 0.41 | 25.70 | | | 1971 | 84360 |
| | | 2.00 | | | 63.8 | 2.500 | 1.250 | CT | 1.303 | 0.40 | 25.50 | | | 1971 | 84360 |
| | | 2.00 | | | 63.9 | 2.500 | 1.250 | CT | 1.203 | 0.30 | 22.10 | | | 1971 | 84360 |
| | | 2.00 | | | 63.9 | 2.500 | 1.250 | CT | 1.207 | 0.30 | 22.30 | | | 1971 | 84360 |
| | | 3.00 | | | 65.0 | 2.500 | 0.625 | CT | 1.232 | 0.28 | 21.90 | | | 1972 | 84306 |
| | | 3.00 | | | 65.0 | 2.000 | 0.750 | CT | --- | 0.34 | 24.00 | | | 1974 | 90011 |
| | | 3.00 | | | 65.0 | 2.490 | 0.625 | CT | 1.259 | 0.27 | 21.30 | | | 1972 | 84306 |
| | | 3.00 | | | 65.0 | 2.000 | 0.620 | CT | --- | 0.50 | 29.00 | | | 1974 | 90011 |
| | | 3.00 | | | 65.0 | 2.480 | 0.624 | CT | 1.292 | 0.25 | 20.70 | | | 1972 | 84306 |
| | | 3.00 | | | 65.0 | 3.000 | 1.000 | CT | --- | 0.26 | 21.00 | | | 1974 | 90011 |
| | | 3.00 | | | 65.0 | 3.000 | 1.000 | CT | --- | 0.28 | 22.00 | | | 1974 | 90011 |
| | | 3.00 | | | 65.0 | 2.000 | 0.750 | CT | --- | 0.37 | 25.00 | | | 1974 | 90011 |
| | | 3.00 | | | 65.0 | 2.500 | 0.626 | CT | 1.239 | 0.34 | 23.80 | | | 1972 | 84306 |

# TABLE 7.5.2.1 (CONTINUED)



## ALUMINUM 2024 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * $(K_{Ic}/TYS)^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ (Ksi * $\sqrt{in.}$)) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 3.00 | R.T. Cont'd | L-T Cont'd | 65.0 | 3.000 | 1.000 | CT | --- | 0.26 | 21.00 | Cont'd | Cont'd | 1974 | 90011 |
| | | 1.75 | | | 65.0 | 5.990 | 0.499 | CT | 3.035 | 0.44 | 27.30 | | | 1972 | 84306 |
| | | 3.00 | | | 65.0 | 2.000 | 0.750 | CT | --- | 0.37 | 25.00 | | | 1974 | 90011 |
| | | 3.00 | | | 65.0 | 2.000 | 0.620 | CT | --- | 0.50 | 29.00 | | | 1974 | 90011 |
| | | 1.75 | | | 65.0 | 3.000 | 0.756 | CT | 1.515 | 0.31 | 22.90 | | | 1972 | 84306 |
| | | 1.75 | | | 65.0 | 5.990 | 0.499 | CT | 3.064 | 0.46 | 27.80 | | | 1972 | 84306 |
| | | 1.75 | | | 65.0 | 3.000 | 0.755 | CT | 1.500 | 0.32 | 23.40 | | | 1972 | 84306 |
| | | 3.00 | | | 65.0 | 2.490 | 0.624 | CT | 1.263 | 0.25 | 20.40 | | | 1972 | 84306 |
| | | 3.00 | | | 65.0 | 2.300 | 0.750 | CT | --- | 0.60 | 32.00 | | | 1974 | 90011 |
| | | 1.00 | | | 65.3 | 1.987 | 0.988 | CT | 1.093 | 0.32 | 23.70 | | | 1978 | MPC01 |
| | | 0.87 | | | 65.3 | 1.989 | 0.877 | CT | 1.074 | 0.28 | 22.50 | | | 1978 | MPC01 |
| | | 1.37 | | | 65.6 | 3.000 | 1.383 | NB | 1.500 | 0.31 | 23.20 | | | 1973 | 86213 |
| | | 1.37 | | | 65.6 | 3.000 | 1.385 | NB | 1.480 | 0.37 | 25.20 | | | 1973 | 86213 |
| | | 1.37 | | | 65.6 | 2.980 | 1.383 | NB | 1.490 | 0.27 | 22.20 | | | 1978 | MPC01 |
| | | 1.37 | | | 65.6 | 1.998 | 1.001 | CT | 1.059 | 0.30 | 23.20 | | | 1978 | MPC01 |
| | | 1.37 | | | 65.6 | 3.020 | 1.383 | NB | 1.480 | 0.27 | 21.80 | | | 1978 | MPC01 |
| | | 1.37 | | | 65.6 | 3.000 | 1.386 | NB | 1.545 | 0.31 | 23.20 | | | 1973 | 86213 |
| | | 1.37 | | | 65.6 | 3.000 | 1.386 | NB | 1.531 | 0.33 | 23.70 | | | 1973 | 86213 |
| | | 1.37 | | | 65.6 | 2.000 | 1.001 | CT | 1.048 | 0.30 | 22.80 | | | 1973 | 86213 |
| | | 1.37 | | | 65.6 | 1.990 | 1.001 | CT | 0.975 | 0.28 | 22.50 | | | 1978 | MPC01 |
| | | 1.37 | | | 65.8 | 2.980 | 1.393 | NB | 1.490 | 0.34 | 25.00 | | | 1978 | MPC01 |
| | | 1.37 | | | 65.8 | 3.020 | 1.393 | NB | 1.510 | 0.36 | 25.40 | | | 1978 | MPC01 |
| | | 3.00 | | | 66.0 | 3.000 | 0.757 | CT | 1.526 | 0.35 | 24.30 | | | 1973 | 85836 |

# TABLE 7.5.2.1 (CONTINUED)



## ALUMINUM 2024 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi * $\sqrt{in.}$) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 3.00 | R.T. Cont'd | L-T Cont'd | 66.0 | 3.000 | 0.995 | CT | 1.533 | 0.32 | 23.50 | Cont'd | Cont'd | 1972 | 84306 |
| | | 3.00 | | | 66.0 | 3.000 | 0.994 | CT | 1.540 | 0.33 | 24.00 | | | 1972 | 84306 |
| | | 1.37 | | | 66.1 | 2.990 | 1.400 | NB | 1.525 | 0.25 | 21.80 | | | 1978 | MPC01 |
| | | 1.37 | | | 66.1 | 3.008 | 1.401 | NB | 1.474 | 0.25 | 21.50 | | | 1978 | MPC01 |
| | | 1.37 | | | 66.1 | 3.000 | 1.400 | NB | 1.536 | 0.28 | 22.10 | | | 1973 | 86213 |
| | | 0.75 | | | 66.1 | 1.502 | 0.761 | CT | 0.781 | 0.27 | 22.10 | | | 1978 | MPC01 |
| | | 1.37 | | | 66.1 | 3.000 | 1.401 | NB | 1.445 | 0.25 | 20.90 | | | 1973 | 86213 |
| | | 0.62 | | | 66.2 | 1.508 | 0.616 | CT | 0.769 | 0.25 | 21.50 | | | 1978 | MPC01 |
| | | 1.00 | | | 66.2 | 2.016 | 1.009 | CT | 1.149 | 0.25 | 21.50 | | | 1978 | MPC01 |
| | | 4.00 | | | 66.5 | 2.000 | 1.020 | NB | --- | 0.25 | 21.00 | | | 1974 | 90981 |
| | | 4.00 | | | 66.5 | 2.000 | 1.020 | NB | --- | 0.24 | 20.40 | | | 1974 | 90981 |
| | | 0.75 | | | 67.0 | 1.500 | 0.709 | CT | --- | 0.27 | 22.00 | | | 1982 | NC003 |
| | | 0.75 | | | 67.0 | 1.500 | 0.709 | CT | --- | 0.27 | 22.00 | | | 1982 | NC003 |
| | | 0.50 | | | 67.1 | 1.500 | 0.518 | CT | 0.765 | 0.24 | 21.10 | | | 1978 | MPC01 |
| | | 0.50 | | | 67.1 | 1.506 | 0.481 | CT | 0.768 | 0.24 | 20.90 | | | 1978 | MPC01 |
| | | 0.37 | | | 67.1 | 1.000 | 0.375 | CT | --- | 0.26 | 21.90 | | | 1974 | 90981 |
| | | 1.50 | | | 67.5 | 2.000 | 1.001 | CT | 1.018 | 0.35 | 25.20 | | | 1973 | 86429 |
| | | 1.50 | | | 67.5 | 1.980 | 1.000 | CT | 1.004 | 0.33 | 24.60 | | | 1973 | 86429 |
| | | 0.62 | | | 68.0 | 1.504 | 0.631 | CT | 0.767 | 0.28 | 23.60 | | | 1978 | MPC01 |
| | | 0.75 | | | 70.1 | 1.500 | 0.750 | CT | --- | 0.26 | 22.80 | | | 1974 | 90981 |
| | | 0.75 | | | 70.1 | 1.500 | 0.750 | CT | --- | 0.25 | 22.00 | | | 1974 | 90981 |
| | | 0.75 | | | 70.1 | 1.500 | 0.750 | CT | --- | 0.29 | 24.00 | | | 1974 | 90981 |

# TABLE 7.5.2.1 (CONTINUED)

## ALUMINUM 2024 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * $(K_{Ic}/TYS)^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi * $\sqrt{in.}$) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 | Plate | 1.37 | R.T. | T-S | 65.4 | 0.996 | 0.500 | CT | 0.488 | 0.28 | 22.50 | --- | --- | 1978 | MPC01 |
| T851 | Plate | 4.00 | R.T. | T-L | 61.5 | 2.000 | 1.020 | NB | --- | 0.26 | 19.80 | 20.7 | 1.9 | 1974 | 90981 |
| | | 4.00 | | | 61.5 | 2.000 | 1.020 | NB | --- | 0.26 | 19.90 | | | 1974 | 90981 |
| | | 3.00 | | | 63.5 | 1.500 | 0.750 | CT | 0.750 | 0.32 | 22.60 | | | 1972 | 83243 |
| | | 3.00 | | | 63.5 | 1.500 | 0.750 | CT | 0.750 | 0.31 | 22.20 | | | 1972 | 83243 |
| | | 3.00 | | | 63.5 | 1.500 | 0.750 | CT | 0.750 | 0.24 | 19.70 | | | 1972 | 83243 |
| | | 3.00 | | | 64.0 | 2.000 | 0.620 | CT | --- | 0.35 | 24.00 | | | 1974 | 90011 |
| | | 3.00 | | | 64.0 | 2.490 | 0.624 | CT | 1.233 | 0.20 | 17.90 | | | 1972 | 84306 |
| | | 3.00 | | | 64.0 | 3.000 | 1.000 | CT | --- | 0.20 | 18.00 | | | 1974 | 90011 |
| | | 3.00 | | | 64.0 | 2.000 | 0.750 | CT | --- | 0.32 | 23.00 | | | 1974 | 90011 |
| | | 3.00 | | | 64.0 | 2.000 | 0.750 | CT | --- | 0.32 | 23.00 | | | 1974 | 90011 |
| | | 3.00 | | | 64.0 | 2.500 | 0.625 | CT | 1.240 | 0.22 | 18.80 | | | 1972 | 84306 |
| | | 3.00 | | | 64.0 | 2.500 | 0.750 | CT | --- | 0.38 | 25.00 | | | 1974 | 90011 |
| | | 3.00 | | | 64.0 | 2.500 | 0.750 | CT | --- | 0.32 | 23.00 | | | 1974 | 90011 |
| | | 3.00 | | | 64.0 | 2.000 | 0.620 | CT | --- | 0.32 | 23.00 | | | 1974 | 90011 |
| | | 3.00 | | | 64.0 | 2.500 | 0.626 | CT | 1.222 | 0.21 | 18.50 | | | 1972 | 84306 |
| | | 3.00 | | | 64.0 | 2.000 | 0.750 | CT | --- | 0.30 | 22.00 | | | 1974 | 90011 |
| | | 1.38 | | | 64.4 | 2.000 | 1.000 | NB | 0.986 | 0.26 | 20.90 | | | 1972 | 82880 |
| | | 1.37 | | | 64.4 | 3.020 | 1.384 | NB | 1.540 | 0.28 | 22.50 | | | 1978 | MPC01 |
| | | 1.37 | | | 64.4 | 3.002 | 1.384 | NB | 1.501 | 0.28 | 22.10 | | | 1978 | MPC01 |
| | | 1.37 | | | 64.4 | 3.020 | 1.383 | NB | 1.510 | 0.21 | 18.90 | | | 1978 | MPC01 |
| | | 1.39 | | | 64.4 | 3.000 | 1.387 | NB | 1.512 | 0.24 | 20.10 | | | 1971 | 84288 |
| | | 1.38 | | | 64.4 | 1.500 | 0.750 | NB | 0.777 | 0.30 | 22.40 | | | 1972 | 82880 |

# TABLE 7.5.2.1 (CONTINUED)



## ALUMINUM 2024 $K_{Ic}$

| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi * $\sqrt{in.}$) | $K_{Ic}$ MEAN | STAN DEV | | |
| T851 Cont'd | Plate Cont'd | 1.39 | R.T. Cont'd | T-L Cont'd | 64.4 | 3.000 | 1.390 | NB | --- | 0.24 | 20.20 | Cont'd | Cont'd | 1972 | 82880 |
| | | 1.39 | | | 64.4 | 3.000 | 1.390 | NB | --- | 0.24 | 20.00 | | | 1972 | 82880 |
| | | 1.37 | | | 64.4 | 2.980 | 1.383 | NB | 1.520 | 0.21 | 19.10 | | | 1978 | MPC01 |
| | | 1.37 | | | 64.4 | 3.021 | 1.383 | NB | 1.450 | 0.19 | 18.20 | | | 1978 | MPC01 |
| | | 1.38 | | | 64.4 | 1.000 | 0.500 | NB | 0.512 | 0.27 | 21.30 | | | 1972 | 82880 |
| | | 1.38 | | | 64.4 | 1.000 | 0.500 | NB | 0.503 | 0.22 | 19.30 | | | 1972 | 82880 |
| | | 1.38 | | | 64.4 | 2.000 | 1.000 | NB | 0.995 | 0.23 | 19.60 | | | 1972 | 82880 |
| | | 1.39 | | | 64.4 | 3.000 | 1.388 | NB | 1.507 | 0.24 | 20.20 | | | 1971 | 84288 |
| | | 1.39 | | | 64.4 | 3.000 | 1.380 | NB | --- | 0.25 | 20.50 | | | 1972 | 82880 |
| | | 1.37 | | | 64.4 | 3.020 | 1.383 | NB | 1.510 | 0.21 | 19.10 | | | 1978 | MPC01 |
| | | 1.39 | | | 64.4 | 3.000 | 1.385 | NB | 1.508 | 0.25 | 20.50 | | | 1971 | 84288 |
| | | 1.38 | | | 64.4 | 1.000 | 0.500 | NB | 0.512 | 0.26 | 20.60 | | | 1972 | 82880 |
| | | 1.38 | | | 64.4 | 2.000 | 1.000 | NB | 0.977 | 0.24 | 20.00 | | | 1972 | 82880 |
| | | 4.00 | | | 64.6 | 2.000 | 1.020 | NB | --- | 0.20 | 18.20 | | | 1974 | 90981 |
| | | 4.00 | | | 64.6 | 2.000 | 1.020 | NB | --- | 0.19 | 17.80 | | | 1974 | 90981 |
| | | 1.37 | | | 64.8 | 2.000 | 1.000 | CT | 1.038 | 0.23 | 19.80 | | | 1973 | 86213 |
| | | 1.37 | | | 64.8 | 2.000 | 1.000 | CT | 1.055 | 0.22 | 19.20 | | | 1973 | 86213 |
| | | 1.37 | | | 64.8 | 2.000 | 1.000 | CT | 1.009 | 0.20 | 18.30 | | | 1973 | 86213 |
| | | 1.37 | | | 65.0 | 3.002 | 1.392 | NB | 1.501 | 0.27 | 21.80 | | | 1978 | MPC01 |
| | | 3.00 | | | 65.0 | 2.500 | 1.245 | CT | 1.293 | 0.31 | 23.00 | | | 1973 | 85836 |
| | | 1.37 | | | 65.0 | 2.978 | 1.392 | NB | 1.489 | 0.19 | 18.30 | | | 1978 | MPC01 |
| | | 1.37 | | | 65.0 | 3.024 | 1.392 | NB | 1.512 | 0.27 | 22.00 | | | 1978 | MPC01 |

# TABLE 7.5.2.1 (CONTINUED)



## ALUMINUM 2024 $K_{Ic}$

| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 • $(K_{Ic}/TYS)^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi • $\sqrt{in.}$) | $K_{Ic}$ MEAN | STAN DEV | | |
| T851 Cont'd | Plate Cont'd | 3.00 | R.T. Cont'd | T-L Cont'd | 65.0 | 2.500 | 1.246 | CT | 1.293 | 0.31 | 23.00 | Cont'd | Cont'd | 1973 | 85836 |
| | | 1.37 | | | 65.0 | 3.000 | 1.392 | NB | 1.565 | 0.23 | 19.80 | | | 1973 | 86213 |
| | | 0.75 | | | 65.2 | 1.494 | 0.761 | CT | 0.792 | 0.21 | 19.10 | | | 1978 | MPC01 |
| | | 1.37 | | | 65.5 | 2.000 | 0.999 | CT | 1.097 | 0.21 | 19.10 | | | 1973 | 86213 |
| | | 1.37 | | | 65.5 | 3.018 | 1.400 | NB | 1.539 | 0.22 | 20.20 | | | 1978 | MPC01 |
| | | 1.37 | | | 65.5 | 3.000 | 1.400 | NB | 1.520 | 0.23 | 19.80 | | | 1973 | 86213 |
| | | 1.37 | | | 65.5 | 2.000 | 0.999 | CT | 1.065 | 0.19 | 18.20 | | | 1973 | 86213 |
| | | 1.37 | | | 65.6 | 2.978 | 1.385 | NB | 1.489 | 0.36 | 25.40 | | | 1978 | MPC01 |
| | | 1.00 | | | 65.7 | 2.016 | 0.987 | CT | 1.109 | 0.24 | 21.00 | | | 1978 | MPC01 |
| | | 0.62 | | | 65.7 | 1.498 | 0.616 | CT | 0.779 | 0.19 | 18.90 | | | 1978 | MPC01 |
| | | 0.50 | | | 65.9 | 1.490 | 0.481 | CT | 0.760 | 0.21 | 19.30 | | | 1978 | MPC01 |
| | | 0.37 | | | 66.6 | 1.000 | 0.375 | CT | --- | 0.29 | 22.70 | | | 1974 | 90981 |
| | | 0.37 | | | 66.6 | 1.000 | 0.375 | CT | --- | 0.28 | 22.10 | | | 1974 | 90981 |
| | | 0.37 | | | 66.6 | 1.000 | 0.375 | CT | --- | 0.32 | 23.80 | | | 1974 | 90981 |
| | | 0.50 | | | 67.2 | 1.508 | 0.518 | CT | 0.784 | 0.21 | 19.50 | | | 1978 | MPC01 |
| | | 0.62 | | | 67.3 | 1.498 | 0.631 | CT | 0.794 | 0.22 | 20.20 | | | 1978 | MPC01 |
| | | 0.75 | | | 68.6 | 1.500 | 0.750 | CT | --- | 0.25 | 21.80 | | | 1974 | 90981 |
| | | 0.75 | | | 68.6 | 1.500 | 0.750 | CT | --- | 0.25 | 21.90 | | | 1974 | 90981 |
| | | 0.75 | | | 68.6 | 1.500 | 0.750 | CT | --- | 0.26 | 22.00 | | | 1974 | 90981 |
| T851 | Plate | 3.00 | R.T. | S-T | 64.0 | 2.500 | 0.750 | CT | --- | 0.35 | 24.00 | --- | --- | 1974 | 90011 |
| T851 | Plate | 1.37 | 82 | L-T | 65.6 | 2.000 | 1.001 | CT | 0.982 | 0.30 | 22.80 | 23.8 | 0.5 | 1973 | 86213 |
| | | 1.37 | | | 65.6 | 2.000 | 1.002 | CT | 1.036 | 0.32 | 23.40 | | | 1973 | 86213 |

# TABLE 7.5.2.1 (CONTINUED)



## ALUMINUM 2024 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * $(K_{Ic}/TYS)^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi * $\sqrt{in.}$) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 1.37 | 82 Cont'd | L-T Cont'd | 65.6 | 2.000 | 1.001 | CT | 0.981 | 0.29 | 22.40 | Cont'd | Cont'd | 1973 | 86213 |
| | | 1.37 | | | 65.6 | 2.000 | 1.002 | CT | 1.030 | 0.32 | 23.40 | | | 1973 | 86213 |
| | | 1.37 | | | 65.6 | 2.000 | 1.001 | CT | 0.975 | 0.29 | 22.50 | | | 1973 | 86213 |
| | | 1.37 | | | 65.6 | 2.000 | 1.002 | CT | 1.033 | 0.32 | 23.40 | | | 1973 | 86213 |
| T851 | Plate | 1.37 | 82 | T-L | 64.4 | 2.000 | 0.999 | CT | 1.021 | 0.24 | 20.00 | 20.2 | 0.2 | 1973 | 86213 |
| | | 1.37 | | | 64.4 | 2.000 | 1.000 | CT | 1.010 | 0.24 | 19.90 | | | 1973 | 86213 |
| | | 1.37 | | | 64.4 | 2.000 | 1.000 | CT | 0.992 | 0.24 | 20.00 | | | 1973 | 86213 |
| | | 1.37 | | | 64.8 | 2.000 | 1.001 | CT | 1.058 | 0.25 | 20.40 | | | 1973 | 86213 |
| | | 1.37 | | | 64.8 | 2.000 | 1.000 | CT | 1.049 | 0.24 | 20.10 | | | 1973 | 86213 |
| | | 1.37 | | | 64.8 | 2.000 | 1.002 | CT | 1.032 | 0.25 | 20.50 | | | 1973 | 86213 |
| T851 | Plate | 1.75 | 84 | L-T | 65.0 | 2.990 | 1.007 | CT | 1.650 | 0.32 | 23.30 | 21.5 | 1.2 | 1972 | 84306 |
| | | 1.00 | | | 68.9 | 1.500 | 0.750 | CT | 0.739 | 0.23 | 20.80 | | | 1973 | 86213 |
| | | 1.00 | | | 68.9 | 1.500 | 0.750 | CT | 0.726 | 0.22 | 20.60 | | | 1973 | 86213 |
| | | 1.00 | | | 68.9 | 1.500 | 0.750 | CT | 0.742 | 0.24 | 21.30 | | | 1973 | 86213 |
| T851 | Plate | 1.00 | 84 | T-L | 67.6 | 1.490 | 0.749 | CT | 0.754 | 0.19 | 18.80 | 18.7 | 0.3 | 1973 | 86213 |
| | | 1.00 | | | 67.6 | 1.500 | 0.750 | CT | 0.749 | 0.18 | 18.30 | | | 1973 | 86213 |
| | | 1.00 | | | 67.6 | 1.500 | 0.750 | CT | 0.740 | 0.20 | 18.90 | | | 1973 | 86213 |
| T851 | Plate | 1.37 | 86 | L-S | 65.8 | 1.000 | 0.500 | CT | 0.504 | 0.26 | 21.30 | 21.0 | 0.8 | 1973 | 86213 |
| | | 1.37 | | | 65.8 | 1.000 | 0.500 | CT | 0.491 | 0.23 | 20.10 | | | 1973 | 86213 |
| | | 1.37 | | | 65.8 | 1.000 | 0.500 | CT | 0.484 | 0.27 | 21.60 | | | 1973 | 86213 |
| T851 | Plate | 1.37 | 86 | T-S | 65.4 | 1.000 | 0.500 | CT | 0.510 | 0.30 | 22.50 | --- | --- | 1973 | 86213 |

# TABLE 7.5.2.1 (CONTINUED)



## ALUMINUM 2024 $K_{Ic}$

| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 * $(K_{Ic}/TYS)^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi * $\sqrt{in.}$) | $K_{Ic}$ MEAN | STAN DEV | | |
| T851 | Plate | 1.37 | 86 | S-T | 64.2 | 1.000 | 0.500 | CT | 0.511 | 0.18 | 17.00 | 16.2 | 0.7 | 1973 | 86213 |
| | | 1.37 | | | 64.2 | 1.000 | 0.500 | CT | 0.499 | 0.15 | 15.70 | | | 1973 | 86213 |
| | | 1.37 | | | 64.2 | 1.000 | 0.500 | CT | 0.510 | 0.16 | 16.00 | | | 1973 | 86213 |
| T851 | Plate | 1.37 | 88 | L-S | 66.1 | 1.000 | 0.500 | CT | 0.513 | 0.29 | 22.40 | 22.9 | 0.7 | 1973 | 86213 |
| | | 1.37 | | | 66.1 | 1.000 | 0.499 | CT | 0.493 | 0.31 | 23.40 | | | 1973 | 86213 |
| T851 | Plate | 1.37 | 88 | T-S | 65.5 | 1.000 | 0.500 | CT | 0.511 | 0.25 | 20.80 | 20.6 | 0.2 | 1973 | 86213 |
| | | 1.37 | | | 65.5 | 1.000 | 0.500 | CT | 0.515 | 0.24 | 20.40 | | | 1973 | 86213 |
| | | 1.37 | | | 65.5 | 1.000 | 0.500 | CT | 0.496 | 0.25 | 20.60 | | | 1973 | 86213 |
| T851 | Plate | 1.37 | 88 | S-T | 64.1 | 1.000 | 0.500 | CT | 0.479 | 0.15 | 15.80 | 15.8 | 0.1 | 1973 | 86213 |
| | | 1.37 | | | 64.1 | 1.000 | 0.500 | CT | 0.502 | 0.15 | 15.90 | | | 1973 | 86213 |
| | | 1.37 | | | 64.1 | 1.000 | 0.500 | CT | 0.480 | 0.15 | 15.80 | | | 1973 | 86213 |
| T851 | Plate | 1.37 | 88 | S-L | 64.1 | 1.000 | 0.501 | CT | 0.506 | 0.18 | 17.20 | 16.4 | 0.8 | 1973 | 86213 |
| | | 1.37 | | | 64.1 | 1.000 | 0.501 | CT | 0.478 | 0.15 | 15.60 | | | 1973 | 86213 |
| | | 1.37 | | | 64.1 | 1.000 | 0.500 | CT | 0.496 | 0.16 | 16.30 | | | 1973 | 86213 |
| T851 | Plate | 3.00 | 200 | L-S | 56.4 | 1.500 | 0.750 | CT | 0.750 | 0.75 | 30.90 | 30.3 | 0.8 | 1972 | 83243 |
| | | 3.00 | | | 56.4 | 1.500 | 0.750 | CT | 0.750 | 0.70 | 29.70 | | | 1972 | 83243 |
| T851 | Plate | 3.00 | 200 | L-T | 58.6 | 1.500 | 0.750 | CT | 0.750 | 0.49 | 25.90 | 26.8 | 1.0 | 1972 | 83243 |
| | | 3.00 | | | 58.6 | 1.500 | 0.750 | CT | 0.750 | 0.56 | 27.80 | | | 1972 | 83243 |
| | | 3.00 | | | 58.6 | 1.500 | 0.750 | CT | 0.750 | 0.52 | 26.80 | | | 1972 | 83243 |
| T851 | Plate | 3.00 | 200 | T-L | 58.3 | 1.500 | 0.750 | CT | 0.750 | 0.32 | 20.70 | 21.8 | 1.1 | 1972 | 83243 |
| | | 3.00 | | | 58.3 | 1.500 | 0.750 | CT | 0.750 | 0.38 | 22.80 | | | 1972 | 83243 |
| | | 3.00 | | | 58.3 | 1.500 | 0.750 | CT | 0.750 | 0.35 | 21.80 | | | 1972 | 83243 |

# TABLE 7.5.2.1 (CONTINUED)



## ALUMINUM 2024 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi * √in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 | Plate | 3.00 | 300 | L-T | 54.9 | 1.500 | 0.750 | CT | 0.750 | 0.60 | 26.80 | 26.9 | 0.4 | 1972 | 83243 |
| | | 3.00 | | | 54.9 | 1.500 | 0.750 | CT | 0.750 | 0.62 | 27.30 | | | 1972 | 83243 |
| | | 3.00 | | | 54.9 | 1.500 | 0.750 | CT | 0.750 | 0.59 | 26.60 | | | 1972 | 83243 |
| T851 | Plate | 3.00 | 300 | T-L | 54.1 | 1.500 | 0.750 | CT | 0.750 | 0.40 | 21.70 | 22.0 | 0.4 | 1972 | 83243 |
| | | 3.00 | | | 54.1 | 1.500 | 0.750 | CT | 0.750 | 0.42 | 22.30 | | | 1972 | 83243 |
| T8510 | Extrusion | 4.50 | R.T. | L-T | 58.5 | 4.023 | 2.000 | CT | 2.132 | 0.78 | 33.10 | 30.4 | 2.7 | 1978 | MPC01 |
| | | 4.00 | | | 61.8 | 3.981 | 1.858 | CT | 2.110 | 0.57 | 30.20 | | | 1978 | MPC01 |
| | | 2.76 | | | 63.2 | 4.018 | 2.000 | CT | 2.009 | 0.46 | 27.80 | | | 1978 | MPC01 |
| T8510 | Extrusion | 4.50 | R.T. | T-L | 58.9 | 5.042 | 2.500 | CT | 2.622 | 0.21 | 17.50 | 16.5 | 1.0 | 1978 | MPC01 |
| | | 4.00 | | | 60.5 | 5.054 | 2.499 | CT | 2.527 | 0.16 | 16.30 | | | 1978 | MPC01 |
| | | 2.76 | | | 61.8 | 4.018 | 1.999 | CT | 2.049 | 0.15 | 15.60 | | | 1978 | MPC01 |
| T8510 | Extrusion | 4.50 | R.T. | S-L | 56.6 | 3.022 | 1.500 | CT | 1.541 | 0.21 | 16.50 | 15.7 | 1.4 | 1978 | MPC01 |
| | | 4.00 | | | 58.2 | 2.998 | 1.498 | CT | 1.529 | 0.19 | 16.50 | | | 1978 | MPC01 |
| | | 2.76 | | | 59.6 | 2.018 | 0.999 | CT | 0.989 | 0.13 | 14.10 | | | 1978 | MPC01 |
| T8511 | Extrusion | 3.50 | R.T. | L-T | 66.5 | 1.996 | 1.000 | CT | 0.978 | 0.32 | 24.40 | 24.1 | 0.4 | 1978 | MPC01 |
| | | 3.50 | | | 66.5 | 2.004 | 1.000 | CT | 0.982 | 0.30 | 23.80 | | | 1978 | MPC01 |
| T8511 | Extrusion | 3.50 | R.T. | T-L | 61.8 | 2.015 | 1.000 | CT | 1.048 | 0.15 | 16.00 | 16.0 | 0.0 | 1978 | MPC01 |
| | | 3.50 | | | 61.8 | 1.980 | 1.000 | CT | 1.010 | 0.15 | 16.00 | | | 1978 | MPC01 |
| T8511 | Extrusion | 3.50 | R.T. | S-T | 61.6 | 2.014 | 1.001 | CT | 1.007 | 0.18 | 17.10 | 16.7 | 0.6 | 1978 | MPC01 |
| | | 3.50 | | | 61.6 | 2.014 | 1.001 | CT | 1.007 | 0.16 | 16.30 | | | 1978 | MPC01 |

# TABLE 7.5.2.1 (CONTINUED)

## ALUMINUM 2024 $K_{Ic}$

| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi * $\sqrt{in.}$) | $K_{Ic}$ MEAN | STAN DEV | | |
| T852 | Forging | 5.00 | R.T. | L-T | 55.1 | 3.000 | 1.504 | NB | 1.542 | 0.66 | 28.30 | 29.2 | 5.2 | 1970 | 77720 |
| | | 5.00 | | | 55.1 | 3.000 | 1.502 | NB | 1.400 | 0.56 | 26.10 | | | 1970 | 77720 |
| | | 5.00 | | | 55.1 | 3.000 | 1.503 | NB | 1.395 | 0.60 | 27.00 | | | 1970 | 77720 |
| | | 6.00 | | | 56.1 | 4.000 | 2.001 | NB | 2.008 | 0.76 | 30.80 | | | 1970 | 77720 |
| | | 6.00 | | | 56.1 | 4.000 | 2.002 | NB | 2.202 | 0.75 | 30.80 | | | 1970 | 77720 |
| | | 6.00 | | | 56.1 | 4.000 | 1.999 | NB | 1.925 | 0.63 | 28.20 | | | 1970 | 77720 |
| | | 3.00 | | | 58.0 | 2.490 | 1.250 | CT | 1.279 | 0.55 | 27.20 | | | 1973 | 85836 |
| | | 3.00 | | | 58.0 | 2.500 | 1.254 | CT | 1.324 | 0.71 | 30.90 | | | 1973 | 85836 |
| | | 5.00 | | | 58.0 | 2.500 | 1.252 | CT | 1.295 | 0.99 | 36.50 | | | 1973 | 85836 |
| | | 3.00 | | | 58.0 | 2.490 | 1.247 | CT | 1.251 | 0.48 | 25.50 | | | 1973 | 85836 |
| | | 5.00 | | | 58.0 | 2.500 | 1.252 | CT | 1.302 | 1.02 | 37.10 | | | 1973 | 85836 |
| | | 5.00 | | | 60.0 | 2.500 | 1.004 | CT | 1.265 | 0.99 | 37.80 | | | 1973 | 85836 |
| | | 2.00 | | | 64.6 | 1.500 | 0.752 | NB | 0.707 | 0.30 | 22.60 | | | 1970 | 77720 |
| | | 2.00 | | | 64.6 | 1.500 | 0.752 | NB | 0.667 | 0.36 | 24.30 | | | 1970 | 77720 |
| | | 2.00 | | | 64.6 | 1.500 | 0.751 | NB | 0.770 | 0.40 | 25.90 | | | 1970 | 77720 |
| | | 3.00 | | | 65.0 | 2.500 | 1.250 | CT | --- | 0.77 | 36.00 | | | 1974 | 90011 |
| | | 3.00 | | | 65.0 | 2.500 | 1.250 | CT | --- | 0.81 | 37.00 | | | 1974 | 90011 |
| | | 3.00 | | | 65.0 | 2.500 | 1.250 | CT | --- | 0.81 | 37.00 | | | 1974 | 90011 |
| | | 4.00 | | | 65.4 | 3.000 | 1.500 | NB | 1.482 | 0.36 | 25.00 | | | 1970 | 77720 |
| | | 4.00 | | | 65.4 | 3.000 | 1.500 | NB | 1.445 | 0.49 | 28.90 | | | 1970 | 77720 |
| | | 4.00 | | | 65.4 | 3.000 | 1.502 | NB | 1.645 | 0.46 | 28.10 | | | 1970 | 77720 |
| | | 3.00 | | | 66.7 | 1.990 | 1.000 | NB | 0.935 | 0.34 | 24.60 | | | 1970 | 77720 |
| | | 3.00 | | | 66.7 | 2.000 | 1.000 | NB | 0.950 | 0.27 | 21.90 | | | 1970 | 77720 |
| | | 3.00 | | | 66.7 | 2.000 | 0.999 | NB | 0.940 | 0.29 | 22.60 | | | 1970 | 77720 |

# TABLE 7.5.2.1 (CONTINUED)

## ALUMINUM 2024 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 • ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi • √in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T852 | Forging | 5.00 | R.T. | T-L | 56.7 | 3.000 | 1.500 | NB | 1.422 | 0.23 | 17.30 | 18.9 | 2.6 | 1970 | 77720 |
| | | 5.00 | | | 56.7 | 3.000 | 1.502 | NB | 1.507 | 0.25 | 17.80 | | | 1970 | 77720 |
| | | 5.00 | | | 56.7 | 3.000 | 1.501 | NB | 1.553 | 0.24 | 17.60 | | | 1970 | 77720 |
| | | 6.00 | | | 57.8 | 4.000 | 2.005 | NB | 2.005 | 0.17 | 15.10 | | | 1970 | 77720 |
| | | 6.00 | | | 57.8 | 3.990 | 2.003 | NB | 2.035 | 0.25 | 18.20 | | | 1973 | 86213 |
| | | 6.00 | | | 57.8 | 3.990 | 2.003 | NB | 2.035 | 0.25 | 18.10 | | | 1970 | 77720 |
| | | 6.00 | | | 57.8 | 4.000 | 2.005 | NB | 2.005 | 0.17 | 15.20 | | | 1973 | 86213 |
| | | 3.00 | | | 58.0 | 2.000 | 1.000 | CT | --- | 0.30 | 20.00 | | | 1974 | 90011 |
| | | 3.00 | | | 58.0 | 2.000 | 1.000 | CT | --- | 0.33 | 21.00 | | | 1974 | 90011 |
| | | 3.00 | | | 58.0 | 2.000 | 1.000 | CT | --- | 0.33 | 21.00 | | | 1974 | 90011 |
| | | 2.00 | | | 63.8 | 1.500 | 0.752 | NB | 0.667 | 0.36 | 24.10 | | | 1970 | 77720 |
| | | 2.00 | | | 63.8 | 1.500 | 0.754 | NB | 0.697 | 0.34 | 23.50 | | | 1970 | 77720 |
| | | 2.00 | | | 63.8 | 1.500 | 0.749 | NB | 0.763 | 0.24 | 19.80 | | | 1970 | 77720 |
| | | 3.00 | | | 69.0 | 2.000 | 1.000 | NB | 0.905 | 0.20 | 19.40 | | | 1970 | 77720 |
| | | 3.00 | | | 69.0 | 2.000 | 1.001 | NB | 1.020 | 0.15 | 16.90 | | | 1970 | 77720 |
| | | 3.00 | | | 69.0 | 1.990 | 0.999 | NB | 1.010 | 0.15 | 16.70 | | | 1970 | 77720 |
| T852 | Forging | 6.00 | R.T. | S-T | 53.9 | 1.400 | 0.700 | NB | 0.700 | 0.27 | 17.70 | 17.6 | 0.1 | 1972 | 82675 |
| | | 6.00 | | | 53.9 | 1.400 | 0.700 | NB | 0.700 | 0.26 | 17.50 | | | 1972 | 82675 |
| T852 | Forging | 6.00 | R.T. | S-L | 53.9 | 1.000 | 0.500 | NB | 0.512 | 0.23 | 16.40 | 15.9 | 0.8 | 1970 | 77720 |
| | | 6.00 | | | 53.9 | 1.000 | 0.500 | NB | 0.505 | 0.19 | 14.80 | | | 1970 | 77720 |
| | | 6.00 | | | 53.9 | 1.000 | 0.500 | NB | 0.507 | 0.26 | 17.30 | | | 1970 | 77720 |
| | | 5.00 | | | 54.5 | 1.000 | 0.500 | NB | 0.490 | 0.22 | 16.00 | | | 1970 | 77720 |
| | | 5.00 | | | 54.5 | 1.000 | 0.500 | NB | 0.473 | 0.21 | 15.80 | | | 1970 | 77720 |
| | | 4.00 | | | 60.6 | 0.500 | 0.250 | NB | 0.267 | 0.15 | 15.00 | | | 1970 | 77720 |

# TABLE 7.5.2.1 (CONCLUDED)



| ALUMINUM 2024 $K_{Ic}$ | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 • $(K_{Ic}/TYS)^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi • $\sqrt{in.}$) | $K_{Ic}$ MEAN | STAN DEV | | |
| T852 Cont'd | Forging Cont'd | 4.00 | R.T. Cont'd | S-L Cont'd | 60.6 | 0.500 | 0.250 | NB | 0.272 | 0.17 | 15.80 | Cont'd | Cont'd | 1970 | 77720 |
| | | 4.00 | | | 60.6 | 0.500 | 0.250 | NB | 0.258 | 0.18 | 16.10 | | | 1970 | 77720 |
| T852 | Forging | 7.00 | 82 | L-T | 49.5 | 1.500 | 0.751 | CT | 0.706 | 0.70 | 26.20 | 23.0 | 4.6 | 1973 | 86213 |
| | | 7.00 | | | 58.6 | 1.490 | 0.758 | CT | 0.719 | 0.28 | 19.70 | | | 1973 | 86213 |
| T852 | Forging | 7.00 | 82 | T-L | 59.0 | 1.500 | 0.750 | CT | 0.719 | 0.47 | 25.50 | --- | --- | 1973 | 86213 |
| T852 | Forging | 7.00 | 83 | L-T | 58.6 | 1.500 | 0.753 | CT | 0.720 | 0.27 | 19.30 | --- | --- | 1973 | 86213 |
| T852 | Forging | 7.00 | 83 | T-L | 53.2 | 1.500 | 0.754 | CT | 0.757 | 0.39 | 21.00 | 19.1 | 2.7 | 1973 | 86213 |
| | | 7.00 | | | 59.5 | 1.500 | 0.753 | CT | 0.767 | 0.21 | 17.20 | | | 1973 | 86213 |
| T852 | Forging | 7.00 | 83 | S-T | 50.1 | 1.000 | 0.506 | CT | 0.495 | 0.40 | 20.00 | 18.5 | 1.4 | 1973 | 86213 |
| | | 7.00 | | | 50.5 | 1.000 | 0.499 | CT | 0.481 | 0.32 | 18.00 | | | 1973 | 86213 |
| | | 7.00 | | | 57.2 | 1.000 | 0.505 | CT | 0.494 | 0.23 | 17.40 | | | 1973 | 86213 |
| T852 | Forging | 4.75 | 84 | L-S | 64.4 | 2.000 | 0.997 | CT | 0.923 | 0.41 | 26.20 | --- | --- | 1973 | 86213 |
| T852 | Forging | 5.00 | 84 | L-T | 61.9 | 1.490 | 0.750 | CT | 0.735 | 0.31 | 21.80 | 22.7 | 1.3 | 1973 | 86213 |
| | | 4.75 | | | 64.4 | 2.000 | 0.999 | CT | 1.061 | 0.34 | 23.60 | | | 1973 | 86213 |
| T852 | Forging | 4.75 | 84 | T-S | 65.2 | 2.000 | 0.997 | CT | 0.937 | 0.14 | 15.20 | --- | --- | 1973 | 86213 |
| T852 | Forging | 5.00 | 84 | T-L | 62.9 | 1.490 | 0.750 | CT | 0.752 | 0.15 | 15.40 | --- | --- | 1973 | 86213 |
| T852 | Forging | 5.00 | 84 | S-T | 57.6 | 0.990 | 0.501 | CT | 0.542 | 0.23 | 17.60 | --- | --- | 1973 | 86213 |
| T852 | Forging | 4.75 | 84 | S-L | 60.9 | 2.000 | 0.997 | CT | 0.946 | 0.17 | 16.10 | --- | --- | 1973 | 86213 |
| T852 | Forging | 3.00 | 265 | L-T | --- | 2.500 | 1.250 | CT | --- | --- | 31.00 | 35.0 | 5.6 | 1974 | 90011 |
| | | 5.00 | | | 65.0 | 2.490 | 1.248 | CT | 1.485 | 0.90 | 38.90 | | | 1973 | 86210 |
| T852 | Forging | 3.00 | 265 | T-L | --- | 2.500 | 1.250 | CT | --- | --- | 24.00 | --- | --- | 1974 | 90011 |

# TABLE 7.5.2.2



## ALUMINUM 2024 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_C$ (Ksi$\sqrt{in}$) | $K_C$ $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 | Sheet | 0.12 | R.T. | L-T | 53.8 | 4.000 | 0.122 | 2.390 | 3.100 | --- | 20.30 | 51.17* | --- | --- | 76.14* | --- | --- | 1970 | 78982 |
| | | 0.12 | | | 53.8 | 4.000 | 0.123 | 1.190 | 1.800 | --- | 35.20 | 50.93* | | | 67.88* | | | 1970 | 78982 |
| | | 0.12 | | | 53.8 | 4.000 | 0.123 | 2.340 | 2.900 | --- | 20.50 | 50.46* | | | 67.62* | | | 1970 | 78982 |
| | | 0.12 | | | 53.8 | 4.000 | 0.123 | 0.390 | 1.000 | --- | 46.00 | 36.22* | | | 59.98* | | | 1970 | 78982 |
| | | 0.12 | | | 53.8 | 4.000 | 0.123 | 2.400 | --- | --- | 44.90 | 113.71* | | | --- | | | 1970 | 78982 |
| | | 0.12 | | | 53.8 | 4.000 | 0.123 | 1.200 | 1.900 | --- | 36.60 | 53.23* | | | 73.79* | | | 1970 | 78982 |
| T3 | Sheet | 0.04 | R.T. | L-T | 50.6 | 6.450 | 0.040 | 2.650 | --- | --- | 26.70 | 60.95* | --- | --- | --- | --- | --- | 1966 | 86734 |
| | | 0.04 | | | 50.6 | 6.450 | 0.040 | 3.900 | --- | --- | 16.90 | 54.84* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 50.6 | 6.450 | 0.040 | 2.820 | --- | --- | 26.30 | 62.95* | | | --- | | | 1966 | 86734 |
| T3 | Sheet | 0.05 | R.T. | L-T | 52.7 | 8.000 | 0.049 | 4.770 | 5.750 | 17.10 | 19.20 | 68.27* | --- | --- | 88.25* | --- | --- | 1970 | 78982 |
| | | 0.05 | | | 52.7 | 8.000 | 0.051 | 2.660 | 3.600 | 19.10 | 31.30 | 68.73* | | | 85.36* | | | 1970 | 78982 |
| T3 | Sheet | 0.12 | R.T. | L-T | 53.8 | 8.000 | 0.123 | 4.700 | 4.900 | --- | 20.50 | 71.70* | --- | --- | 75.21* | --- | --- | 1970 | 78982 |
| | | 0.12 | | | 53.8 | 8.000 | 0.123 | 0.800 | 1.900 | --- | 46.40 | 52.34* | | | 83.07* | | | 1970 | 78982 |
| | | 0.12 | | | 53.8 | 8.000 | 0.123 | 4.740 | 5.260 | --- | 19.60 | 69.20* | | | 78.70* | | | 1970 | 78982 |
| | | 0.12 | | | 53.8 | 8.000 | 0.123 | 0.800 | 2.000 | --- | 46.40 | 52.34* | | | 85.56* | | | 1970 | 78982 |
| | | 0.12 | | | 53.8 | 8.000 | 0.124 | 2.600 | 3.300 | --- | 34.30 | 74.21* | | | 87.46* | | | 1970 | 78982 |
| T3 | Sheet | 0.04 | R.T. | L-T | 51.7 | 9.700 | 0.040 | 3.980 | --- | --- | 28.60 | 79.98* | --- | --- | --- | --- | --- | 1966 | 86734 |
| T3 | Sheet | 0.06 | R.T. | L-T | 51.9 | 12.000 | 0.063 | 4.720 | 5.420 | 24.40 | 27.70 | 83.54* | --- | --- | 92.79* | --- | --- | 1966 | 67821 |
| | | 0.06 | | | 51.9 | 12.000 | 0.063 | 3.080 | 3.810 | 23.30 | 33.20 | 76.14* | | | 86.67* | | | 1966 | 67821 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.5.2.2 (CONTINUED)

| ALUMINUM 2024 $K_C$ | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($Ksi\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($Ksi\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
| BUCKLING OF CRACK EDGES RESTRAINED | | | | | | | | | | | | | | | | | | |
| T3 | Sheet | 0.03 | R.T. | L-T | 52.0 | 20.000 | 0.032 | 5.260 | 7.070 | 20.00 | 27.60 | 82.90 | 83.5 | 0.8 | 99.78* | --- | --- | 1966 | 67821 |
| | | 0.03 | | | 52.0 | 20.000 | 0.032 | 3.450 | 4.860 | 22.80 | 36.40 | 86.33* | | | 104.40* | | | 1966 | 67821 |
| | | 0.03 | | | 52.0 | 20.000 | 0.032 | 1.120 | 2.060 | 43.10 | 47.00 | 62.46* | | | 85.10* | | | 1966 | 67821 |
| | | 0.03 | | | 52.0 | 20.000 | 0.032 | 7.460 | 9.500 | 16.30 | 22.40 | 84.00 | | | 100.98* | | | 1966 | 67821 |
| | | 0.03 | | | 52.0 | 20.000 | 0.032 | 0.640 | 1.200 | 47.60 | 48.50 | 48.66* | | | 66.74* | | | 1966 | 67821 |
| T3 | Sheet | 0.06 | R.T. | L-T | 51.9 | 20.000 | 0.063 | 7.200 | 13.500 | 23.20 | 23.20 | 84.91 | 83.4 | 2.1 | 152.84* | --- | --- | 1966 | 67821 |
| | | 0.06 | | | 51.9 | 20.000 | 0.063 | 3.270 | 5.030 | 19.20 | 37.70 | 86.88* | | | 110.30* | | | 1966 | 67821 |
| | | 0.06 | | | 51.9 | 20.000 | 0.063 | 4.930 | 6.900 | 25.60 | 32.20 | 93.12* | | | 114.53* | | | 1966 | 67821 |
| | | 0.06 | | | 51.9 | 20.000 | 0.063 | 4.310 | 7.770 | 26.70 | 30.60 | 81.98 | | | 118.90* | | | 1966 | 67821 |
| | | 0.06 | | | 51.9 | 20.000 | 0.063 | 0.960 | 2.600 | 38.50 | 43.60 | 53.62* | | | 89.04* | | | 1966 | 67821 |
| | | 0.06 | | | 51.9 | 20.000 | 0.063 | 0.870 | 2.200 | 43.60 | 43.60 | 51.03* | | | 81.66* | | | 1966 | 67821 |
| T3 | Sheet | 0.08 | R.T. | L-T | 53.3 | 20.000 | 0.080 | 7.350 | 8.950 | 20.80 | 24.80 | 92.05 | 85.6 | 6.4 | 106.46* | --- | --- | 1966 | 67821 |
| | | 0.08 | | | 53.3 | 20.000 | 0.080 | 0.700 | 1.440 | 51.90 | 51.80 | 54.36* | | | 78.16* | | | 1966 | 67821 |
| | | 0.08 | | | 53.3 | 20.000 | 0.080 | 5.090 | 6.450 | 21.30 | 29.00 | 85.44 | | | 98.71* | | | 1966 | 67821 |
| | | 0.08 | | | 53.3 | 20.000 | 0.080 | 3.310 | 4.950 | 29.20 | 34.20 | 79.33 | | | 99.14* | | | 1966 | 67821 |
| | | 0.08 | | | 53.3 | 20.000 | 0.080 | 1.270 | 1.900 | 46.46 | 48.00 | 67.96* | | | 83.39* | | | 1966 | 67821 |
| T3 | Sheet | 0.05 | R.T. | L-T | 52.7 | 24.000 | 0.049 | 7.000 | 13.500 | 17.00 | 27.60 | 96.64 | 99.5 | 2.5 | 159.57* | --- | --- | 1970 | 78982 |
| | | 0.05 | | | 52.7 | 24.000 | 0.049 | 7.160 | 11.000 | 16.20 | 28.30 | 100.48 | | | 135.67* | | | 1970 | 78982 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.5.2.2 (CONTINUED)

## ALUMINUM 2024 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_C$ (Ksi$\sqrt{in}$) | $K_C$ $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 Cont'd | Sheet Cont'd | 0.05 | R.T. Cont'd | L-T Cont'd | 52.7 | 24.000 | 0.049 | 14.27 | 18.000 | 12.70 | 16.50 | 101.30 | Cont'd | Cont'd | 141.83* | Cont'd | Cont'd | 1970 | 78982 |
| | | 0.05 | | | 52.7 | 24.000 | 0.049 | 2.320 | 7.400 | 34.00 | 42.20 | 81.03* | | | 152.94* | | | 1970 | 78982 |
| T3 | Sheet | 0.12 | R.T. | L-T | 53.8 | 24.000 | 0.123 | 7.650 | 11.600 | --- | 29.20 | 108.07 | 93.9 | 11.1 | 146.35* | --- | --- | 1970 | 78982 |
| | | 0.12 | | | 53.8 | 24.000 | 0.123 | 6.220 | 11.800 | --- | 28.00 | 91.33 | | | 142.43* | | | 1970 | 78982 |
| | | 0.12 | | | 53.8 | 24.000 | 0.123 | 2.400 | 3.250 | --- | 44.60 | 87.13* | | | 101.93* | | | 1970 | 78982 |
| | | 0.12 | | | 53.8 | 24.000 | 0.123 | 2.400 | 4.400 | --- | 44.60 | 87.13* | | | 119.74* | | | 1970 | 78982 |
| | | 0.12 | | | 53.8 | 24.000 | 0.123 | 14.35 | 16.200 | --- | 15.40 | 95.15 | | | 111.14* | | | 1970 | 78982 |
| | | 0.12 | | | 53.8 | 24.000 | 0.123 | 14.39 | 17.800 | --- | 13.10 | 81.20 | | | 110.25* | | | 1970 | 78982 |
| T3 | Sheet | 0.06 | R.T. | L-T | 51.9 | 30.000 | 0.063 | 3.670 | 6.710 | 27.50 | 39.70 | 96.21* | 87.3 | 4.9 | 133.01* | 108.9 | 8.2 | 1966 | 67821 |
| | | 0.06 | | | 51.9 | 30.000 | 0.063 | 10.86 | 14.400 | 17.60 | 18.20 | 81.89 | | | 101.38 | | | 1966 | 67821 |
| | | 0.06 | | | 51.9 | 30.000 | 0.063 | 7.130 | 10.710 | 19.80 | 26.40 | 91.56 | | | 117.67 | | | 1966 | 67821 |
| | | 0.06 | | | 51.9 | 30.000 | 0.063 | 5.730 | 8.090 | 22.00 | 28.80 | 88.40 | | | 107.53 | | | 1966 | 67821 |
| T3 | Sheet | 0.06 | R.T. | T-L | 43.4 | 6.000 | 0.060 | 2.000 | 2.350 | --- | 30.25 | 57.62* | --- | --- | 64.31* | --- | --- | 1966 | 86734 |
| T3 | Sheet | 0.06 | R.T. | T-L | 43.4 | 9.000 | 0.060 | 3.000 | 3.600 | --- | 30.50 | 71.15* | --- | --- | 80.64* | --- | --- | 1966 | 86734 |
| T3 | Sheet | 0.06 | R.T. | T-L | 43.4 | 15.000 | 0.060 | 5.000 | 5.800 | --- | 28.00 | 84.32* | --- | --- | 93.27* | --- | --- | 1966 | 86734 |
| T3 | Sheet | 0.06 | R.T. | T-L | 43.4 | 18.000 | 0.060 | 6.000 | 7.200 | --- | 27.50 | 90.72* | --- | --- | 102.82* | --- | --- | 1966 | 86734 |
| T3 | Sheet | 0.06 | R.T. | T-L | 43.4 | 21.000 | 0.060 | 7.000 | 8.600 | --- | 27.40 | 97.63* | --- | --- | 112.58* | --- | --- | 1966 | 86734 |
| T3 | Sheet | 0.06 | R.T. | T-L | 43.4 | 24.000 | 0.060 | 8.000 | 9.600 | --- | 26.70 | 101.71* | --- | --- | 115.27* | --- | --- | 1966 | 86734 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.5.2.2 (CONTINUED)

## ALUMINUM 2024 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_C$ (Ksi$\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 | Sheet | 0.08 | R.T. | T-L | 46.8 | 48.000 | 0.080 | 24.00 | 28.420 | --- | 18.30 | 133.62 | 134.7 | 1.5 | 158.14* | --- | --- | 1962 | 62308 |
| | | 0.08 | | | 46.8 | 48.010 | 0.080 | 24.00 | 28.390 | --- | 18.60 | 135.80 | | | 160.52* | | | 1962 | 62308 |
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 | Sheet | 0.06 | R.T. | L-T | 55.5 | 2.000 | 0.061 | 0.621 | 0.800 | --- | 39.30 | 41.26* | --- | --- | 48.98* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 55.5 | 2.000 | 0.061 | 0.624 | 1.030 | 35.90 | 38.90 | 41.00* | | | 59.56* | | | 1973 | 86213 |
| | | 0.06 | | | 55.5 | 2.000 | 0.061 | 0.622 | 0.960 | 35.40 | 38.80 | 40.81* | | | 55.80* | | | 1973 | 86213 |
| | | 0.06 | | | 50.0 | 2.000 | 0.063 | 0.624 | 0.870 | 30.10 | 36.20 | 38.16* | | | 48.06* | | | 1973 | 86213 |
| | | 0.06 | | | 50.0 | 2.000 | 0.063 | 0.626 | 0.920 | 32.40 | 36.20 | 38.23* | | | 50.25* | | | 1973 | 86213 |
| | | 0.06 | | | 50.0 | 2.000 | 0.063 | 0.626 | 0.900 | --- | 36.30 | 38.34* | | | 49.50* | | | 1973 | 86213 |
| | | 0.06 | | | 53.2 | 2.000 | 0.064 | 0.621 | 1.000 | --- | 36.10 | 37.90* | | | 53.80* | | | 1973 | 86213 |
| T3 | Sheet | 0.09 | R.T. | L-T | 51.1 | 3.000 | 0.092 | 1.190 | 1.992 | --- | 30.50 | 46.27* | --- | --- | 76.02* | --- | --- | 1973 | 86213 |
| | | 0.09 | | | 51.1 | 3.000 | 0.092 | 1.240 | 2.215 | --- | 29.90 | 46.76* | | | 88.16* | | | 1973 | 86213 |
| | | 0.09 | | | 51.1 | 3.000 | 0.092 | 1.210 | 2.002 | --- | 30.30 | 46.53* | | | 76.06* | | | 1973 | 86213 |
| T3 | Sheet | 0.12 | R.T. | L-T | 53.7 | 3.000 | 0.124 | 1.143 | 2.080 | 17.10 | 32.40 | 47.73* | --- | --- | 86.04* | --- | --- | 1973 | 86213 |
| | | 0.12 | | | 53.7 | 3.000 | 0.124 | 1.123 | 1.940 | 19.90 | 33.30 | 48.46* | | | 80.08* | | | 1973 | 86213 |
| | | 0.12 | | | 53.7 | 3.000 | 0.124 | 1.223 | 2.040 | 17.40 | 31.20 | 48.26* | | | 80.47* | | | 1973 | 86213 |
| | | 0.12 | | | 53.8 | 3.000 | 0.125 | 1.167 | 1.830 | 16.30 | 32.30 | 48.29* | | | 72.22* | | | 1973 | 86213 |
| | | 0.12 | | | 53.8 | 3.000 | 0.126 | 1.190 | 1.790 | 15.00 | 31.60 | 47.94* | | | 68.87* | | | 1973 | 86213 |
| | | 0.12 | | | 53.8 | 3.000 | 0.127 | 1.140 | 1.760 | 15.70 | 33.10 | 48.70* | | | 70.78* | | | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.5.2.2 (CONTINUED)

## ALUMINUM 2024 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($K_{app}$ (Ksi$\sqrt{in}$)) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($K_C$ (Ksi$\sqrt{in}$)) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 Cont'd | Sheet Cont'd | 0.12 | R.T. Cont'd | L-T Cont'd | 55.8 | 3.000 | 0.129 | 1.165 | 1.780 | 16.70 | 32.30 | 48.23* | Cont'd | Cont'd | 69.95* | Cont'd | Cont'd | 1973 | 86213 |
| | | 0.12 | | | 55.8 | 3.000 | 0.130 | 1.150 | 1.800 | 17.80 | 32.50 | 48.12* | | | 71.28* | | | 1973 | 86213 |
| | | 0.12 | | | 55.8 | 3.000 | 0.130 | 1.257 | 1.840 | 15.10 | 29.70 | 46.89* | | | 66.84* | | | 1973 | 86213 |
| T3 | Sheet | 0.16 | R.T. | L-T | 50.4 | 3.000 | 0.160 | 1.140 | 1.780 | 15.90 | 31.10 | 45.76* | --- | --- | 67.35* | --- | --- | 1973 | 86213 |
| | | 0.16 | | | 50.4 | 3.000 | 0.161 | 1.163 | 1.820 | 16.90 | 30.40 | 45.34* | | | 67.53* | | | 1973 | 86213 |
| | | 0.16 | | | 50.4 | 3.000 | 0.162 | 1.162 | 1.850 | 17.80 | 30.50 | 45.49* | | | 69.08* | | | 1973 | 86213 |
| | | 0.16 | | | 50.6 | 3.000 | 0.163 | 1.163 | 1.780 | 17.70 | 30.50 | 45.49* | | | 66.05* | | | 1973 | 86213 |
| | | 0.16 | | | 50.6 | 3.000 | 0.163 | 1.150 | 1.760 | 17.20 | 31.20 | 46.19* | | | 66.72* | | | 1973 | 86213 |
| | | 0.16 | | | 50.6 | 3.000 | 0.163 | 1.255 | 1.710 | 15.70 | 28.70 | 45.26* | | | 59.49* | | | 1973 | 86213 |
| | | 0.16 | | | 53.8 | 3.000 | 0.163 | 1.162 | 1.810 | 16.10 | 32.10 | 47.88* | | | 70.85* | | | 1973 | 86213 |
| | | 0.16 | | | 53.8 | 3.000 | 0.163 | 1.140 | 1.840 | 16.60 | 32.80 | 48.26* | | | 73.81* | | | 1973 | 86213 |
| | | 0.16 | | | 53.8 | 3.000 | 0.164 | 1.127 | 1.800 | 17.10 | 33.10 | 48.28* | | | 72.60* | | | 1973 | 86213 |
| T3 | Sheet | 0.12 | R.T. | L-T | 56.0 | 4.000 | 0.125 | 1.645 | 2.749 | --- | 31.40 | 56.46* | --- | --- | 94.95* | --- | --- | 1973 | 86213 |
| | | 0.12 | | | 56.9 | 4.000 | 0.125 | 1.627 | 2.678 | --- | 31.50 | 56.18* | | | 91.72* | | | 1973 | 86213 |
| T3 | Sheet | 0.08 | R.T. | L-T | 52.7 | 12.000 | 0.081 | 2.430 | --- | --- | 43.20 | 86.60* | --- | --- | --- | --- | --- | 1956 | 84367 |
| | | 0.08 | | | 52.7 | 12.000 | 0.081 | 2.960 | --- | --- | 41.40 | 92.77* | | | --- | | | 1956 | 84367 |
| | | 0.08 | | | 52.7 | 12.000 | 0.081 | 2.910 | --- | --- | 43.10 | 95.64* | | | --- | | | 1956 | 84367 |
| | | 0.08 | | | 52.7 | 12.000 | 0.081 | 2.980 | --- | --- | 44.30 | 99.66* | | | --- | | | 1956 | 84367 |
| | | 0.08 | | | 52.7 | 12.000 | 0.081 | 4.830 | --- | --- | 28.80 | 88.32* | | | --- | | | 1956 | 84367 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.5.2.2 (CONTINUED)

## ALUMINUM 2024 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_C$ (Ksi$\sqrt{in}$) | $K_C$ $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 Cont'd | Sheet Cont'd | 0.08 | R.T. Cont'd | L-T Cont'd | 52.7 | 12.000 | 0.081 | 3.180 | --- | --- | 39.70 | 92.78* | Cont'd | Cont'd | --- | Cont'd | Cont'd | 1956 | 84367 |
| | | 0.08 | | | 52.7 | 12.000 | 0.081 | 4.740 | --- | --- | 26.80 | 81.07* | | | --- | | | 1956 | 84367 |
| | | 0.08 | | | 52.7 | 12.000 | 0.081 | 4.950 | --- | --- | 17.60 | 86.19* | | | --- | | | 1956 | 84367 |
| | | 0.08 | | | 52.7 | 12.000 | 0.081 | 1.330 | --- | --- | 51.70 | 75.30* | | | --- | | | 1956 | 84367 |
| | | 0.08 | | | 52.7 | 12.000 | 0.081 | 4.820 | --- | --- | 27.90 | 85.43* | | | --- | | | 1956 | 84367 |
| | | 0.08 | | | 52.7 | 12.000 | 0.081 | 1.280 | --- | --- | 50.90 | 72.69* | | | --- | | | 1956 | 84367 |
| T3 | Sheet | 0.06 | R.T. | L-T | 51.6 | 15.800 | 0.062 | 3.990 | 6.080 | --- | 32.20 | 83.94* | --- | --- | 109.70* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 51.6 | 15.820 | 0.062 | 1.010 | 1.440 | --- | 49.80 | 62.88* | | | 75.28* | | | 1973 | 86213 |
| | | 0.06 | | | 51.6 | 15.810 | 0.063 | 3.010 | 4.260 | --- | 37.10 | 82.52* | | | 100.51* | | | 1973 | 86213 |
| | | 0.06 | | | 51.6 | 15.810 | 0.063 | 6.010 | 7.080 | --- | 24.20 | 81.77 | | | 92.41* | | | 1973 | 86213 |
| T3 | Sheet | 0.16 | R.T. | L-T | 50.8 | 29.990 | 0.163 | 15.00 | 18.360 | --- | 20.70 | 119.51* | --- | --- | 146.96* | --- | --- | 1962 | 62308 |
| | | 0.16 | | | 50.8 | 30.010 | 0.163 | 15.00 | 18.880 | --- | 20.60 | 118.90* | | | 151.24* | | | 1962 | 62308 |
| T3 | Plate | 0.50 | R.T. | L-T | 54.8 | 8.000 | 0.500 | 2.600 | 2.770 | 21.00 | 30.60 | 66.20* | --- | --- | 69.00* | --- | --- | 1970 | 78982 |
| T3 | Plate | 0.50 | R.T. | L-T | 54.8 | 7.960 | 0.509 | 4.820 | 5.000 | 12.80 | 18.00 | 64.99* | --- | --- | 67.93* | --- | --- | 1970 | 78982 |
| | | 0.50 | | | 54.8 | 8.050 | 0.509 | 4.850 | 4.900 | 13.20 | 18.00 | 64.98* | | | 65.76* | | | 1970 | 78982 |
| T3 | Plate | 0.25 | R.T. | L-T | 53.6 | 15.000 | 0.253 | 7.500 | 11.250 | --- | 21.30 | 86.94 | --- | --- | 144.74* | --- | --- | 1966 | 86734 |
| | | 0.25 | | | 53.6 | 15.000 | 0.255 | 7.500 | 11.440 | --- | 21.50 | 87.76* | | | 151.02* | | | 1966 | 86734 |
| T3 | Plate | 0.50 | R.T. | L-T | 55.4 | 15.000 | 0.515 | 7.500 | 10.420 | --- | 18.70 | 76.33 | 76.3 | 0.0 | 111.37* | --- | --- | 1966 | 86734 |
| | | 0.50 | | | 55.4 | 15.000 | 0.517 | 7.500 | 10.080 | --- | 18.70 | 76.33 | | | 106.01* | | | 1966 | 86734 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.5.2.2 (CONTINUED)

## ALUMINUM 2024 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_C$ (Ksi$\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 | Plate | 0.50 | R.T. | L-T | 54.8 | 24.000 | 0.509 | 7.250 | 12.000 | 17.20 | 26.80 | 95.89 | 95.9 | 2.4 | 138.37* | --- | --- | 1970 | 78982 |
| | | 0.50 | | | 54.8 | 24.150 | 0.509 | 7.200 | 11.500 | 18.50 | 27.60 | 98.26 | | | 137.01* | | | 1970 | 78982 |
| | | 0.50 | | | 54.8 | 24.150 | 0.509 | 14.10 | 17.400 | --- | 15.50 | 93.54 | | | 124.29* | | | 1970 | 78982 |
| | | 0.50 | | | 54.8 | 24.150 | 0.509 | 2.300 | 4.800 | 25.70 | 42.80 | 81.81* | | | 120.47* | | | 1970 | 78982 |
| T3 | Sheet | 0.06 | R.T. | T-L | 47.8 | 2.000 | 0.061 | 0.621 | 1.040 | 34.40 | 35.20 | 36.95* | --- | --- | 54.38* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 47.8 | 2.000 | 0.061 | 0.623 | 0.900 | --- | 35.40 | 37.24* | | | 48.27* | | | 1973 | 86213 |
| | | 0.06 | | | 47.8 | 2.000 | 0.062 | 0.625 | 1.050 | 28.00 | 34.70 | 36.57* | | | 54.09* | | | 1973 | 86213 |
| | | 0.06 | | | 44.4 | 2.000 | 0.063 | 0.626 | 1.030 | 28.30 | 34.10 | 36.01* | | | 52.21* | | | 1973 | 86213 |
| | | 0.06 | | | 44.4 | 2.000 | 0.064 | 0.625 | 1.080 | 32.30 | 33.20 | 34.99* | | | 53.17* | | | 1973 | 86213 |
| | | 0.06 | | | 46.2 | 2.000 | 0.064 | 0.620 | 0.980 | --- | 33.90 | 35.59* | | | 49.63* | | | 1973 | 86213 |
| T3 | Sheet | 0.09 | R.T. | T-L | 45.3 | 3.000 | 0.092 | 1.220 | 2.372 | --- | 28.00 | 43.26* | --- | --- | 95.11* | --- | --- | 1973 | 86213 |
| | | 0.09 | | | 45.3 | 3.000 | 0.093 | 1.190 | 2.480 | --- | 28.70 | 43.54* | | | 109.23* | | | 1973 | 86213 |
| | | 0.09 | | | 45.3 | 3.000 | 0.093 | 1.200 | 2.336 | --- | 28.60 | 43.66* | | | 93.86* | | | 1973 | 86213 |
| T3 | Sheet | 0.12 | R.T. | T-L | 45.7 | 3.000 | 0.124 | 1.130 | 2.250 | 15.20 | 30.50 | 44.60* | --- | --- | 92.69* | --- | --- | 1973 | 86213 |
| | | 0.12 | | | 45.7 | 3.000 | 0.124 | 1.178 | --- | 16.60 | 29.30 | 44.13* | | | --- | | | 1973 | 86213 |
| | | 0.12 | | | 45.7 | 3.000 | 0.124 | 1.148 | --- | 16.90 | 29.80 | 44.06* | | | --- | | | 1973 | 86213 |
| | | 0.12 | | | 46.0 | 3.000 | 0.127 | 1.180 | 2.250 | 14.80 | 28.50 | 42.98* | | | 86.61* | | | 1973 | 86213 |
| | | 0.12 | | | 46.0 | 3.000 | 0.127 | 1.233 | 2.200 | 13.70 | 27.70 | 43.11* | | | 80.74* | | | 1973 | 86213 |
| | | 0.12 | | | 46.0 | 3.000 | 0.128 | 1.137 | 2.160 | 15.00 | 29.50 | 43.30* | | | 83.28* | | | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.5.2.2 (CONTINUED)

## ALUMINUM 2024 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_C$ (Ksi$\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 Cont'd | Sheet Cont'd | 0.12 | R.T. Cont'd | T-L Cont'd | 48.1 | 3.000 | 0.129 | 1.110 | 2.190 | 17.10 | 30.10 | 43.47* | Cont'd | Cont'd | 87.03* | Cont'd | Cont'd | 1973 | 86213 |
| | | 0.12 | | | 48.1 | 3.000 | 0.129 | 1.107 | 2.110 | 16.90 | 30.10 | 43.37* | | | 81.75* | | | 1973 | 86213 |
| T3 | Sheet | 0.16 | R.T. | T-L | 43.2 | 3.000 | 0.161 | 1.183 | 2.110 | 14.70 | 27.50 | 41.52* | --- | --- | 74.69* | --- | --- | 1973 | 86213 |
| | | 0.16 | | | 43.2 | 3.000 | 0.161 | 1.260 | 2.120 | 15.50 | 26.00 | 41.15* | | | 71.15* | | | 1973 | 86213 |
| | | 0.16 | | | 43.2 | 3.000 | 0.162 | 1.160 | 2.050 | 15.20 | 27.40 | 40.82* | | | 71.18* | | | 1973 | 86213 |
| | | 0.16 | | | 43.5 | 3.000 | 0.162 | 1.137 | 2.090 | 14.40 | 28.10 | 41.24* | | | 75.18* | | | 1973 | 86213 |
| | | 0.16 | | | 43.5 | 3.000 | 0.162 | 1.202 | 2.110 | 15.90 | 27.00 | 41.26* | | | 73.33* | | | 1973 | 86213 |
| | | 0.16 | | | 43.5 | 3.000 | 0.162 | 1.242 | 2.070 | 14.20 | 26.10 | 40.86* | | | 68.80* | | | 1973 | 86213 |
| | | 0.16 | | | 45.6 | 3.000 | 0.162 | 1.255 | 2.240 | 15.60 | 27.70 | 43.68* | | | 83.47* | | | 1973 | 86213 |
| | | 0.16 | | | 45.6 | 3.000 | 0.162 | 1.117 | 2.110 | 16.90 | 30.30 | 43.93* | | | 82.29* | | | 1973 | 86213 |
| | | 0.16 | | | 45.6 | 3.000 | 0.162 | 1.130 | 2.160 | 15.70 | 30.20 | 44.16* | | | 85.25* | | | 1973 | 86213 |
| T3 | Sheet | 0.06 | R.T. | T-L | 46.0 | 15.810 | 0.063 | 4.000 | --- | --- | 29.10 | 75.96* | --- | --- | --- | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 46.0 | 15.810 | 0.064 | 3.010 | 4.110 | --- | 32.80 | 72.96* | | | 86.99* | | | 1973 | 86213 |
| | | 0.06 | | | 46.0 | 15.810 | 0.064 | 6.010 | --- | --- | 22.50 | 76.02 | | | --- | | | 1973 | 86213 |
| | | 0.06 | | | 46.0 | 15.820 | 0.064 | 1.020 | 1.780 | --- | 43.00 | 54.57* | | | 72.47* | | | 1973 | 86213 |
| T3 | Sheet | 0.06 | R.T. | T-L | 44.0 | 24.000 | 0.063 | 8.000 | 9.600 | --- | 28.40 | 108.18* | --- | --- | 122.61* | --- | --- | 1966 | 86734 |
| | | 0.06 | | | 44.0 | 24.000 | 0.063 | 8.000 | 9.600 | --- | 27.20 | 103.61* | | | 117.43* | | | 1966 | 86734 |
| | | 0.06 | | | 44.0 | 24.000 | 0.063 | 8.000 | 9.600 | --- | 27.90 | 106.28* | | | 120.45* | | | 1966 | 86734 |
| | | 0.06 | | | 44.0 | 24.000 | 0.063 | 8.000 | 9.600 | --- | 27.80 | 105.90* | | | 120.02* | | | 1966 | 86734 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.5.2.2 (CONTINUED)



| ALUMINUM 2024 $K_C$ | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ (Ksi$\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 | Sheet | 0.16 | R.T. | T-L | 45.4 | 30.000 | 0.164 | 15.00 | 18.900 | --- | 18.20 | 105.06* | --- | --- | 133.83* | --- | --- | 1966 | 86734 |
| | | 0.16 | | | 45.4 | 30.000 | 0.165 | 15.00 | 18.450 | --- | 18.20 | 105.06* | | | 129.94* | | | 1966 | 86734 |
| T3 | Plate | 0.25 | R.T. | T-L | 47.3 | 15.000 | 0.254 | 7.500 | 9.650 | --- | 19.30 | 78.78* | --- | --- | 103.08* | --- | --- | 1966 | 86734 |
| | | 0.25 | | | 47.3 | 15.000 | 0.255 | 7.500 | 9.950 | --- | 19.40 | 79.19* | | | 107.98* | | | 1966 | 86734 |
| T3 | Plate | 0.50 | R.T. | T-L | 49.2 | 15.000 | 0.516 | 7.500 | 10.350 | --- | 15.70 | 64.08 | 65.1 | 1.4 | 92.54* | --- | --- | 1966 | 86734 |
| | | 0.50 | | | 49.2 | 15.000 | 0.519 | 7.500 | 10.400 | --- | 16.20 | 66.12 | | | 96.20* | | | 1966 | 86734 |
| T3 | Sheet | 0.09 | 84 | T-L | 44.3 | 16.000 | 0.095 | 4.000 | 6.420 | 18.10 | 29.80 | 77.71* | --- | --- | 105.29* | --- | --- | 1973 | 86213 |
| | | 0.09 | | | 44.3 | 16.000 | 0.095 | 4.000 | 6.530 | 15.80 | 29.30 | 76.41* | | | 104.82* | | | 1973 | 86213 |
| T351 | Plate | 0.25 | R.T. | L-T | 55.4 | 4.000 | 0.246 | 1.733 | 2.627 | --- | 29.00 | 54.25* | --- | --- | 82.17* | --- | --- | 1973 | 86213 |
| | | 0.25 | | | 55.8 | 4.000 | 0.247 | 1.727 | 2.706 | --- | 29.80 | 55.60* | | | 88.08* | | | 1973 | 86213 |
| T351 | Plate | 0.50 | R.T. | L-T | 49.0 | 4.000 | 0.498 | 1.789 | --- | --- | 28.00 | 53.70* | --- | --- | --- | --- | --- | 1966 | 86734 |
| | | 0.50 | | | 49.0 | 4.000 | 0.503 | 1.880 | --- | --- | 28.00 | 55.95* | | | --- | | | 1966 | 86734 |
| | | 0.50 | | | 54.0 | 4.000 | 0.507 | 1.673 | --- | 15.80 | 30.30 | 55.17* | | | --- | | | 1973 | 86213 |
| | | 0.50 | | | 54.3 | 4.000 | 0.508 | 1.653 | --- | 15.70 | 30.70 | 55.40* | | | --- | | | 1973 | 86213 |
| T351 | Plate | 0.50 | R.T. | L-T | 49.0 | 12.000 | 0.441 | 7.750 | --- | --- | 18.00 | 86.42* | --- | --- | --- | --- | --- | 1966 | 86734 |
| | | 0.50 | | | 49.0 | 12.000 | 0.444 | 5.000 | --- | --- | 29.10 | 91.56* | | | --- | | | 1966 | 86734 |
| | | 0.50 | | | 49.0 | 12.000 | 0.448 | 9.620 | --- | --- | 9.00 | 63.19* | | | --- | | | 1966 | 86734 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.5.2.2 (CONTINUED)

## ALUMINUM 2024 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_C$ (Ksi$\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T351 | Plate | 1.00 | R.T. | L-T | 58.2 | 20.000 | 1.023 | 4.850 | 7.550 | --- | 28.00 | 80.21 | 78.6 | 5.1 | 105.89 | 107.1 | 1.8 | 1973 | 86213 |
| | | 1.00 | | | 58.2 | 20.000 | 1.023 | 2.610 | 6.250 | --- | 35.60 | 72.85 | | | 118.78* | | | 1973 | 86213 |
| | | 1.00 | | | 58.2 | 20.000 | 1.023 | 7.000 | 10.000 | --- | 23.00 | 82.59 | | | 108.40 | | | 1973 | 86213 |
| T351 | Plate | 0.25 | R.T. | T-L | 47.1 | 4.000 | 0.255 | 1.790 | 2.500 | --- | 23.80 | 45.69* | --- | --- | 63.28* | --- | --- | 1973 | 86213 |
| | | 0.25 | | | 47.1 | 4.000 | 0.255 | 1.860 | 2.240 | --- | 22.90 | 45.35* | | | 53.80* | | | 1973 | 86213 |
| T351 | Plate | 0.50 | R.T. | T-L | 48.6 | 14.970 | 0.507 | 4.970 | 7.900 | --- | 23.80 | 71.41 | 71.1 | 0.5 | 102.00* | --- | --- | 1973 | 86213 |
| | | 0.50 | | | 48.6 | 15.000 | 0.507 | 5.000 | 8.600 | --- | 23.50 | 70.77 | | | 109.59* | | | 1973 | 86213 |
| T351 | Plate | 1.00 | R.T. | T-L | 52.0 | 20.000 | 1.023 | 4.850 | 8.500 | --- | 24.00 | 68.75 | 67.8 | 4.2 | 98.96* | --- | --- | 1973 | 86213 |
| | | 1.00 | | | 52.0 | 20.000 | 1.023 | 7.000 | 10.100 | --- | 19.90 | 71.46 | | | 94.63 | | | 1973 | 86213 |
| | | 1.00 | | | 52.0 | 20.000 | 1.023 | 2.610 | 6.450 | --- | 30.90 | 63.23 | | | 105.18* | | | 1973 | 86213 |
| T36 | Sheet | 0.06 | R.T. | L-T | 63.6 | 2.000 | 0.062 | 0.625 | 1.160 | --- | 41.30 | 43.53* | --- | --- | 71.21* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 63.6 | 2.000 | 0.062 | 0.625 | 1.250 | --- | 41.90 | 44.16* | | | 78.77* | | | 1973 | 86213 |
| T36 | Sheet | 0.06 | R.T. | T-L | 56.4 | 2.000 | 0.062 | 0.625 | 1.280 | --- | 37.40 | 39.42* | --- | --- | 72.45* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 56.4 | 2.000 | 0.062 | 0.625 | 1.220 | --- | 37.50 | 39.53* | | | 68.46* | | | 1973 | 86213 |
| T4 | Sheet | 0.04 | R.T. | L-T | 37.5 | 7.500 | 0.040 | 1.950 | --- | --- | 27.40 | 50.06* | --- | --- | --- | --- | --- | 1966 | 86734 |
| | | 0.04 | | | 37.5 | 7.500 | 0.040 | 1.930 | --- | --- | 29.00 | 52.66* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 37.5 | 7.500 | 0.040 | 0.500 | --- | --- | 40.30 | 35.81* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 37.5 | 7.500 | 0.040 | 1.100 | --- | --- | 35.60 | 47.43* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 37.5 | 7.500 | 0.040 | 0.500 | --- | --- | 40.50 | 35.99* | | | --- | | | 1966 | 86734 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.5.2.2 (CONTINUED)

## ALUMINUM 2024 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_c$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ (Ksi$\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T4 Cont'd | Sheet Cont'd | 0.04 | R.T. Cont'd | L-T Cont'd | 37.5 | 7.500 | 0.040 | 4.100 | --- | --- | 16.83 | 52.84* | Cont'd | Cont'd | --- | Cont'd | Cont'd | 1966 | 86734 |
| | | 0.04 | | | 37.5 | 7.500 | 0.040 | 0.540 | --- | --- | 39.60 | 36.59* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 37.5 | 7.500 | 0.040 | 5.000 | --- | --- | 12.14 | 48.11* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 37.5 | 7.500 | 0.040 | 4.600 | --- | --- | 12.13 | 43.16* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 37.5 | 7.500 | 0.040 | 1.000 | --- | --- | 36.30 | 46.00* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 37.5 | 7.500 | 0.040 | 0.500 | --- | --- | 39.20 | 34.84* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 37.5 | 7.500 | 0.040 | 3.860 | --- | --- | 17.47 | 51.76* | | | --- | | | 1966 | 86734 |
| T4 | Sheet | 0.06 | R.T. | L-T | 41.6 | 7.500 | 0.064 | 1.500 | --- | --- | 34.90 | 54.93* | --- | --- | --- | --- | --- | 1966 | 86734 |
| | | 0.06 | | | 41.6 | 7.500 | 0.064 | 1.020 | --- | --- | 37.60 | 48.14* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 41.6 | 7.500 | 0.064 | 0.500 | --- | --- | 42.00 | 37.32* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 41.6 | 7.500 | 0.064 | 0.800 | --- | --- | 40.00 | 45.16* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 41.6 | 7.500 | 0.064 | 1.000 | --- | --- | 37.70 | 47.77* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 41.6 | 7.500 | 0.064 | 2.100 | --- | --- | 30.70 | 58.62* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 41.6 | 7.500 | 0.064 | 0.500 | --- | --- | 41.20 | 36.61* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 41.6 | 7.500 | 0.064 | 4.030 | --- | --- | 17.80 | 54.94* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 41.6 | 7.500 | 0.064 | 5.000 | --- | --- | 12.13 | 48.08* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 41.6 | 7.500 | 0.064 | 0.500 | --- | --- | 42.30 | 37.59* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 41.6 | 7.500 | 0.064 | 3.100 | --- | --- | 12.13 | 29.99 | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 41.6 | 7.500 | 0.064 | 3.900 | --- | --- | 18.50 | 55.34* | | | --- | | | 1966 | 86734 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.5.2.2 (CONTINUED)

## ALUMINUM 2024 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_C$ (Ksi$\sqrt{in}$) | $K_C$ $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T4 | Sheet | 0.04 | R.T. | T-L | 37.7 | 7.500 | 0.040 | 0.550 | --- | --- | 38.10 | 35.53* | --- | --- | --- | --- | --- | 1966 | 86734 |
| | | 0.04 | | | 37.7 | 7.500 | 0.040 | 4.020 | --- | --- | 14.87 | 45.79* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 37.7 | 7.500 | 0.040 | 0.500 | --- | --- | 38.90 | 34.57* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 37.7 | 7.500 | 0.040 | 0.500 | --- | --- | 39.30 | 34.92* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 37.7 | 7.500 | 0.040 | 2.020 | --- | --- | 27.70 | 51.67* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 37.7 | 7.500 | 0.040 | 1.050 | --- | --- | 35.50 | 46.15* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 37.7 | 7.500 | 0.040 | 0.530 | --- | --- | 38.10 | 34.87* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 37.7 | 7.500 | 0.040 | 1.100 | --- | --- | 34.20 | 45.56* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 37.7 | 7.500 | 0.040 | 2.060 | --- | --- | 27.30 | 51.53* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 37.7 | 7.500 | 0.040 | 5.350 | --- | --- | 12.13 | 53.30* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 37.7 | 7.500 | 0.040 | 4.000 | --- | --- | 16.00 | 49.03* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 37.7 | 7.500 | 0.040 | 5.000 | --- | --- | 12.14 | 48.11* | | | --- | | | 1966 | 86734 |
| T4 | Sheet | 0.06 | R.T. | T-L | 41.4 | 7.500 | 0.064 | 2.080 | --- | --- | 28.00 | 53.15* | --- | --- | --- | --- | --- | 1966 | 86734 |
| | | 0.06 | | | 41.4 | 7.500 | 0.064 | 1.100 | --- | --- | 35.20 | 46.89* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 41.4 | 7.500 | 0.064 | 4.300 | --- | --- | 14.63 | 48.24* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 41.4 | 7.500 | 0.064 | 0.510 | --- | --- | 37.90 | 34.02* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 41.4 | 7.500 | 0.064 | 0.500 | --- | --- | 39.40 | 35.01* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 41.4 | 7.500 | 0.064 | 1.960 | --- | --- | 29.70 | 54.42* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 41.4 | 7.500 | 0.064 | 3.900 | --- | --- | 17.58 | 52.59* | | | --- | | | 1966 | 86734 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.5.2.2 (CONTINUED)

## ALUMINUM 2024 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($K_{app}$ (Ksi$\sqrt{in}$)) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($K_C$ (Ksi$\sqrt{in}$)) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T4 Cont'd | Sheet Cont'd | 0.06 | R.T. Cont'd | T-L Cont'd | 41.4 | 7.500 | 0.064 | 0.500 | --- | --- | 40.80 | 36.26* | Cont'd | Cont'd | --- | Cont'd | Cont'd | 1966 | 86734 |
| | | 0.06 | | | 41.4 | 7.500 | 0.064 | 5.200 | --- | --- | 11.54 | 48.45* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 41.4 | 7.500 | 0.064 | 0.560 | --- | --- | 38.80 | 36.52* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 41.4 | 7.500 | 0.064 | 4.100 | --- | --- | 16.00 | 50.23* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 41.4 | 7.500 | 0.064 | 1.150 | --- | --- | 34.70 | 47.33* | | | --- | | | 1966 | 86734 |
| T6 | Sheet | 0.06 | R.T. | L-T | 54.7 | 2.000 | 0.062 | 0.621 | 0.860 | --- | 39.10 | 41.05* | --- | --- | 51.44* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 54.7 | 2.000 | 0.062 | 0.622 | 0.930 | --- | 39.70 | 41.76* | | | 55.60* | | | 1973 | 86213 |
| | | 0.06 | | | 54.7 | 2.000 | 0.062 | 0.624 | 0.850 | --- | 39.30 | 41.42* | | | 51.24* | | | 1973 | 86213 |
| T6 | Sheet | 0.06 | R.T. | T-L | 54.2 | 2.000 | 0.062 | 0.622 | 0.790 | --- | 35.80 | 37.66* | --- | --- | 44.21* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 54.2 | 2.000 | 0.062 | 0.623 | 0.840 | --- | 36.00 | 37.87* | | | 46.52* | | | 1973 | 86213 |
| | | 0.06 | | | 54.2 | 2.000 | 0.062 | 0.622 | 0.880 | --- | 35.10 | 36.92* | | | 47.01* | | | 1973 | 86213 |
| BUCKLING OF CRACK EDGES RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T62 (GQ) | Sheet | 0.13 | R.T. | L-T | 58.7 | 5.980 | 0.126 | 2.010 | --- | --- | 29.71 | 56.60 | --- | --- | 91.80 | --- | --- | 1978 | GD005 |
| T62 (GQ) | Sheet | 0.13 | R.T. | L-T | 58.7 | 15.970 | 0.126 | 4.000 | --- | --- | 28.87 | 75.30 | 75.9 | 0.8 | 82.30 | --- | --- | 1978 | GD005 |
| | | 0.13 | | | 58.7 | 16.000 | 0.126 | 4.030 | --- | --- | 29.17 | 76.40 | | | 143.70* | | | 1978 | GD005 |
| T62 (GQ) | Sheet | 0.13 | R.T. | T-L | 57.0 | 5.990 | 0.125 | 2.030 | --- | --- | 25.78 | 49.40 | 50.8 | 2.0 | 64.00 | 63.0 | 1.4 | 1978 | GD005 |
| | | 0.13 | | | 57.0 | 5.990 | 0.125 | 1.960 | --- | --- | 27.78 | 52.20 | | | 62.00 | | | 1978 | GD005 |
| T62 (WQ) | Sheet | 0.13 | R.T. | L-T | --- | 6.000 | 0.125 | 2.080 | --- | --- | 27.87 | 54.50 | 54.2 | 0.4 | 73.00 | 77.1 | 5.8 | 1978 | GD005 |
| | | 0.13 | | | --- | 5.980 | 0.126 | 1.990 | --- | --- | 28.40 | 53.90 | | | 81.20 | | | 1978 | GD005 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.5.2.2 (CONTINUED)



| ALUMINUM 2024 $K_C$ | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_C$ (Ksi$\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
| BUCKLING OF CRACK EDGES RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T62 (WQ) | Sheet | 0.13 | R.T. | L-T | --- | 15.980 | 0.126 | 4.000 | --- | --- | 29.37 | 76.60 | --- | --- | 139.20 | --- | --- | 1978 | GD005 |
| T62 (WQ) | Sheet | 0.13 | R.T. | T-L | --- | 5.990 | 0.125 | 1.960 | --- | --- | 27.51 | 51.70 | 51.7 | 0.1 | 73.80 | 72.4 | 2.1 | 1978 | GD005 |
| | | 0.13 | | | --- | 5.980 | 0.126 | 1.960 | --- | --- | 27.45 | 51.60 | | | 70.90 | | | 1978 | GD005 |
| T81 | Sheet | 0.13 | R.T. | L-T | 64.8 | 5.980 | 0.125 | 2.010 | --- | --- | 30.64 | 58.60 | 55.4 | 2.8 | 91.10* | 65.4 | 3.8 | 1978 | GD005 |
| | | 0.13 | | | 64.8 | 5.990 | 0.126 | 1.990 | --- | --- | 28.09 | 53.30 | | | 62.70 | | | 1978 | GD005 |
| | | 0.13 | | | 64.8 | 5.990 | 0.126 | 2.010 | --- | --- | 28.35 | 54.20 | | | 68.10 | | | 1978 | GD005 |
| T81 | Sheet | 0.04 | R.T. | L-T | 65.6 | 6.450 | 0.040 | 2.100 | --- | --- | 21.90 | 42.59 | 46.2 | 3.2 | --- | --- | --- | 1966 | 86734 |
| | | 0.04 | | | 65.6 | 6.450 | 0.040 | 2.500 | --- | --- | 21.90 | 47.92 | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 65.6 | 6.450 | 0.040 | 2.250 | --- | --- | 23.70 | 48.23 | | | --- | | | 1966 | 86734 |
| T81 | Sheet | 0.04 | R.T. | L-T | 65.1 | 9.700 | 0.040 | 4.000 | --- | --- | 19.69 | 55.27 | --- | --- | --- | --- | --- | 1966 | 86734 |
| T81 | Sheet | 0.06 | R.T. | T-L | 62.0 | 6.000 | 0.060 | 2.000 | 2.500 | --- | 27.10 | 51.62 | --- | --- | 60.29 | --- | --- | 1966 | 86734 |
| T81 | Sheet | 0.13 | R.T. | T-L | 64.1 | 5.990 | 0.126 | 2.020 | --- | --- | 23.32 | 44.70 | 44.4 | 0.9 | 59.50 | 57.3 | 2.0 | 1978 | GD005 |
| | | 0.13 | | | 64.1 | 6.000 | 0.126 | 1.980 | --- | --- | 22.88 | 43.30 | | | 55.70 | | | 1978 | GD005 |
| | | 0.13 | | | 64.1 | 6.010 | 0.126 | 2.060 | --- | --- | 23.24 | 45.10 | | | 56.80 | | | 1978 | GD005 |
| T81 | Sheet | 0.06 | R.T. | T-L | 62.0 | 15.000 | 0.060 | 5.000 | 6.000 | --- | 18.90 | 56.92 | --- | --- | 64.51 | --- | --- | 1966 | 86734 |
| T81 | Sheet | 0.06 | R.T. | T-L | 62.0 | 18.000 | 0.060 | 6.000 | 7.000 | --- | 18.50 | 61.03 | --- | --- | 67.78 | --- | --- | 1966 | 86734 |
| T81 | Sheet | 0.06 | R.T. | T-L | 62.0 | 21.000 | 0.060 | 7.000 | 8.200 | --- | 17.60 | 62.71 | --- | --- | 69.85 | --- | --- | 1966 | 86734 |
| T81 | Sheet | 0.06 | R.T. | T-L | 62.0 | 24.000 | 0.060 | 8.000 | 9.100 | --- | 16.40 | 62.47 | --- | --- | 68.15 | --- | --- | 1966 | 86734 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.5.2.2 (CONTINUED)

## ALUMINUM 2024 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($K_{app}$ (Ksi$\sqrt{in}$)) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($K_C$ (Ksi$\sqrt{in}$)) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T81 | Sheet | 0.06 | -65 | L-T | 67.0 | 9.000 | 0.065 | 2.950 | --- | --- | 28.50 | 65.76 | --- | --- | --- | --- | --- | 1966 | 86734 |
| T81 | Sheet | 0.06 | R.T. | L-T | 68.0 | 2.000 | 0.061 | 0.625 | 0.970 | --- | 35.40 | 37.31 | 38.0 | 0.5 | 51.37* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 68.0 | 2.000 | 0.061 | 0.619 | 1.065 | --- | 36.10 | 37.82 | | | 56.99* | | | 1973 | 86213 |
| | | 0.06 | | | 68.0 | 2.000 | 0.061 | 0.619 | 0.940 | --- | 38.20 | 40.02* | | | 53.97* | | | 1973 | 86213 |
| | | 0.06 | | | 68.0 | 2.000 | 0.061 | 0.617 | 1.040 | --- | 36.60 | 38.26 | | | 56.54* | | | 1973 | 86213 |
| | | 0.06 | | | 68.0 | 2.000 | 0.061 | 0.620 | 1.070 | --- | 37.00 | 38.84 | | | 58.73* | | | 1973 | 86213 |
| | | 0.06 | | | 68.0 | 2.000 | 0.062 | 0.625 | 1.040 | --- | 36.00 | 37.94 | | | 55.61* | | | 1973 | 86213 |
| | | 0.06 | | | 69.1 | 2.000 | 0.062 | 0.624 | 0.840 | --- | 35.90 | 37.84 | | | 46.39* | | | 1973 | 86213 |
| | | 0.06 | | | 69.1 | 2.000 | 0.062 | 0.623 | 0.870 | --- | 35.40 | 37.24 | | | 46.99* | | | 1973 | 86213 |
| | | 0.06 | | | 69.1 | 2.000 | 0.062 | 0.623 | 0.960 | --- | 36.50 | 38.39 | | | 52.50* | | | 1973 | 86213 |
| T81 | Sheet | 0.12 | R.T. | L-T | 65.2 | 3.000 | 0.123 | 1.000 | 1.550 | --- | 35.20 | 47.41* | 46.2 | 0.6 | 66.20* | --- | --- | 1973 | 86213 |
| | | 0.12 | | | 65.2 | 3.000 | 0.123 | 1.080 | 1.690 | --- | 34.00 | 48.19* | | | 69.61* | | | 1973 | 86213 |
| | | 0.12 | | | 65.2 | 3.000 | 0.123 | 1.070 | 1.680 | --- | 32.70 | 46.06 | | | 66.53* | | | 1973 | 86213 |
| | | 0.12 | | | 64.9 | 3.000 | 0.125 | 1.060 | 1.620 | --- | 33.10 | 46.33 | | | 64.93* | | | 1973 | 86213 |
| | | 0.12 | | | 64.9 | 3.000 | 0.125 | 1.040 | 1.660 | --- | 33.90 | 46.85 | | | 68.14* | | | 1973 | 86213 |
| | | 0.12 | | | 64.9 | 3.000 | 0.125 | 1.000 | 1.580 | --- | 33.70 | 45.39 | | | 64.53* | | | 1973 | 86213 |
| T81 | Sheet | 0.06 | R.T. | L-T | 59.0 | 9.000 | 0.064 | 3.320 | --- | --- | 27.70 | 69.15 | 70.8 | 2.4 | --- | --- | --- | 1966 | 86734 |
| | | 0.06 | | | 59.0 | 9.000 | 0.065 | 3.380 | --- | --- | 28.70 | 72.54 | | | --- | | | 1966 | 86734 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.5.2.2 (CONTINUED)



## ALUMINUM 2024 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($K_{app}$ (Ksi$\sqrt{in}$)) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($K_C$ (Ksi$\sqrt{in}$)) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T81 | Sheet | 0.06 | R.T. | L-T | 59.0 | 20.000 | 0.065 | 11.50 | --- | --- | 14.00 | 75.62 | 76.6 | 1.4 | --- | --- | --- | 1966 | 86734 |
| | | 0.06 | | | 59.0 | 20.000 | 0.065 | 11.25 | --- | --- | 14.70 | 77.58 | | | --- | --- | --- | 1966 | 86734 |
| T81 | Sheet | 0.06 | 250 | L-T | 59.0 | 9.000 | 0.065 | 3.600 | --- | --- | 32.40 | 85.66* | --- | --- | --- | --- | --- | 1966 | 86734 |
| T81 | Sheet | 0.06 | R.T. | T-L | 66.7 | 2.000 | 0.061 | 0.617 | 0.985 | --- | 33.30 | 34.81 | 35.5 | 1.1 | 48.93* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 66.7 | 2.000 | 0.061 | 0.625 | 0.980 | --- | 35.20 | 37.10 | | | 51.54* | | | 1973 | 86213 |
| | | 0.06 | | | 66.7 | 2.000 | 0.061 | 0.613 | 0.960 | --- | 33.70 | 35.09 | | | 48.47* | | | 1973 | 86213 |
| | | 0.06 | | | 66.7 | 2.000 | 0.061 | 0.625 | 1.065 | --- | 35.40 | 37.31 | | | 55.88* | | | 1973 | 86213 |
| | | 0.06 | | | 66.7 | 2.000 | 0.061 | 0.625 | 0.940 | --- | 33.00 | 34.78 | | | 46.63* | | | 1973 | 86213 |
| | | 0.06 | | | 66.7 | 2.000 | 0.061 | 0.617 | 0.985 | --- | 33.60 | 35.13 | | | 49.37* | | | 1973 | 86213 |
| | | 0.06 | | | 67.2 | 2.000 | 0.062 | 0.622 | 0.840 | --- | 32.30 | 33.98 | | | 41.74* | | | 1973 | 86213 |
| | | 0.06 | | | 67.2 | 2.000 | 0.062 | 0.623 | 0.860 | --- | 34.40 | 36.18 | | | 45.26* | | | 1973 | 86213 |
| | | 0.06 | | | 67.2 | 2.000 | 0.062 | 0.622 | 0.950 | --- | 33.60 | 35.34 | | | 47.90* | | | 1973 | 86213 |
| T81 | Sheet | 0.12 | R.T. | T-L | 66.4 | 3.000 | 0.123 | 1.060 | 1.420 | --- | 30.50 | 42.69 | 42.3 | 0.4 | 53.09* | --- | --- | 1973 | 86213 |
| | | 0.12 | | | 66.4 | 3.000 | 0.123 | 1.000 | 1.340 | --- | 31.00 | 41.75 | | | 51.46* | | | 1973 | 86213 |
| | | 0.12 | | | 66.4 | 3.000 | 0.123 | 1.050 | 1.570 | --- | 30.90 | 42.98 | | | 58.81* | | | 1973 | 86213 |
| | | 0.12 | | | 66.0 | 3.000 | 0.125 | 1.070 | 1.480 | --- | 30.00 | 42.26 | | | 54.12* | | | 1973 | 86213 |
| | | 0.12 | | | 66.0 | 3.000 | 0.125 | 1.070 | 1.600 | --- | 30.00 | 42.26 | | | 58.14* | | | 1973 | 86213 |
| | | 0.12 | | | 66.0 | 3.000 | 0.125 | 1.000 | 1.470 | --- | 31.20 | 42.02 | | | 55.95* | | | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.5.2.2 (CONTINUED)

## ALUMINUM 2024 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($K_{app}$ (Ksi$\sqrt{in}$)) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($K_C$ (Ksi$\sqrt{in}$)) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T81 | Sheet | 0.06 | R.T. | T-L | 62.0 | 6.000 | 0.060 | 2.000 | 2.420 | --- | 25.60 | 48.76 | 51.2 | 3.5 | 55.60 | 57.9 | 3.2 | 1966 | 86734 |
| | | 0.06 | | | 62.0 | 6.000 | 0.060 | 2.000 | 2.360 | --- | 28.20 | 53.71 | | | 60.14 | | | 1966 | 86734 |
| T81 | Sheet | 0.06 | R.T. | T-L | 62.0 | 9.000 | 0.060 | 3.000 | 3.500 | --- | 23.00 | 53.65 | 55.2 | 2.3 | 59.59 | 61.2 | 5.1 | 1966 | 86734 |
| | | 0.06 | | | 62.0 | 9.000 | 0.060 | 3.000 | 3.260 | --- | 23.20 | 54.12 | | | 57.20 | | | 1966 | 86734 |
| | | 0.06 | | | 62.0 | 9.000 | 0.060 | 3.000 | 3.700 | --- | 24.80 | 57.85 | | | 66.90 | | | 1966 | 86734 |
| T81 | Sheet | 0.06 | R.T. | T-L | 62.0 | 15.000 | 0.060 | 5.000 | 5.600 | --- | 16.80 | 50.59 | 50.6 | 0.0 | 54.60 | 54.6 | 0.0 | 1966 | 86734 |
| | | 0.06 | | | 62.0 | 15.000 | 0.060 | 5.000 | 5.600 | --- | 16.80 | 50.59 | | | 54.60 | | | 1966 | 86734 |
| T81 | Sheet | 0.06 | R.T. | T-L | 62.0 | 18.000 | 0.060 | 6.000 | 6.640 | --- | 15.60 | 51.46 | 51.1 | 0.5 | 55.08 | 54.6 | 0.7 | 1966 | 86734 |
| | | 0.06 | | | 62.0 | 18.000 | 0.060 | 6.000 | 6.600 | --- | 15.40 | 50.80 | | | 54.14 | | | 1966 | 86734 |
| T81 | Sheet | 0.06 | R.T. | T-L | 62.0 | 21.000 | 0.060 | 7.000 | 8.200 | --- | 14.60 | 52.02 | 50.6 | 2.0 | 57.95 | 55.9 | 2.9 | 1966 | 86734 |
| | | 0.06 | | | 62.0 | 21.000 | 0.060 | 7.000 | 8.000 | --- | 13.80 | 49.17 | | | 53.82 | | | 1966 | 86734 |
| T81 | Sheet | 0.06 | R.T. | T-L | 62.0 | 24.000 | 0.060 | 8.000 | 8.800 | --- | 13.00 | 49.52 | 48.6 | 1.3 | 52.78 | 52.2 | 0.9 | 1966 | 86734 |
| | | 0.06 | | | 62.0 | 24.000 | 0.060 | 8.000 | 9.000 | --- | 12.50 | 47.62 | | | 51.54 | | | 1966 | 86734 |
| T851 | Sheet | 0.12 | R.T. | L-T | 65.8 | 3.000 | 0.125 | 1.000 | 1.510 | 19.50 | 31.50 | 42.42 | 42.0 | 1.0 | 57.84* | --- | --- | 1973 | 86213 |
| | | 0.12 | | | 65.8 | 3.000 | 0.125 | 1.090 | 1.530 | 14.50 | 29.00 | 41.37 | | | 53.89* | | | 1973 | 86213 |
| | | 0.12 | | | 65.8 | 3.000 | 0.125 | 1.000 | 1.400 | 19.90 | 31.60 | 42.56 | | | 54.36* | | | 1973 | 86213 |
| | | 0.12 | | | 65.8 | 3.000 | 0.125 | 1.000 | 1.330 | 18.70 | 32.30 | 43.50 | | | 53.30* | | | 1973 | 86213 |
| | | 0.12 | | | 65.8 | 3.000 | 0.125 | 1.080 | 1.700 | 15.50 | 29.40 | 41.67 | | | 60.56* | | | 1973 | 86213 |
| | | 0.12 | | | 65.8 | 3.000 | 0.125 | 1.100 | 1.520 | 15.30 | 28.60 | 41.05 | | | 52.83* | | | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.5.2.2 (CONTINUED)

## ALUMINUM 2024 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($Ksi\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($Ksi\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T851 Cont'd | Sheet Cont'd | 0.12 | R.T. Cont'd | L-T Cont'd | 65.8 | 3.000 | 0.125 | 1.000 | 1.500 | 19.50 | 32.40 | 43.64 | Cont'd | Cont'd | 59.14* | Cont'd | Cont'd | 1973 | 86213 |
| | | 0.12 | | | 66.1 | 3.000 | 0.125 | 1.000 | 1.460 | 20.40 | 30.90 | 41.62 | | | 55.08* | | | 1973 | 86213 |
| | | 0.12 | | | 66.1 | 3.000 | 0.125 | 1.000 | 1.300 | 17.40 | 30.70 | 41.35 | | | 49.76* | | | 1973 | 86213 |
| | | 0.12 | | | 66.1 | 3.000 | 0.125 | 1.070 | 1.430 | 14.60 | 28.60 | 40.29 | | | 50.08* | | | 1973 | 86213 |
| | | 0.12 | | | 66.1 | 3.000 | 0.125 | 1.050 | 1.560 | 17.50 | 29.80 | 41.45 | | | 56.38* | | | 1973 | 86213 |
| | | 0.12 | | | 65.8 | 3.000 | 0.127 | 1.110 | 1.510 | 16.90 | 29.70 | 42.90 | | | 54.54* | | | 1973 | 86213 |
| | | 0.12 | | | 62.2 | 3.000 | 0.132 | 1.000 | 1.640 | --- | 34.20 | 46.06* | | | 67.91* | | | 1973 | 86213 |
| | | 0.12 | | | 62.2 | 3.000 | 0.132 | 1.090 | 1.740 | --- | 33.20 | 47.36* | | | 70.11* | | | 1973 | 86213 |
| | | 0.12 | | | 62.2 | 3.000 | 0.132 | 1.060 | 1.750 | --- | 33.20 | 46.47* | | | 70.55* | | | 1973 | 86213 |
| T851 | Plate | 0.25 | R.T. | L-T | 65.2 | 4.000 | 0.242 | 1.330 | 2.140 | --- | 31.90 | 49.53 | 48.6 | 0.8 | 71.60* | --- | --- | 1973 | 86213 |
| | | 0.25 | | | 65.2 | 4.000 | 0.242 | 1.330 | 2.140 | --- | 30.90 | 47.97 | | | 69.36* | | | 1973 | 86213 |
| | | 0.25 | | | 65.2 | 4.000 | 0.243 | 1.410 | 2.290 | --- | 30.00 | 48.41 | | | 72.13* | | | 1973 | 86213 |
| T851 | Plate | 0.25 | R.T. | L-T | 66.4 | 4.000 | 0.256 | 1.330 | 2.210 | --- | 33.80 | 52.48 | 51.9 | 0.9 | 78.33* | --- | --- | 1973 | 86213 |
| | | 0.25 | | | 66.4 | 4.000 | 0.256 | 1.440 | 2.210 | --- | 31.30 | 51.23 | | | 72.53* | | | 1973 | 86213 |
| T851 | Plate | 1.00 | R.T. | L-T | 65.8 | 20.000 | 1.000 | 7.000 | 9.170 | --- | 10.70 | 38.42 | 38.6 | 2.3 | 46.84 | 48.4 | 3.8 | 1973 | 86213 |
| | | 1.00 | | | 65.8 | 20.000 | 1.000 | 7.000 | 9.920 | --- | 11.20 | 40.22 | | | 52.41 | | | 1973 | 86213 |
| | | 1.00 | | | 65.8 | 20.000 | 1.000 | 7.000 | 9.570 | --- | 11.00 | 39.50 | | | 49.90 | | | 1973 | 86213 |
| | | 1.00 | | | 65.8 | 20.000 | 1.000 | 7.000 | 9.540 | --- | 10.70 | 38.42 | | | 48.41 | | | 1973 | 86213 |
| | | 1.00 | | | 65.8 | 20.000 | 1.000 | 7.000 | 9.680 | --- | 11.40 | 40.94 | | | 52.22 | | | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.5.2.2 (CONTINUED)

## ALUMINUM 2024 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($Ksi\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($Ksi\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T851 Cont'd | Plate Cont'd | 1.00 | R.T. Cont'd | L-T Cont'd | 65.8 | 20.000 | 1.000 | 7.000 | 9.300 | --- | 10.90 | 39.14 | Cont'd | Cont'd | 48.27 | Cont'd | Cont'd | 1973 | 86213 |
| | | 1.00 | | | 65.8 | 20.000 | 1.000 | 7.000 | 9.300 | --- | 11.50 | 41.30 | | | 50.93 | | | 1973 | 86213 |
| | | 1.00 | | | 65.8 | 20.000 | 1.000 | 7.000 | 10.050 | --- | 11.50 | 41.30 | | | 54.44 | | | 1973 | 86213 |
| | | 1.00 | | | 66.1 | 20.000 | 1.000 | 7.000 | 9.250 | --- | 10.00 | 35.91 | | | 44.09 | | | 1973 | 86213 |
| | | 1.00 | | | 66.1 | 20.000 | 1.000 | 7.000 | 9.170 | --- | 10.70 | 38.42 | | | 46.84 | | | 1973 | 86213 |
| | | 1.00 | | | 66.1 | 20.000 | 1.000 | 7.000 | 9.710 | --- | 9.80 | 35.19 | | | 45.01 | | | 1973 | 86213 |
| | | 1.00 | | | 66.1 | 20.000 | 1.000 | 7.000 | 8.900 | --- | 9.70 | 34.83 | | | 41.45 | | | 1973 | 86213 |
| T851 | Sheet | 0.12 | R.T. | T-L | 64.4 | 3.000 | 0.120 | 1.130 | 1.450 | 13.80 | 25.00 | 36.56 | 37.0 | 1.3 | 44.30 | 44.8 | 1.7 | 1973 | 86213 |
| | | 0.12 | | | 64.4 | 3.000 | 0.124 | 1.000 | 1.420 | 19.40 | 25.90 | 34.88 | | | 45.09 | | | 1973 | 86213 |
| | | 0.12 | | | 64.4 | 3.000 | 0.125 | 1.000 | 1.300 | 14.90 | 28.10 | 37.84 | | | 45.55 | | | 1973 | 86213 |
| | | 0.12 | | | 64.4 | 3.000 | 0.125 | 1.100 | 1.490 | 12.90 | 26.00 | 37.32 | | | 47.18* | | | 1973 | 86213 |
| | | 0.12 | | | 65.4 | 3.000 | 0.125 | 1.000 | 1.320 | 19.40 | 29.10 | 39.19 | | | 47.74 | | | 1973 | 86213 |
| | | 0.12 | | | 65.4 | 3.000 | 0.125 | 1.100 | 1.560 | 13.90 | 25.40 | 36.46 | | | 48.06* | | | 1973 | 86213 |
| | | 0.12 | | | 65.4 | 3.000 | 0.125 | 1.000 | 1.410 | 17.20 | 28.20 | 37.98 | | | 48.80* | | | 1973 | 86213 |
| | | 0.12 | | | 65.4 | 3.000 | 0.125 | 1.070 | 1.380 | 14.80 | 26.90 | 37.89 | | | 45.73 | | | 1973 | 86213 |
| | | 0.12 | | | 65.4 | 3.000 | 0.125 | 1.120 | 1.490 | 15.00 | 24.30 | 35.32 | | | 44.09 | | | 1973 | 86213 |
| | | 0.12 | | | 65.4 | 3.000 | 0.125 | 1.050 | 1.300 | 15.80 | 26.90 | 37.41 | | | 43.60 | | | 1973 | 86213 |
| | | 0.12 | | | 65.4 | 3.000 | 0.125 | 1.000 | 1.300 | 18.00 | 28.20 | 37.98 | | | 45.71 | | | 1973 | 86213 |
| | | 0.12 | | | 65.4 | 3.000 | 0.125 | 1.000 | 1.250 | 16.70 | 26.40 | 35.55 | | | 41.53 | | | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.5.2.2 (CONTINUED)



| ALUMINUM 2024 $K_C$ | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{Max}$ | $K_{app}$ ($Ksi\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($Ksi\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T851 | Sheet | 0.12 | R.T. | T-L | 64.1 | 3.000 | 0.132 | 1.060 | 1.600 | --- | 29.70 | 41.57 | 42.3 | 0.9 | 57.56* | --- | --- | 1973 | 86213 |
| | | 0.12 | | | 64.1 | 3.000 | 0.132 | 1.000 | 1.540 | --- | 32.10 | 43.23 | | | 60.01* | | | 1973 | 86213 |
| | | 0.12 | | | 64.1 | 3.000 | 0.132 | 1.060 | 1.580 | --- | 30.00 | 41.99 | | | 57.44* | | | 1973 | 86213 |
| T851 | Plate | 0.25 | R.T. | T-L | 56.6 | 3.000 | 0.245 | 1.120 | 1.320 | --- | 17.00 | 24.71 | 26.7 | 1.4 | 27.89 | 31.3 | 2.5 | 1973 | 86213 |
| | | 0.25 | | | 59.2 | 3.000 | 0.249 | 1.180 | 1.560 | --- | 17.30 | 26.09 | | | 32.73 | | | 1973 | 86213 |
| | | 0.25 | | | 56.6 | 3.000 | 0.250 | 1.170 | 1.420 | --- | 17.30 | 25.93 | | | 30.11 | | | 1973 | 86213 |
| | | 0.25 | | | 56.6 | 3.000 | 0.251 | 1.160 | 1.500 | --- | 18.60 | 27.71 | | | 33.95 | | | 1973 | 86213 |
| | | 0.25 | | | 59.2 | 3.000 | 0.252 | 1.220 | 1.260 | --- | 18.50 | 28.58 | | | 29.28 | | | 1973 | 86213 |
| | | 0.25 | | | 59.2 | 3.000 | 0.252 | 1.180 | 1.540 | --- | 18.00 | 27.14 | | | 33.65 | | | 1973 | 86213 |
| T851 | Plate | 0.25 | R.T. | T-L | 66.2 | 4.000 | 0.243 | 1.330 | 1.900 | --- | 25.00 | 38.81 | 38.6 | 0.4 | 50.40 | 48.9 | 1.4 | 1973 | 86213 |
| | | 0.25 | | | 66.2 | 4.000 | 0.243 | 1.440 | 1.940 | --- | 23.30 | 38.14 | | | 47.82 | | | 1973 | 86213 |
| | | 0.25 | | | 66.2 | 4.000 | 0.243 | 1.330 | 1.800 | --- | 25.10 | 38.97 | | | 48.40 | | | 1973 | 86213 |
| T851 | Plate | 0.25 | R.T. | T-L | 68.0 | 4.000 | 0.255 | 1.390 | 1.740 | --- | 19.90 | 31.81 | 37.6 | 7.1 | 37.36 | 45.8 | 11.1 | 1973 | 86213 |
| | | 0.25 | | | 65.8 | 4.000 | 0.256 | 1.330 | 1.860 | --- | 28.00 | 43.47 | | | 55.45 | | | 1973 | 86213 |
| | | 0.25 | | | 65.8 | 4.000 | 0.256 | 1.430 | 1.940 | --- | 27.00 | 43.98 | | | 55.41 | | | 1973 | 86213 |
| | | 0.25 | | | 68.0 | 4.000 | 0.256 | 1.400 | 1.670 | --- | 19.30 | 31.00 | | | 35.11 | | | 1973 | 86213 |
| T851 | Plate | 1.00 | R.T. | T-L | 64.4 | 20.000 | 1.000 | 7.000 | 9.200 | --- | 7.10 | 25.50 | 27.8 | 1.3 | 31.16 | 33.7 | 1.9 | 1973 | 86213 |
| | | 1.00 | | | 64.4 | 20.000 | 1.000 | 7.000 | 9.230 | --- | 7.40 | 26.57 | | | 32.57 | | | 1973 | 86213 |
| | | 1.00 | | | 64.4 | 20.000 | 1.000 | 7.000 | 9.100 | --- | 7.20 | 25.86 | | | 31.32 | | | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.5.2.2 (CONTINUED)



## ALUMINUM 2024 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($K_{si}\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($K_{si}\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T851 Cont'd | Plate Cont'd | 1.00 | R.T. Cont'd | T-L Cont'd | 64.4 | 20.000 | 1.000 | 7.000 | 9.000 | --- | 7.50 | 26.93 | Cont'd | Cont'd | 32.34 | Cont'd | Cont'd | 1973 | 86213 |
| | | 1.00 | | | 65.4 | 20.000 | 1.000 | 7.000 | 8.980 | --- | 7.90 | 28.37 | | | 34.00 | | | 1973 | 86213 |
| | | 1.00 | | | 65.4 | 20.000 | 1.000 | 7.000 | 8.840 | --- | 8.00 | 28.73 | | | 34.01 | | | 1973 | 86213 |
| | | 1.00 | | | 65.4 | 20.000 | 1.000 | 7.000 | 8.880 | --- | 7.80 | 28.01 | | | 33.27 | | | 1973 | 86213 |
| | | 1.00 | | | 65.4 | 20.000 | 1.000 | 7.000 | 8.890 | --- | 7.90 | 28.37 | | | 33.73 | | | 1973 | 86213 |
| | | 1.00 | | | 65.4 | 20.000 | 1.000 | 7.000 | 9.320 | --- | 8.00 | 28.73 | | | 35.49 | | | 1973 | 86213 |
| | | 1.00 | | | 65.4 | 20.000 | 1.000 | 7.000 | 9.320 | --- | 8.40 | 30.17 | | | 37.27 | | | 1973 | 86213 |
| | | 1.00 | | | 65.4 | 20.000 | 1.000 | 7.000 | 8.770 | --- | 7.70 | 27.65 | | | 32.53 | | | 1973 | 86213 |
| | | 1.00 | | | 65.4 | 20.000 | 1.000 | 7.000 | 9.700 | --- | 7.90 | 28.37 | | | 36.25 | | | 1973 | 86213 |
| T86 | Sheet | 0.06 | R.T. | L-T | 72.5 | 2.000 | 0.062 | 0.616 | 0.960 | --- | 35.90 | 37.53 | 38.4 | 1.4 | 51.63* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 72.5 | 2.000 | 0.062 | 0.619 | 0.860 | --- | 37.30 | 39.08 | | | 49.07* | | | 1973 | 86213 |
| | | 0.06 | | | 72.5 | 2.000 | 0.062 | 0.617 | 0.900 | --- | 36.40 | 38.06 | | | 49.63* | | | 1973 | 86213 |
| | | 0.06 | | | 72.5 | 2.000 | 0.062 | 0.614 | 0.970 | --- | 38.70 | 40.38 | | | 56.16* | | | 1973 | 86213 |
| | | 0.06 | | | 73.4 | 2.000 | 0.062 | 0.622 | 0.900 | --- | 36.90 | 38.81 | | | 50.31* | | | 1973 | 86213 |
| | | 0.06 | | | 73.4 | 2.000 | 0.062 | 0.624 | 0.910 | --- | 36.90 | 38.89 | | | 50.76* | | | 1973 | 86213 |
| | | 0.06 | | | 73.4 | 2.000 | 0.062 | 0.623 | 0.720 | --- | 38.40 | 40.39 | | | 44.44* | | | 1973 | 86213 |
| | | 0.06 | | | 72.4 | 2.000 | 0.064 | 0.623 | 0.850 | --- | 34.60 | 36.40 | | | 45.11* | | | 1973 | 86213 |
| | | 0.06 | | | 72.4 | 2.000 | 0.064 | 0.619 | 0.820 | --- | 35.90 | 37.61 | | | 45.56* | | | 1973 | 86213 |
| | | 0.06 | | | 72.4 | 2.000 | 0.064 | 0.622 | 0.900 | --- | 35.00 | 36.82 | | | 47.72* | | | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.5.2.2 (CONCLUDED)



## ALUMINUM 2024 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_C$ (Ksi$\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T86 | Sheet | 0.06 | R.T. | L-T | 72.9 | 15.810 | 0.063 | 6.010 | 6.930 | --- | 16.10 | 54.40 | 47.6 | 4.6 | 60.45 | 53.0 | 4.7 | 1973 | 86213 |
| | | 0.06 | | | 72.9 | 15.800 | 0.064 | 3.000 | 3.400 | --- | 22.20 | 49.29 | | | 52.82 | | | 1973 | 86213 |
| | | 0.06 | | | 72.9 | 15.810 | 0.064 | 3.990 | 4.660 | --- | 18.20 | 47.44 | | | 52.06 | | | 1973 | 86213 |
| | | 0.06 | | | 72.9 | 15.820 | 0.064 | 5.990 | 6.800 | --- | 12.80 | 43.14 | | | 47.35 | | | 1973 | 86213 |
| | | 0.06 | | | 72.9 | 15.820 | 0.064 | 1.010 | 1.420 | --- | 34.70 | 43.82 | | | 52.08 | | | 1973 | 86213 |
| T86 | Sheet | 0.06 | R.T. | T-L | 71.6 | 2.000 | 0.062 | 0.616 | 0.800 | --- | 34.70 | 36.28 | 34.4 | 0.9 | 43.25* | 42.5 | 0.6 | 1973 | 86213 |
| | | 0.06 | | | 71.6 | 2.000 | 0.062 | 0.618 | 0.875 | --- | 33.20 | 34.78 | | | 44.23* | | | 1973 | 86213 |
| | | 0.06 | | | 71.6 | 2.000 | 0.062 | 0.617 | 0.815 | --- | 33.90 | 35.44 | | | 42.79 | | | 1973 | 86213 |
| | | 0.06 | | | 71.6 | 2.000 | 0.062 | 0.615 | 0.915 | --- | 32.40 | 33.80 | | | 44.73* | | | 1973 | 86213 |
| | | 0.06 | | | 72.6 | 2.000 | 0.063 | 0.620 | 0.910 | --- | 32.60 | 34.22 | | | 44.85* | | | 1973 | 86213 |
| | | 0.06 | | | 72.6 | 2.000 | 0.063 | 0.623 | 0.820 | --- | 32.90 | 34.61 | | | 41.75 | | | 1973 | 86213 |
| | | 0.06 | | | 72.6 | 2.000 | 0.063 | 0.620 | 0.860 | --- | 32.70 | 34.33 | | | 43.02 | | | 1973 | 86213 |
| | | 0.06 | | | 70.8 | 2.000 | 0.064 | 0.623 | 0.890 | --- | 31.70 | 33.34 | | | 42.84* | | | 1973 | 86213 |
| | | 0.06 | | | 70.8 | 2.000 | 0.064 | 0.624 | 0.870 | --- | 32.20 | 33.94 | | | 42.75* | | | 1973 | 86213 |
| | | 0.06 | | | 70.8 | 2.000 | 0.064 | 0.622 | 0.880 | --- | 31.60 | 33.24 | | | 42.33 | | | 1973 | 86213 |
| T86 | Sheet | 0.06 | R.T. | T-L | 71.2 | 15.810 | 0.063 | 3.010 | 3.430 | --- | 19.70 | 43.82 | 42.5 | 3.4 | 47.10 | 45.9 | 3.2 | 1973 | 86213 |
| | | 0.06 | | | 71.2 | 15.820 | 0.063 | 3.020 | 3.360 | --- | 21.50 | 47.91 | | | 50.81 | | | 1973 | 86213 |
| | | 0.06 | | | 71.2 | 15.810 | 0.064 | 6.020 | 6.630 | --- | 11.80 | 39.92 | | | 42.82 | | | 1973 | 86213 |
| | | 0.06 | | | 71.2 | 15.820 | 0.064 | 4.000 | 4.620 | --- | 15.70 | 40.98 | | | 44.67 | | | 1973 | 86213 |
| | | 0.06 | | | 71.2 | 15.820 | 0.064 | 1.000 | 1.200 | --- | 31.90 | 40.08 | | | 43.95 | | | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# RESISTANCE CURVE

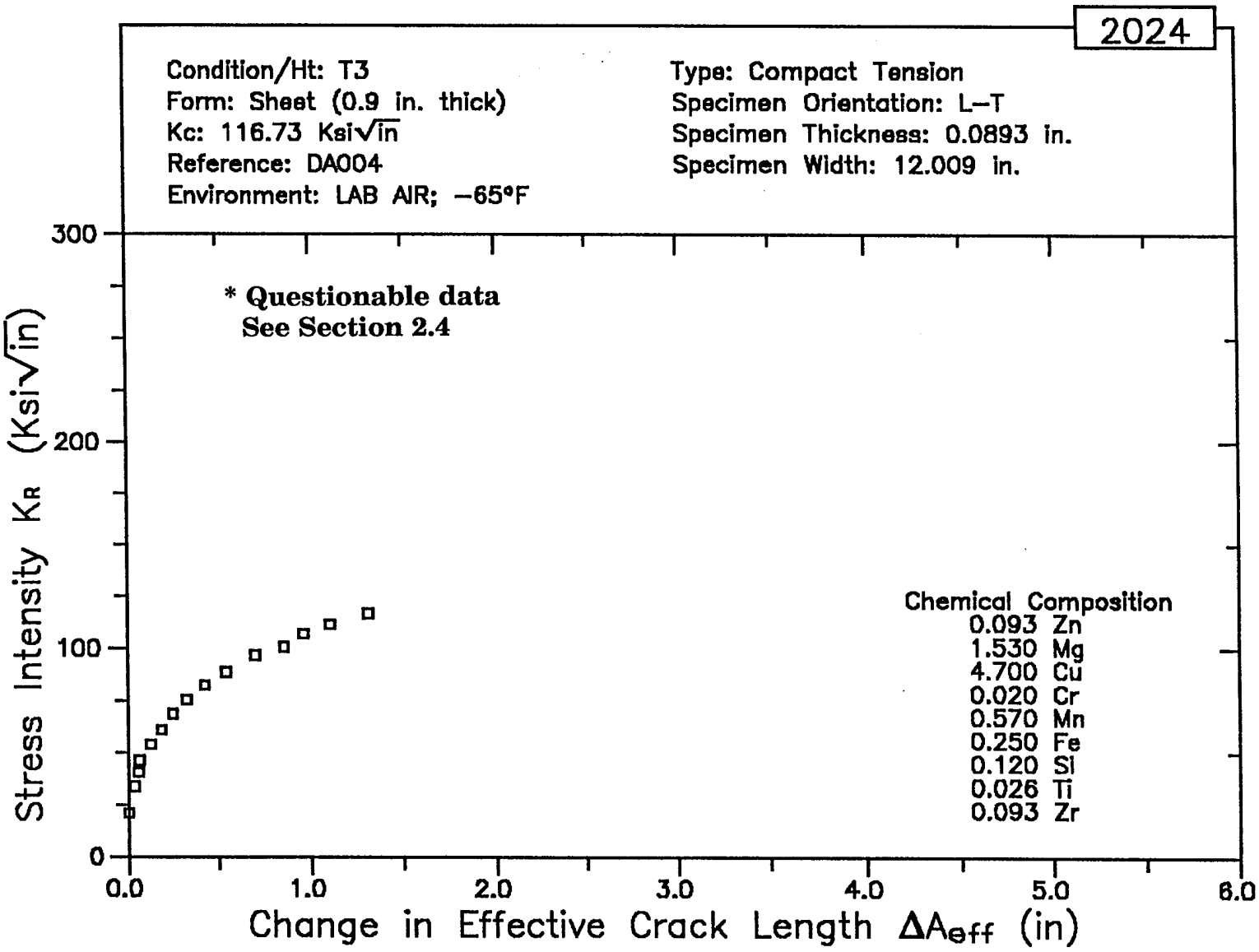



Figure 7.5.2.3.1

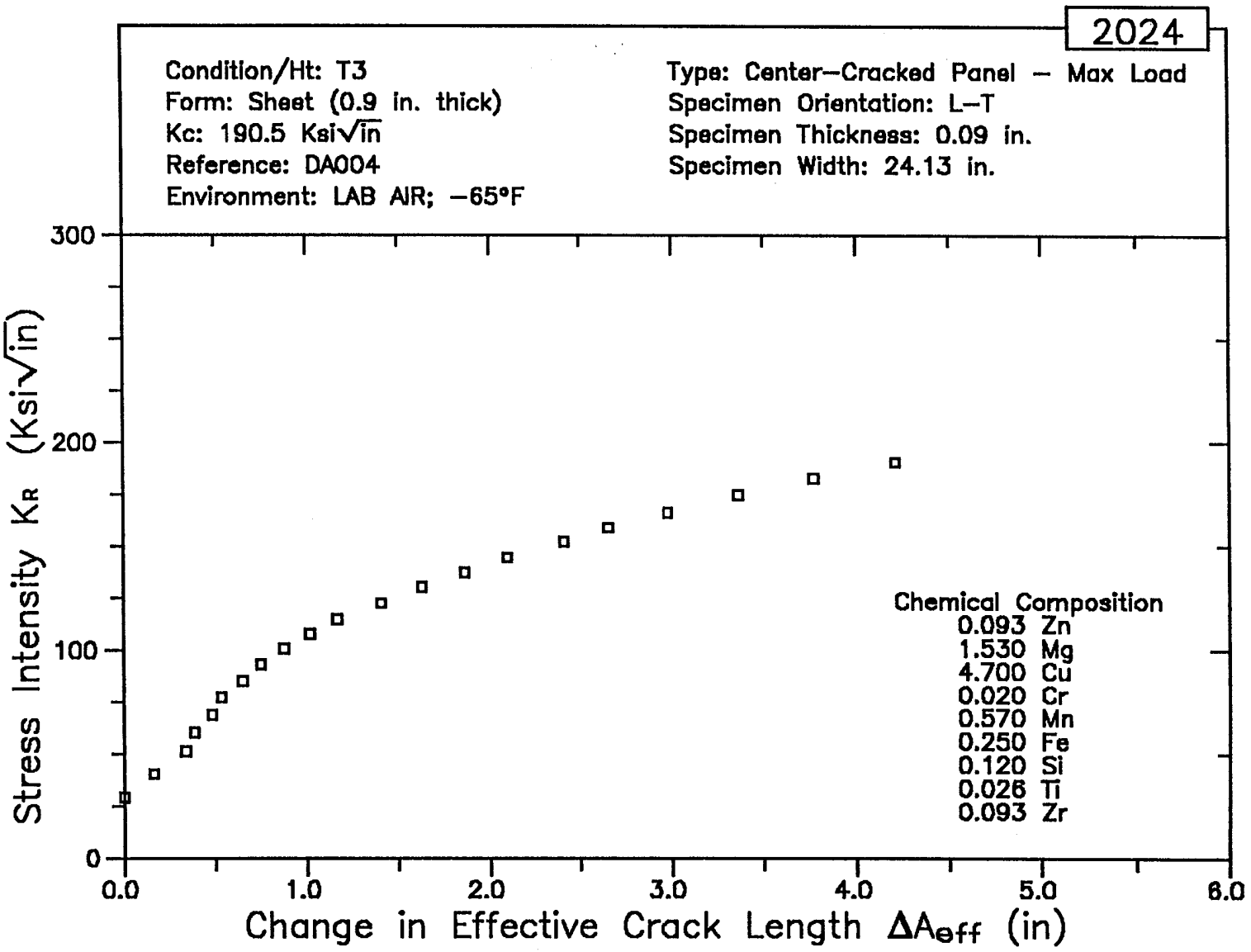



Figure 7.5.2.3.2

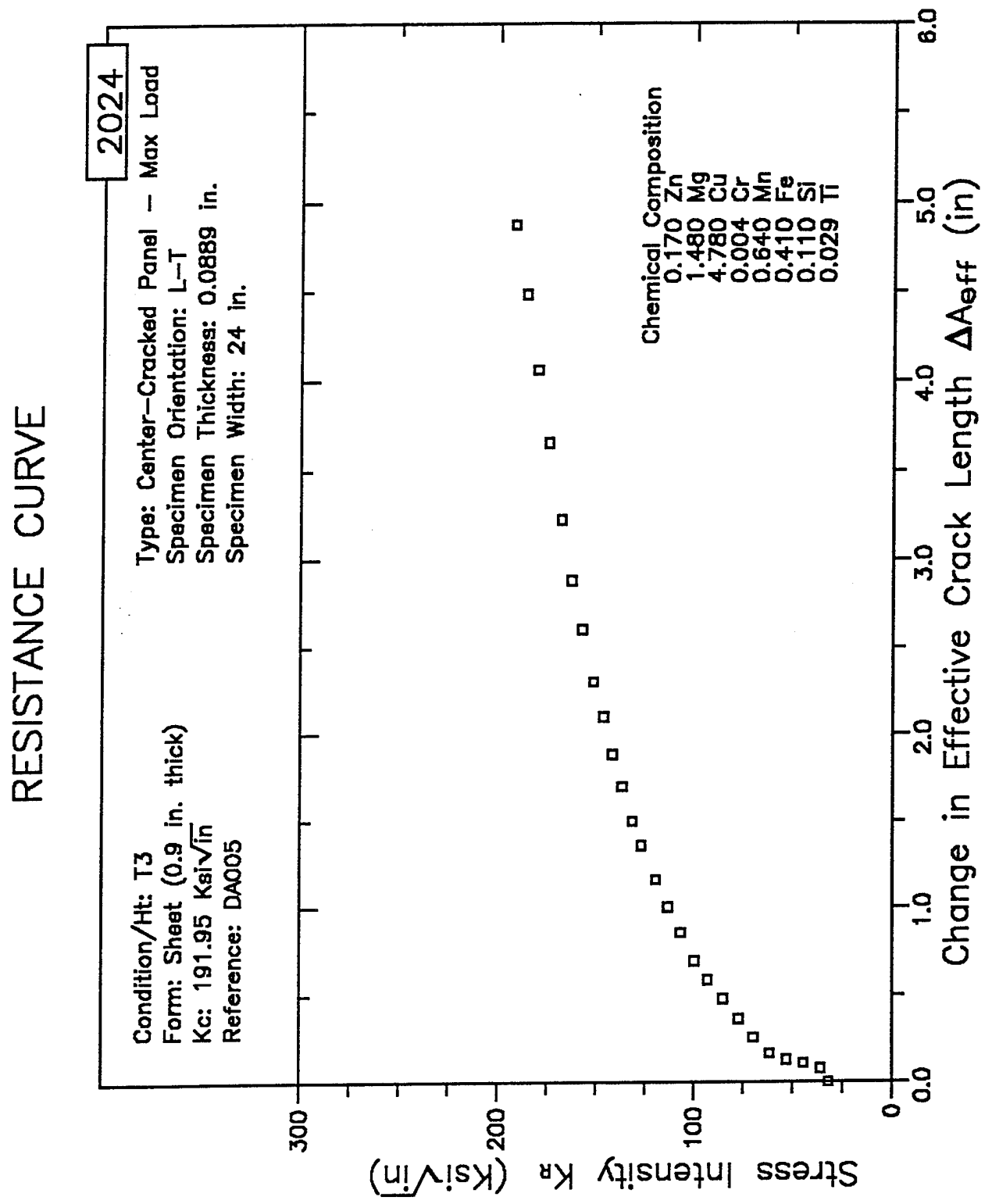



**Figure 7.5.2.3.3**

# RESISTANCE CURVE

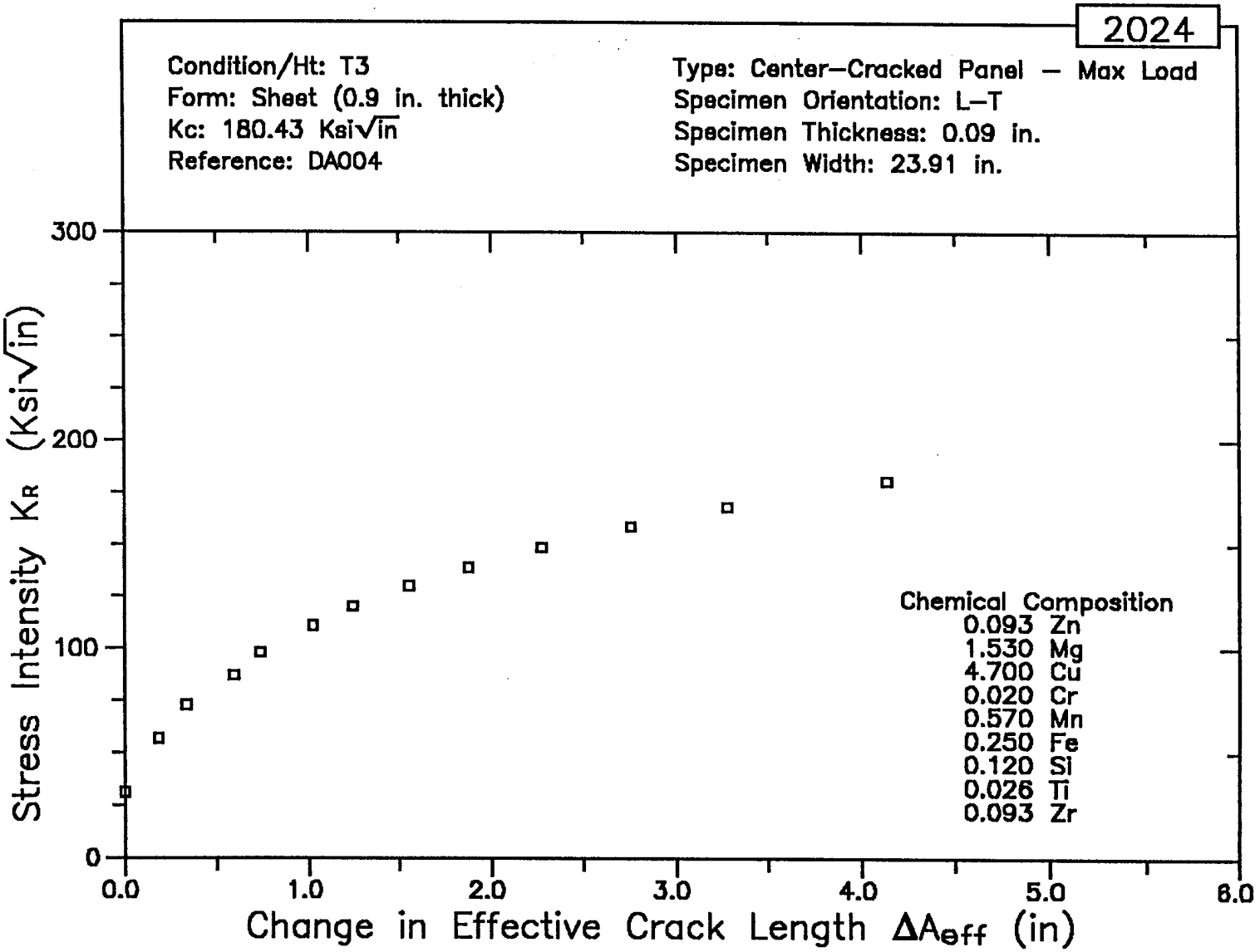



Figure 7.5.2.3.4

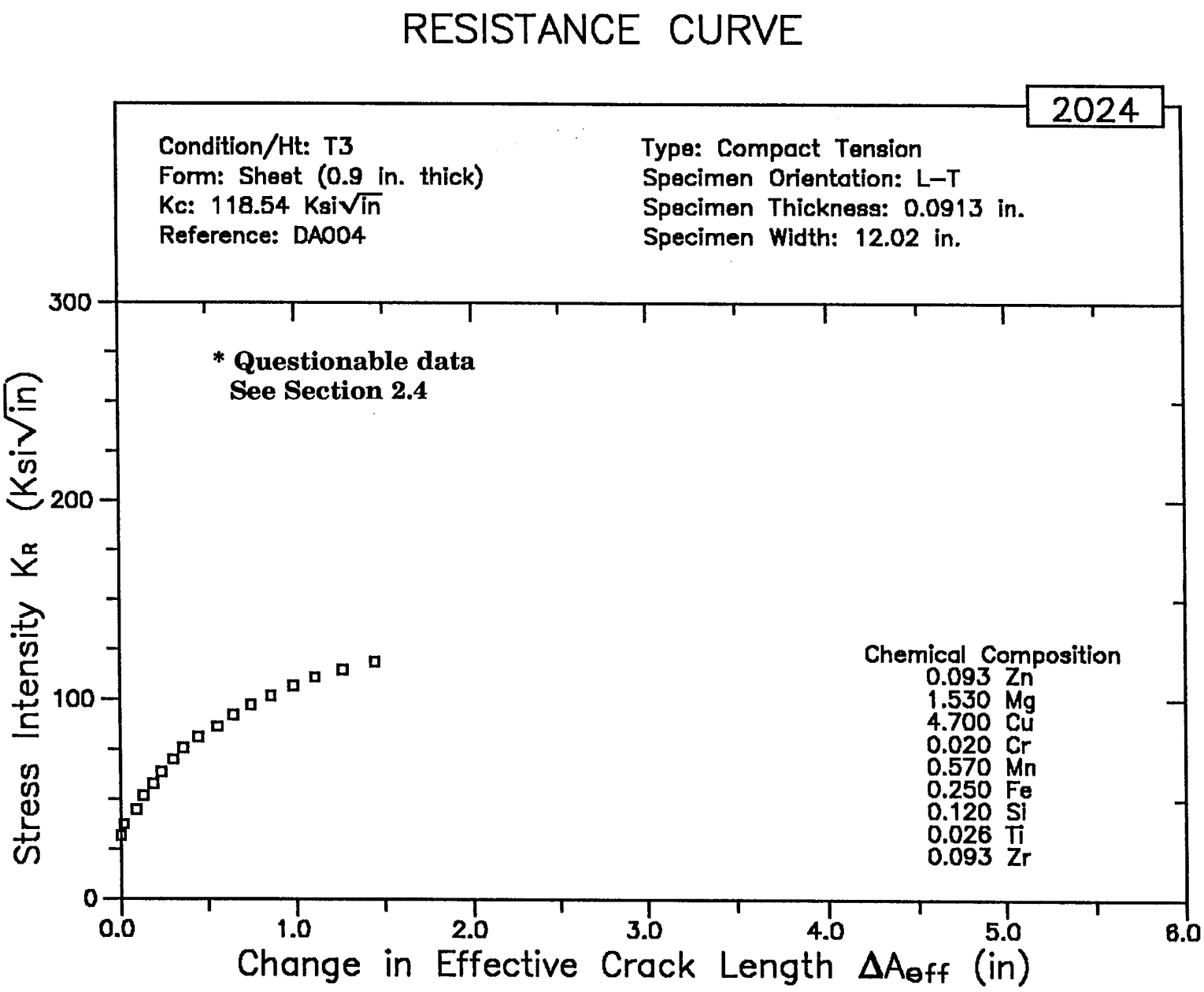



Figure 7.5.2.3.5

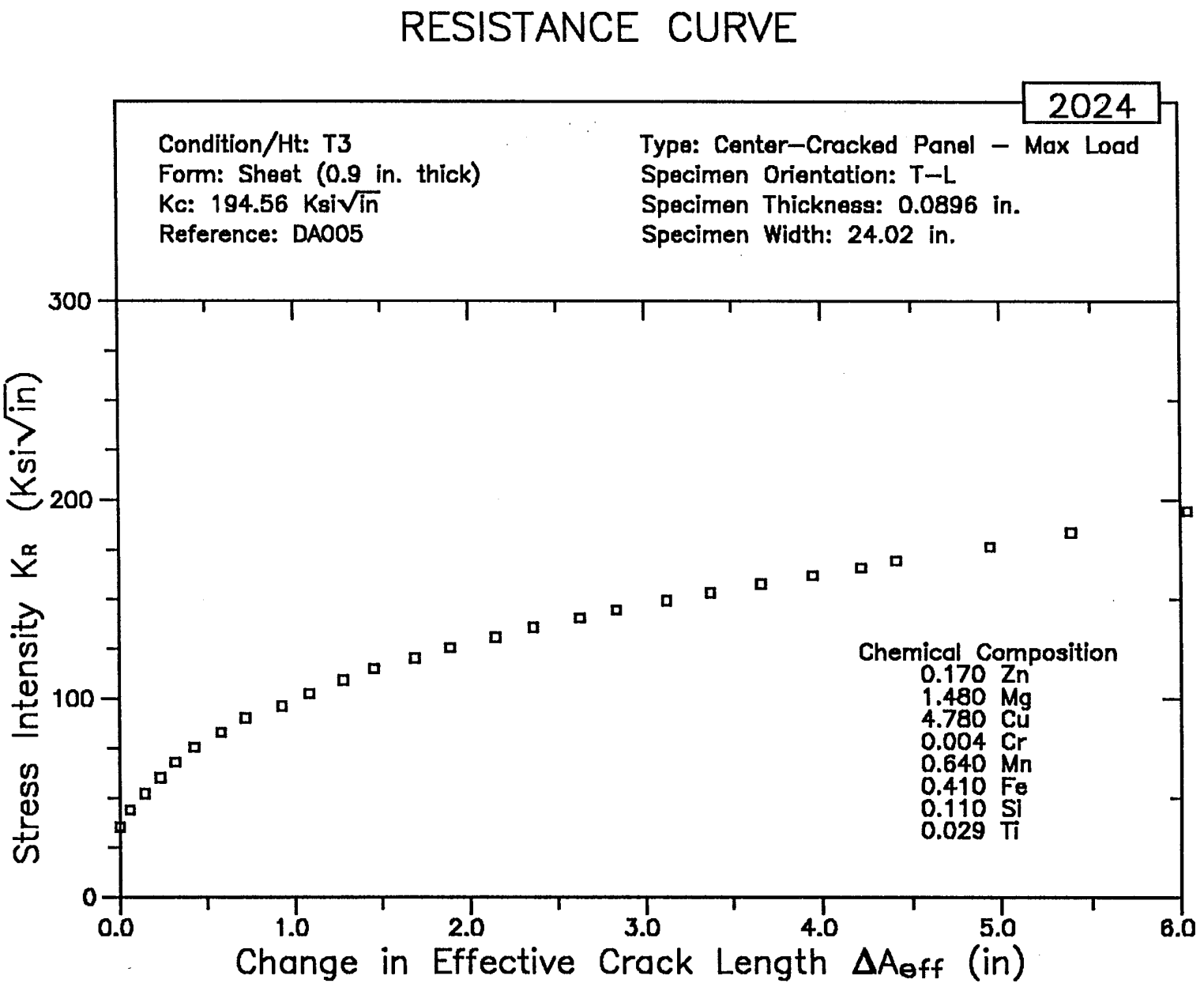



Figure 7.5.2.3.6

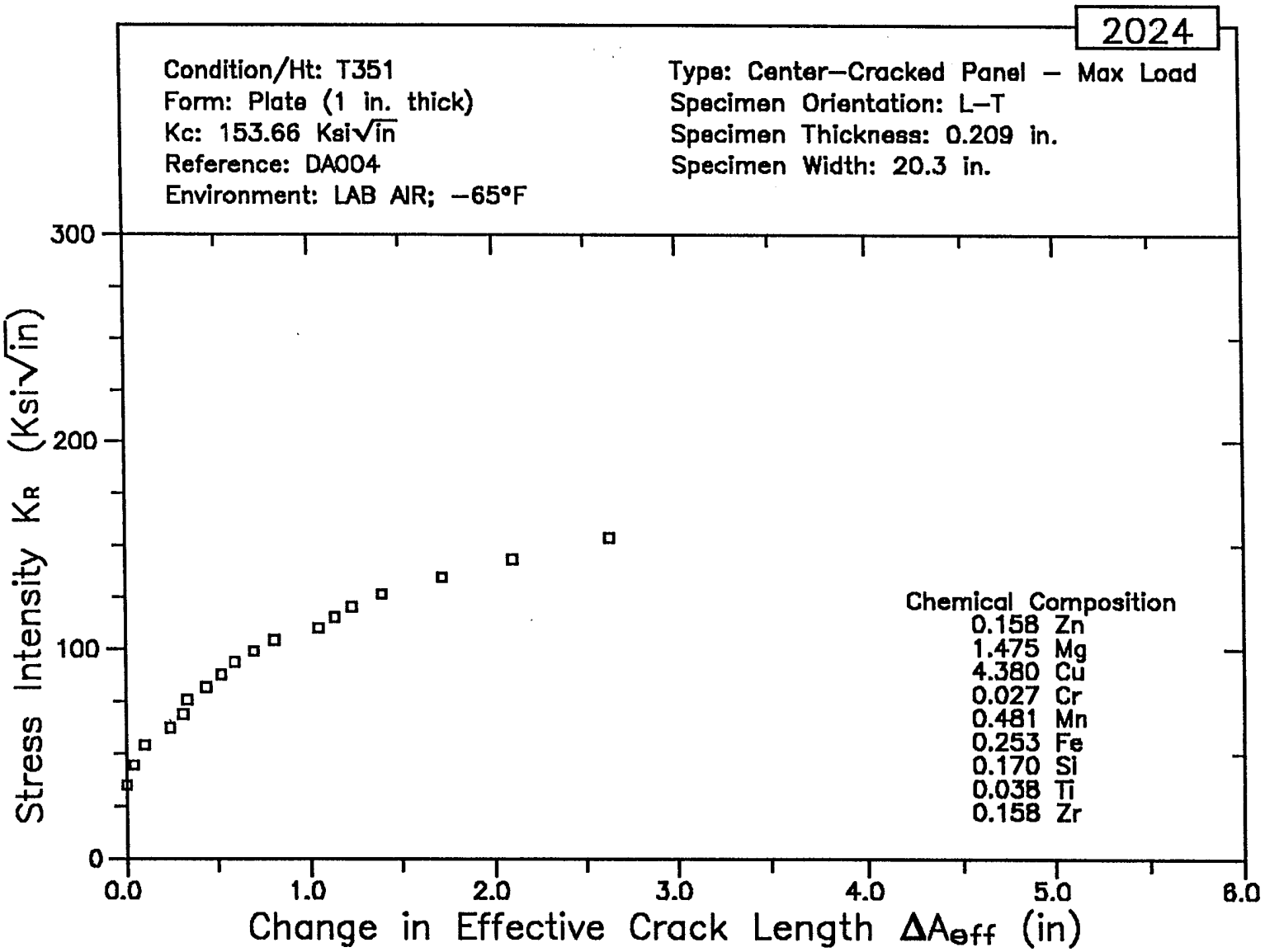



Figure 7.5.2.3.7

# RESISTANCE CURVE

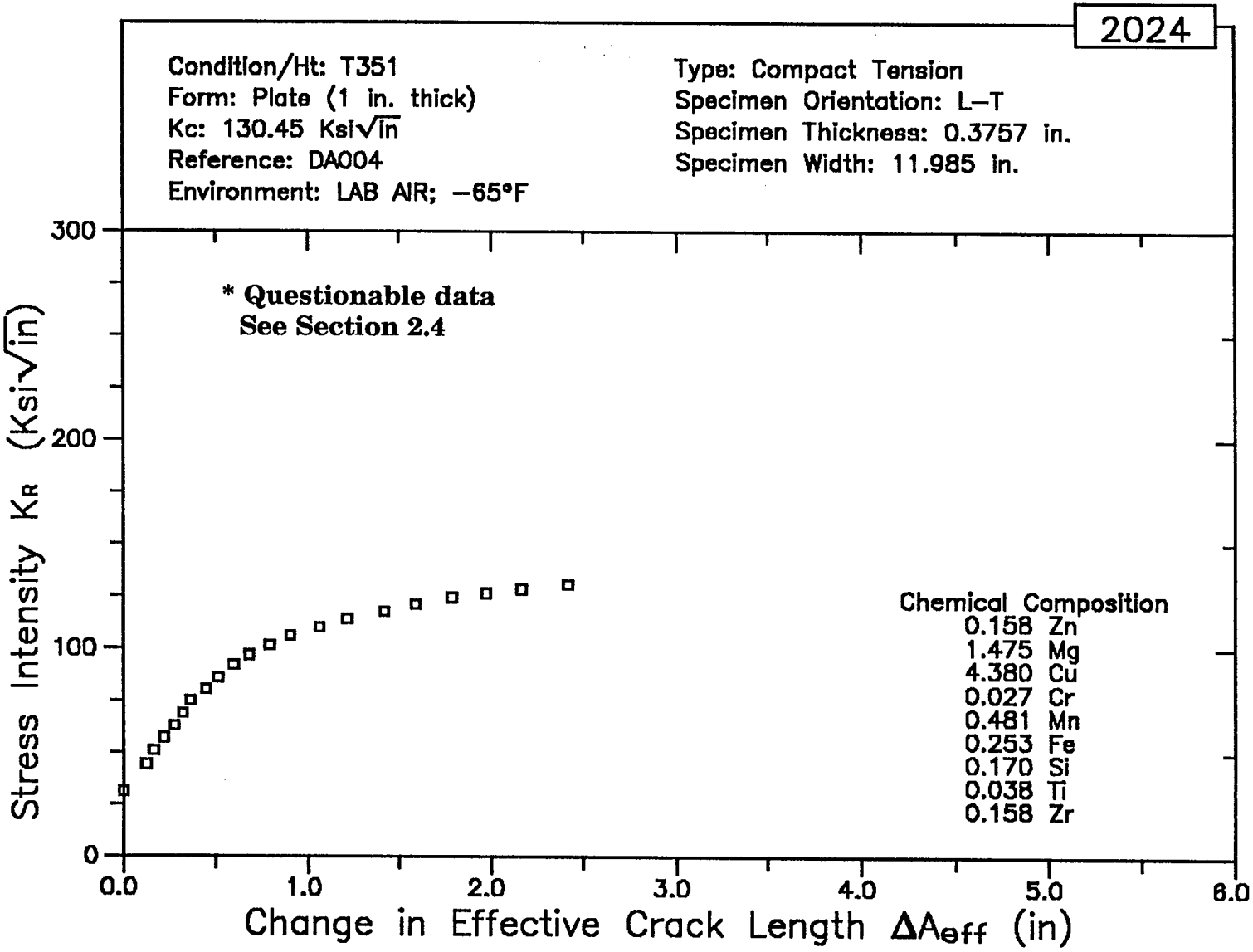



Figure 7.5.2.3.8

# RESISTANCE CURVE

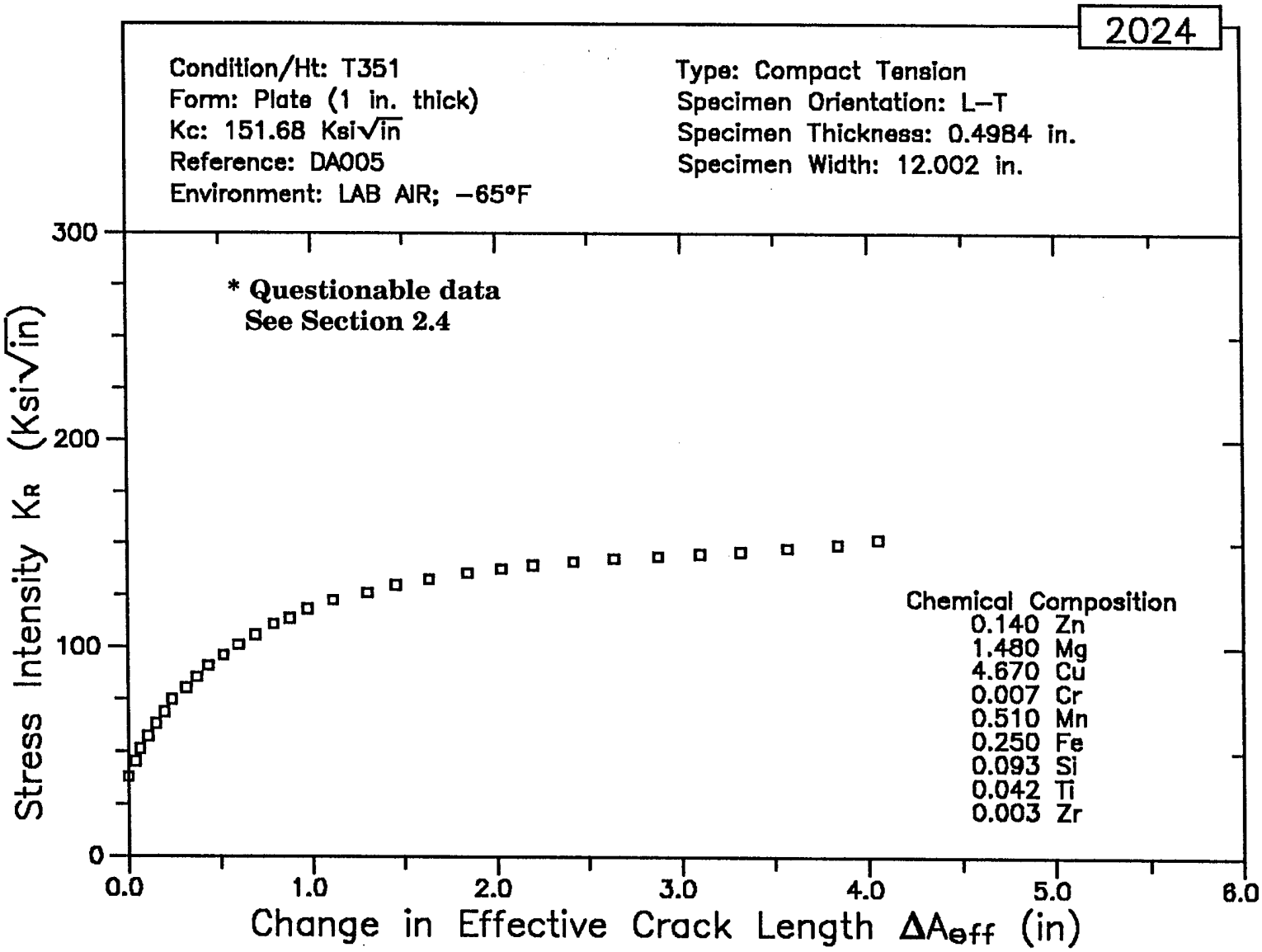



Figure 7.5.2.3.9

# RESISTANCE CURVE

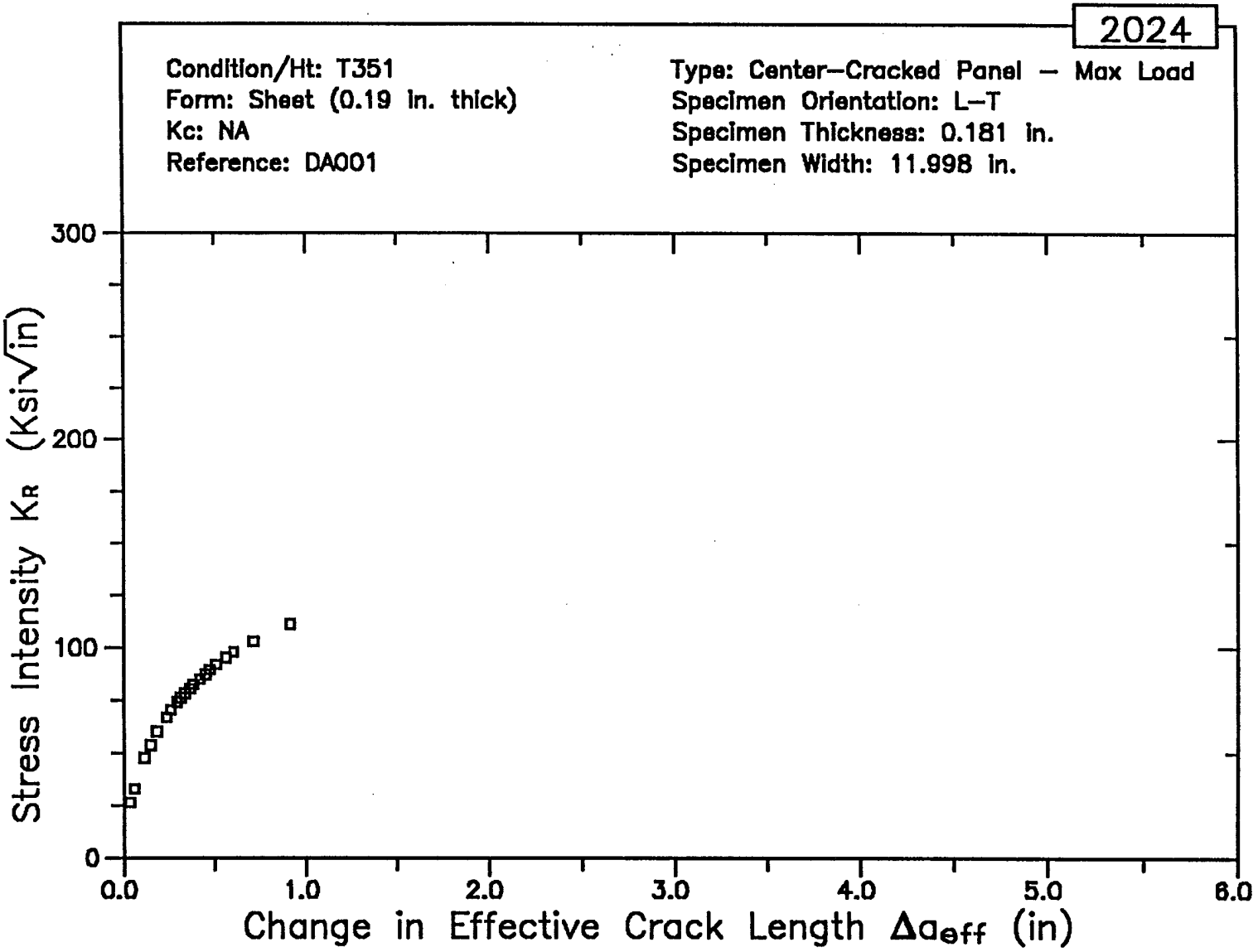



Figure 7.5.2.3.10

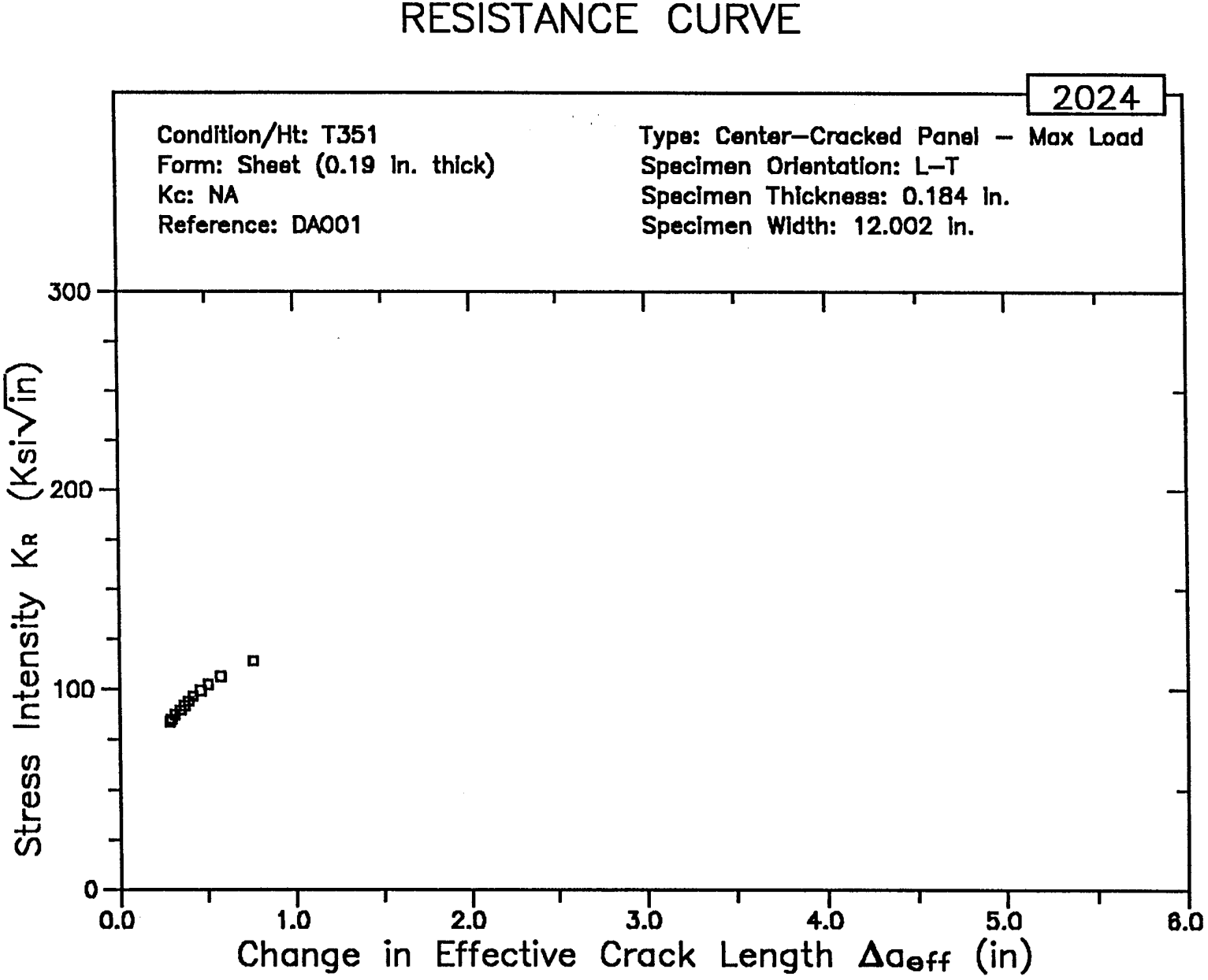



Figure 7.5.2.3.11

# RESISTANCE CURVE

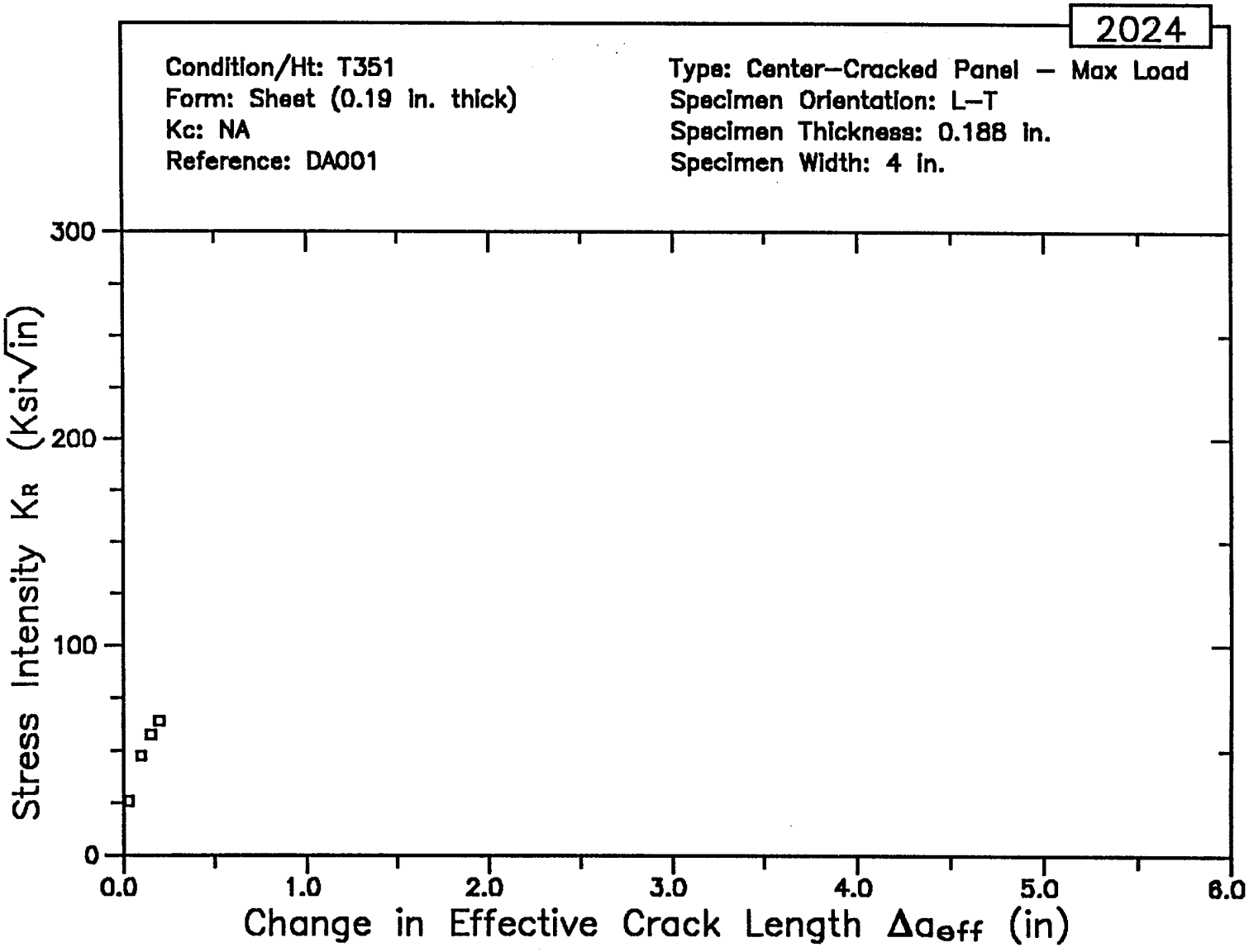



Figure 7.5.2.3.12

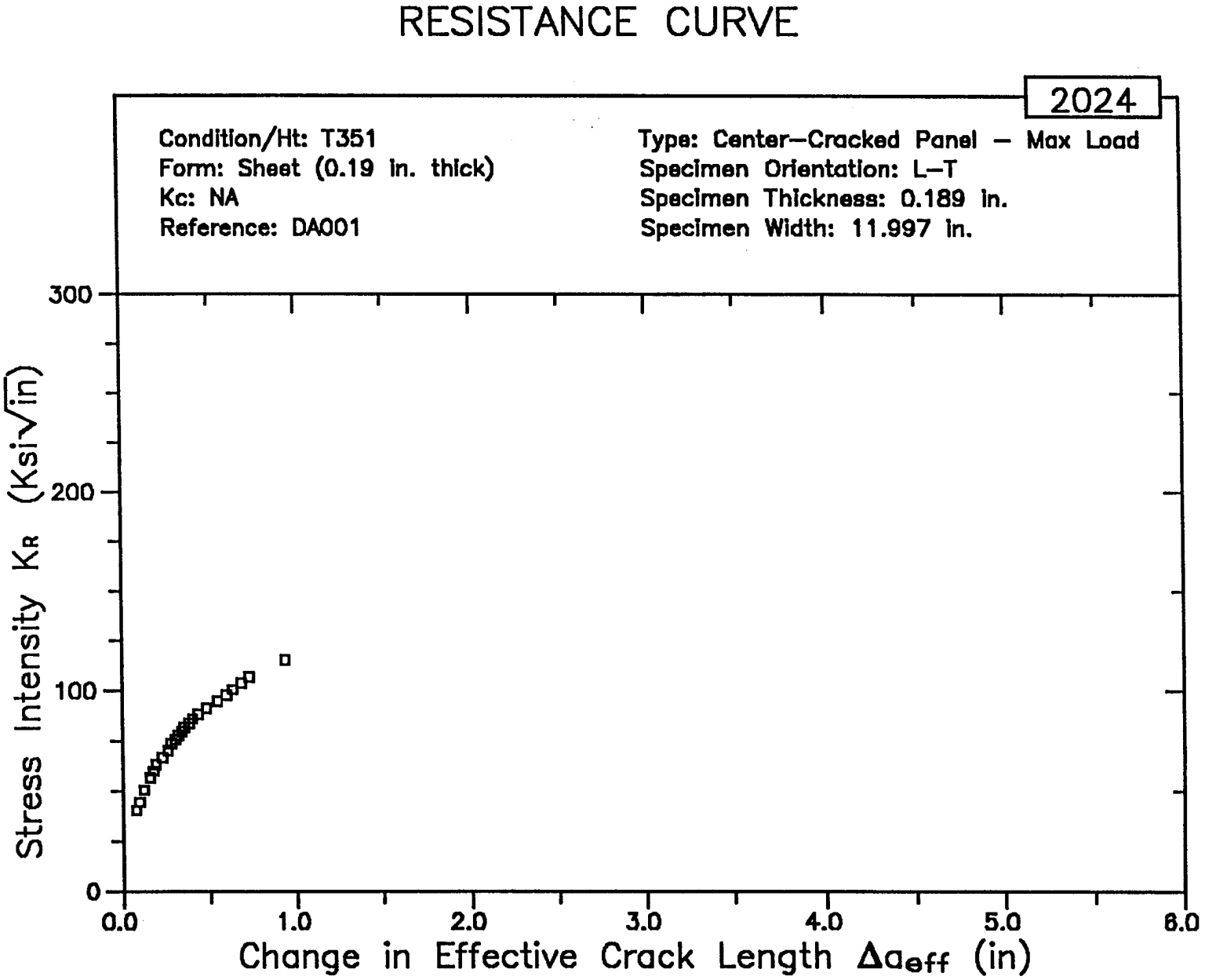



Figure 7.5.2.3.13

# RESISTANCE CURVE

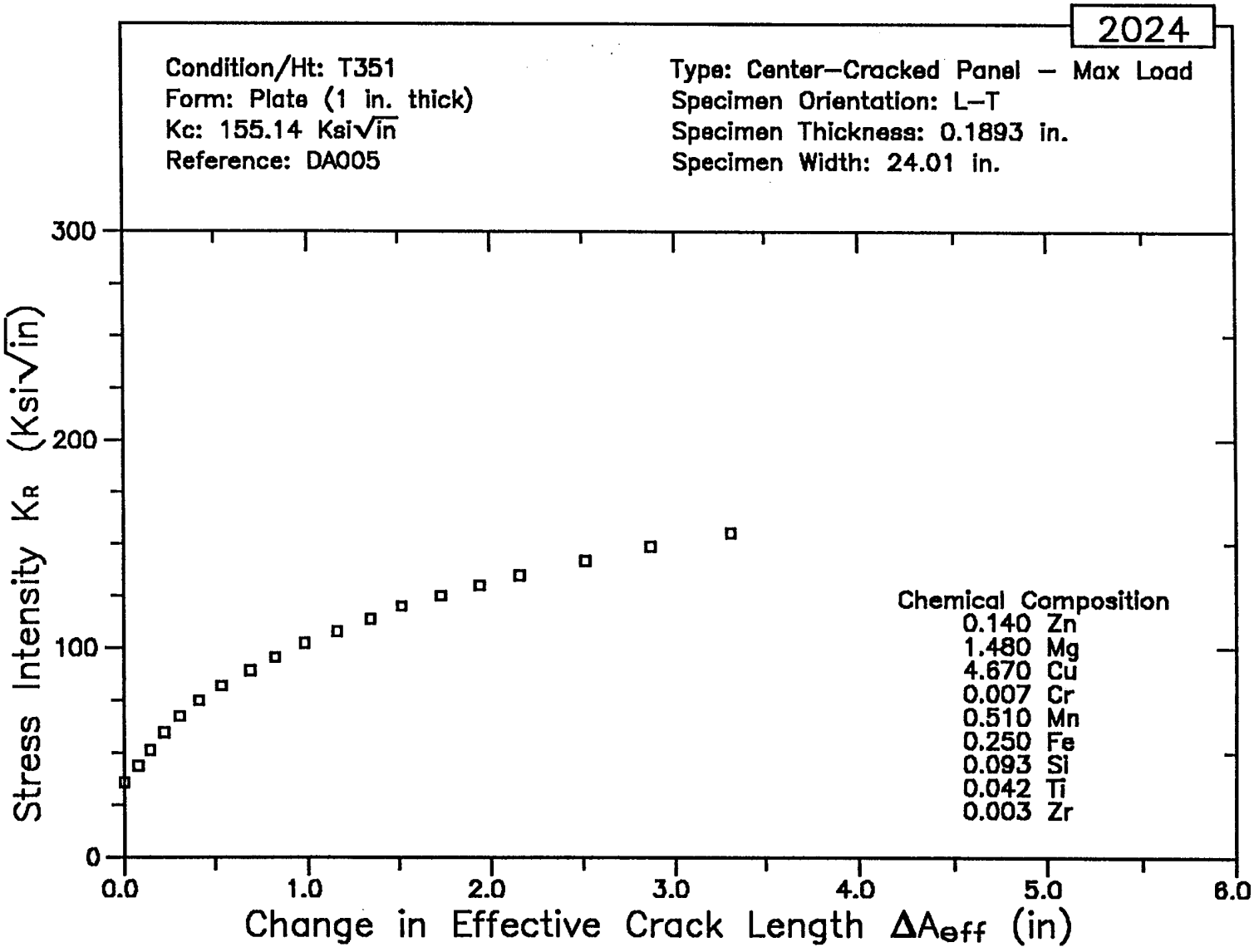



Figure 7.5.2.3.14

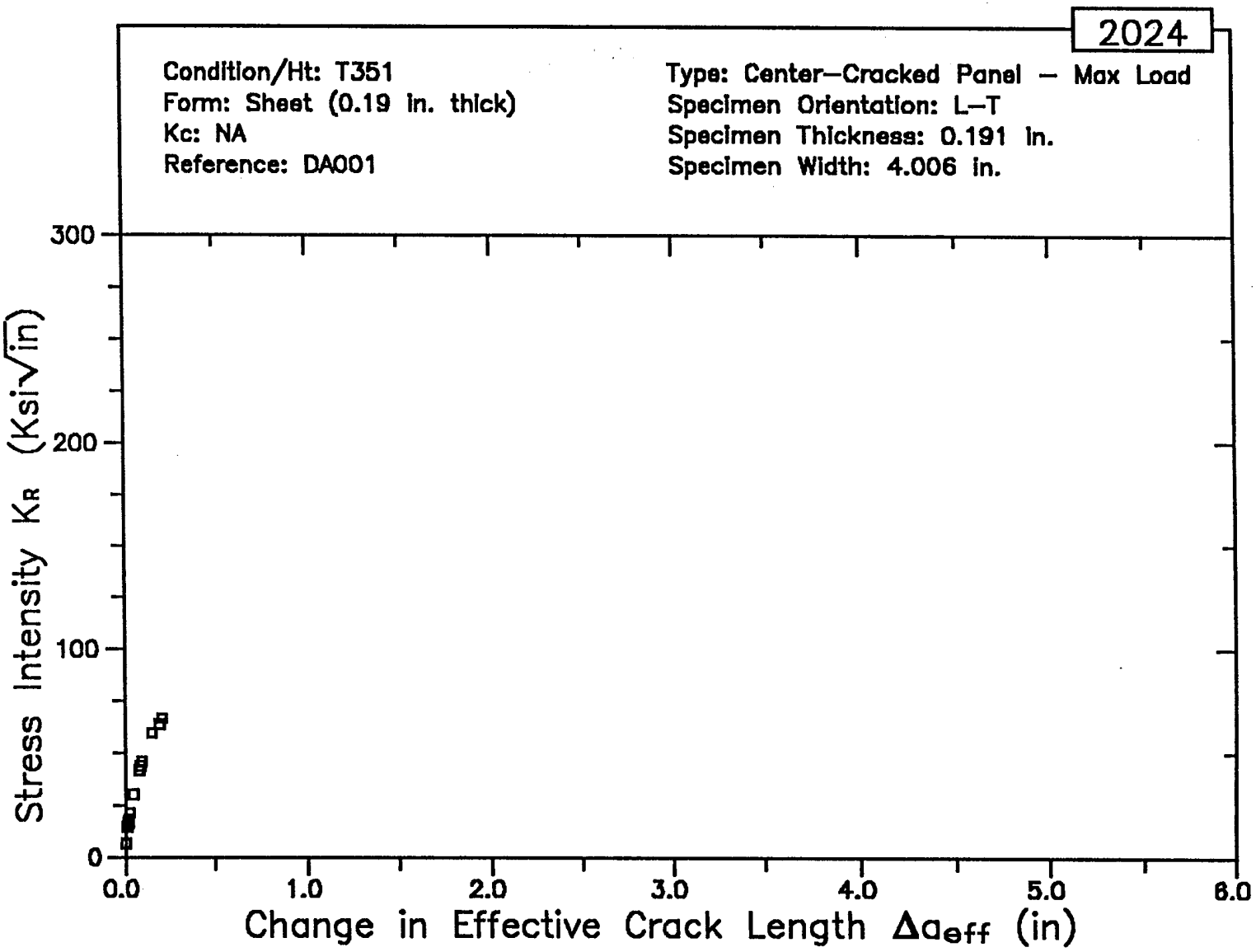



Figure 7.5.2.3.15

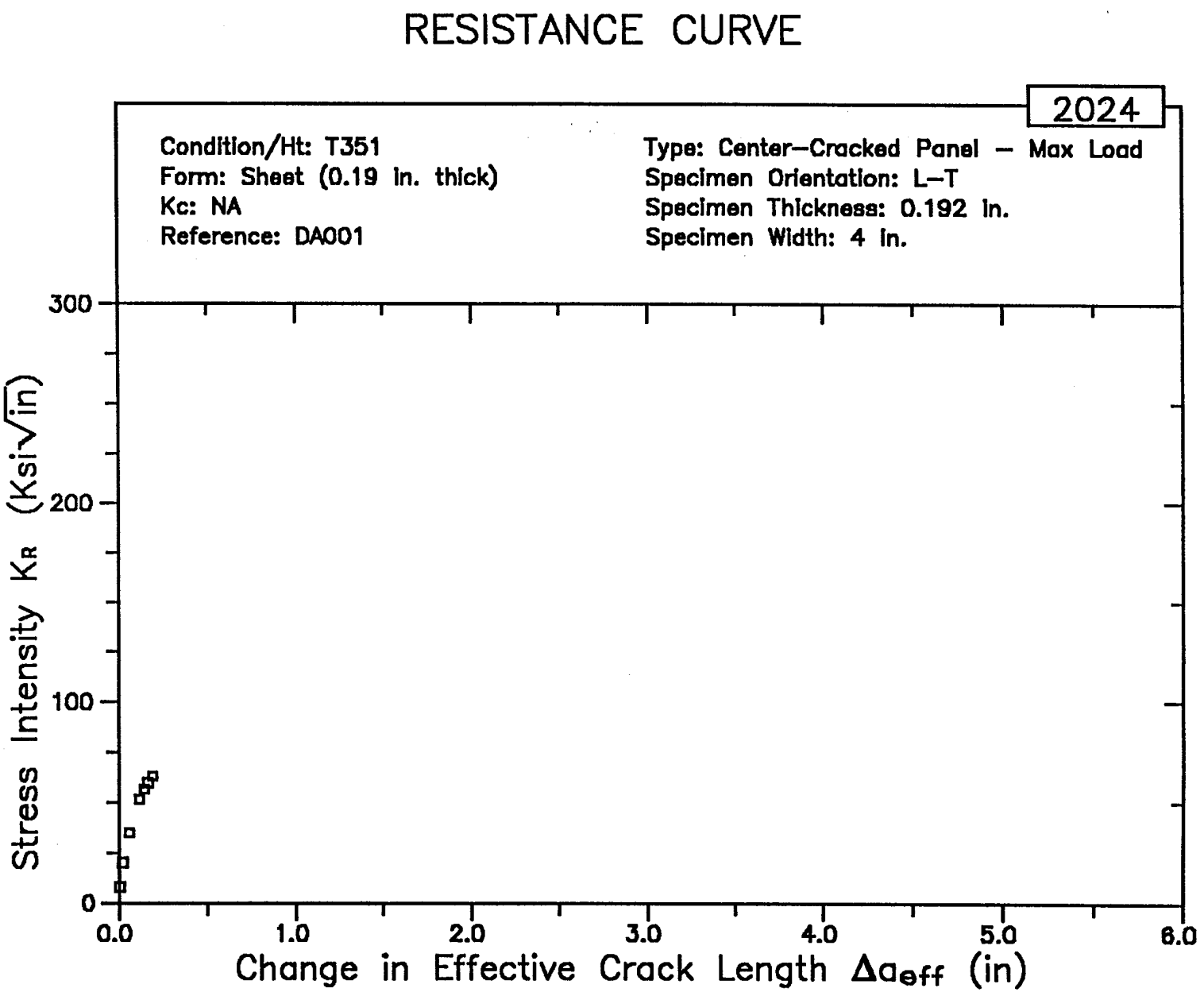



Figure 7.5.2.3.16

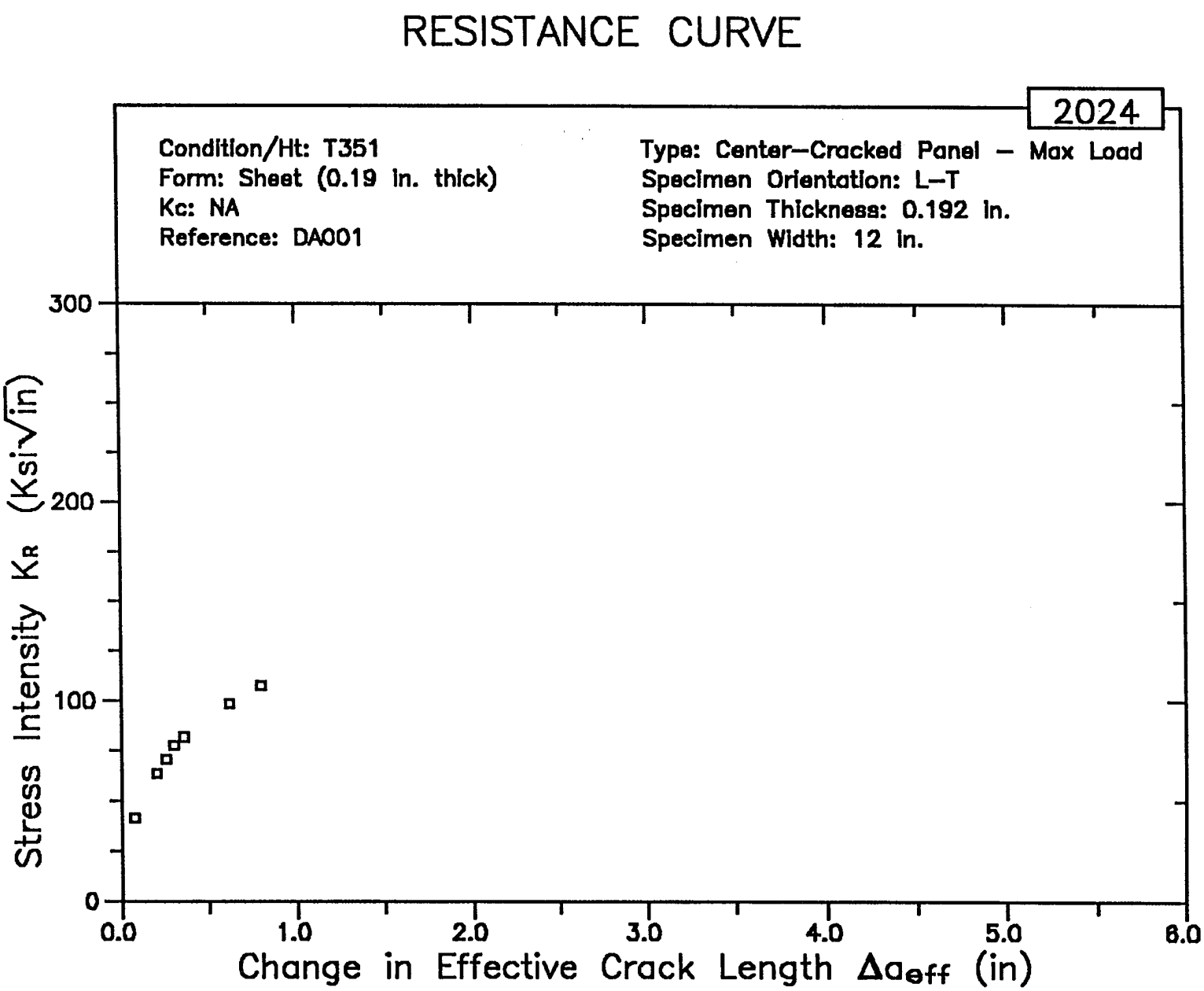



Figure 7.5.2.3.17

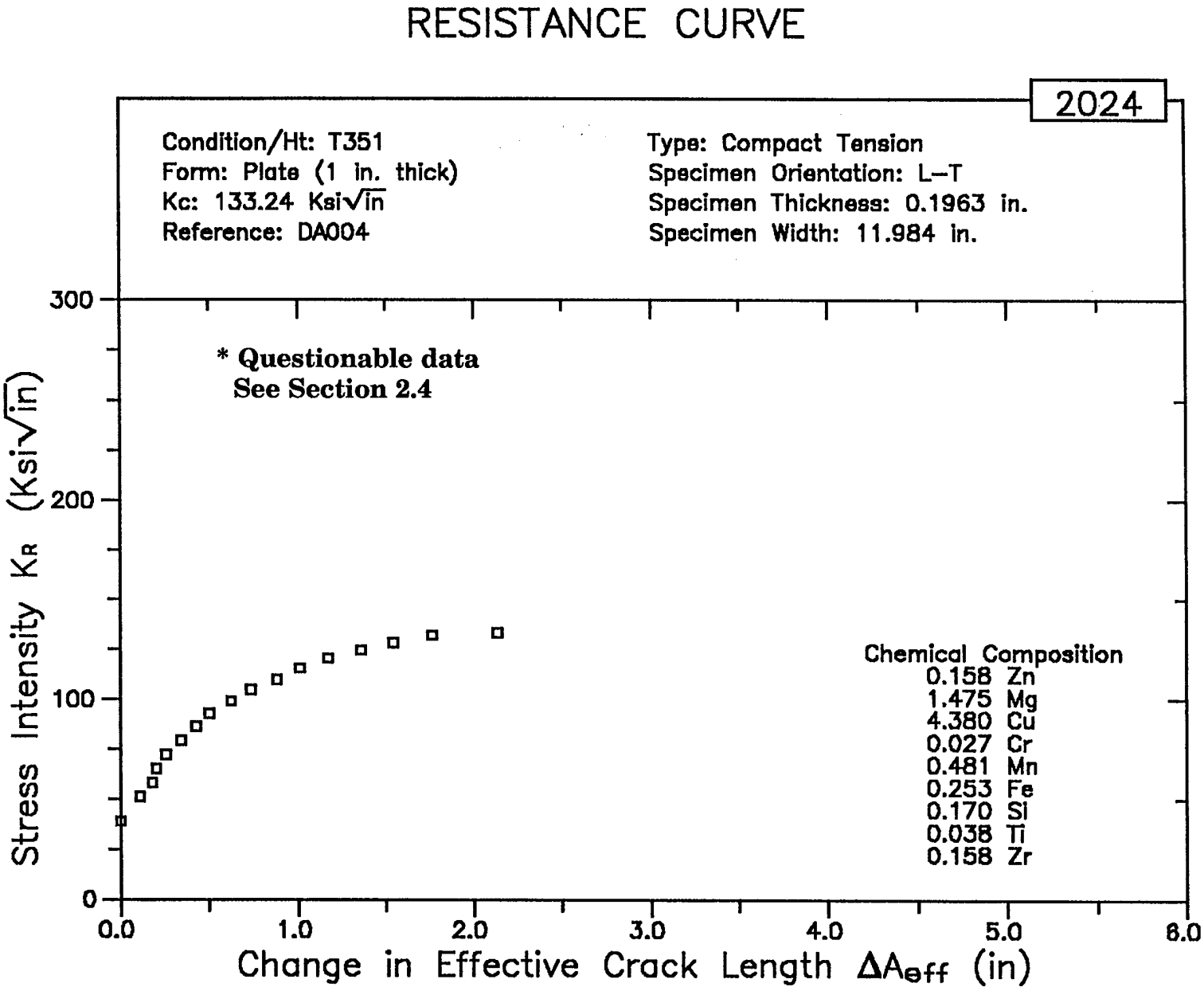



Figure 7.5.2.3.18

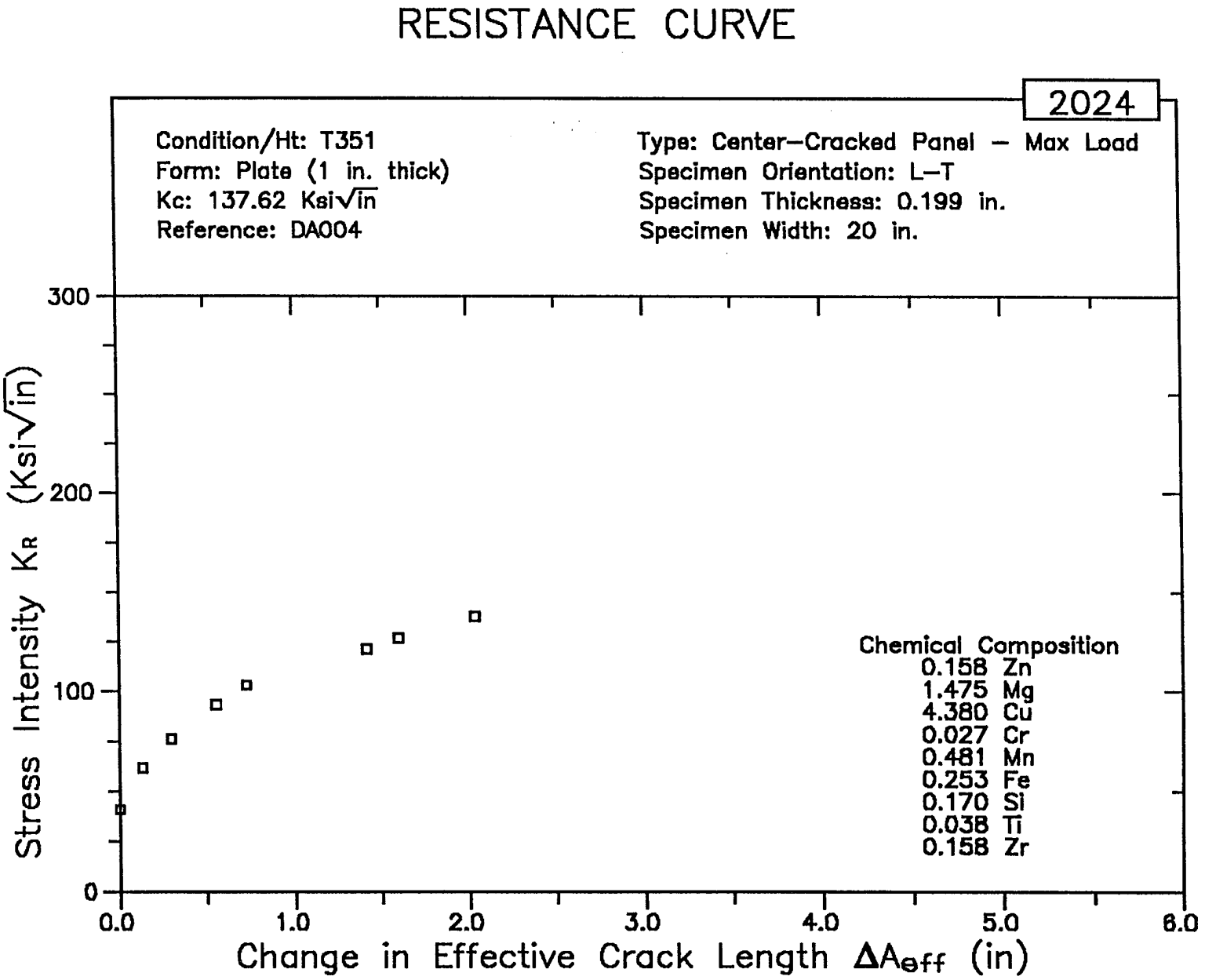



Figure 7.5.2.3.19

# RESISTANCE CURVE

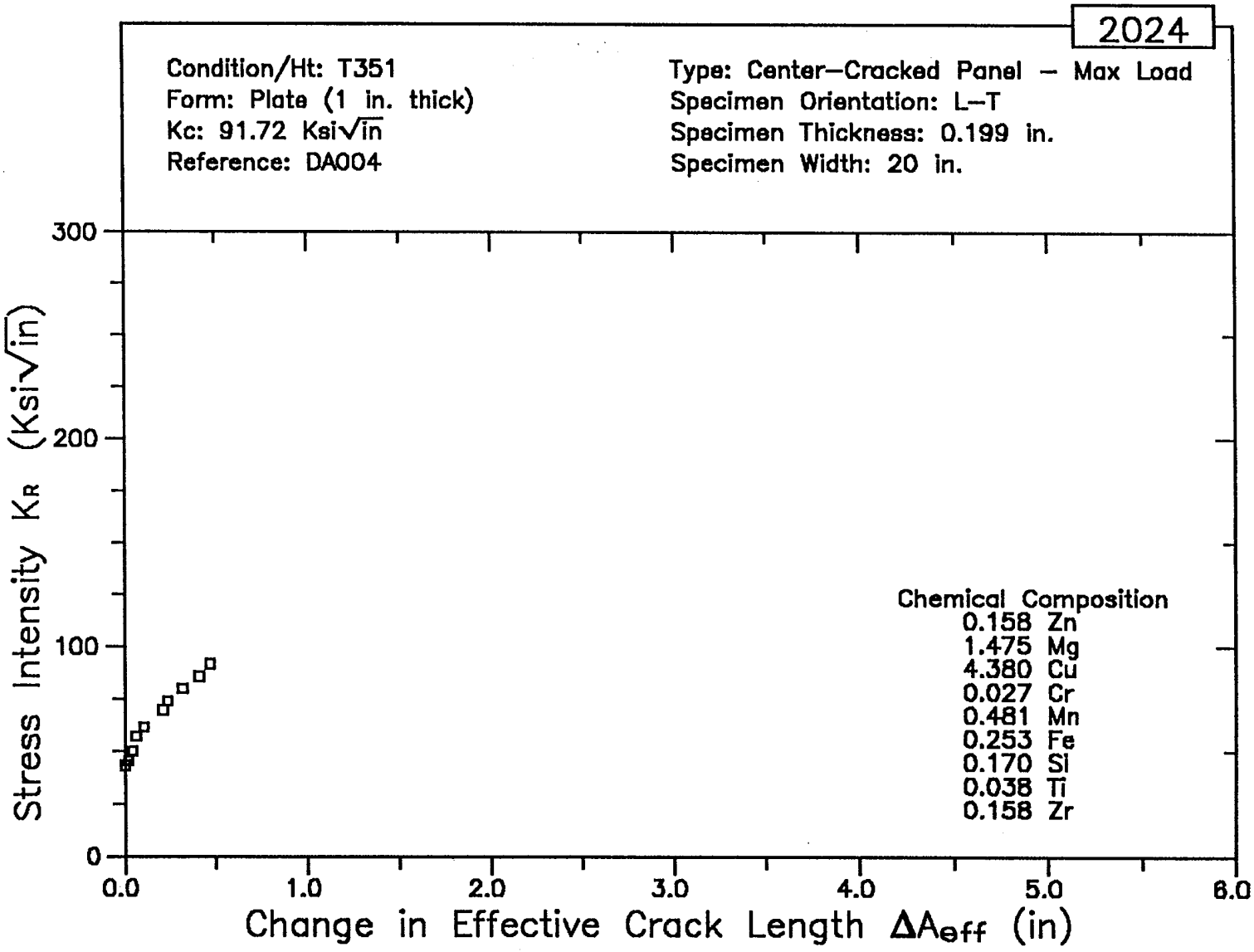



Figure 7.5.2.3.20

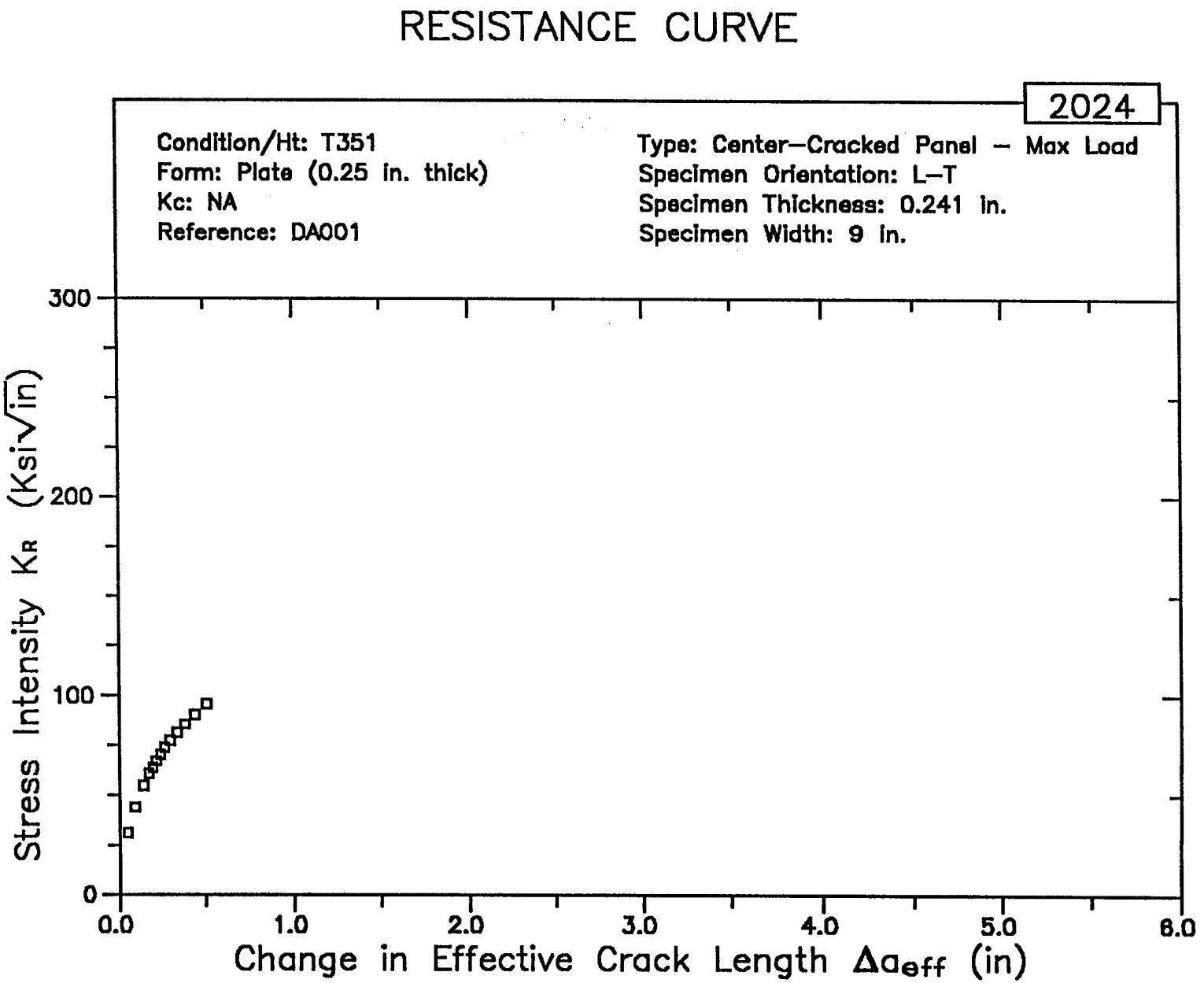



Figure 7.5.2.3.21

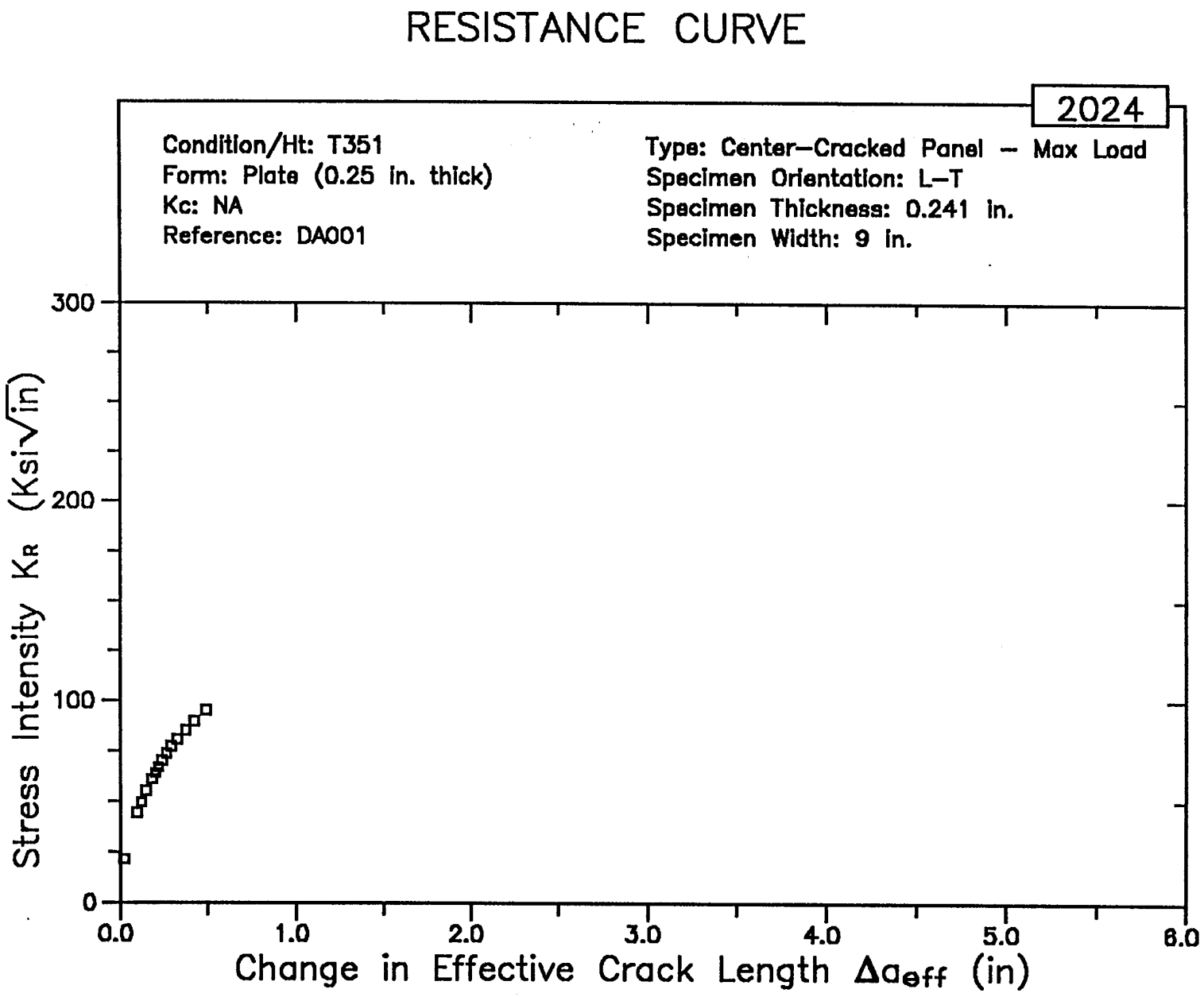



Figure 7.5.2.3.22

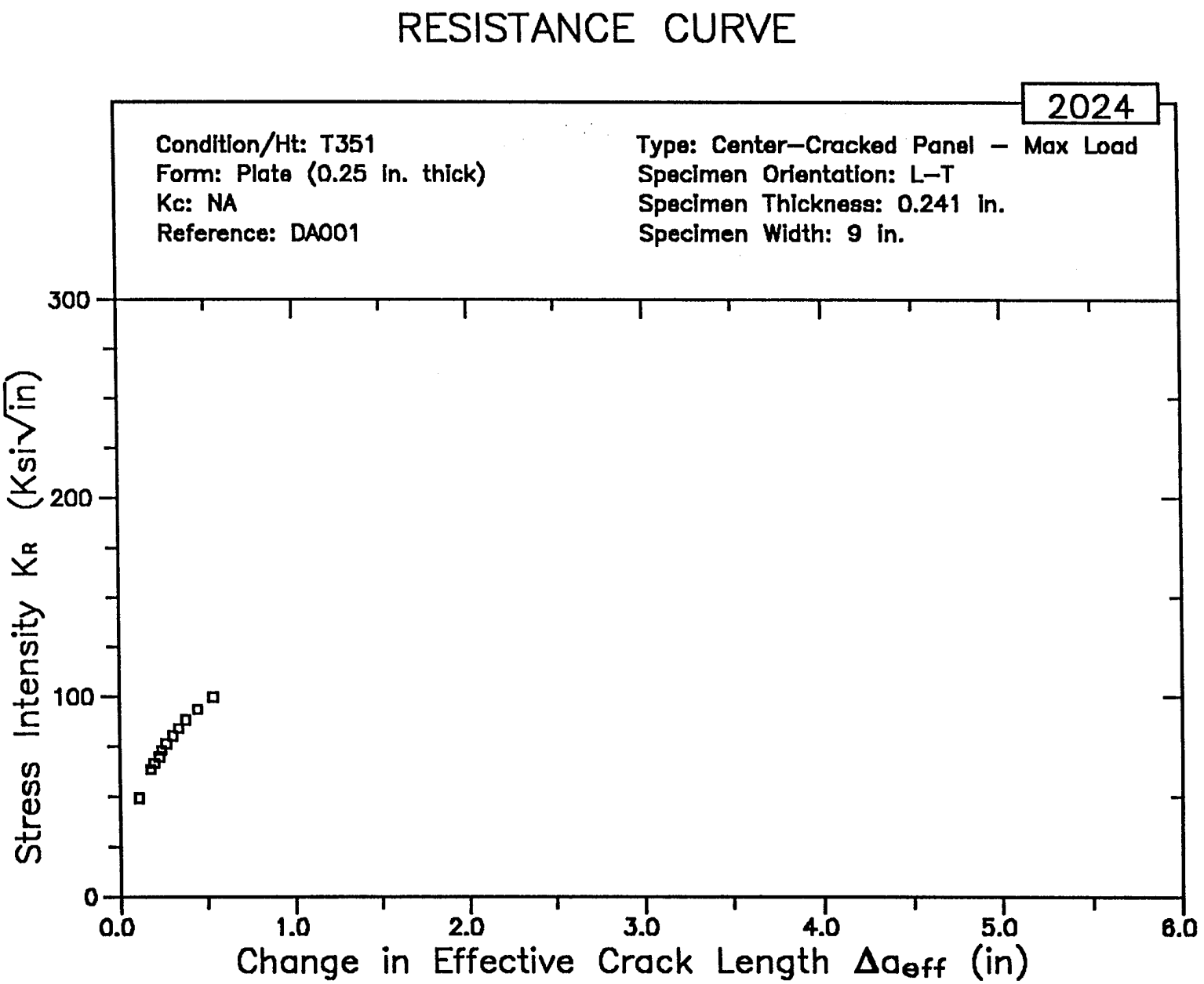



Figure 7.5.2.3.23

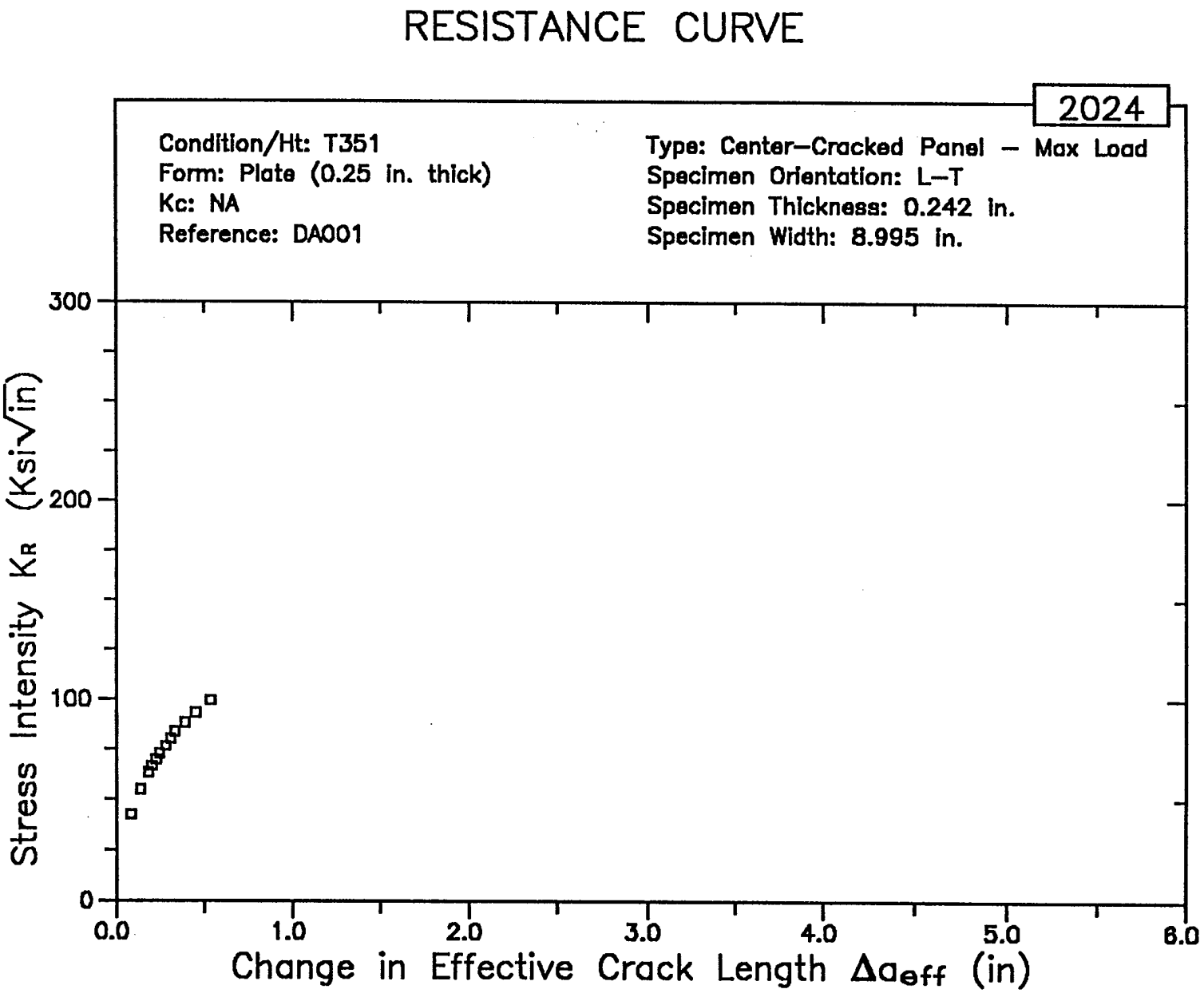



Figure 7.5.2.3.24

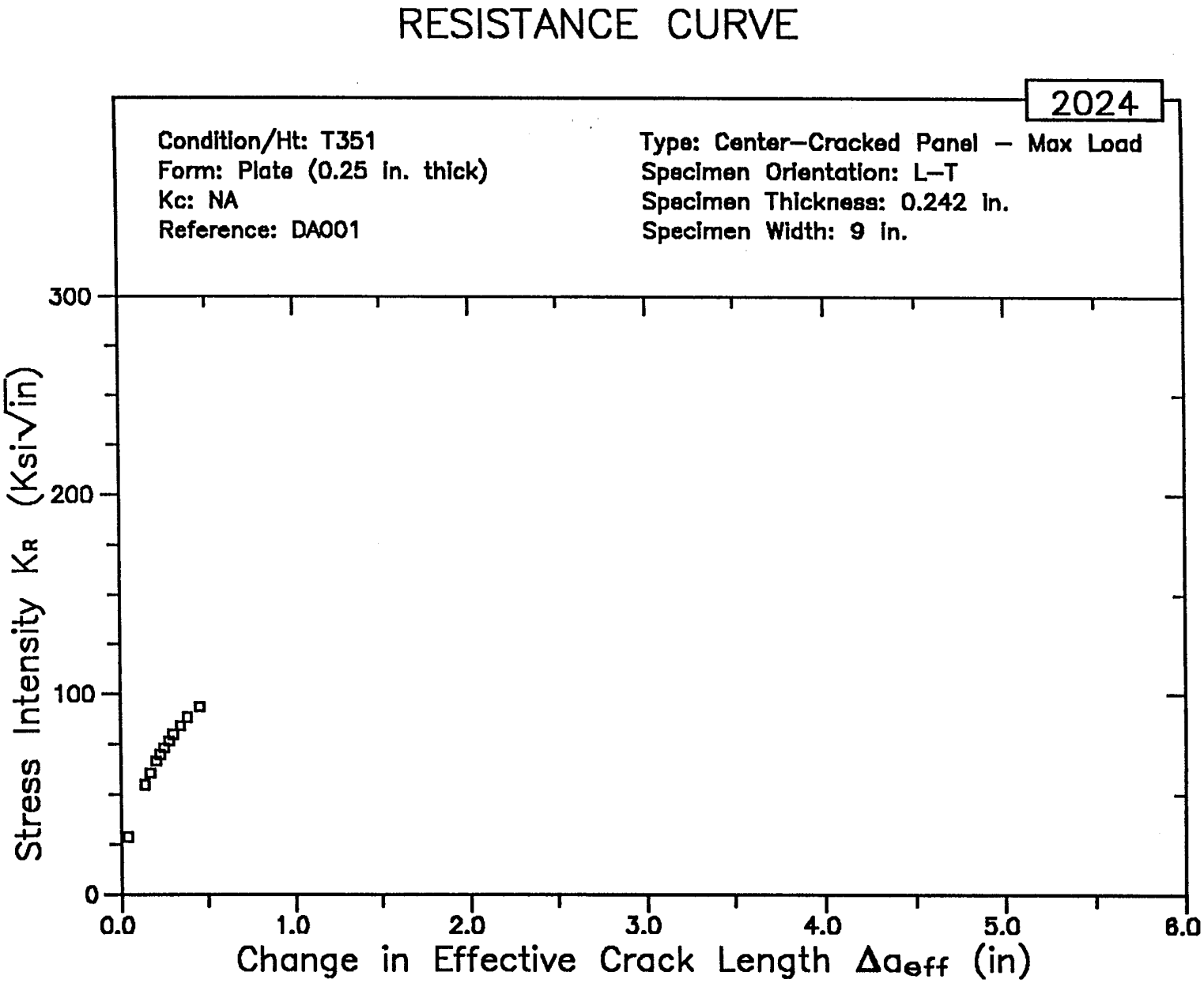



Figure 7.5.2.3.25

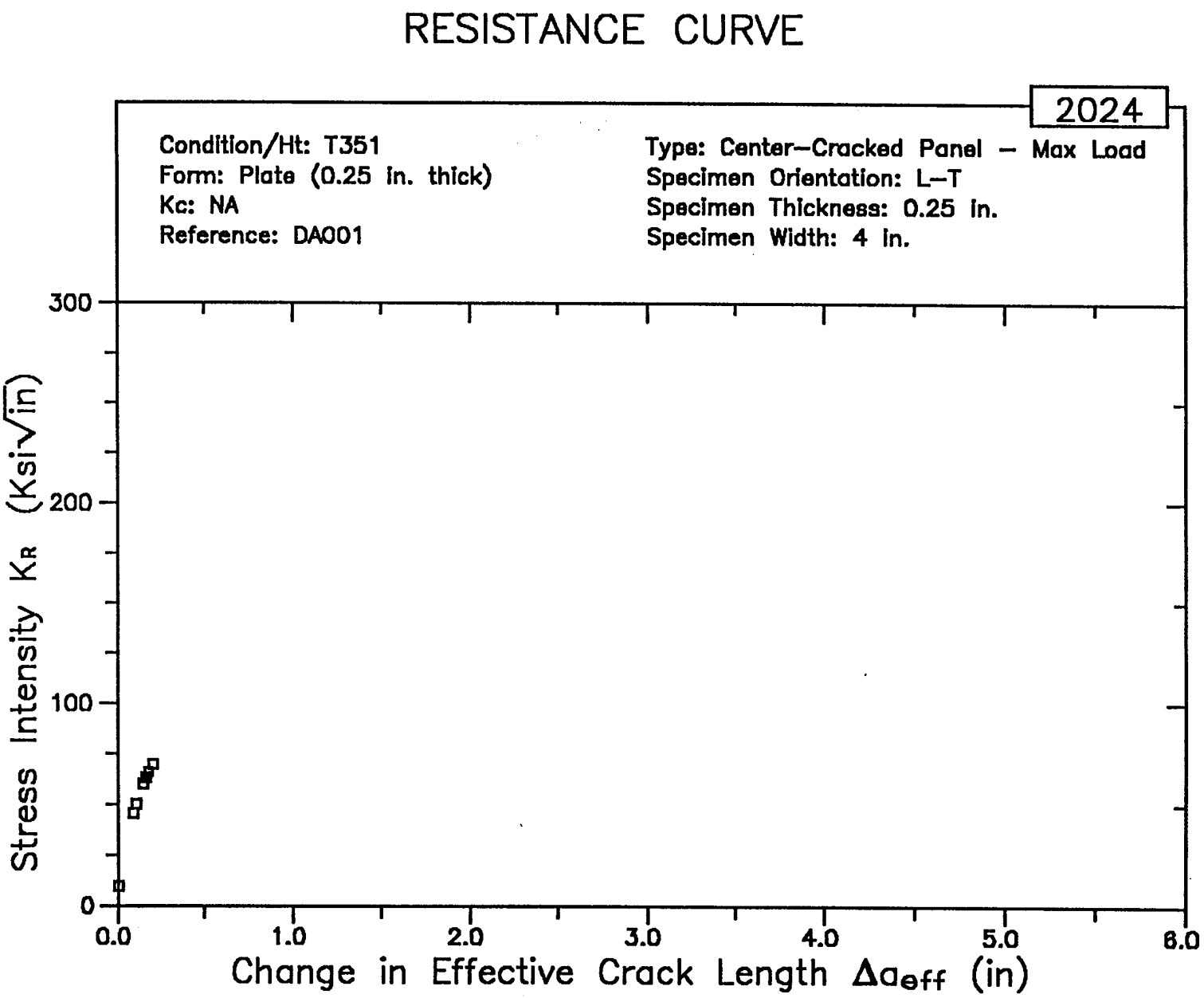



Figure 7.5.2.3.26

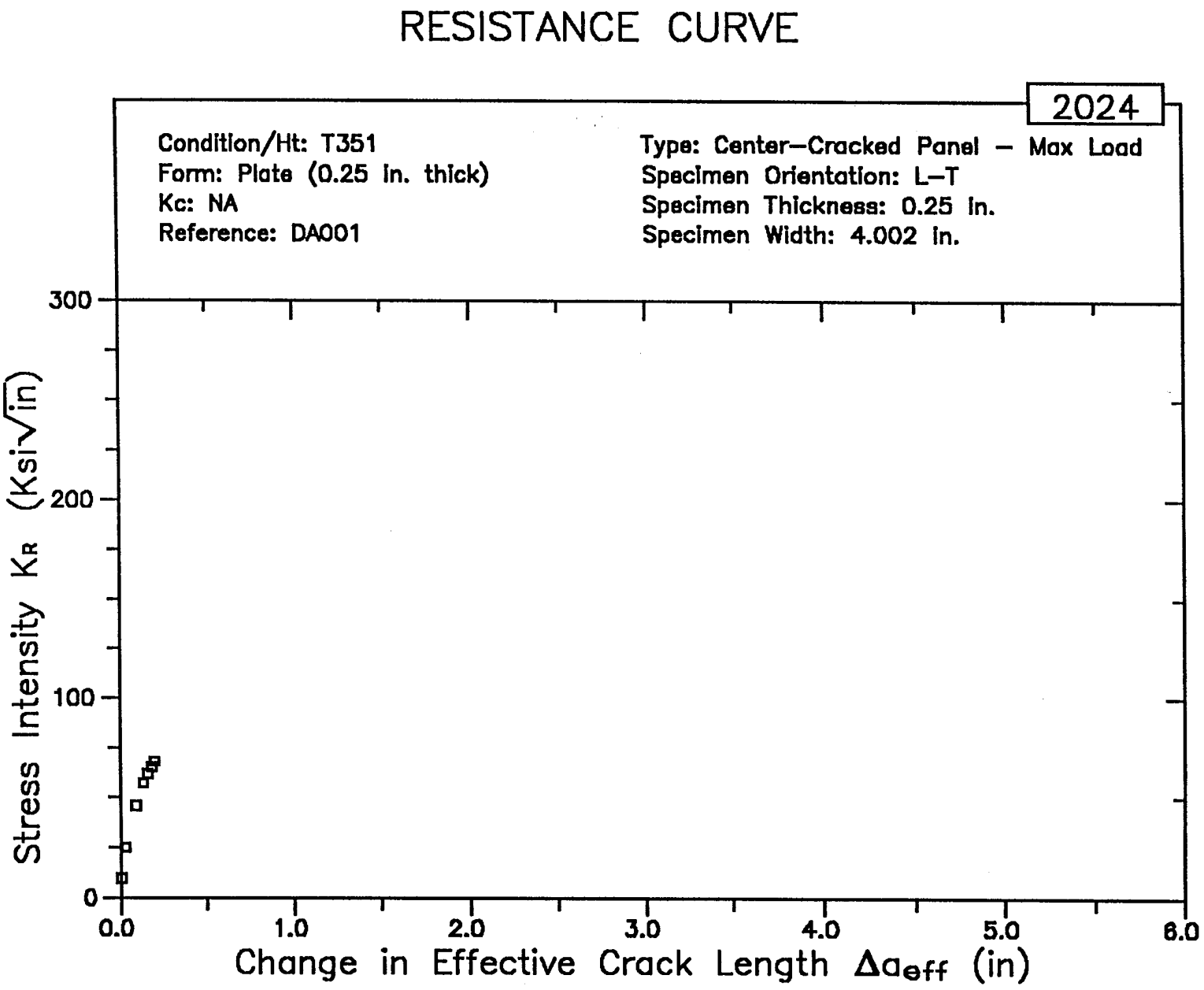



Figure 7.5.2.3.27

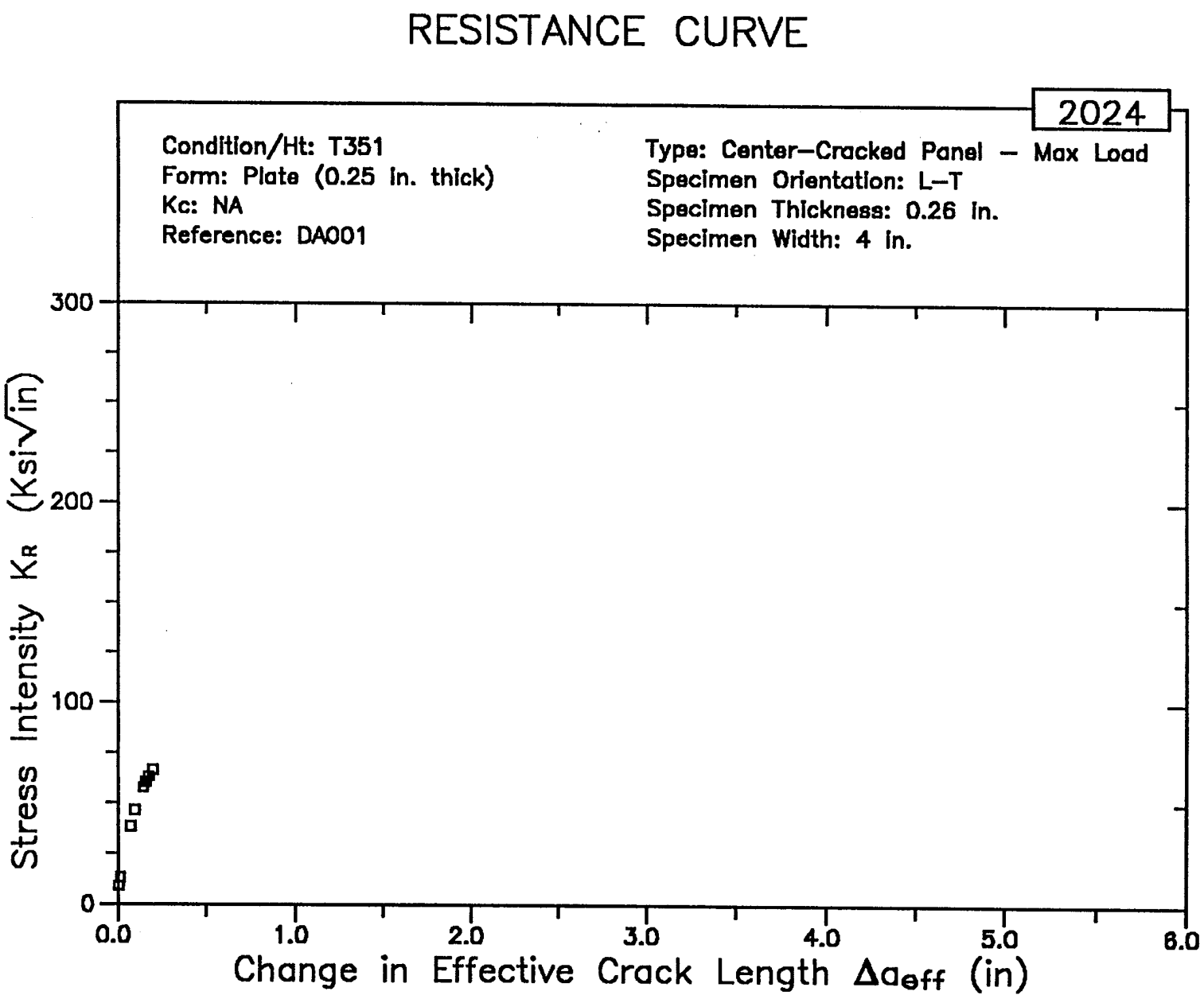



Figure 7.5.2.3.28

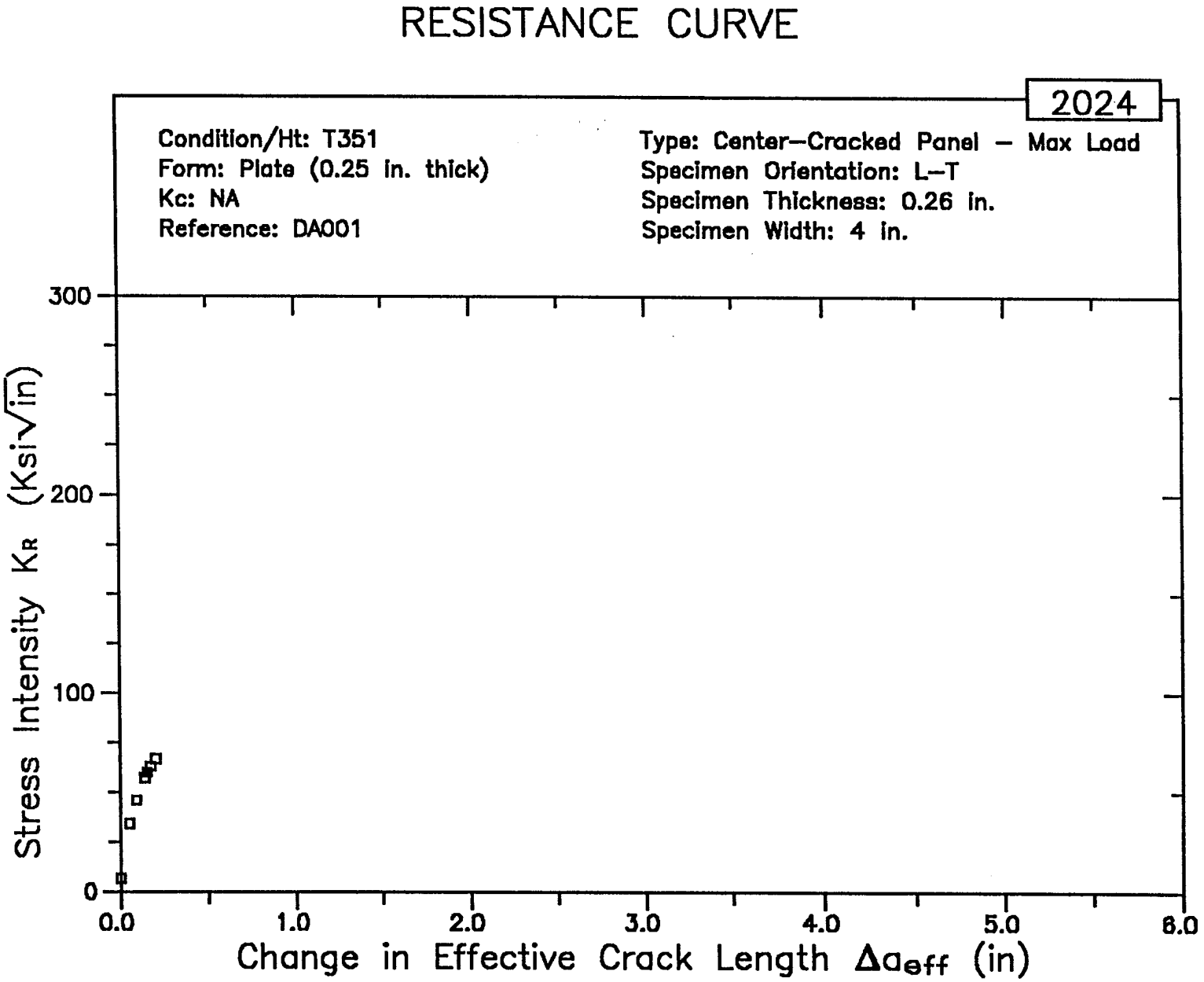



Figure 7.5.2.3.29

# RESISTANCE CURVE

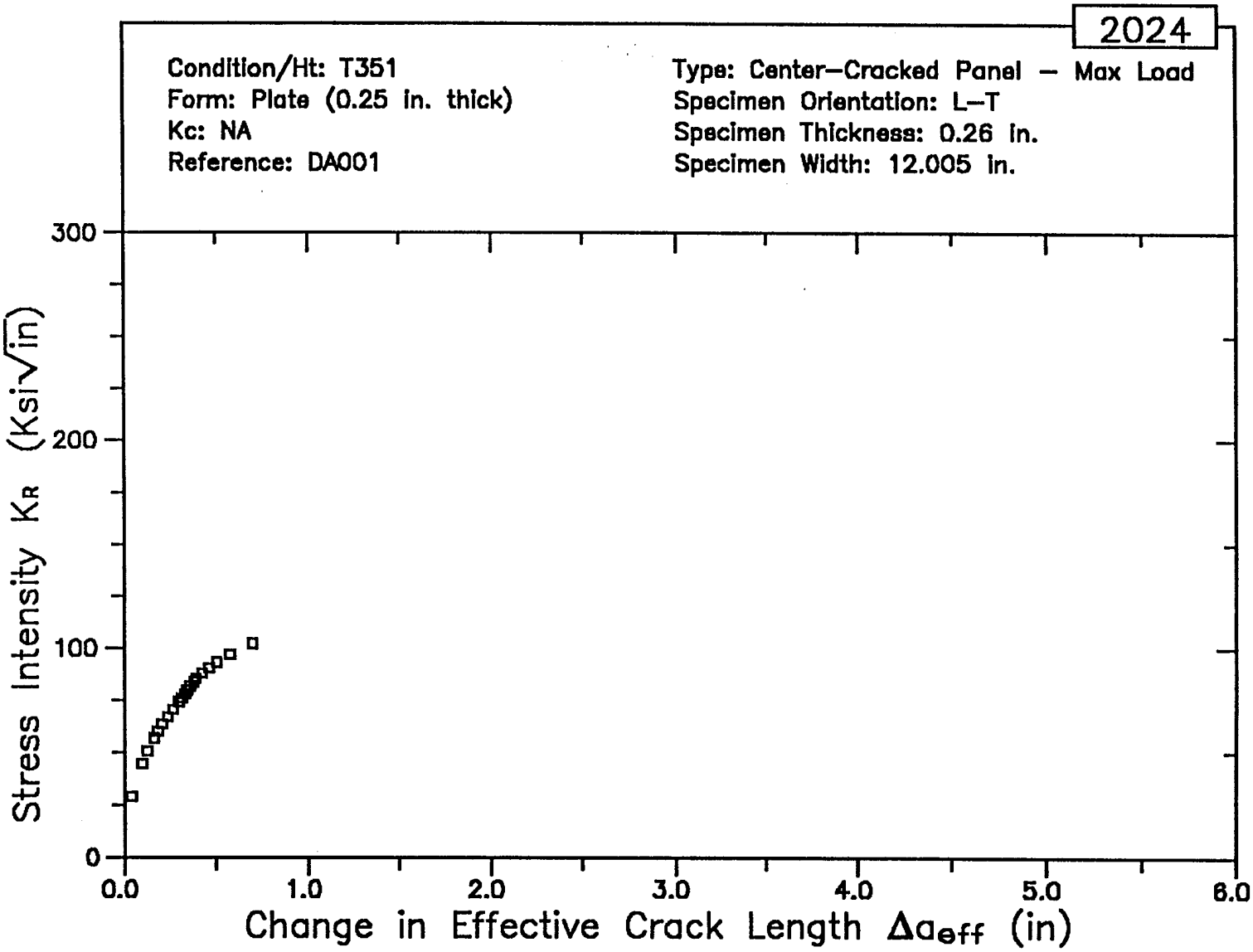



Figure 7.5.2.3.30

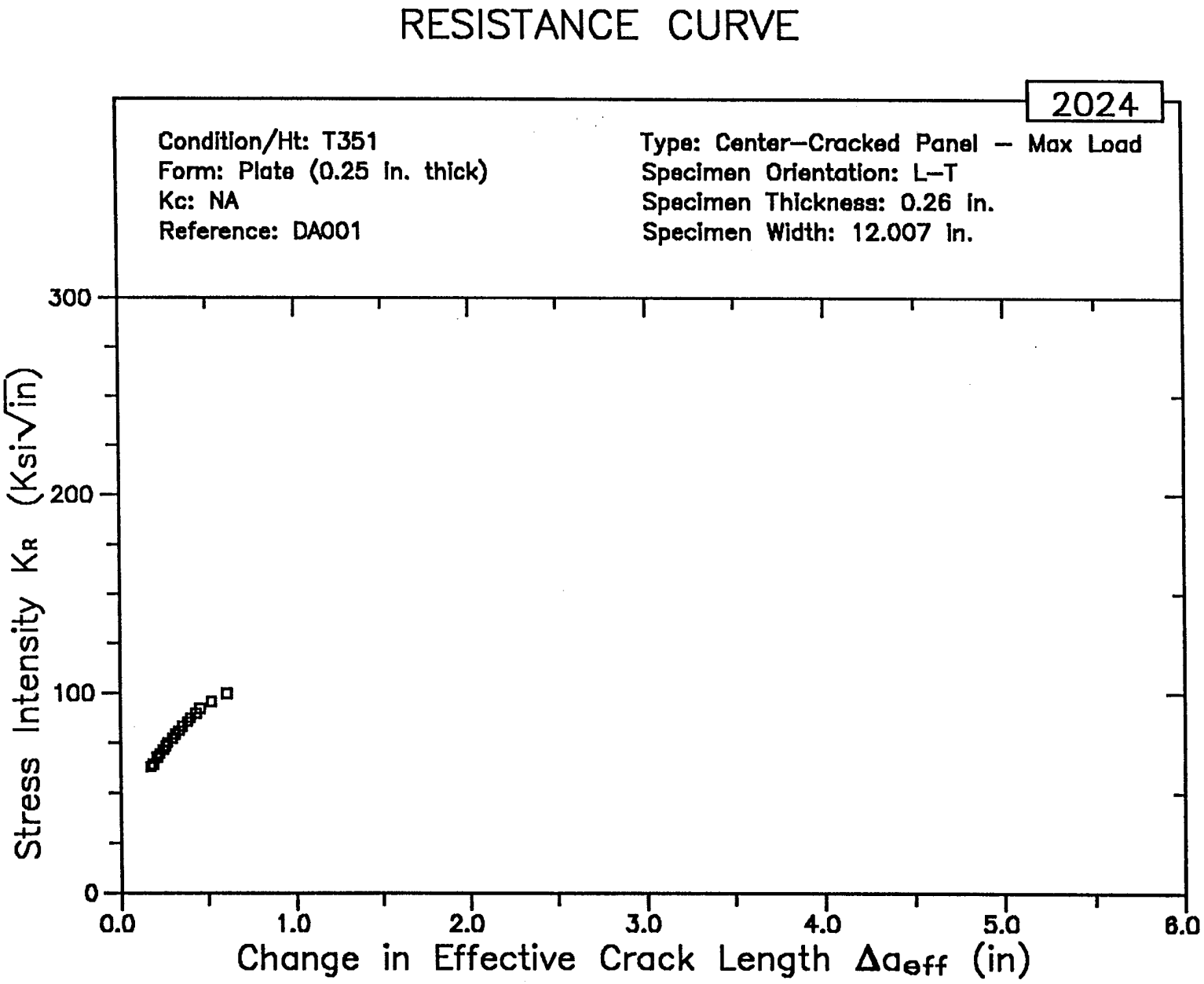



Figure 7.5.2.3.31

# RESISTANCE CURVE

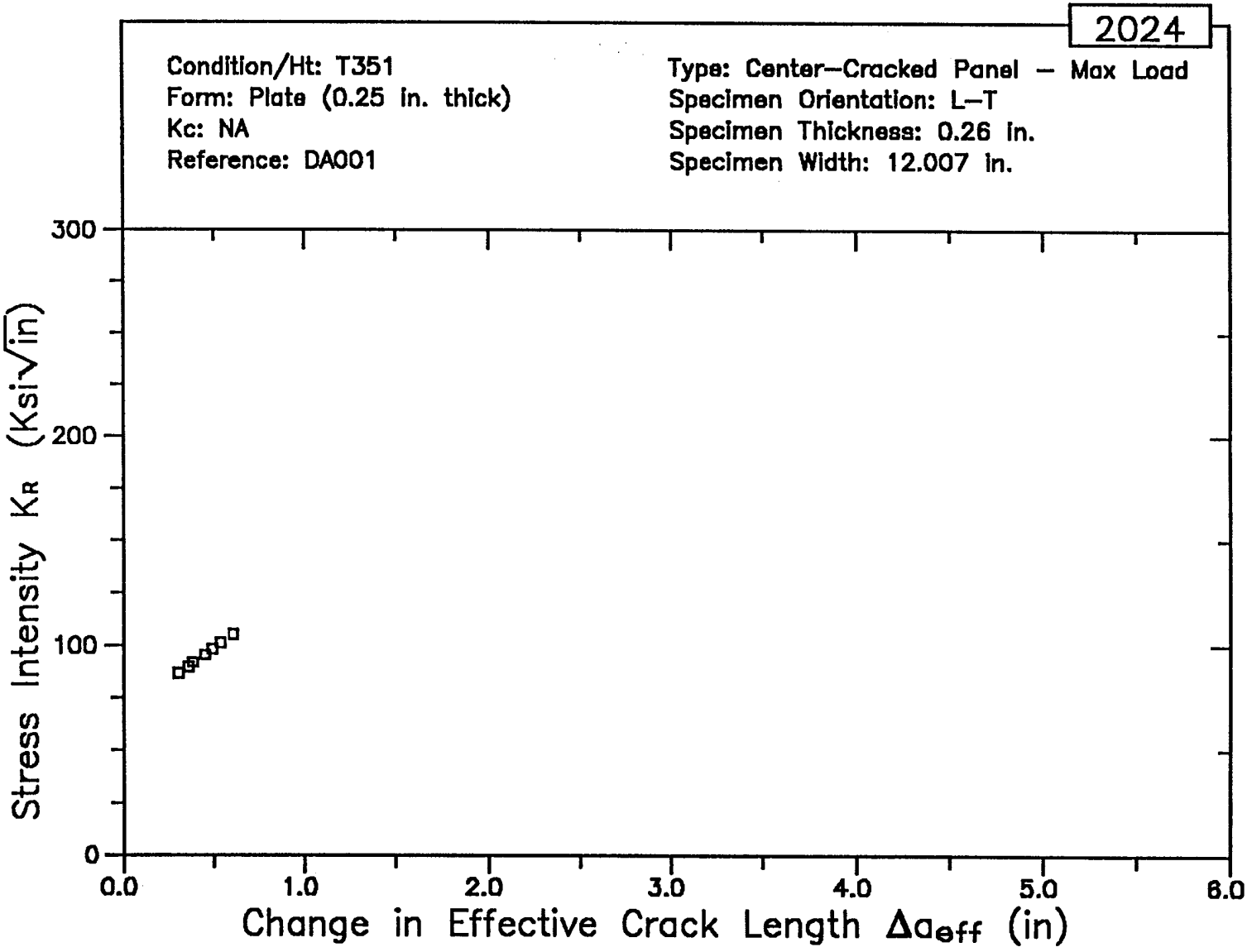



Figure 7.5.2.3.32

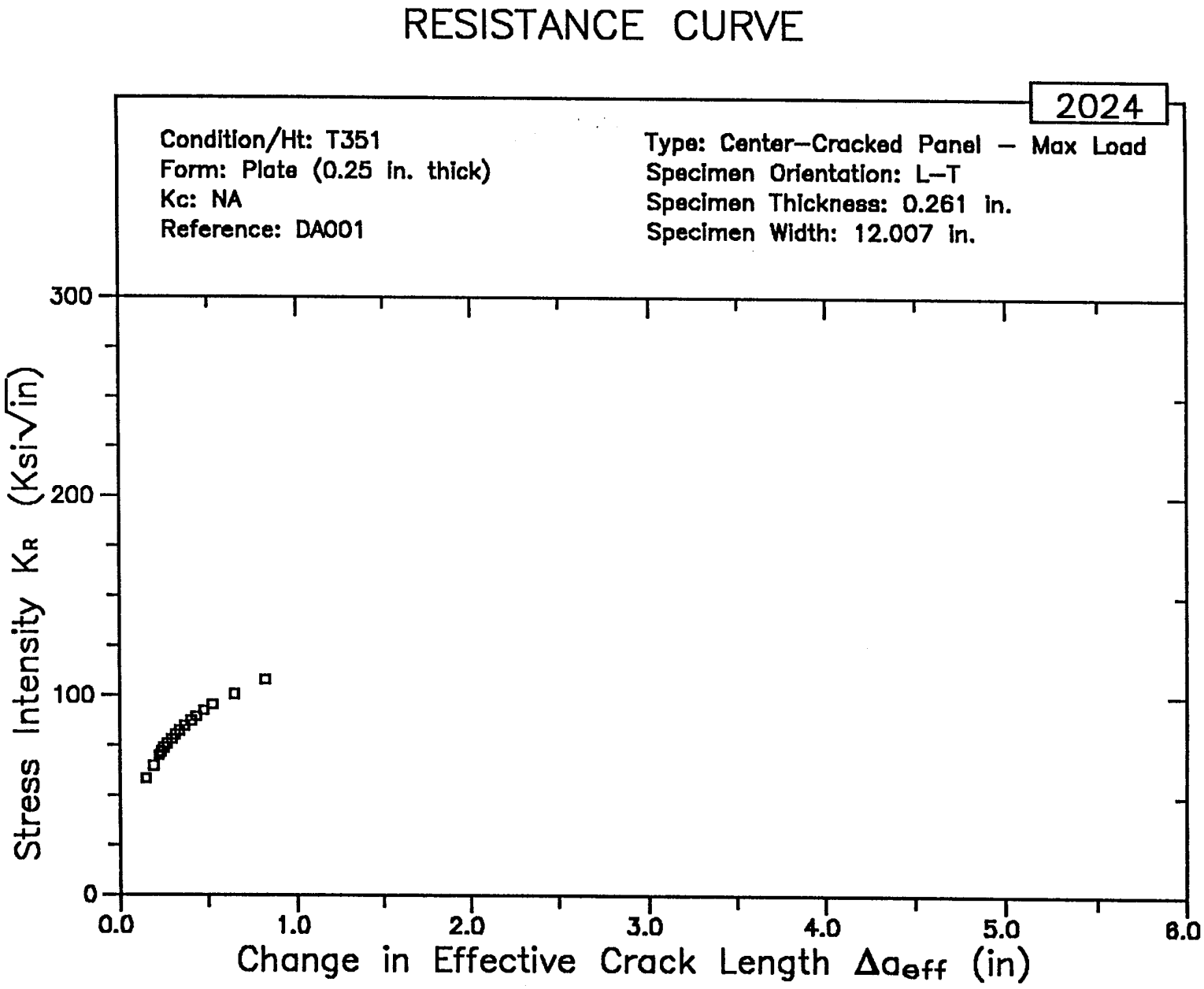



Figure 7.5.2.3.33

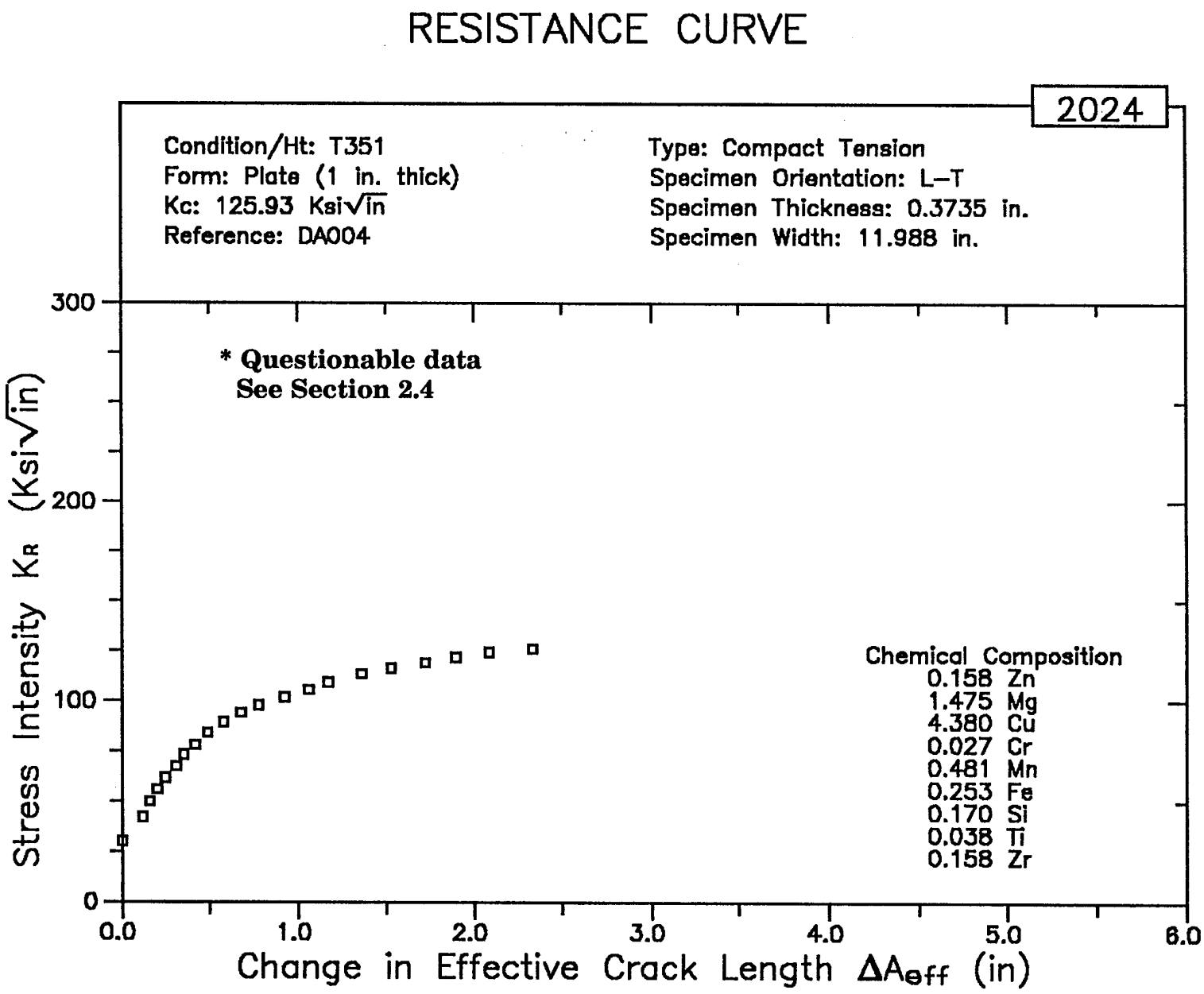



Figure 7.5.2.3.34

# RESISTANCE CURVE

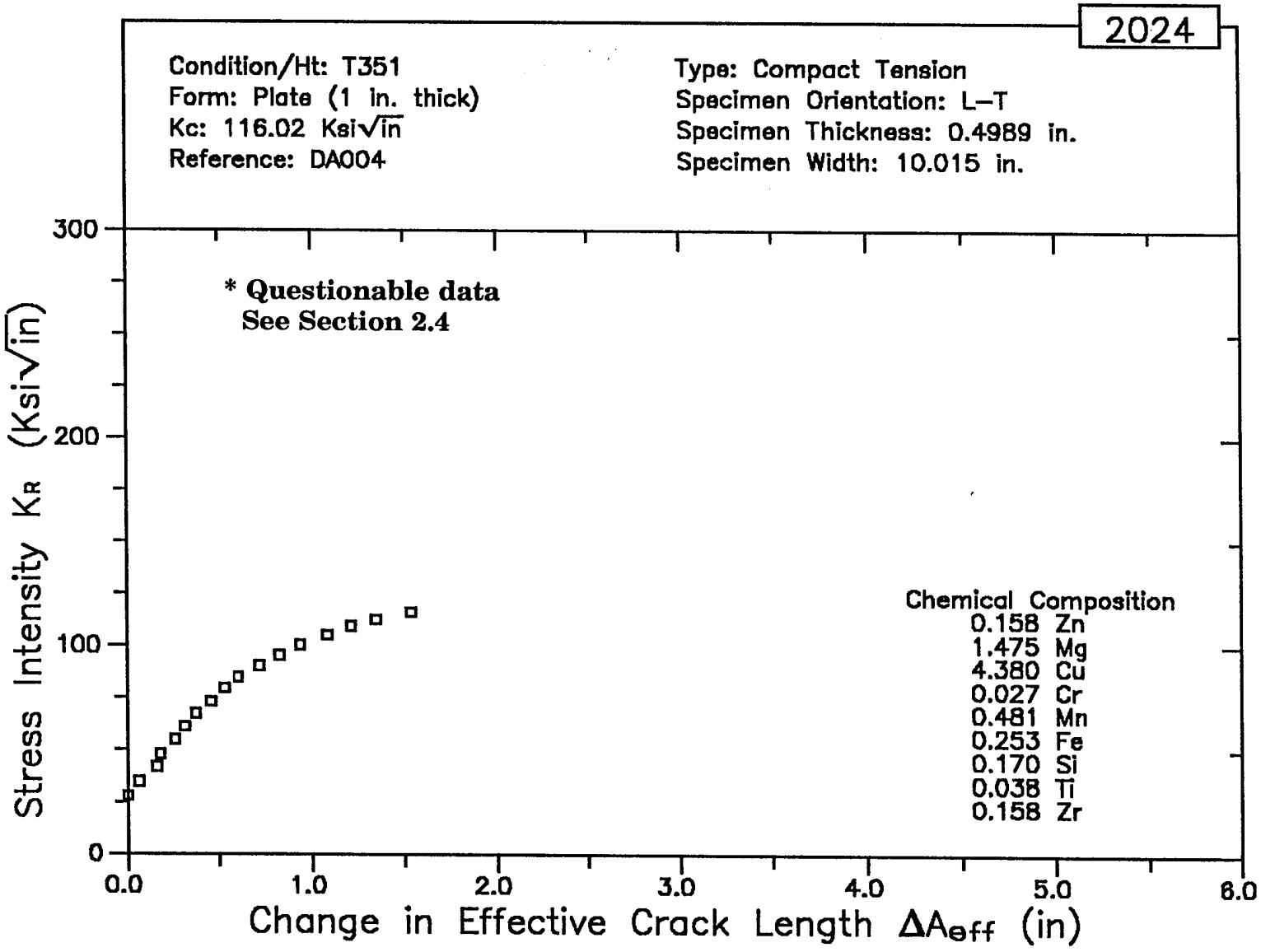



Figure 7.5.2.3.35

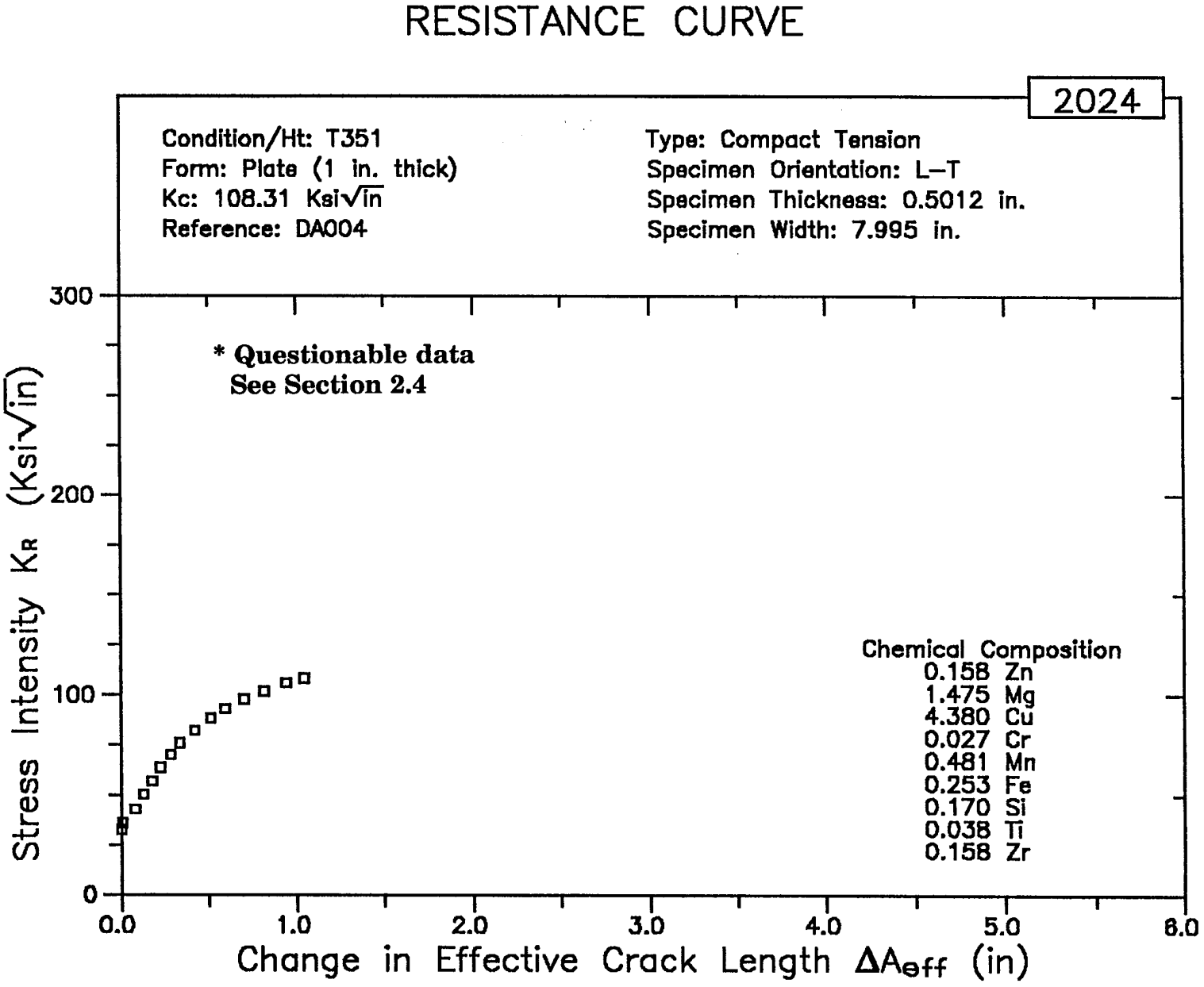



Figure 7.5.2.3.36

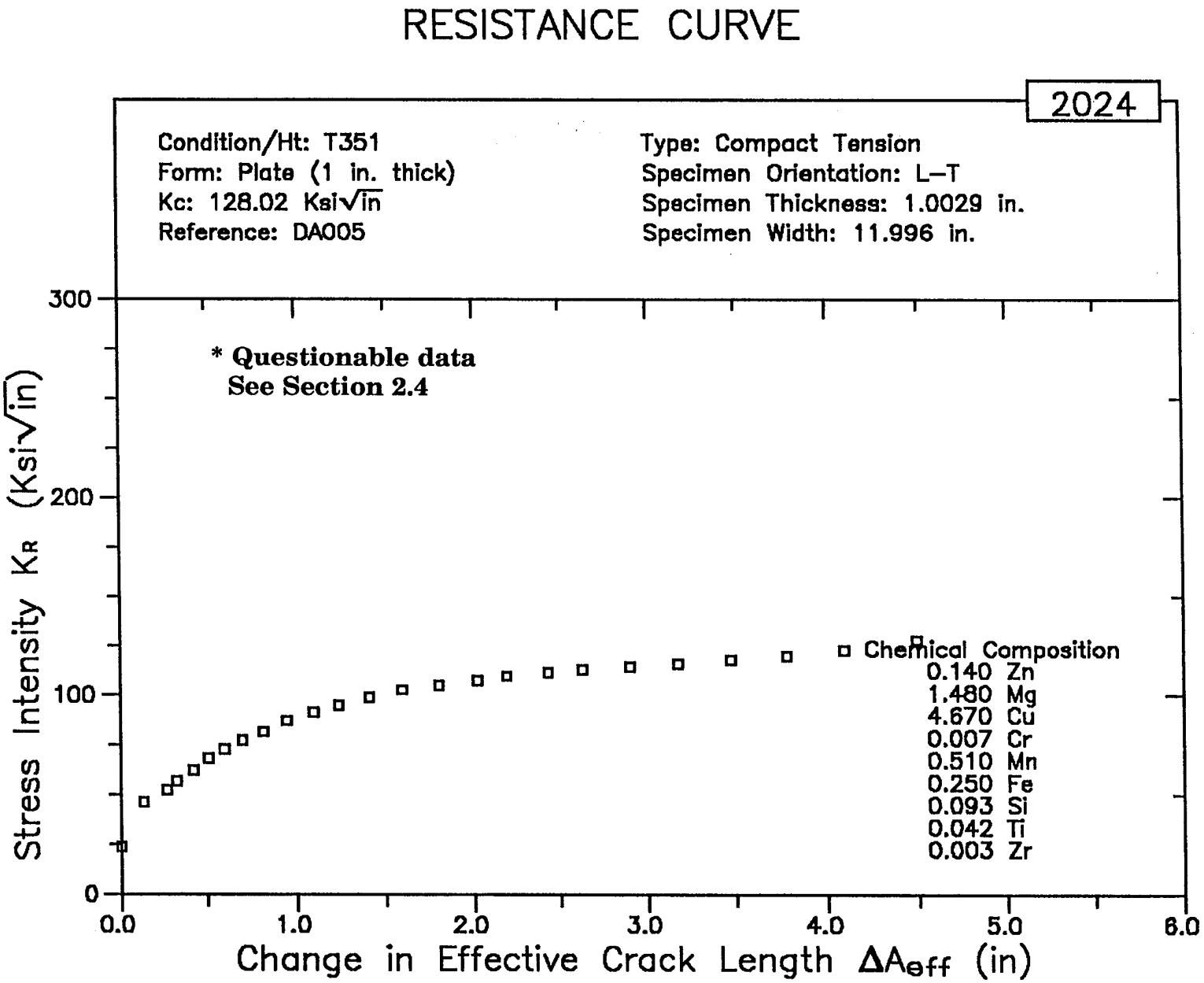



Figure 7.5.2.3.37

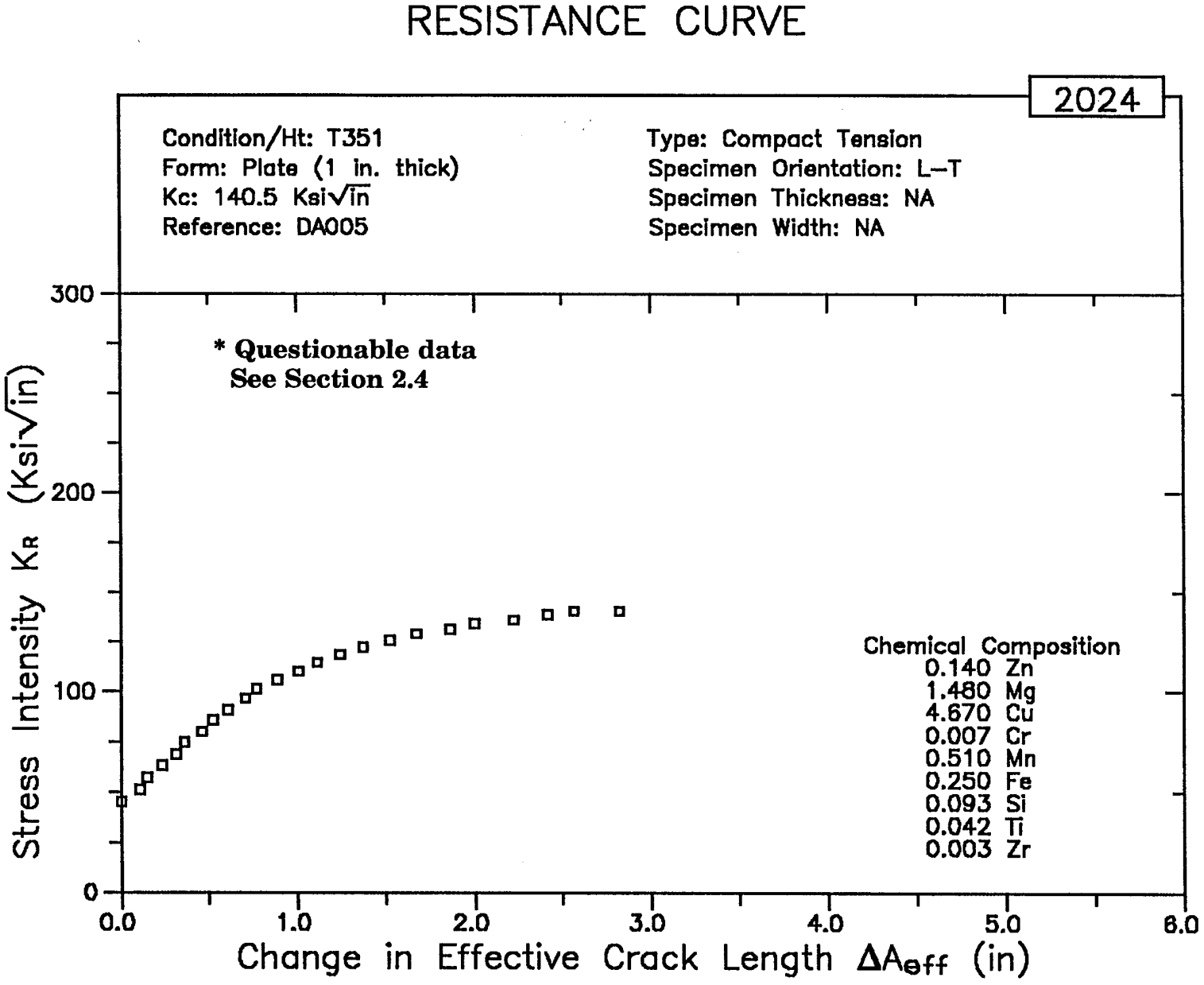



Figure 7.5.2.3.38

# RESISTANCE CURVE

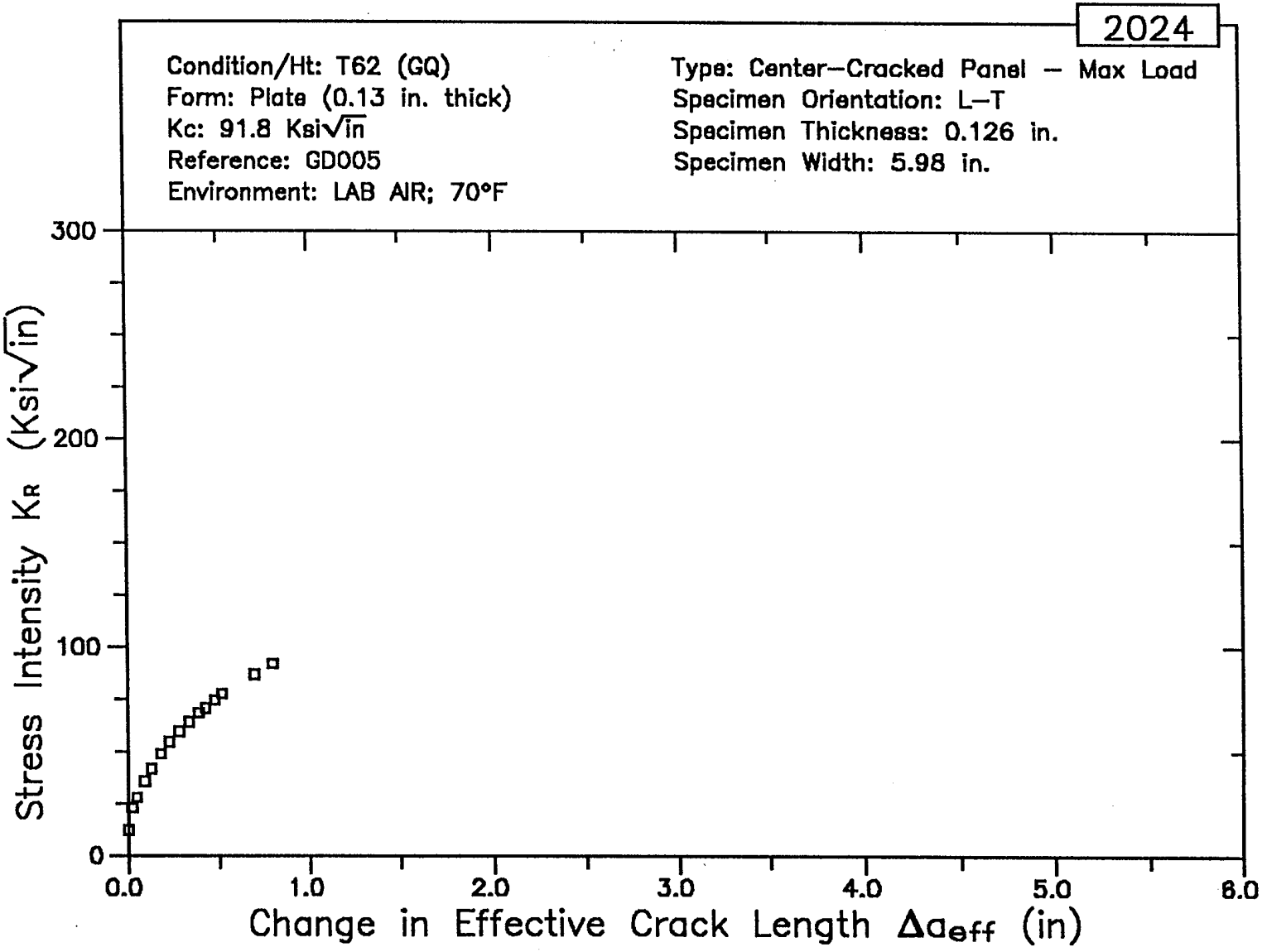



Figure 7.5.2.3.39

# RESISTANCE CURVE

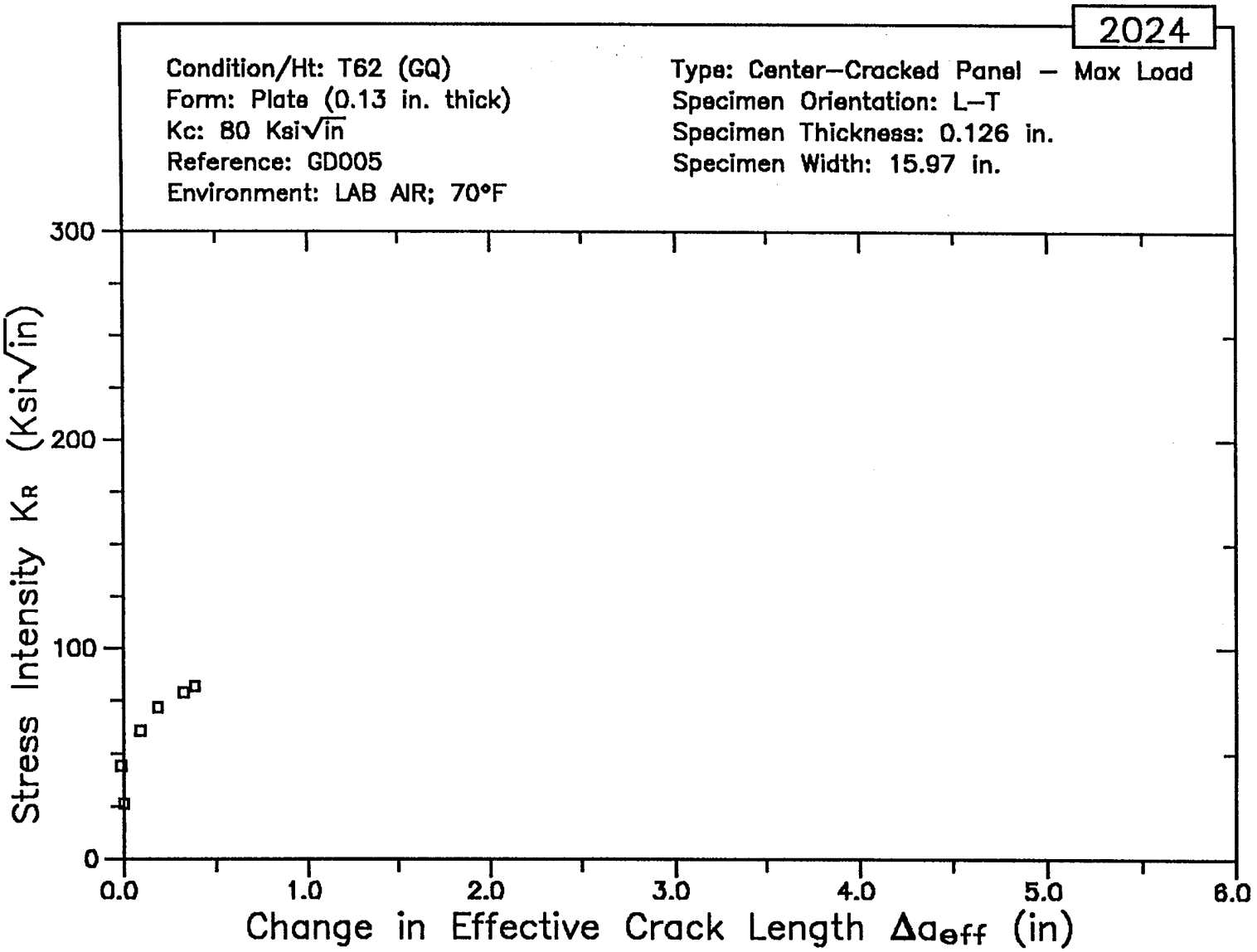



Figure 7.5.2.3.40

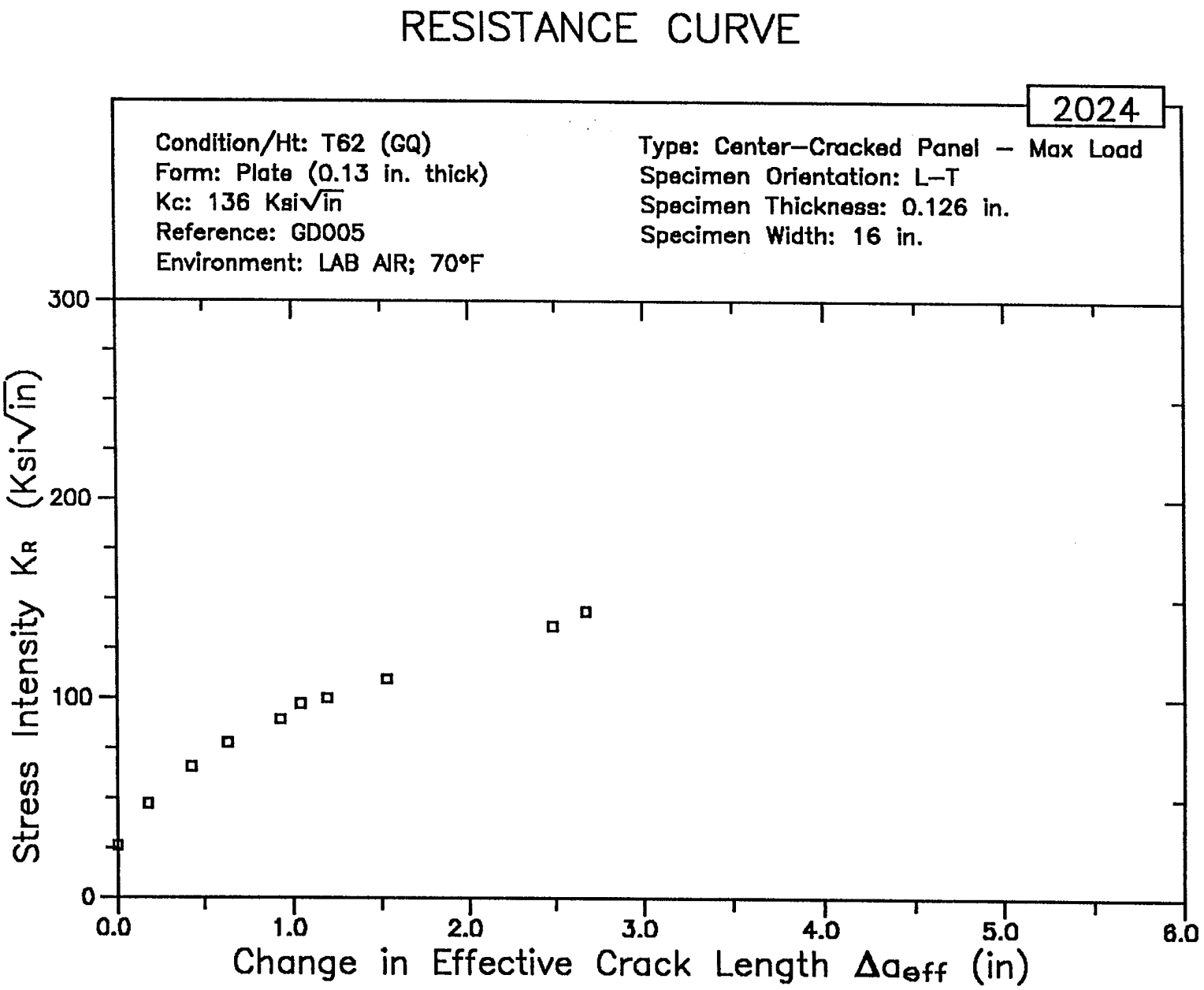



Figure 7.5.2.3.41

# RESISTANCE CURVE

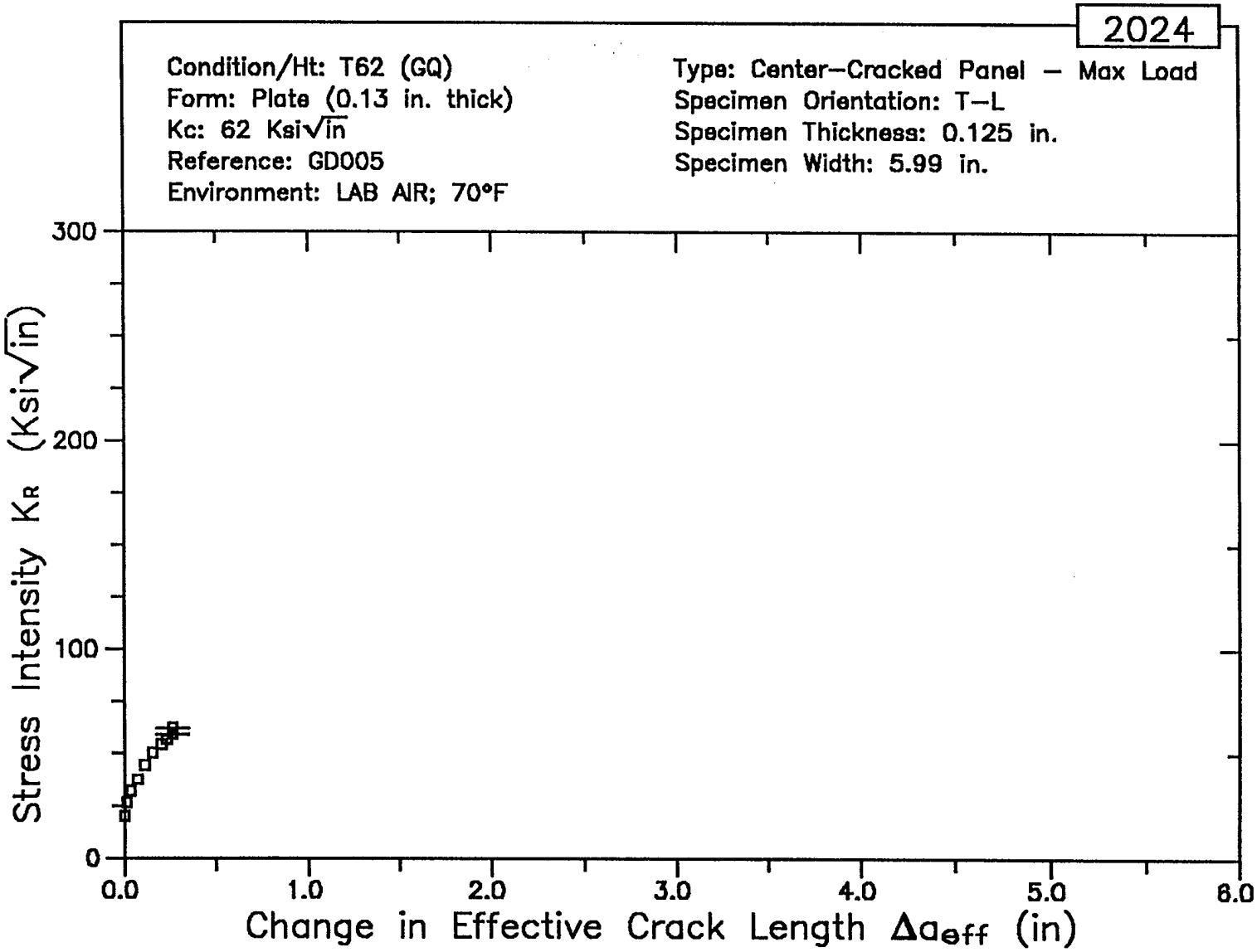



Figure 7.5.2.3.42

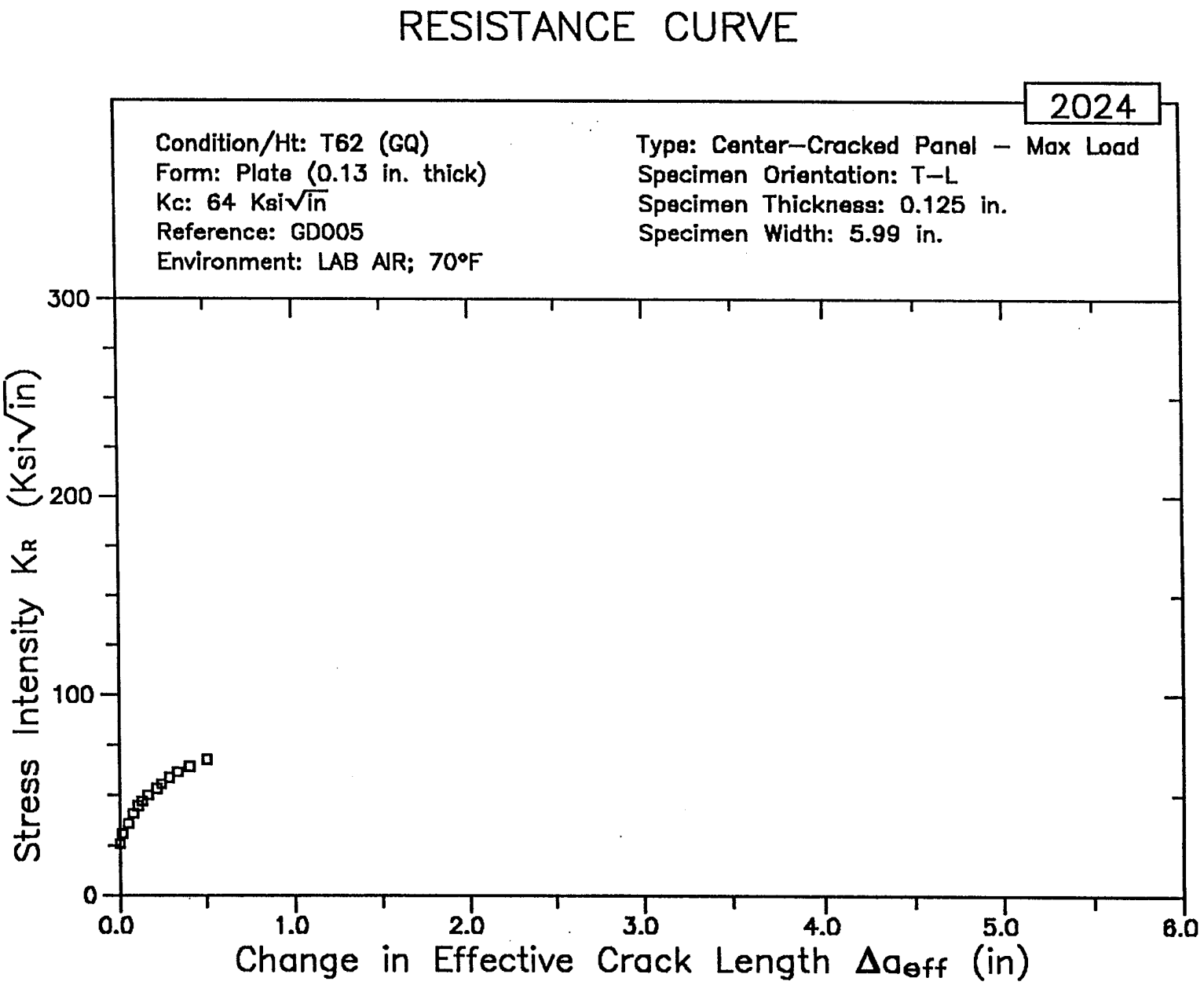



Figure 7.5.2.3.43

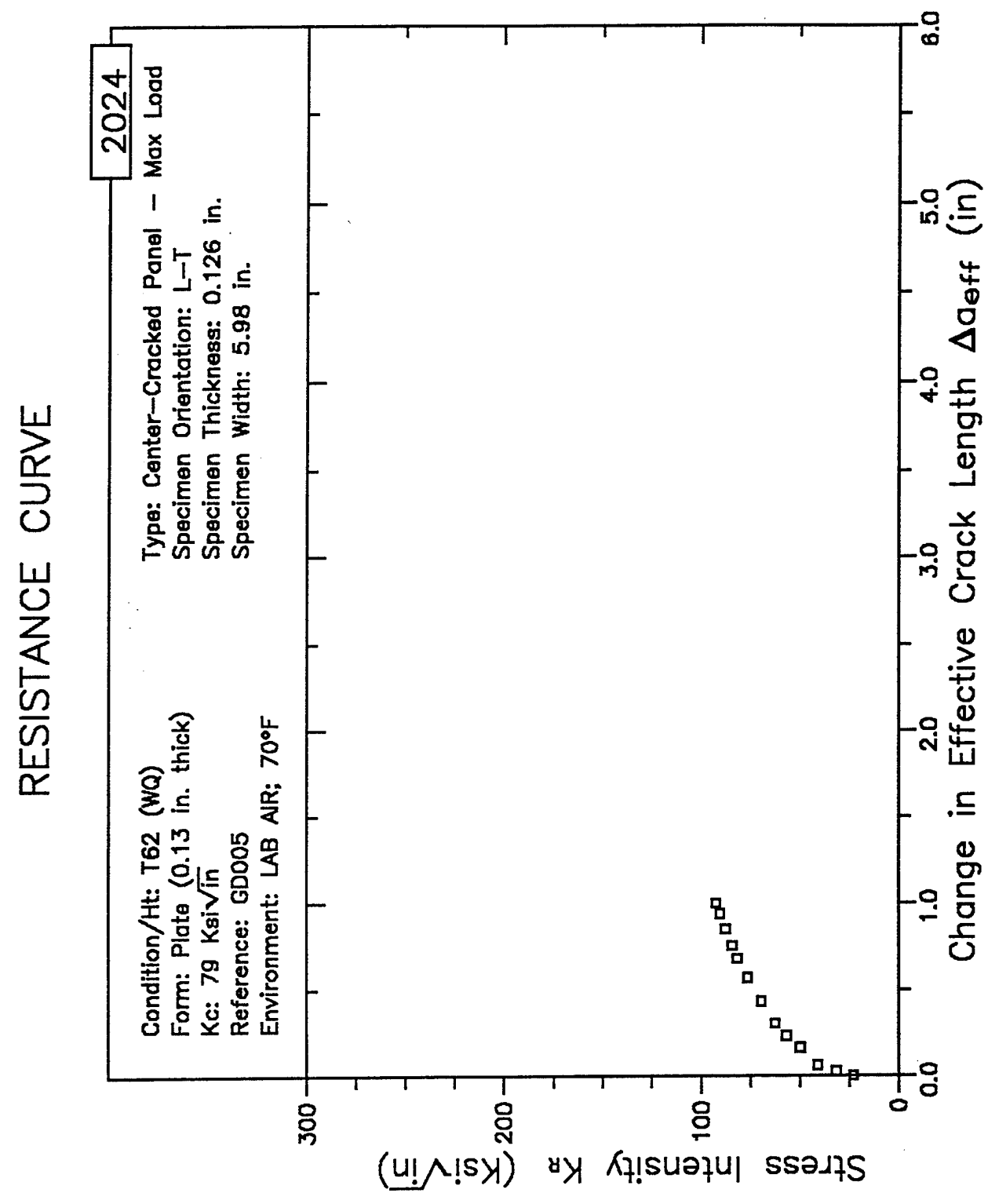



**Figure 7.5.2.3.44**

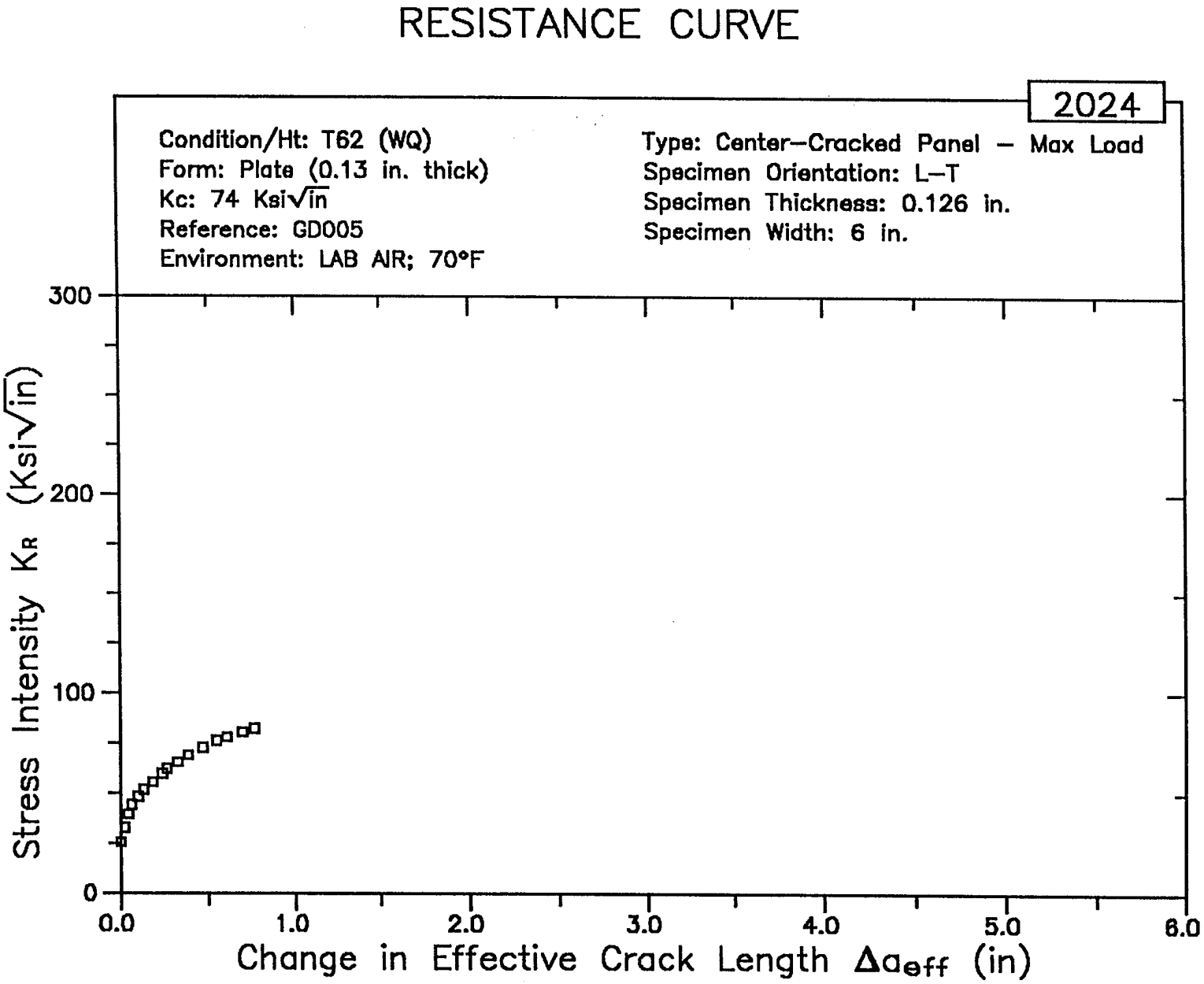



Figure 7.5.2.3.45

# RESISTANCE CURVE

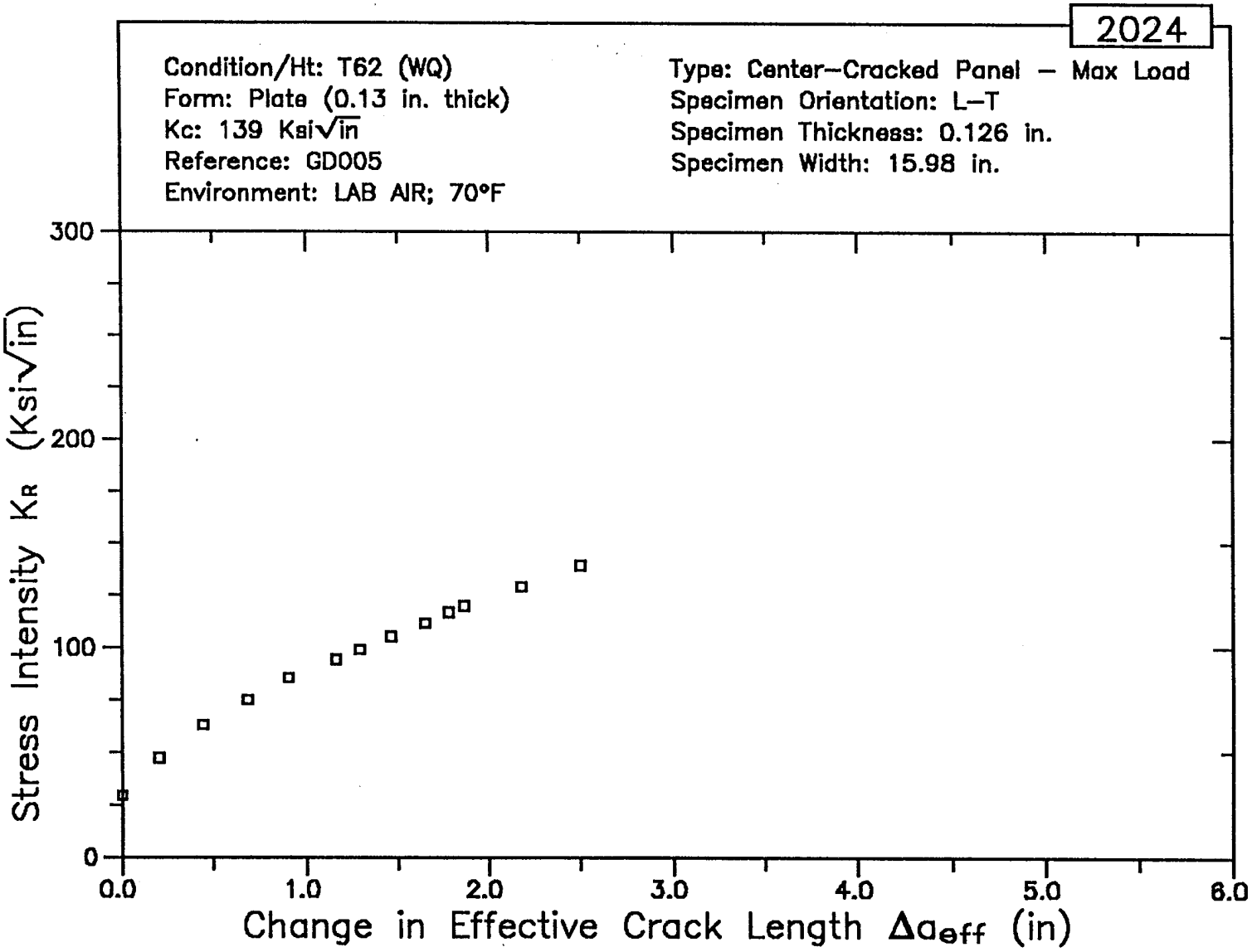



Figure 7.5.2.3.46

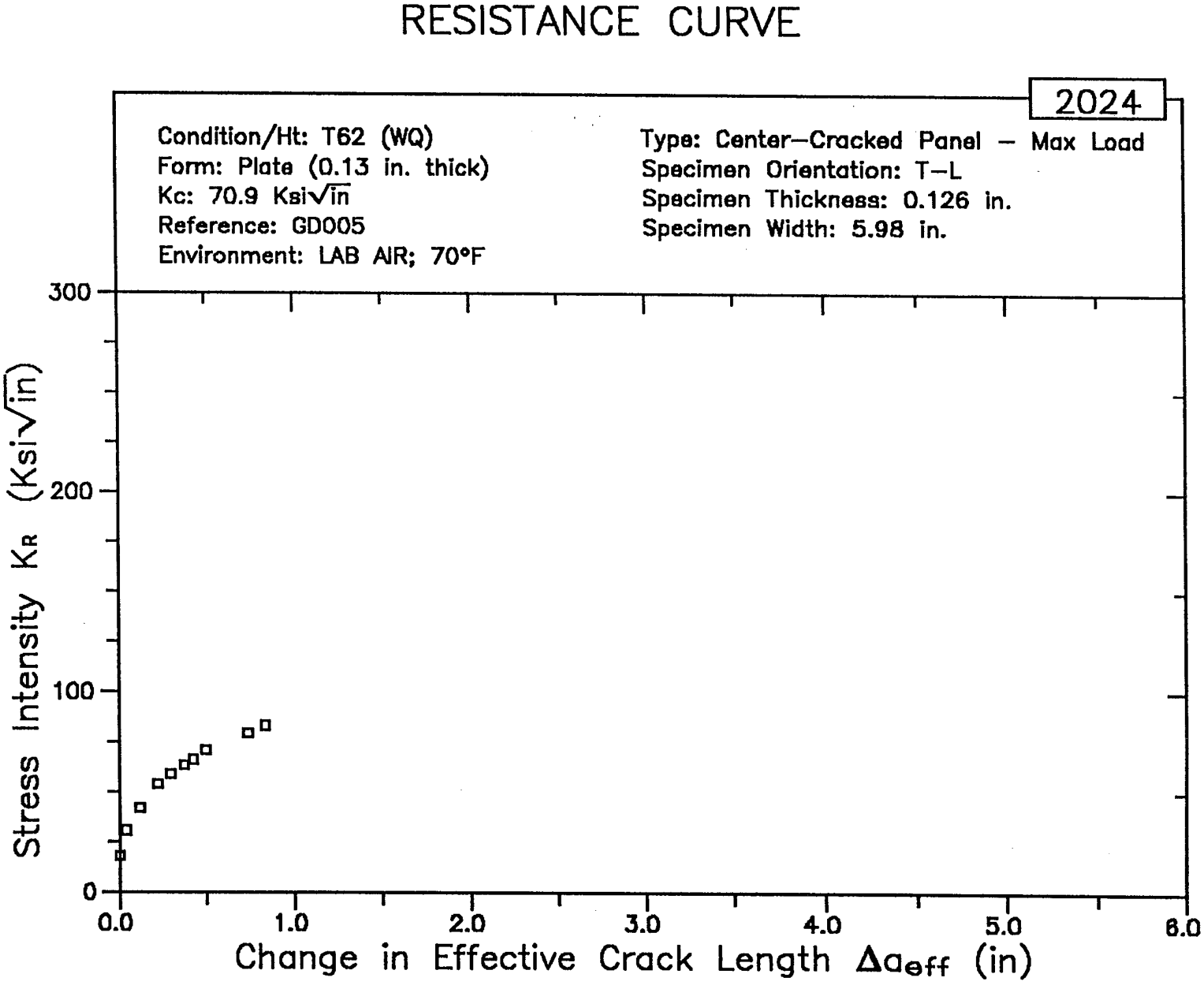



Figure 7.5.2.3.47

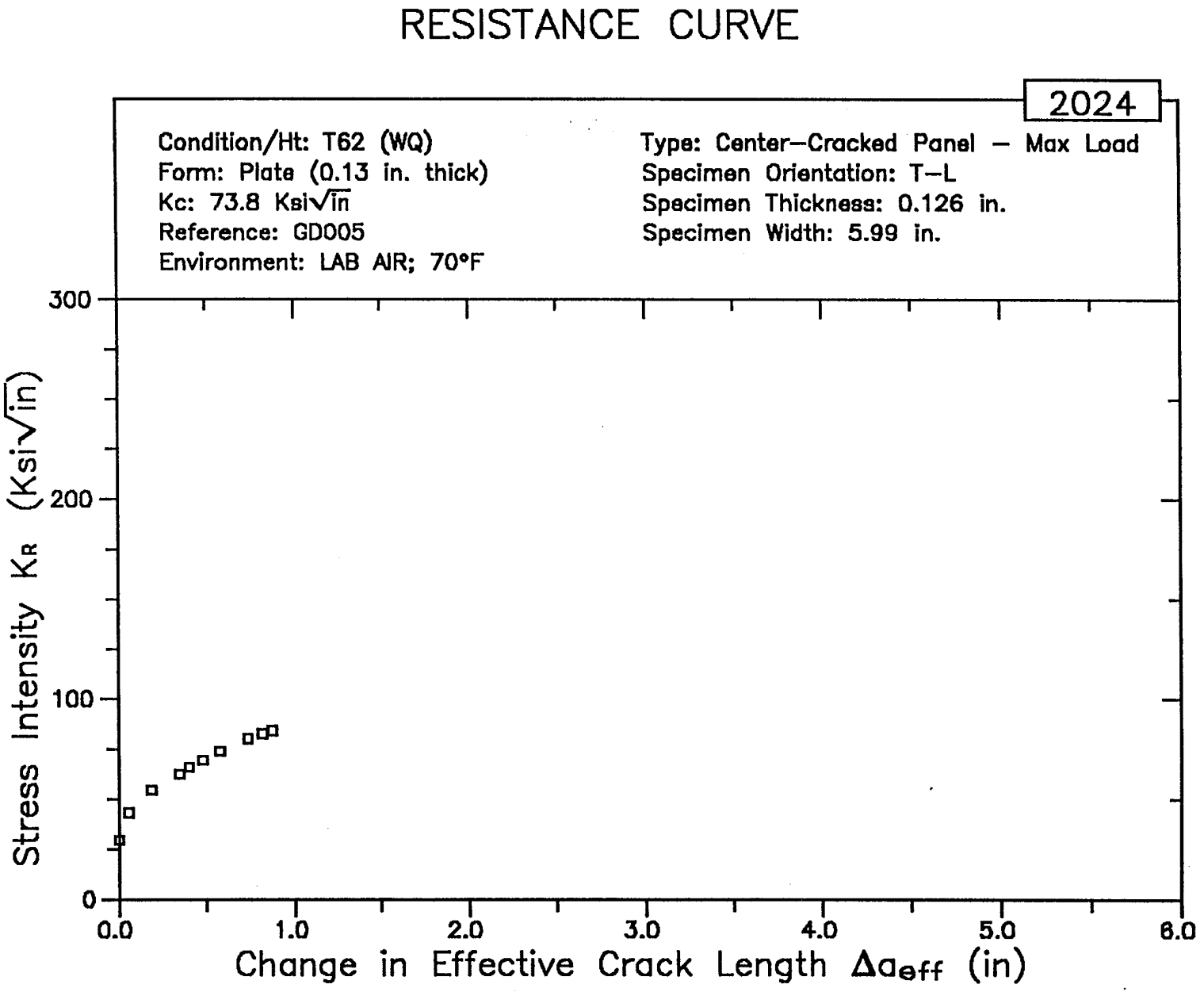



Figure 7.5.2.3.48

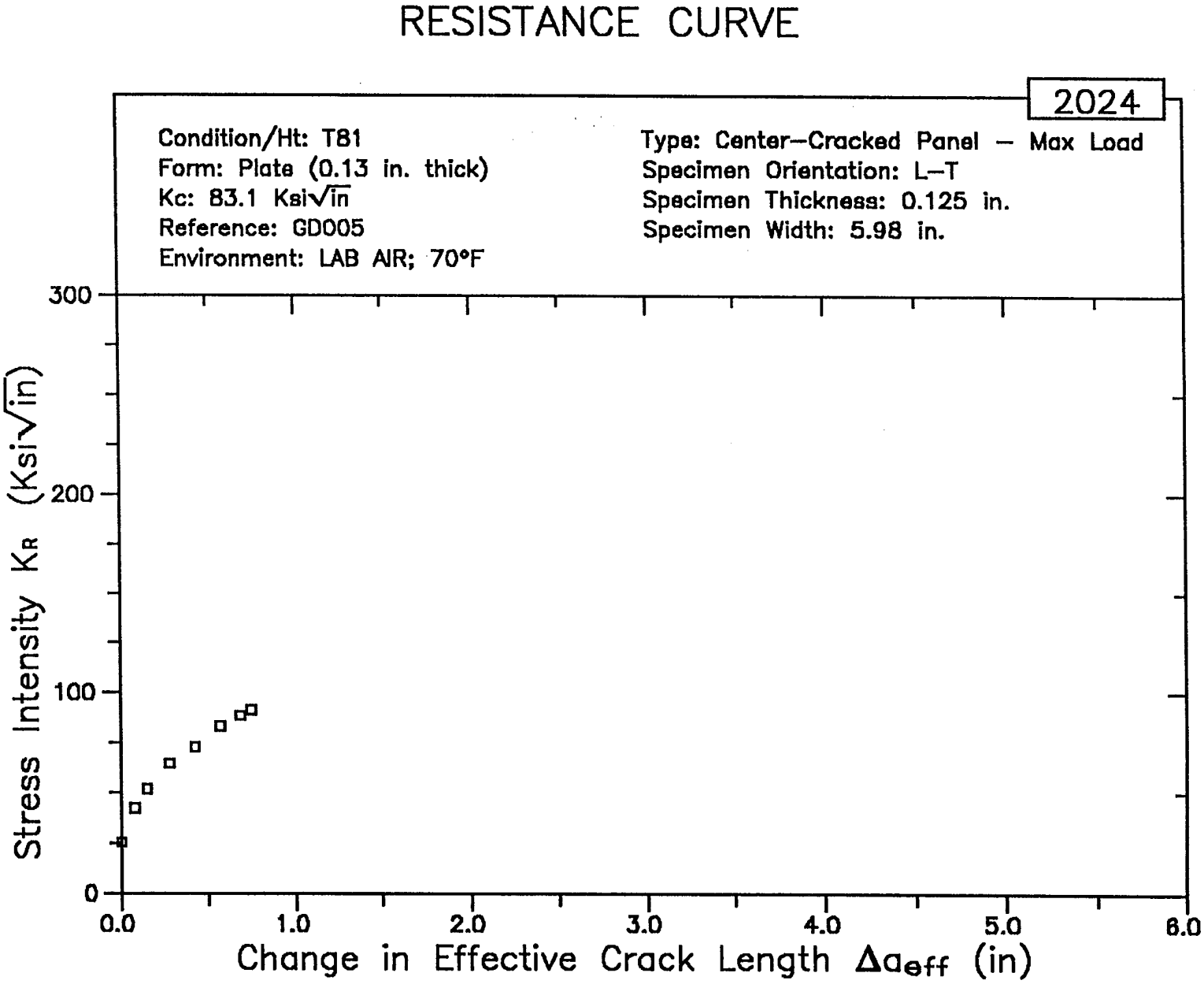



Figure 7.5.2.3.49

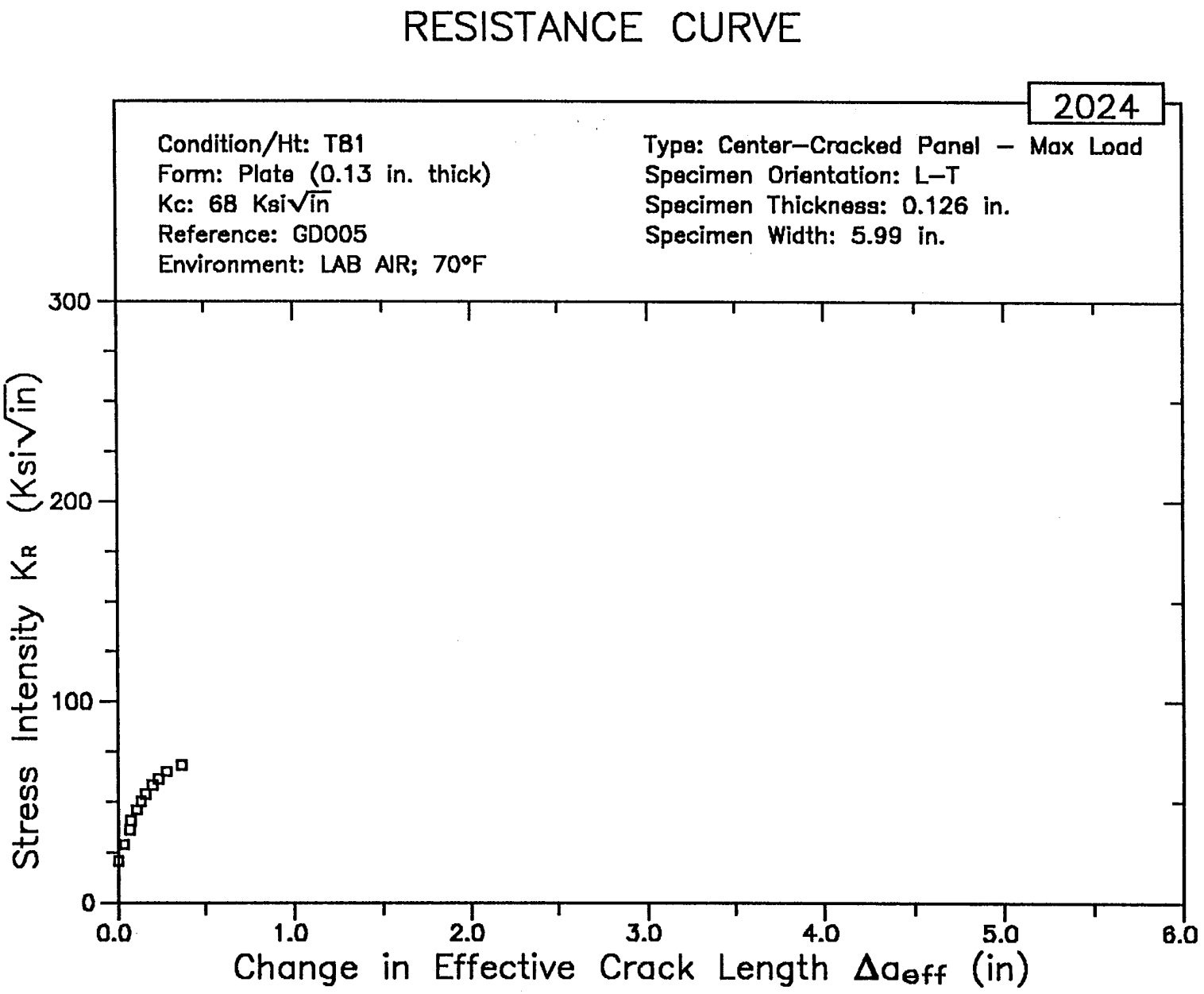



Figure 7.5.2.3.50

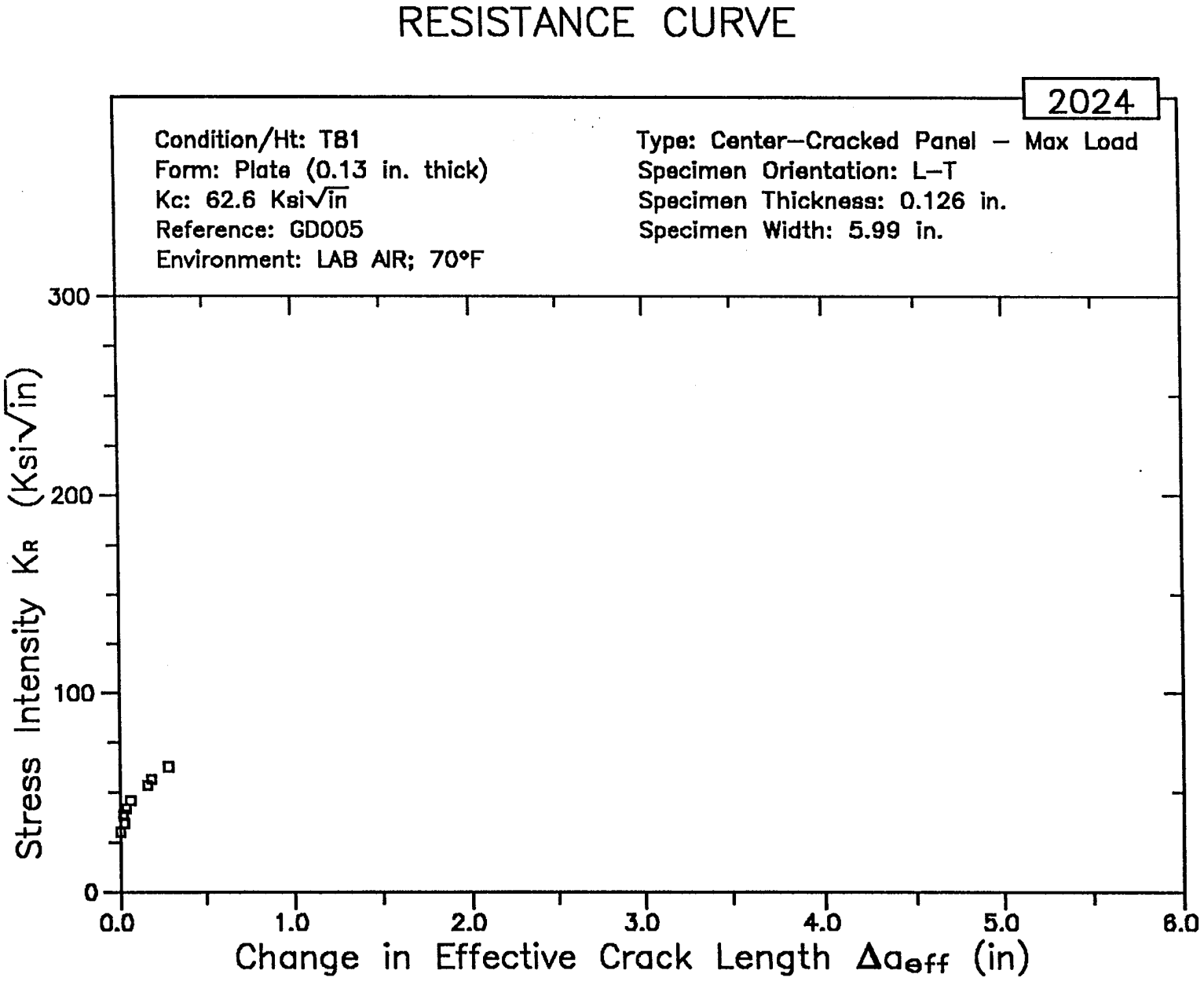



Figure 7.5.2.3.51

# RESISTANCE CURVE

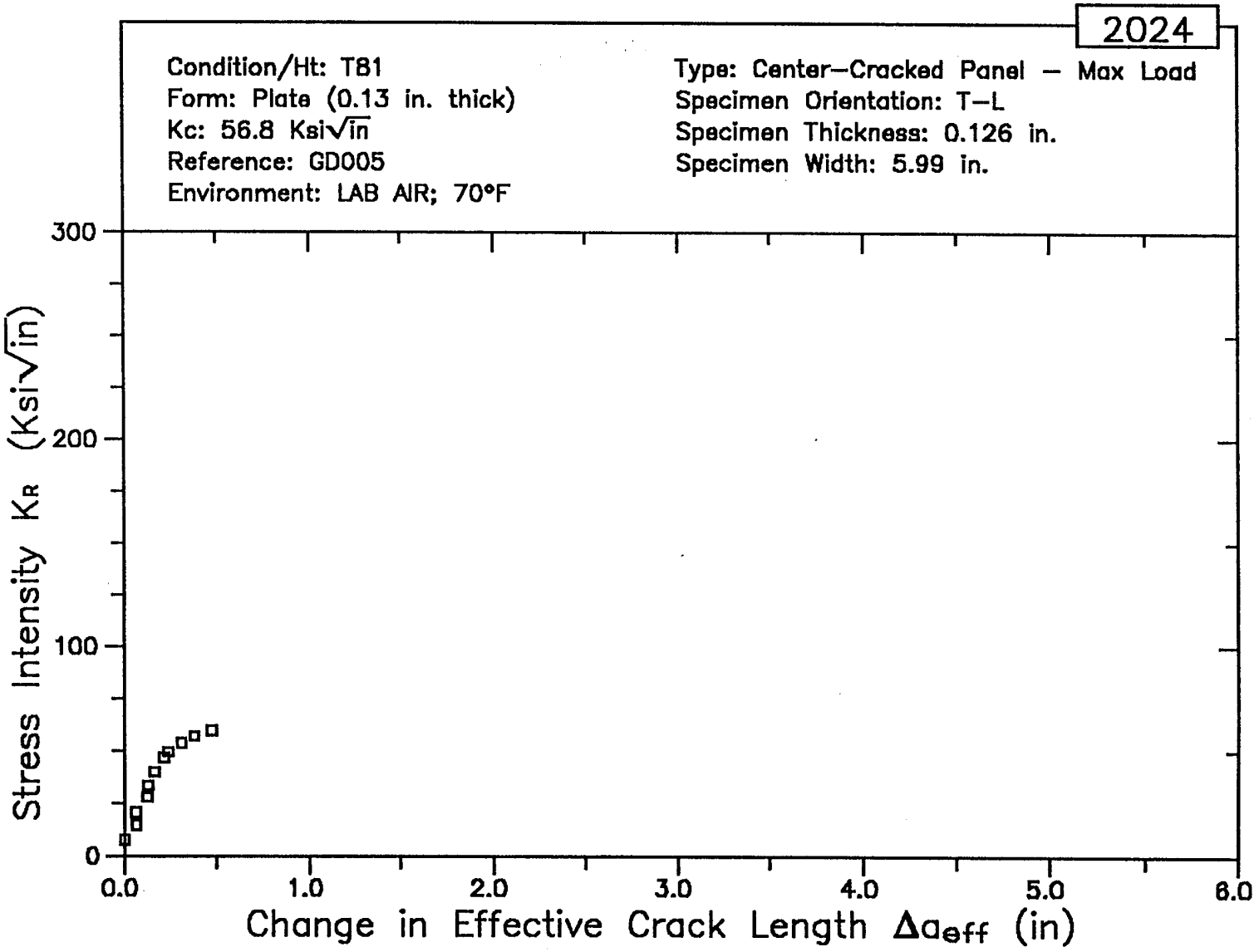



Figure 7.5.2.3.52

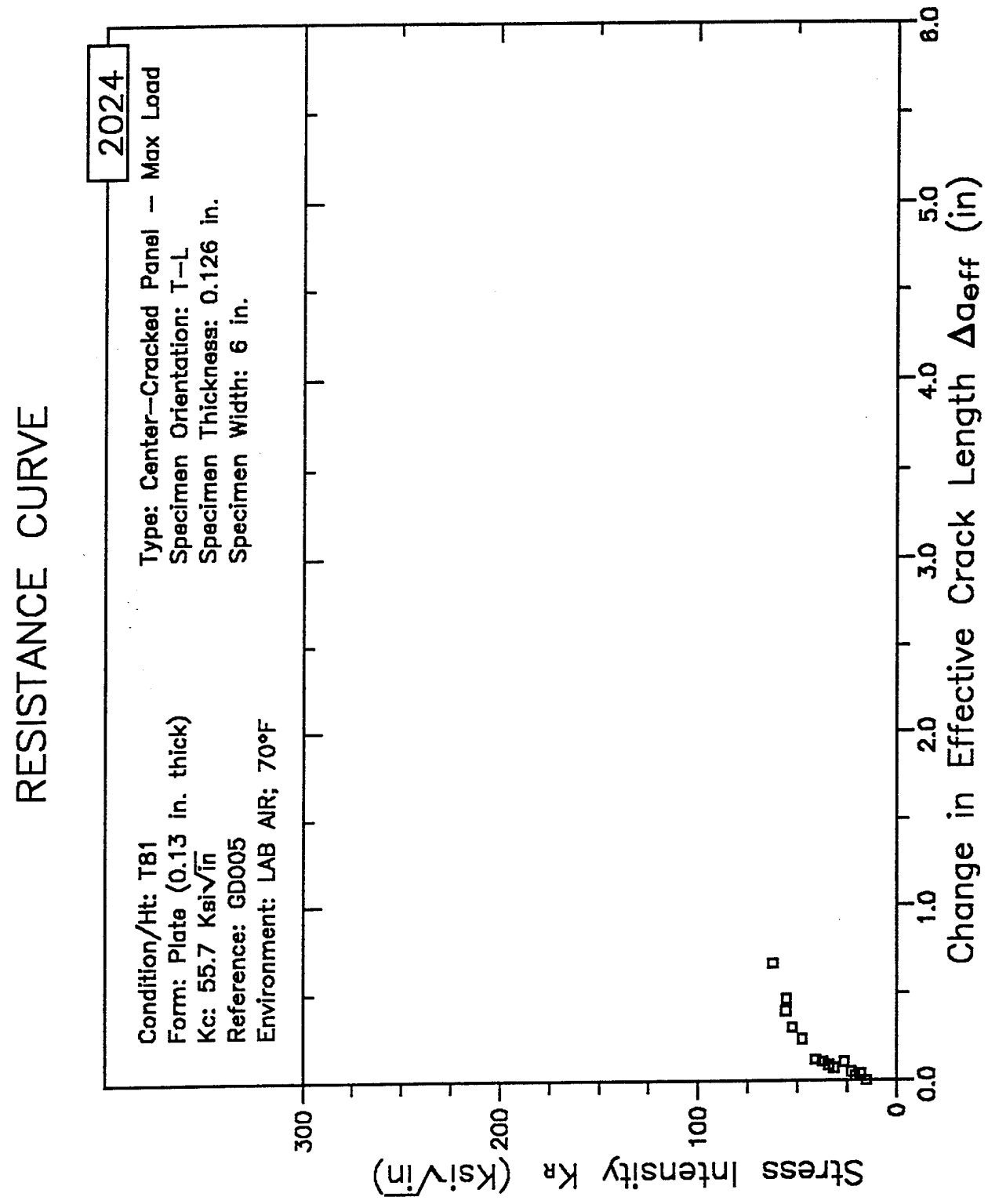



**Figure 7.5.2.3.53**

# RESISTANCE CURVE

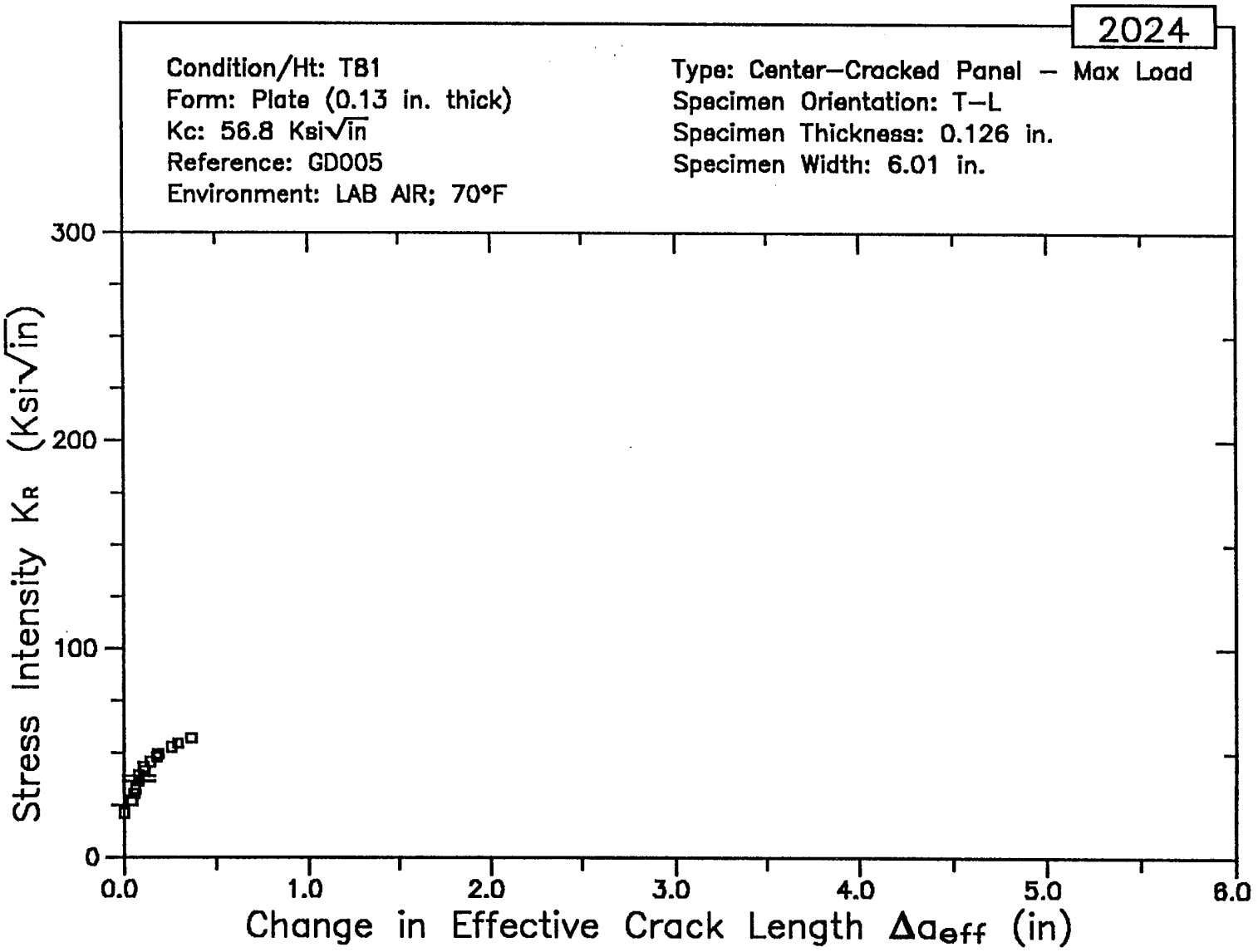



Figure 7.5.2.3.54

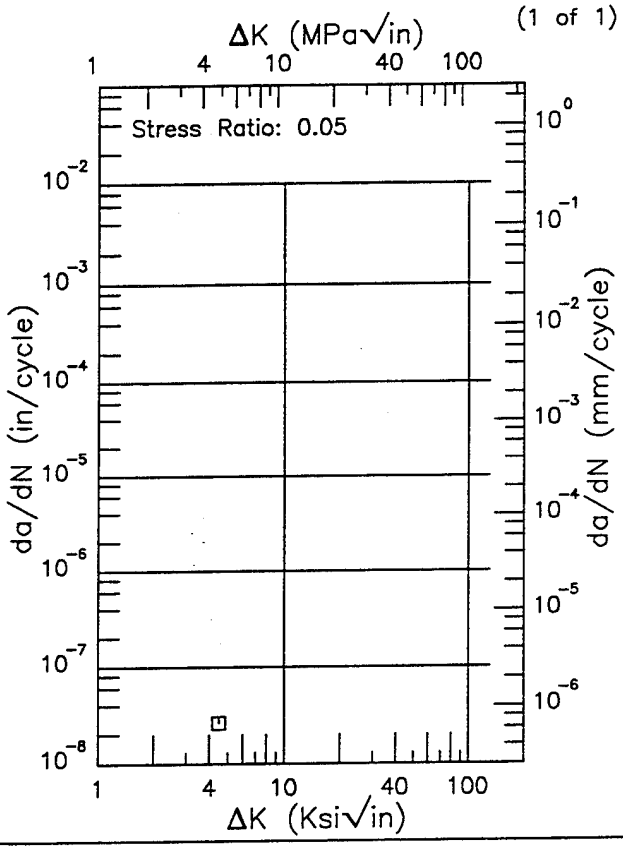
2024

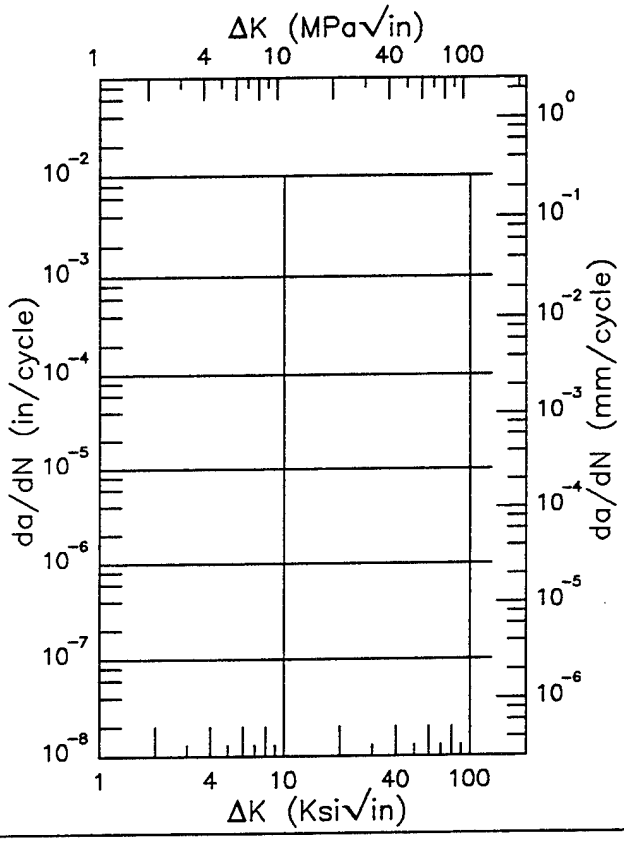
R

Condition/Ht: T3
Form: 0.9 in. Sheet
Specimen Type: CT
Orientation: L–T
Frequency: 1 – 20 Hz
Environment: LAB AIR; RT

Yield Strength: 45. ksi
Ult. Strength:
Specimen Thk: 0.089 in.
Specimen Width: 1.502 in.
Ref: DA005

(1 of 1)




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

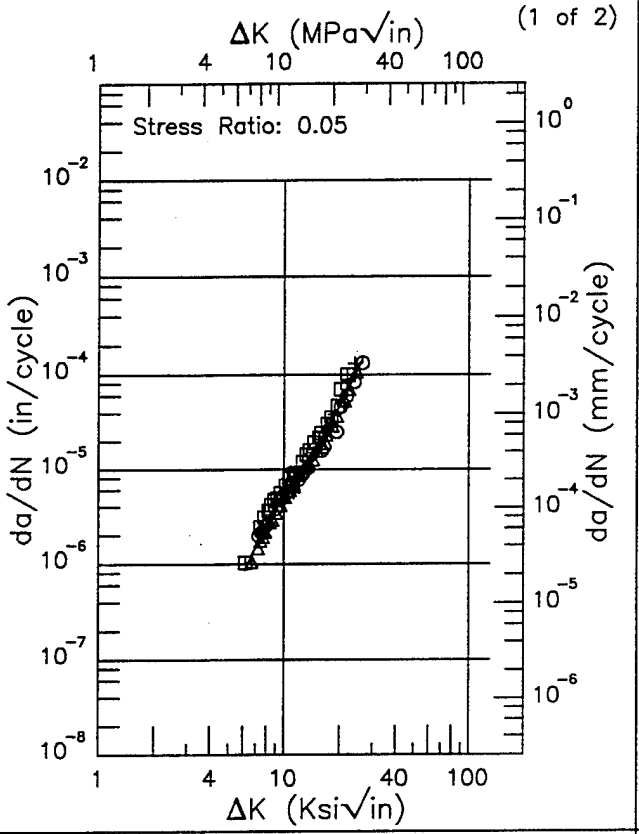
| RMS % Error | Life Prediction Ratio Summary | RMS % Error | Life Prediction Ratio Summary |
|---|---|---|---|
| | 0. .5 .8 1.25 2. | | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.1**

2024 R

Condition/Ht: T3
Form: 0.9 in. Sheet
Specimen Type: CT
Orientation: L–T
Frequency: 1 Hz
Environment: DIST WATER; RT

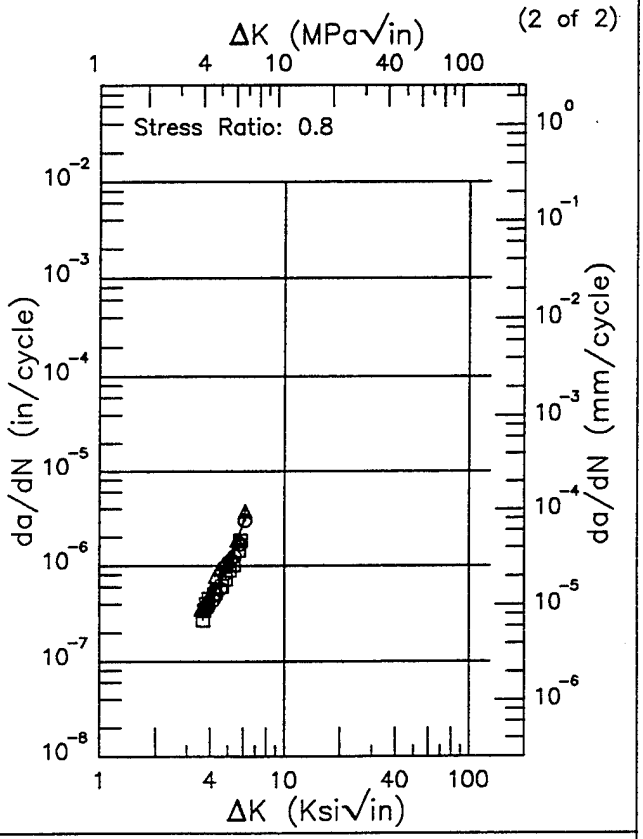
Yield Strength: 45. – 52.5 ksi
Ult. Strength: 67.5 ksi
Specimen Thk: 0.089 – 0.09 in.
Specimen Width: 1.499 – 1.503 in.
Ref: DA004;DA005




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.16 (min) | 0.854 |
| 7. | 1.50 |
| 8. | 2.52 |
| 9. | 3.80 |
| 10. | 5.35 |
| 13. | 11.8 |
| 16. | 22.1 |
| 20. | 46.8 |
| 25. | 115. |
| 26.42 (max) | 148. |

| RMS % Error |
|---|
| 17.17 |

Life Prediction Ratio Summary
0. .5 .8 1.25 2.




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.55 (min) | 0.326 |
| 4. | 0.453 |
| 5. | 0.993 |
| 6. | 2.80 |
| 6.11 (max) | 3.59 |

| RMS % Error |
|---|
| 18.33 |

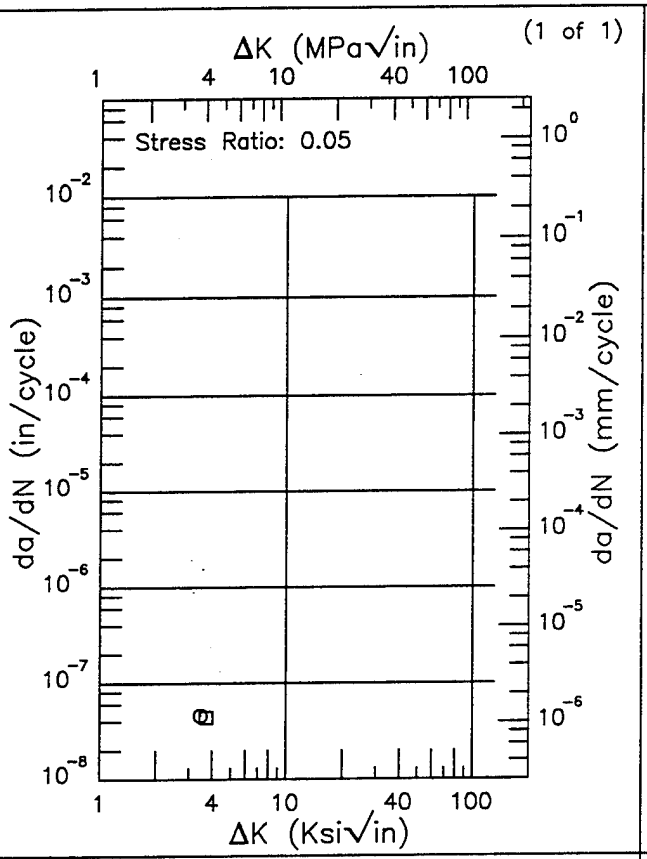
Life Prediction Ratio Summary
0. .5 .8 1.25 2.

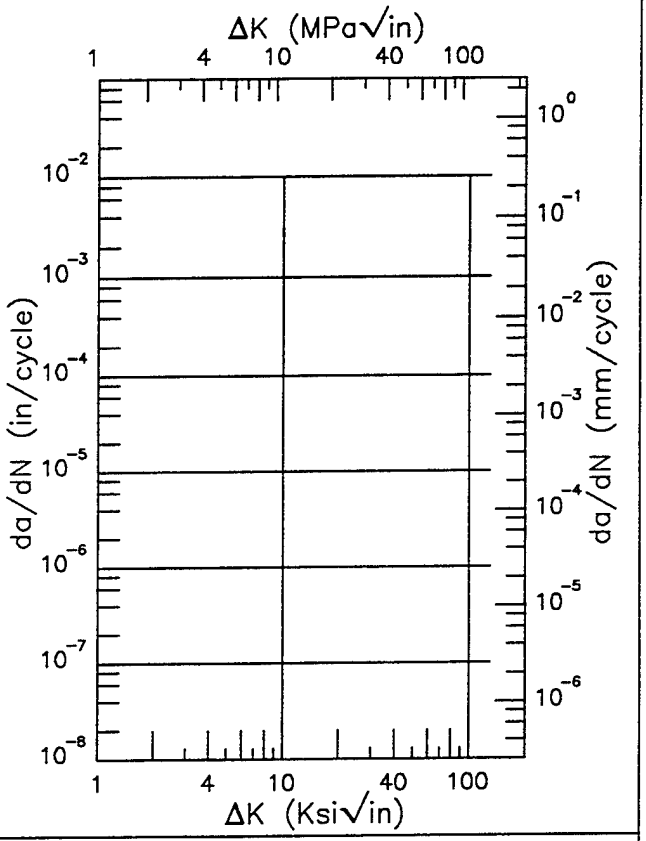
**Figure 7.5.3.1.2**

R 2024

Condition/Ht: T3
Form: 0.9 in. Sheet
Specimen Type: CT
Orientation: L–T
Frequency: 5 Hz
Environment: DIST WATER; RT

Yield Strength: 45. – 51.2 ksi
Ult. Strength:
Specimen Thk: 0.089 in.
Specimen Width: 1.499 – 1.5 in.
Ref: DA005




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

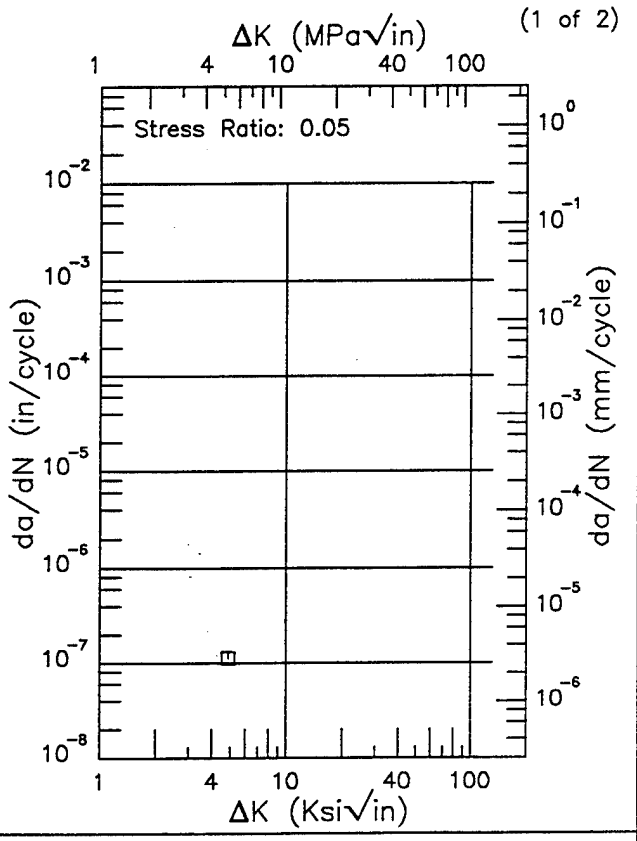
ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

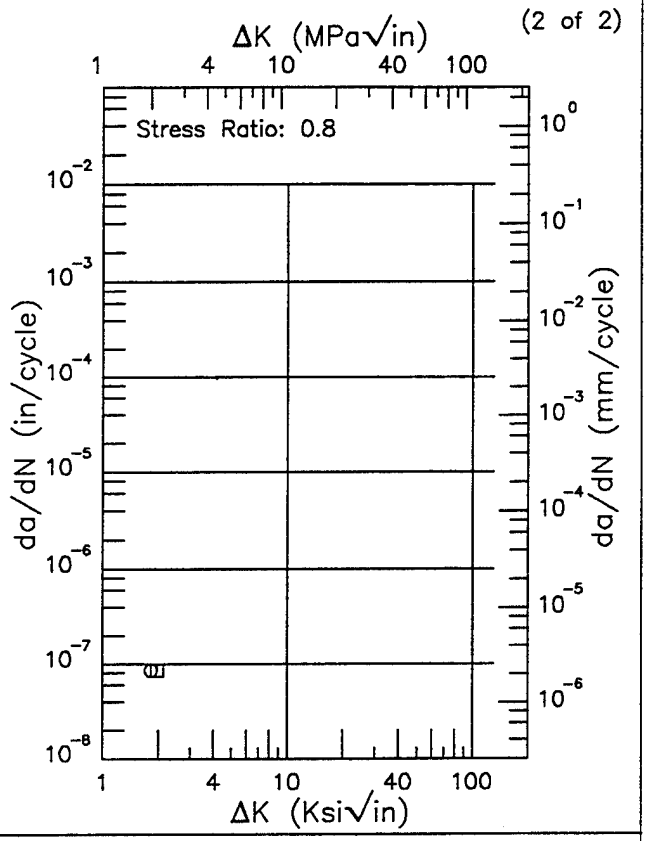
| RMS % Error | Life Prediction Ratio Summary | RMS % Error | Life Prediction Ratio Summary |
|---|---|---|---|
| | 0. .5 .8 1.25 2. | | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.3**

Condition/Ht: T3
Form: 0.9 in. Sheet
Specimen Type: CT
Orientation: L–T
Frequency: 1 – 5 Hz
Environment: DIST WATER; RT

Yield Strength: 45. – 51.2 ksi
Ult. Strength:
Specimen Thk: 0.089 in.
Specimen Width: 1.5 – 1.502 in.
Ref: DA005




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

| RMS % Error | Life Prediction Ratio Summary | RMS % Error | Life Prediction Ratio Summary |
|---|---|---|---|
| | 0. .5 .8 1.25 2. | | 0. .5 .8 1.25 2. |

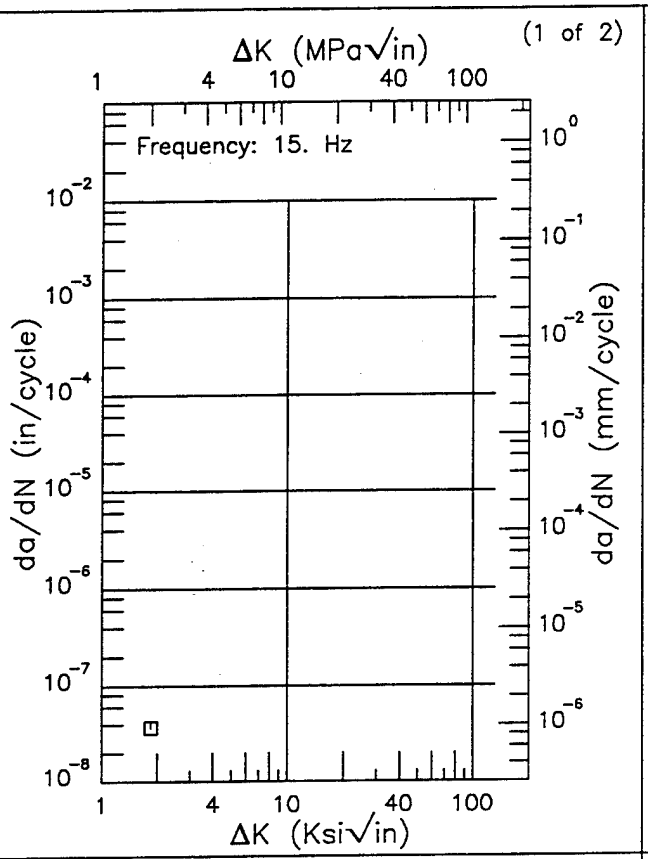
**Figure 7.5.3.1.4**

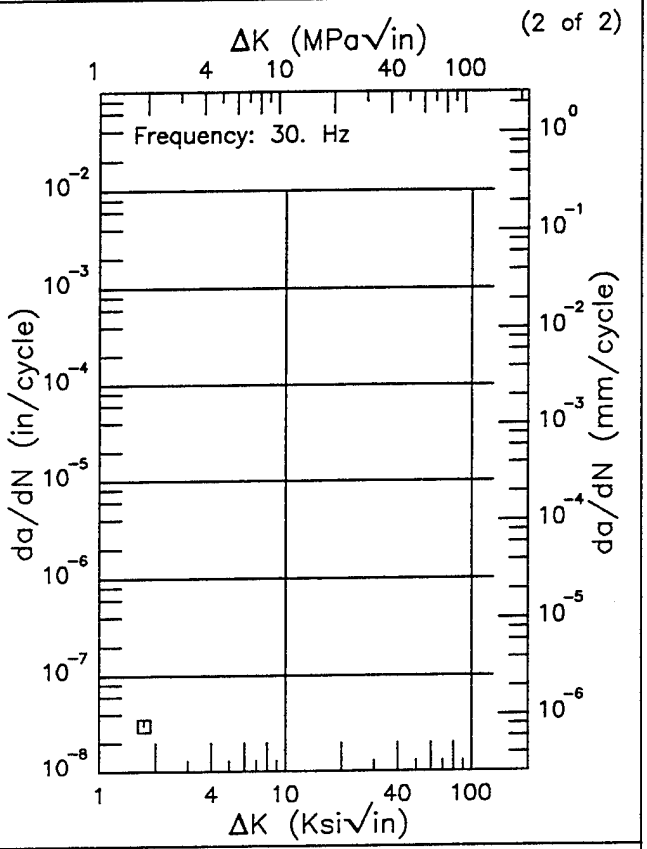
2024

F

Condition/Ht: T3
Form: 0.9 in. Sheet
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.8
Environment: LAB AIR; RT

Yield Strength: 45. – 51.2 ksi
Ult. Strength:
Specimen Thk: 0.089 in.
Specimen Width: 1.5 – 1.502 in.
Ref: DA005




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

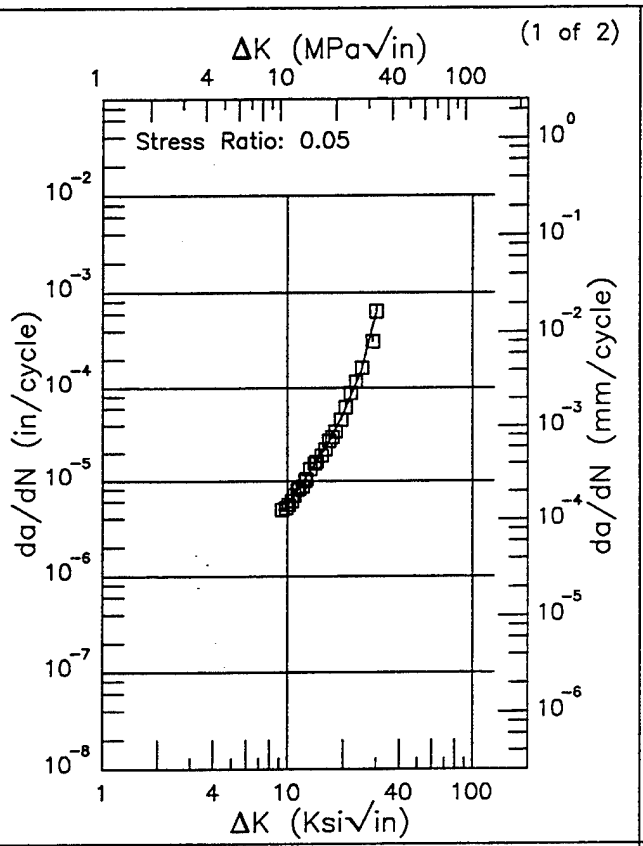
| RMS % Error | Life Prediction Ratio Summary | RMS % Error | Life Prediction Ratio Summary |
|---|---|---|---|
| | 0. .5 .8 1.25 2. | | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.5**

2024 R

Condition/Ht: T3
Form: 0.9 in. Sheet
Specimen Type: CT
Orientation: T–L
Frequency: 1 Hz
Environment: DIST WATER; RT

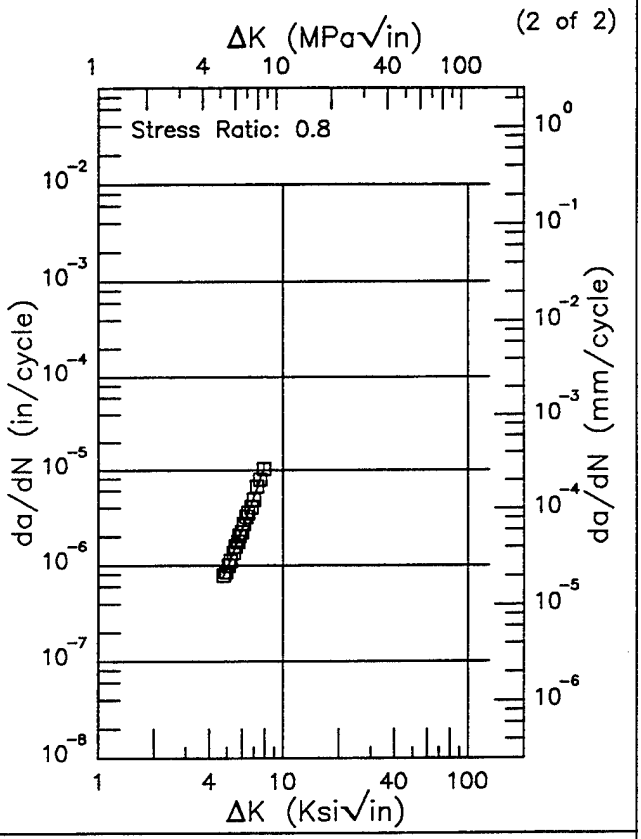
Yield Strength: 45.1 ksi
Ult. Strength: 65.8 ksi
Specimen Thk: 0.091 – 0.092 in.
Specimen Width: 1.501 – 1.502 in.
Ref: DA004




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 9.31 (min) | 4.79 |
| 10. | 5.50 |
| 13. | 12.0 |
| 16. | 22.6 |
| 20. | 53.6 |
| 25. | 154. |
| 29.99 (max) | 613. |

RMS % Error: 7.65

Life Prediction Ratio Summary
0. .5 .8 1.25 2.




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.76 (min) | 0.773 |
| 5. | 0.911 |
| 6. | 2.33 |
| 7. | 5.14 |
| 7.85 (max) | 10.0 |

RMS % Error: 3.02

Life Prediction Ratio Summary
0. .5 .8 1.25 2.

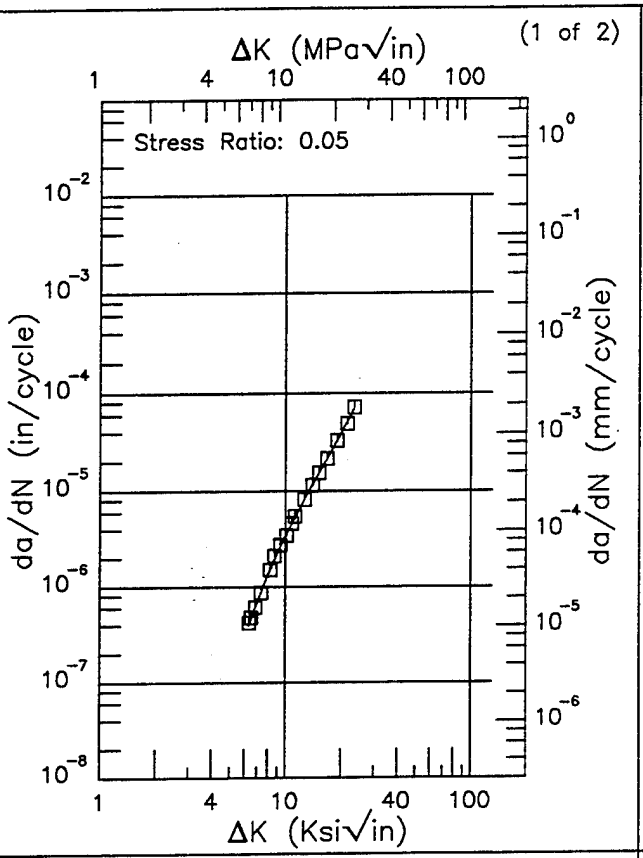
**Figure 7.5.3.1.6**

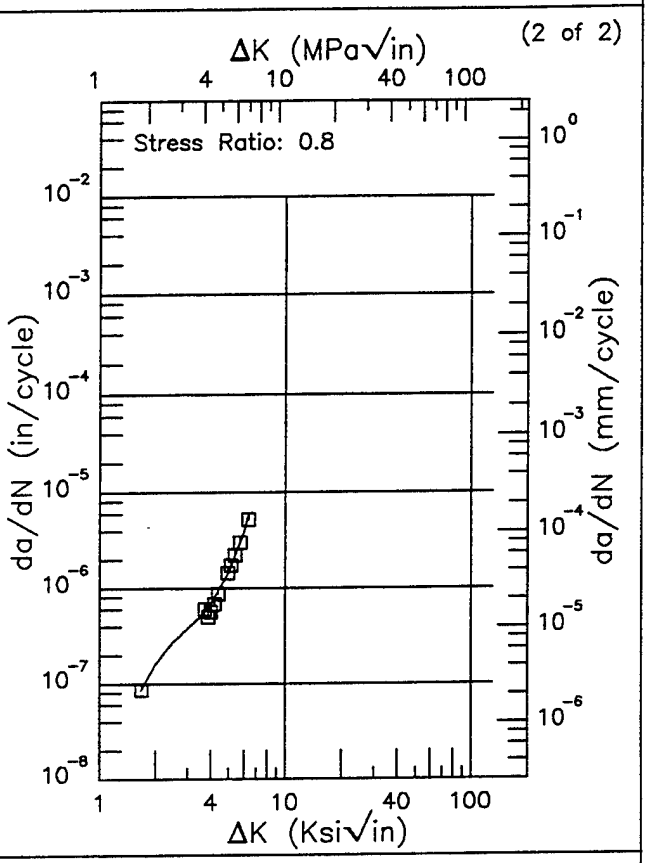
## 2024

R

Condition/Ht: T3
Form: 0.9 in. Sheet
Specimen Type: CT
Orientation: T–L
Frequency: 1 – 5 Hz
Environment: DIST WATER; RT

Yield Strength: 45.1 ksi
Ult. Strength: 65.8 ksi
Specimen Thk: 0.091 in.
Specimen Width: 1.5 – 1.503 in.
Ref: DA004




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.34 (min) | 0.390 |
| 7. | 0.677 |
| 8. | 1.32 |
| 9. | 2.25 |
| 10. | 3.48 |
| 13. | 9.18 |
| 16. | 18.4 |
| 20. | 39.1 |
| 23.38 (max) | 69.5 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 1.68 (min) | 0.0863 |
| 2. | 0.162 |
| 2.5 | 0.275 |
| 3. | 0.380 |
| 3.5 | 0.504 |
| 4. | 0.684 |
| 5. | 1.47 |
| 6. | 3.92 |
| 6.31 (max) | 5.54 |

RMS % Error: 4.29

Life Prediction Ratio Summary

0. .5 .8 1.25 2.

RMS % Error: 9.75

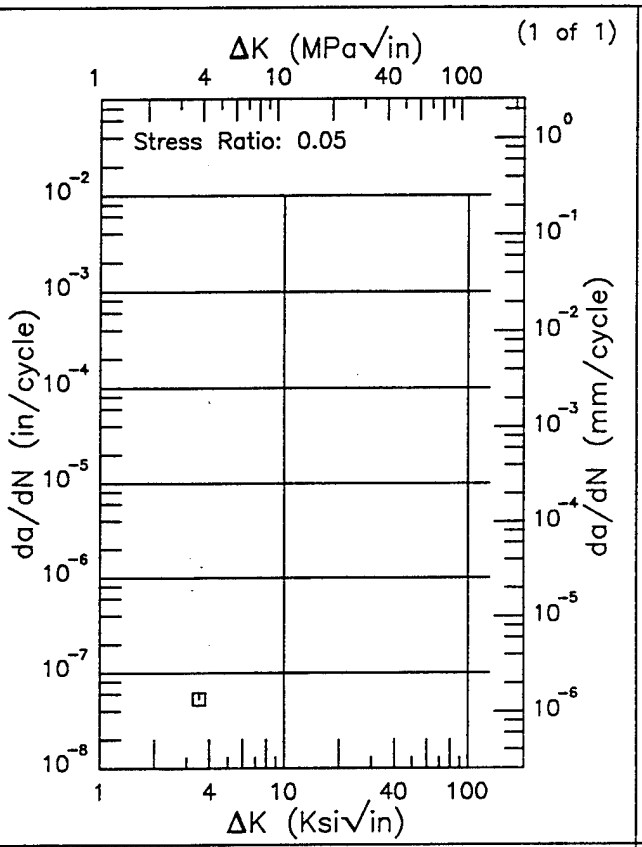
Life Prediction Ratio Summary

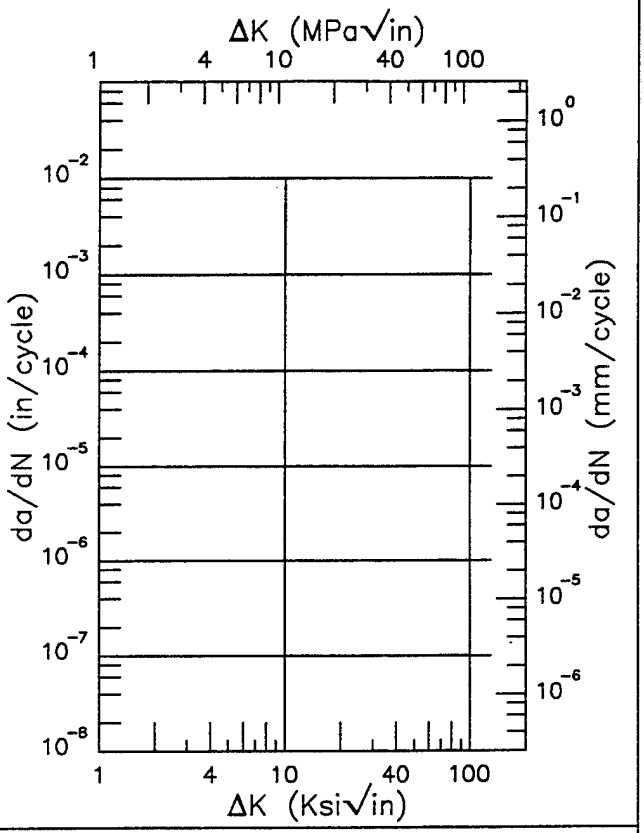
0. .5 .8 1.25 2.

**Figure 7.5.3.1.7**

Condition/Ht: T3
Form: 0.9 in. Sheet
Specimen Type: CT
Orientation: T–L
Frequency: 5 Hz
Environment: DIST WATER; RT

Yield Strength: 45.1 ksi
Ult. Strength: 65.8 ksi
Specimen Thk: 0.091 in.
Specimen Width: 1.503 in.
Ref: DA004




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

| RMS % Error | Life Prediction Ratio Summary | RMS % Error | Life Prediction Ratio Summary |
|---|---|---|---|
| | 0. .5 .8 1.25 2. | | 0. .5 .8 1.25 2. |

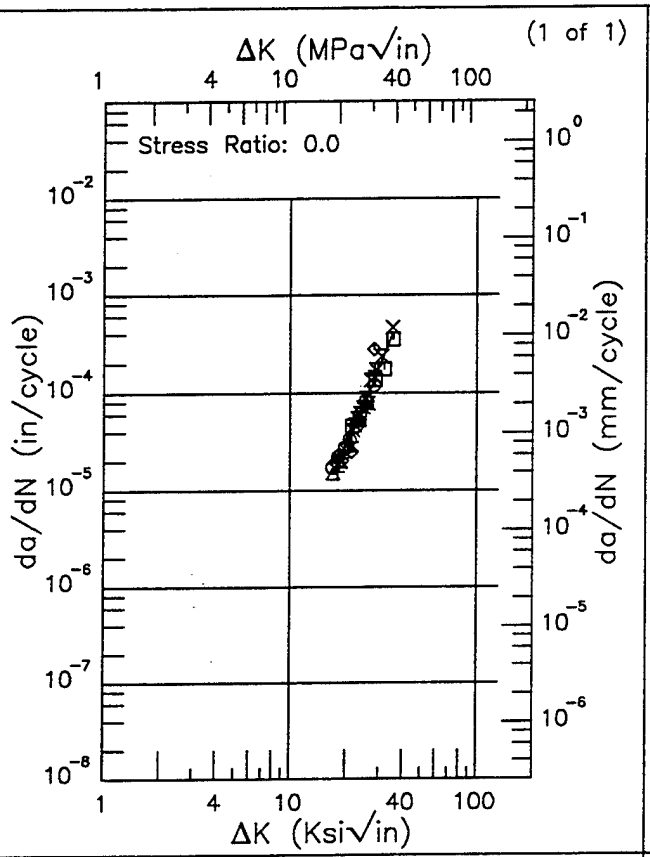
**Figure 7.5.3.1.8**

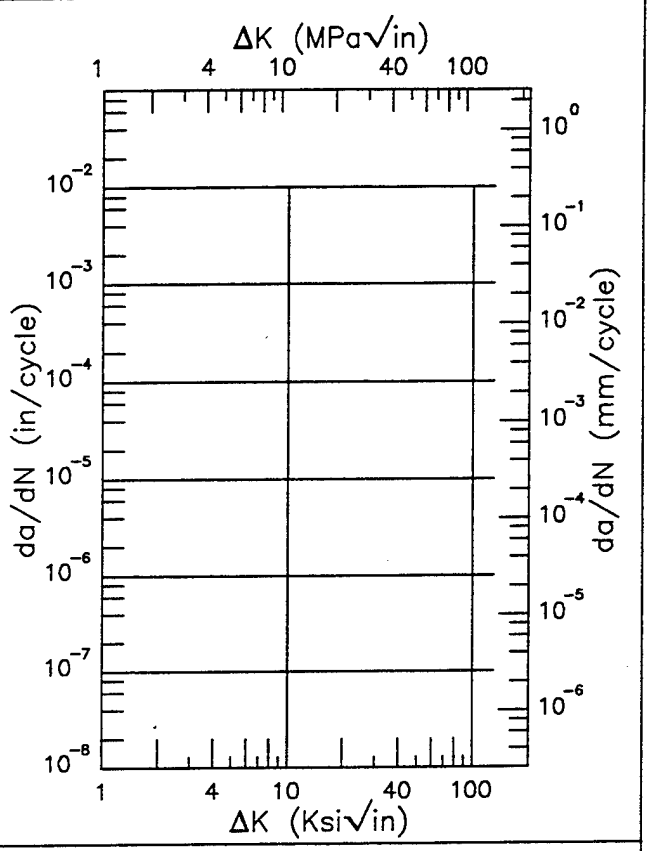
## 2024

R

Condition/Ht: T3
Form: 0.13 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 13.3 Hz
Environment: LAB AIR; RT

Yield Strength: 50 ksi
Ult. Strength: 68.2 ksi
Specimen Thk: 0.125 – 0.126 in.
Specimen Width: 4 in.
Ref: 86213




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 16.84 (min) | 15.3 |
| 20. | 28.6 |
| 25. | 76.3 |
| 30. | 184. |
| 35. | 390. |
| 35.36 (max) | 410. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

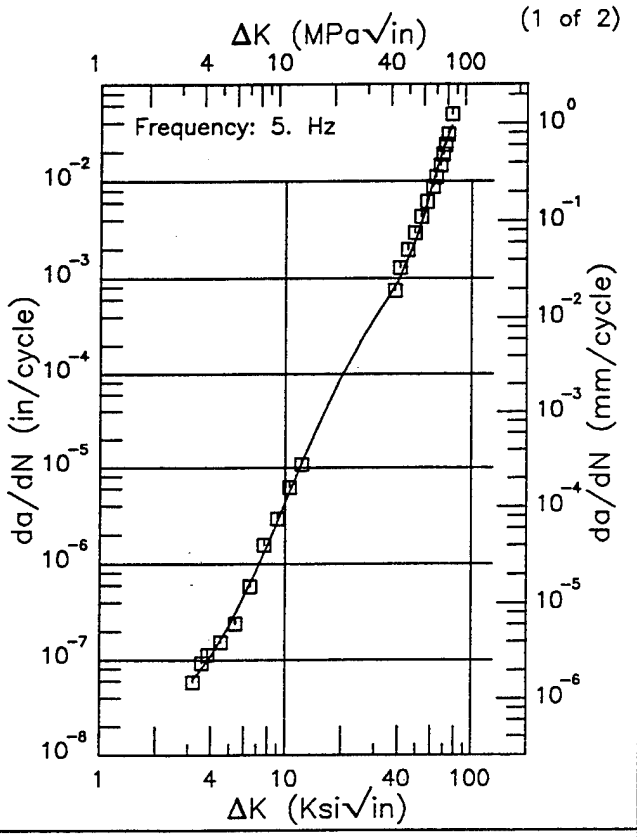
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 20.55 | 0. .5 .8 1.25 2. |

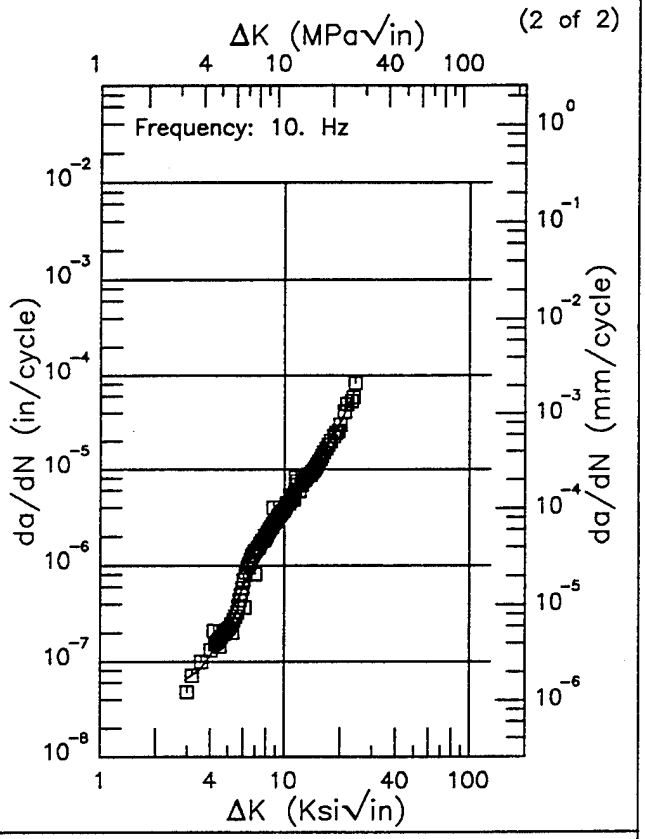
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.9**

Condition/Ht: T3
Form: 0.9 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Stress Ratio: 0.05
Environment: LAB AIR; RT

Yield Strength: 15–52.5 ksi
Ult. Strength: 67.5 ksi
Specimen Thk: 0.089 in.
Specimen Width: 12.009–12.01 in.
Ref: DA004;DA005




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.17 (min) | 0.0614 |
| 3.5 | 0.0767 |
| 4. | 0.110 |
| 5. | 0.229 |
| 6. | 0.460 |
| 7. | 0.875 |
| 8. | 1.57 |
| 9. | 2.67 |
| 10. | 4.34 |
| 16. | 36.8 |
| 20. | 94.0 |
| 30. | 387. |
| 40. | 947. |
| 60. | 8309. |
| 77.51 (max) | 37569. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.97 (min) | 0.0669 |
| 3. | 0.0672 |
| 3.5 | 0.0823 |
| 4. | 0.117 |
| 5. | 0.269 |
| 6. | 0.599 |
| 7. | 1.18 |
| 8. | 2.01 |
| 9. | 3.01 |
| 10. | 4.10 |
| 13. | 7.96 |
| 16. | 13.7 |
| 20. | 31.2 |
| 24.00 (max) | 69.2 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 14.23 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 14.00 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.10**

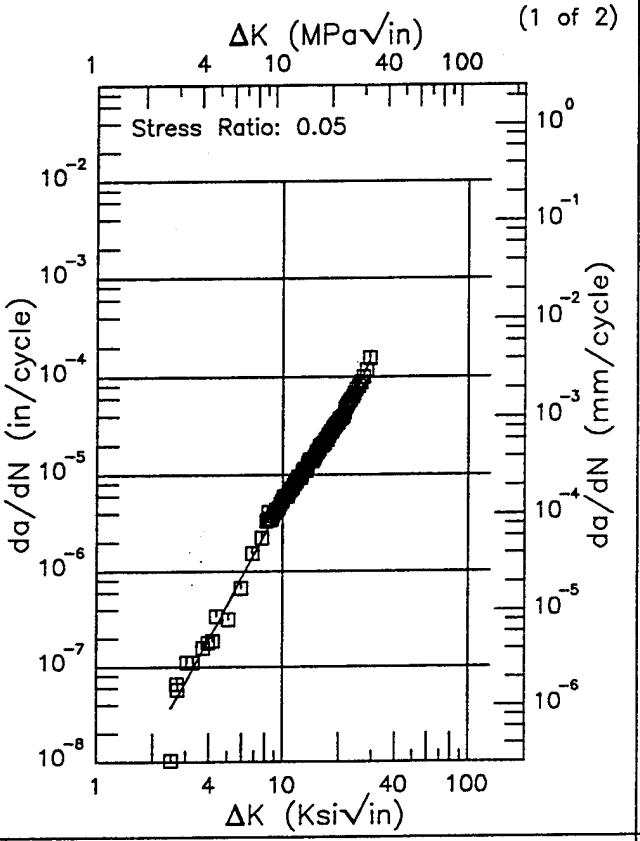
## 2024

R

Condition/Ht: T3
Form: 0.9 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 5 Hz
Environment: LAB AIR; RT

Yield Strength: 15 ksi
Ult. Strength:
Specimen Thk: 0.089 in.
Specimen Width: 11.012–11.016 in.
Ref: DA005

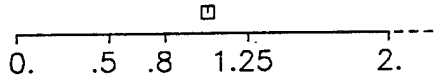
(1 of 2)



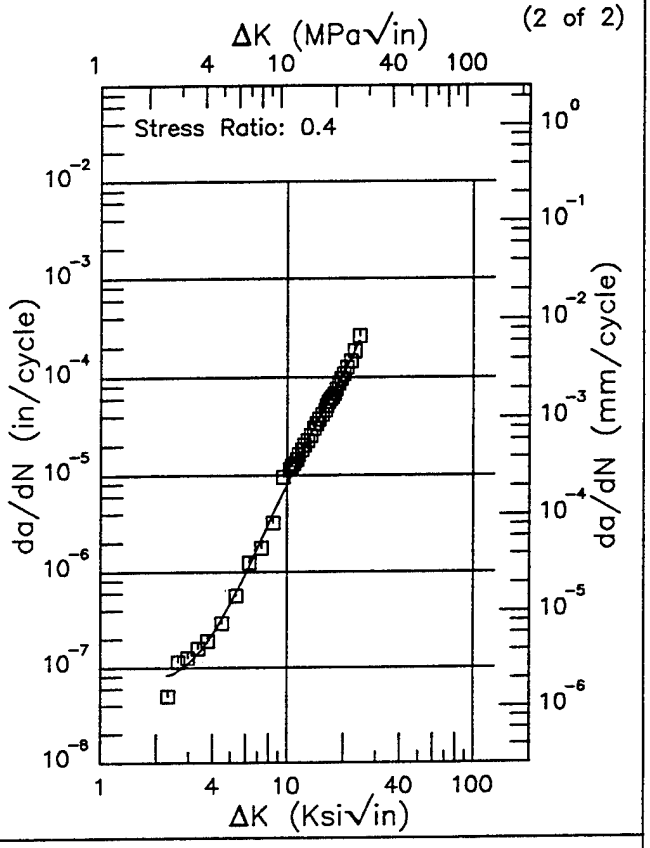

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 2.49 (min) | 0.0368 |
| 2.5 | 0.0373 |
| 3. | 0.0694 |
| 3.5 | 0.120 |
| 4. | 0.195 |
| 5. | 0.444 |
| 6. | 0.868 |
| 7. | 1.52 |
| 8. | 2.42 |
| 9. | 3.62 |
| 10. | 5.11 |
| 13. | 11.3 |
| 16. | 20.0 |
| 20. | 37.2 |
| 25. | 75.5 |
| 29.22 (max) | 150. |

RMS % Error
12.62

Life Prediction Ratio Summary




(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 2.32 (min) | 0.0831 |
| 2.5 | 0.0868 |
| 3. | 0.110 |
| 3.5 | 0.154 |
| 4. | 0.222 |
| 5. | 0.470 |
| 6. | 0.951 |
| 7. | 1.80 |
| 8. | 3.17 |
| 9. | 5.25 |
| 10. | 8.19 |
| 13. | 23.4 |
| 16. | 49.4 |
| 20. | 109. |
| 24.37 (max) | 237. |

RMS % Error
13.62

Life Prediction Ratio Summary

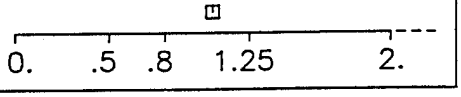
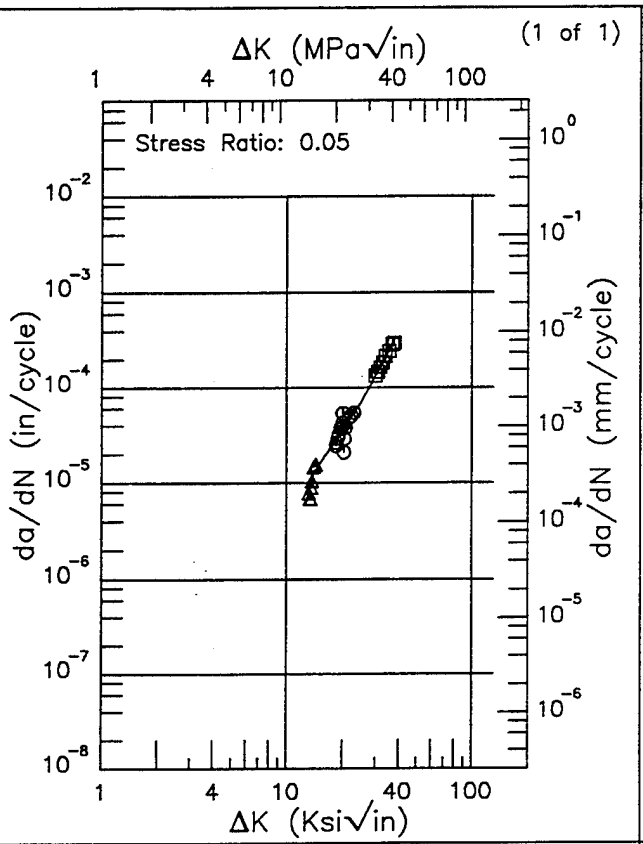
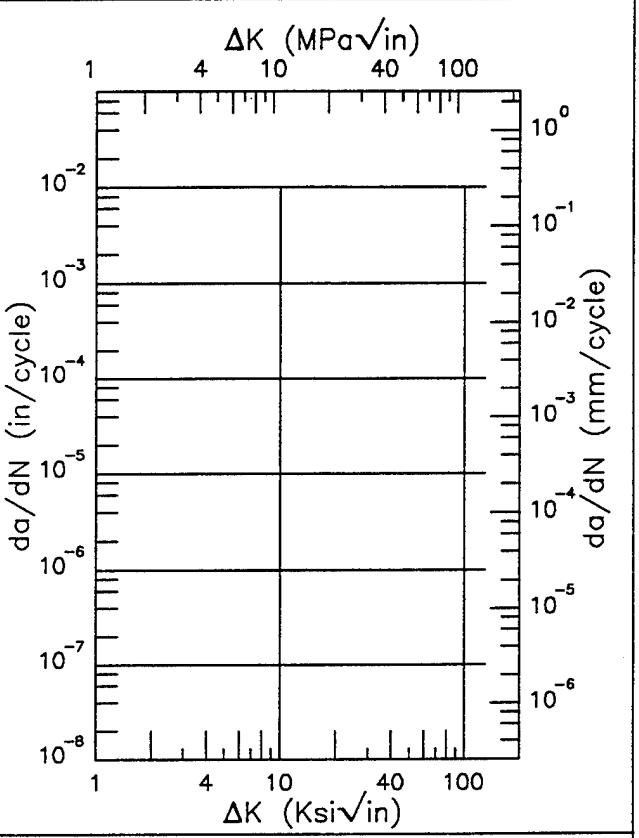



**Figure 7.5.3.1.11**

Condition/Ht: T3
Form: 0.13 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 2 Hz
Environment: H.H.A.; RT

Yield Strength: 49 ksi
Ult. Strength: 66 ksi
Specimen Thk: 0.128 in.
Specimen Width: 12 in.
Ref: 86212




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 13.10 (min) | 10.0 |
| 16. | 19.1 |
| 20. | 35.3 |
| 25. | 69.0 |
| 30. | 135. |
| 35. | 235. |
| 37.88 (max) | 299. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 20.44 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

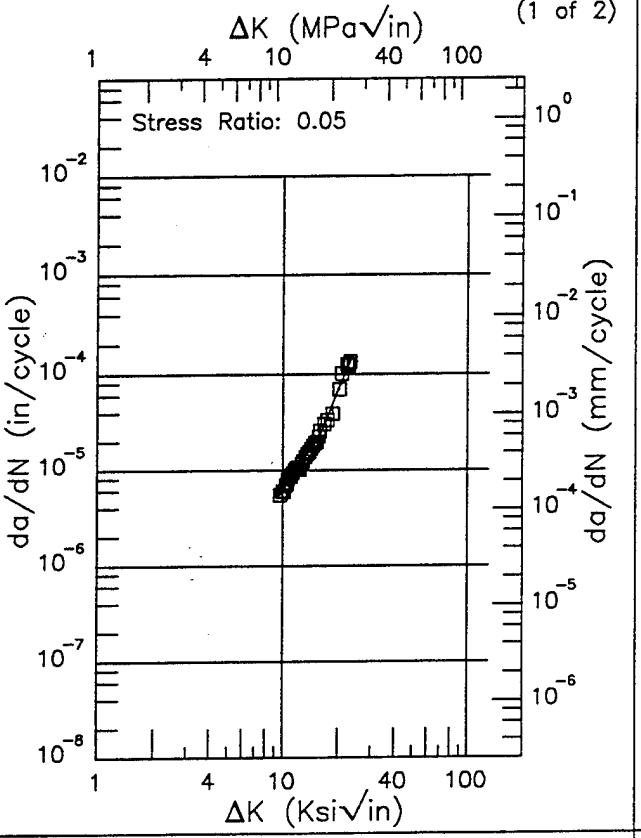
**Figure 7.5.3.1.12**

R | 2024

Condition/Ht: T3
Form: 0.9 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 1 Hz
Environment: DIST WATER; RT

Yield Strength: 52.5 ksi
Ult. Strength: 67.5 ksi
Specimen Thk: 0.09 in.
Specimen Width: 3.861 – 3.864 in.
Ref: DA004

(1 of 2)



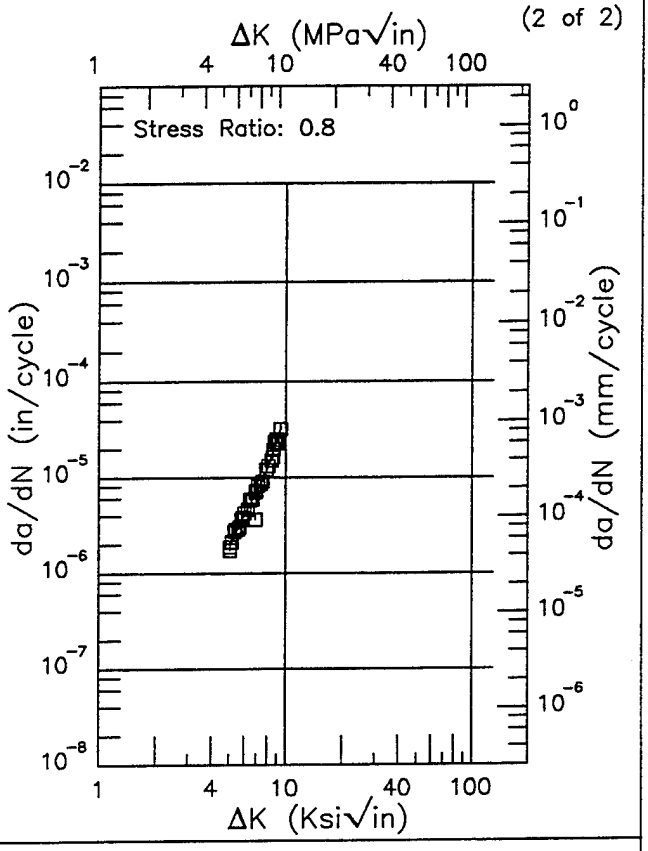

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 9.64 (min) | 5.49 |
| 10. | 6.16 |
| 13. | 13.4 |
| 16. | 23.9 |
| 20. | 70.0 |
| 23.09 (max) | 137. |

| RMS % Error |
|---|
| 6.94 |

Life Prediction Ratio Summary

0. .5 .8 1.25 2.

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.05 (min) | 1.95 |
| 6. | 3.96 |
| 7. | 6.88 |
| 8. | 12.2 |
| 9. | 24.2 |
| 9.34 (max) | 31.4 |

| RMS % Error |
|---|
| 10.81 |

Life Prediction Ratio Summary

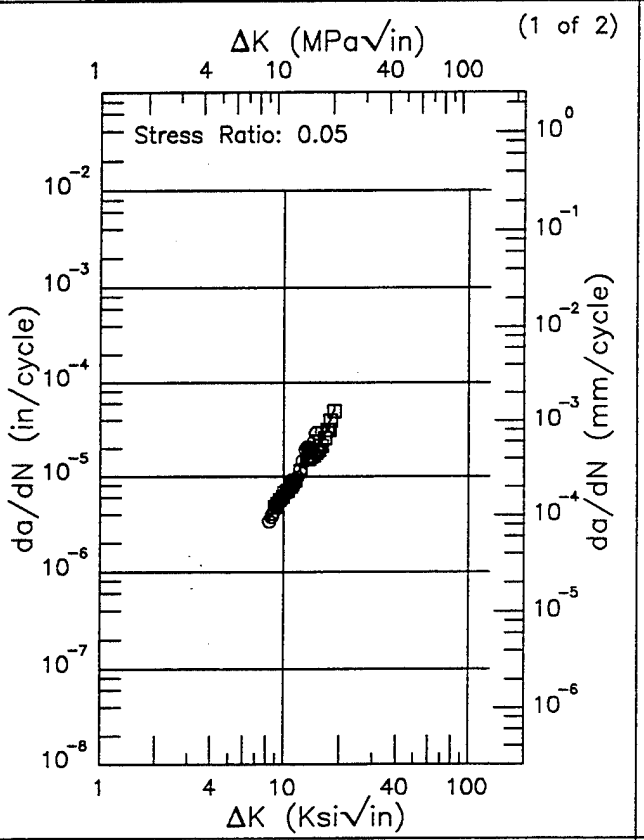
0. .5 .8 1.25 2.

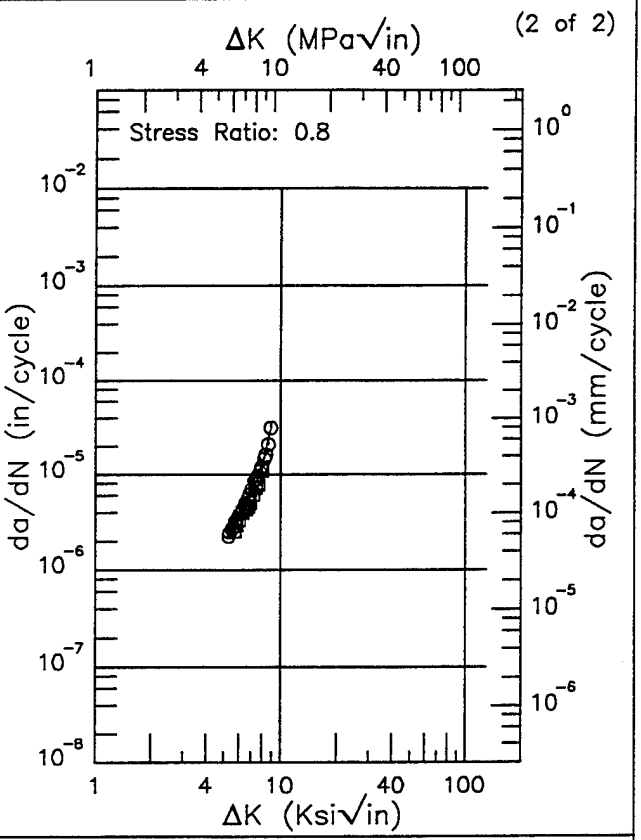
**Figure 7.5.3.1.13**

2024 R

Condition/Ht: T3
Form: 0.9 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 1 Hz
Environment: DIST WATER; RT

Yield Strength: 45. – 51.2 ksi
Ult. Strength:
Specimen Thk: 0.089 in.
Specimen Width: 3.95 – 3.952 in.
Ref: DA005




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 8.31 (min) | 3.57 |
| 9. | 4.59 |
| 10. | 6.35 |
| 13. | 14.6 |
| 16. | 23.4 |
| 18.65 (max) | 53.7 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.27 (min) | 2.33 |
| 6. | 3.47 |
| 7. | 6.34 |
| 8. | 12.1 |
| 8.86 (max) | 29.7 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 12.46 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 8.06 | 0. .5 .8 1.25 2. |

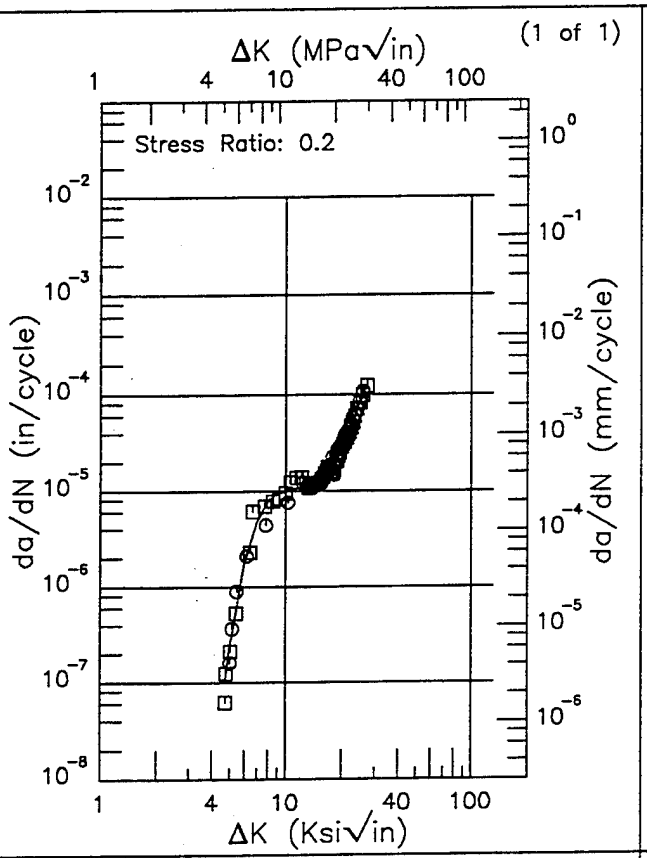
**Figure 7.5.3.1.14**

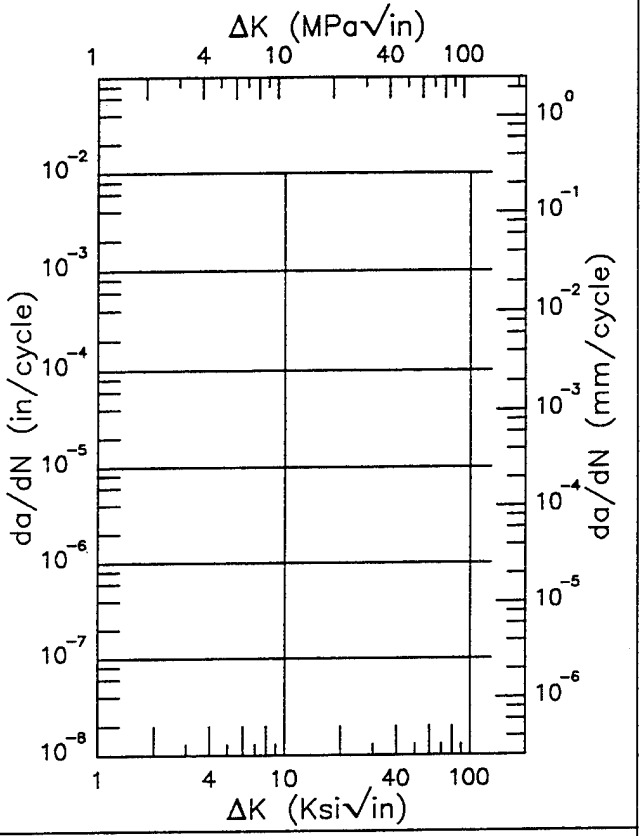
R | 2024

Condition/Ht: T3
Form: 0.09 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 10 Hz
Environment: LAB AIR; RT

Yield Strength:
Ult. Strength:
Specimen Thk: 0.09 in.
Specimen Width: 4.01 in.
Ref: FR001

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.73 (min) | 0.107 |
| 5. | 0.244 |
| 6. | 1.81 |
| 7. | 4.87 |
| 8. | 7.77 |
| 9. | 9.49 |
| 10. | 10.2 |
| 13. | 11.2 |
| 16. | 14.9 |
| 20. | 29.5 |
| 25. | 85.0 |
| 27.13 (max) | 125. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 17.02 | 0. .5 .8 1.25 2. |

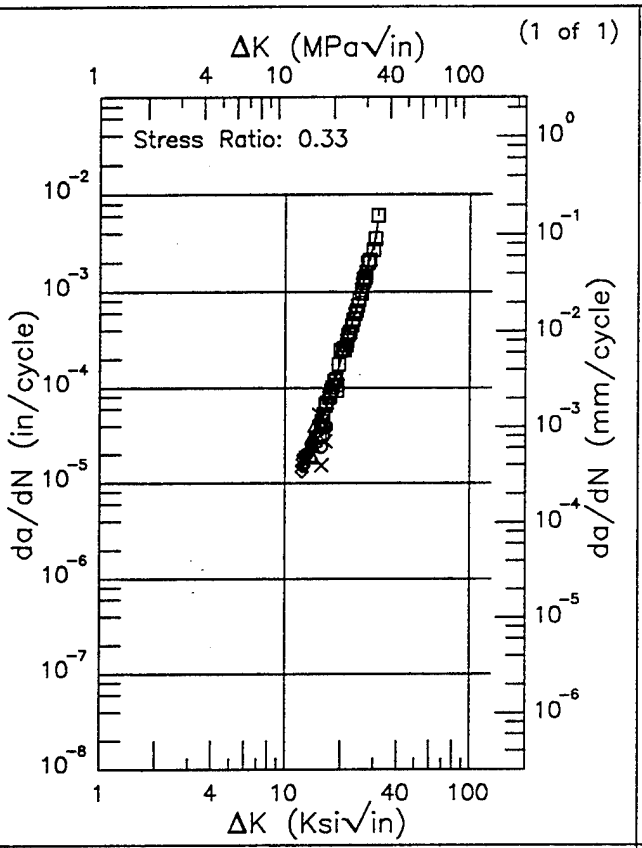
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

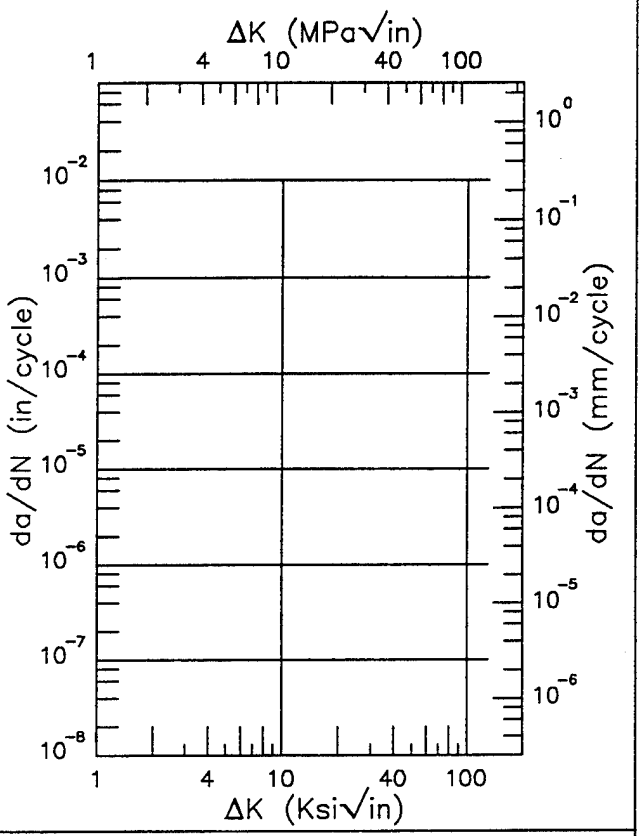
**Figure 7.5.3.1.15**

2024 R

Condition/Ht: T3
Form: 0.04 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 3.3 Hz
Environment: LAB AIR; RT

Yield Strength: 45 ksi
Ult. Strength: 69 ksi
Specimen Thk: 0.039 in.
Specimen Width: 16 in.
Ref: 87398




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 12.30 (min) | 17.6 |
| 13. | 19.7 |
| 16. | 47.0 |
| 20. | 197. |
| 25. | 869. |
| 30. | 3141. |
| 31.48 (max) | 5315. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 18.50 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.16**

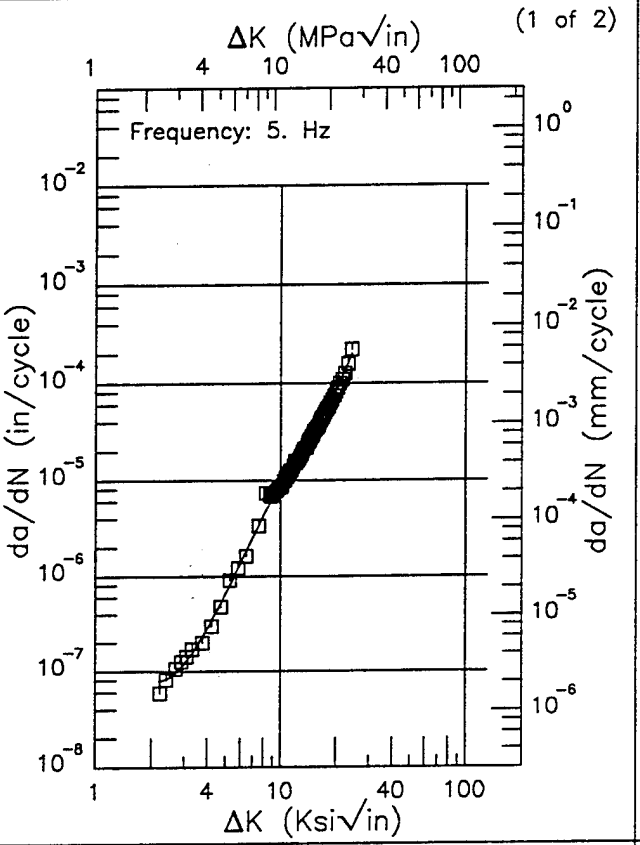
## 2024

F

Condition/Ht: T3
Form: 0.9 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Stress Ratio: 0.4
Environment: LAB AIR; RT

Yield Strength: 45.0–52.5 ksi
Ult. Strength: 67.5 ksi
Specimen Thk: 0.088–0.089 in.
Specimen Width: 12.012–12.014 in.
Ref: DA005;DA004

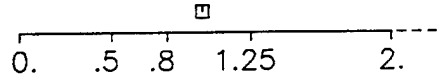
(1 of 2)



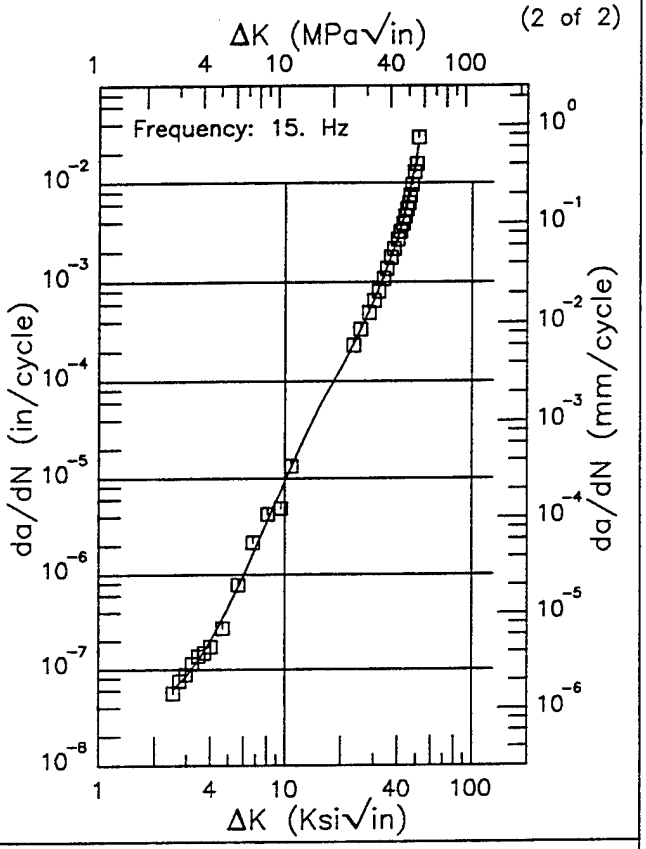

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.21 (min) | 0.0777 |
| 2.5 | 0.0857 |
| 3. | 0.119 |
| 3.5 | 0.179 |
| 4. | 0.278 |
| 5. | 0.646 |
| 6. | 1.36 |
| 7. | 2.55 |
| 8. | 4.29 |
| 9. | 6.57 |
| 10. | 9.28 |
| 13. | 19.7 |
| 16. | 36.6 |
| 20. | 84.2 |
| 24.21 (max) | 203. |

RMS % Error
9.02

Life Prediction Ratio Summary




(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.53 (min) | 0.0616 |
| 3. | 0.0860 |
| 3.5 | 0.129 |
| 4. | 0.198 |
| 5. | 0.453 |
| 6. | 0.966 |
| 7. | 1.90 |
| 8. | 3.45 |
| 9. | 5.85 |
| 10. | 9.34 |
| 16. | 62.1 |
| 20. | 134. |
| 30. | 653. |
| 40. | 2663. |
| 51.23 (max) | 24121. |

RMS % Error
14.32

Life Prediction Ratio Summary

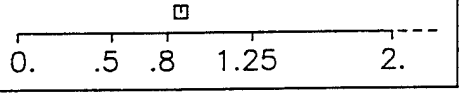
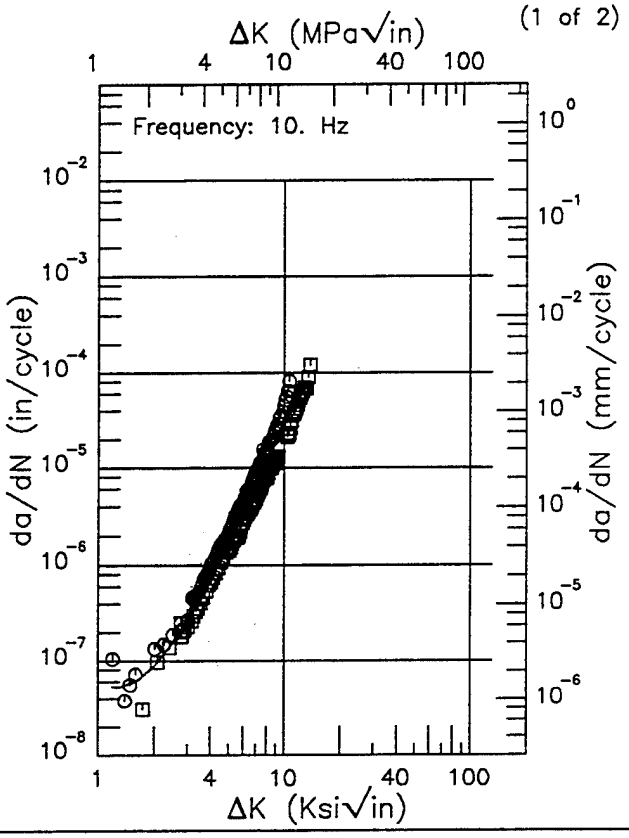



**Figure 7.5.3.1.17**

Condition/Ht: T3
Form: 0.9 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Stress Ratio: 0.8
Environment: LAB AIR; RT

Yield Strength: 15.0–52.5 ksi
Ult. Strength: 67.5 ksi
Specimen Thk: 0.086–0.089 in.
Specimen Width: 11.998–12.012 in.
Ref: DA005;DA004

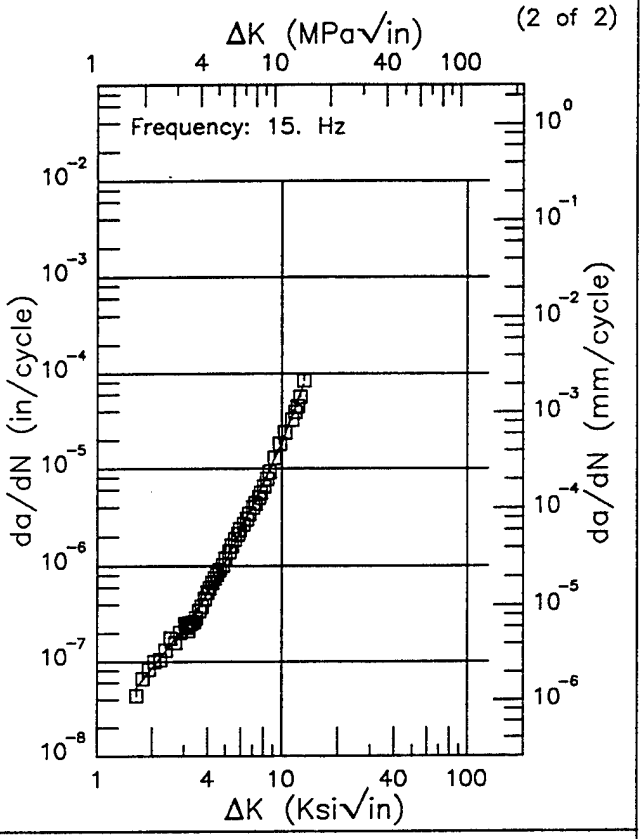
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 1.19 (min) | 0.0531 |
| 1.3 | 0.0528 |
| 1.6 | 0.0611 |
| 2. | 0.0888 |
| 2.5 | 0.155 |
| 3. | 0.274 |
| 3.5 | 0.471 |
| 4. | 0.779 |
| 5. | 1.89 |
| 6. | 3.98 |
| 7. | 7.45 |
| 8. | 12.6 |
| 9. | 19.8 |
| 10. | 29.0 |
| 13. | 67.9 |
| 13.76 (max) | 79.7 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 30.14 | 0. .5 .8 1.25 2. |

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 1.64 (min) | 0.0528 |
| 2. | 0.0853 |
| 2.5 | 0.146 |
| 3. | 0.231 |
| 3.5 | 0.352 |
| 4. | 0.525 |
| 5. | 1.12 |
| 6. | 2.24 |
| 7. | 4.15 |
| 8. | 7.14 |
| 9. | 11.7 |
| 10. | 18.5 |
| 13. | 73.4 |
| 13.09 (max) | 76.7 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 9.02 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.18**

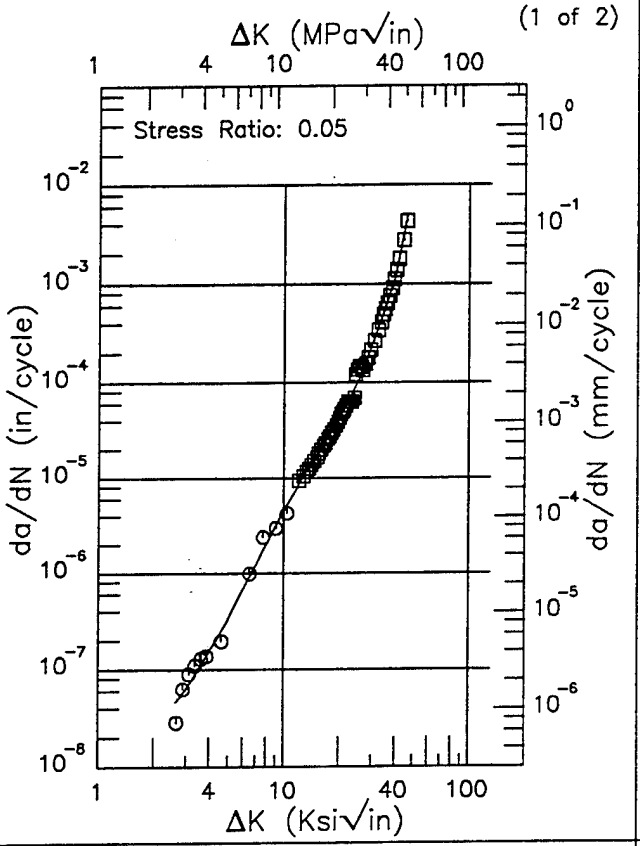
## 2024

R

Condition/Ht: T3
Form: 0.9 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 2 – 10 Hz
Environment: LAB AIR; RT

Yield Strength: 45.1 ksi
Ult. Strength: 65.8 ksi
Specimen Thk: 0.088 – 0.089 in.
Specimen Width: 9.68 – 9.72 in.
Ref: DA004

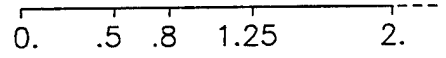
(1 of 2)



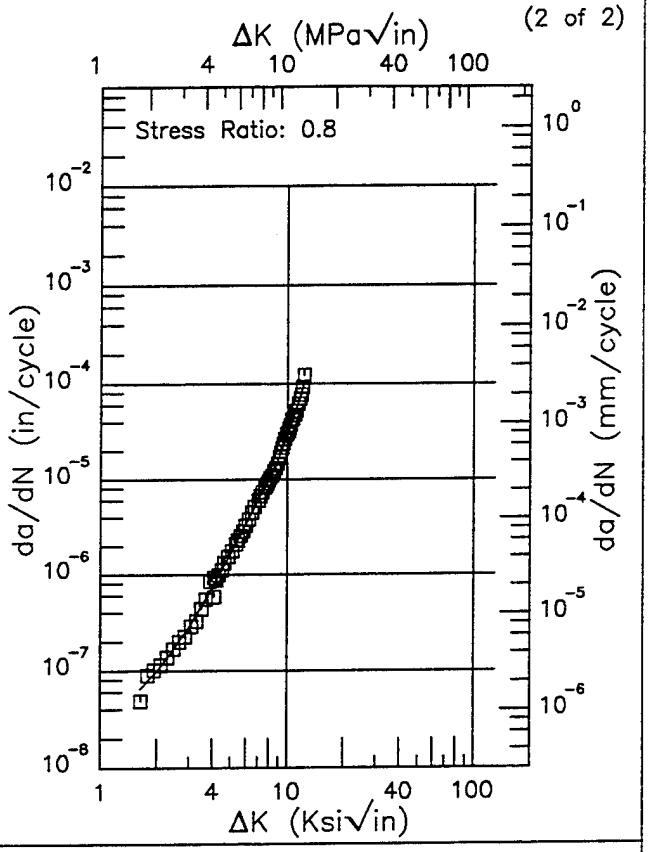

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.66 (min) | 0.0466 |
| 3. | 0.0635 |
| 3.5 | 0.0998 |
| 4. | 0.154 |
| 5. | 0.337 |
| 6. | 0.665 |
| 7. | 1.20 |
| 8. | 1.99 |
| 9. | 3.09 |
| 10. | 4.55 |
| 16. | 21.1 |
| 20. | 42.4 |
| 30. | 242. |
| 40. | 1204. |
| 45.93 (max) | 4349. |

RMS % Error
13.49

Life Prediction Ratio Summary




(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 1.64 (min) | 0.0655 |
| 2. | 0.0991 |
| 2.5 | 0.172 |
| 3. | 0.286 |
| 3.5 | 0.461 |
| 4. | 0.723 |
| 5. | 1.65 |
| 6. | 3.34 |
| 7. | 6.04 |
| 8. | 10.0 |
| 9. | 16.6 |
| 10. | 28.9 |
| 12.29 (max) | 100. |

RMS % Error
8.21

Life Prediction Ratio Summary

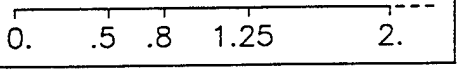
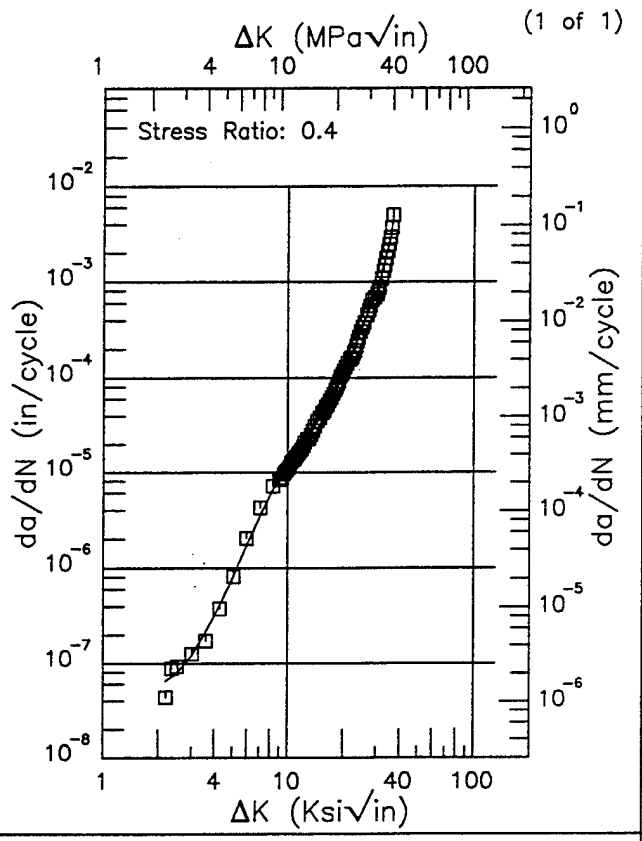


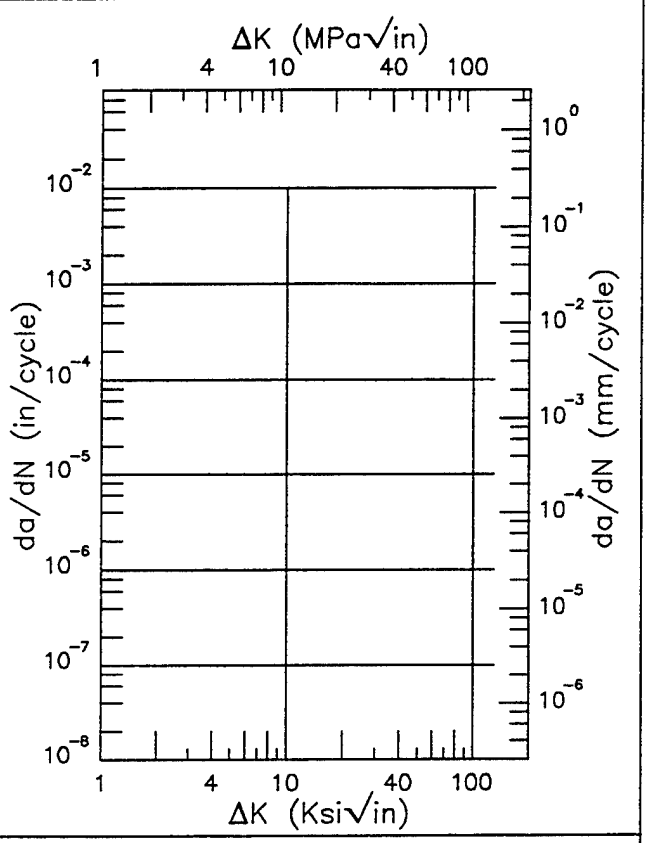

**Figure 7.5.3.1.19**

2024 R

Condition/Ht: T3
Form: 0.9 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 0.5 – 15 Hz
Environment: LAB AIR; RT

Yield Strength: 45.1 ksi
Ult. Strength: 65.8 ksi
Specimen Thk: 0.089 in.
Specimen Width: 9.705 in.
Ref: DA004




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.18 (min) | 0.0651 |
| 2.5 | 0.0788 |
| 3. | 0.120 |
| 3.5 | 0.195 |
| 4. | 0.316 |
| 5. | 0.783 |
| 6. | 1.71 |
| 7. | 3.29 |
| 8. | 5.67 |
| 9. | 8.84 |
| 10. | 12.7 |
| 16. | 45.8 |
| 20. | 108. |
| 30. | 783. |
| 36.70 (max) | 5126. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 10.16 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

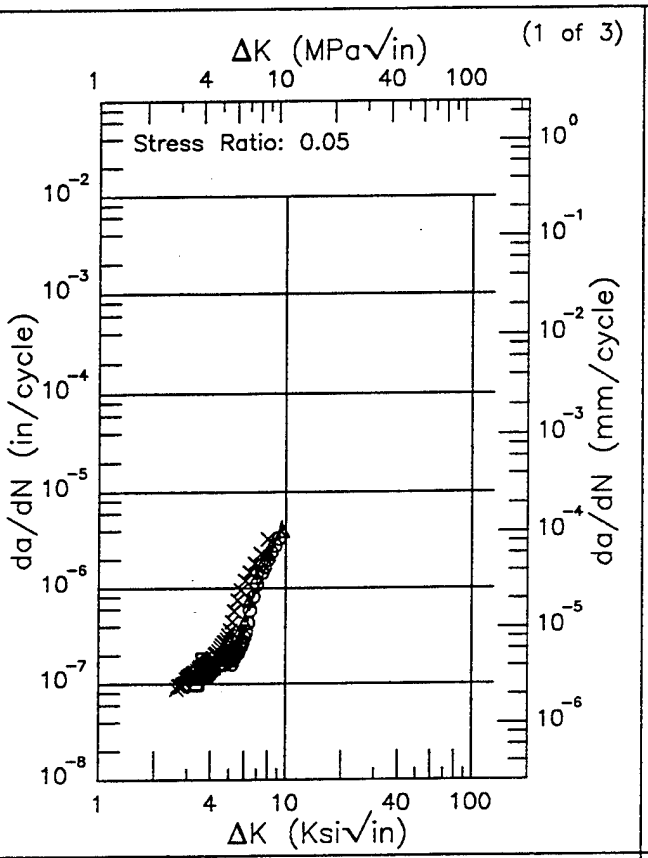
**Figure 7.5.3.1.20**

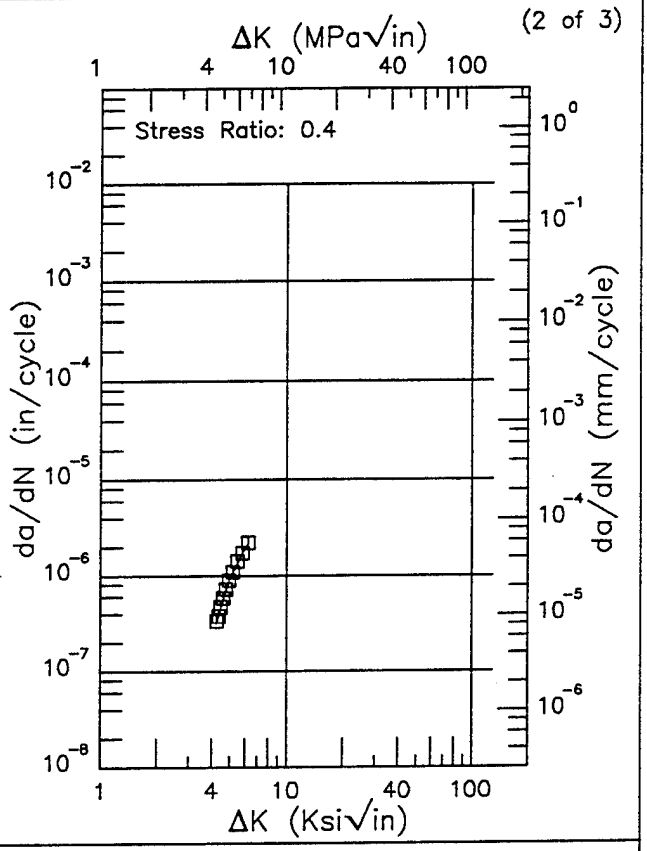
2024

R

Condition/Ht: T3
Form: Sheet
Specimen Type: CCP (max stress specified)
Orientation: T–L
Frequency: 30 Hz
Environment: LAB AIR; RT

Yield Strength: 47.2 ksi
Ult. Strength: 68.2 ksi
Specimen Thk: 0.09 in.
Specimen Width: 13.985–14.03 in.
Ref: EFM01




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.63 (min) | 0.116 |
| 3. | 0.110 |
| 3.5 | 0.120 |
| 4. | 0.146 |
| 5. | 0.258 |
| 6. | 0.497 |
| 7. | 0.974 |
| 8. | 1.89 |
| 9. | 3.56 |
| 9.56 (max) | 5.03 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.24 (min) | 0.323 |
| 5. | 0.946 |
| 6. | 1.92 |
| 6.24 (max) | 2.19 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 33.90 | ⊙ △ + × 0. .5 .8 1.25 2. |

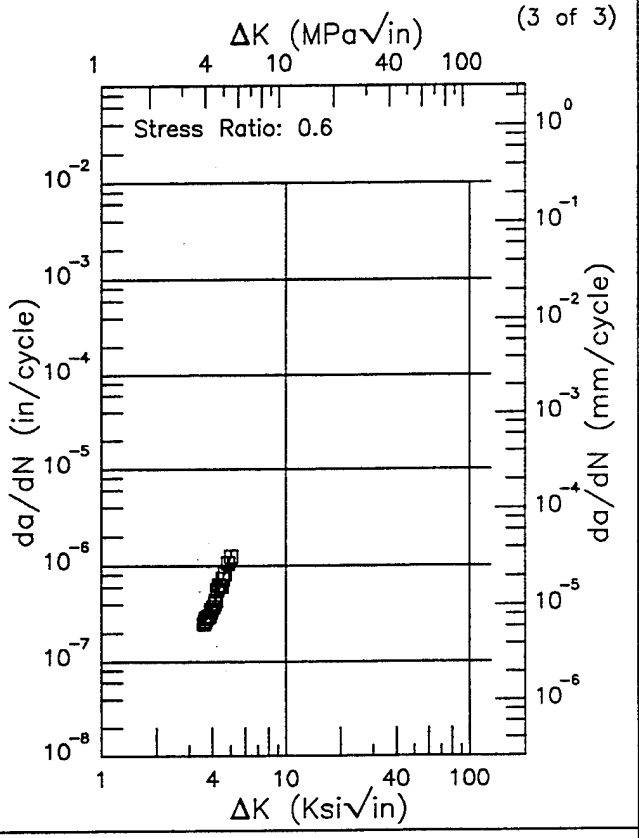
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 4.73 | ⊡ 0. .5 .8 1.25 2. |

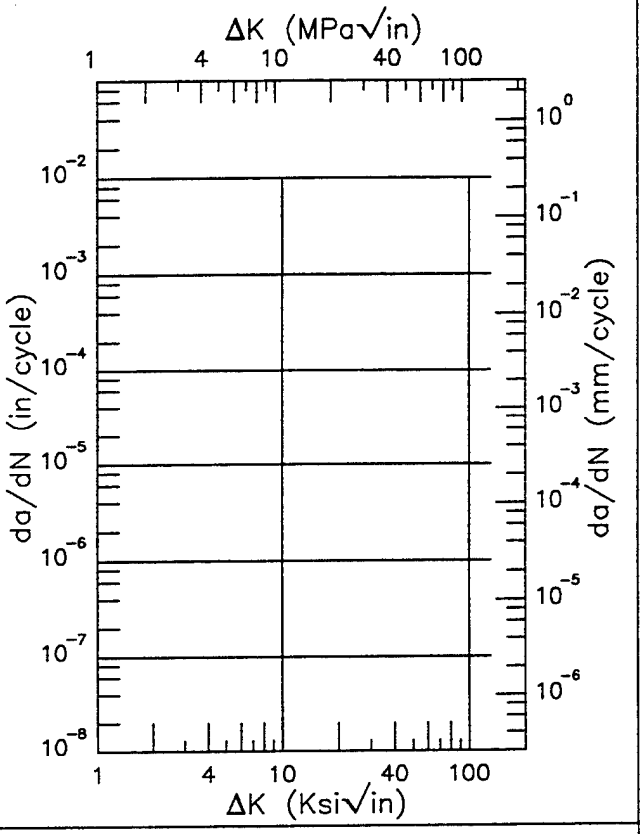
**Figure 7.5.3.1.21**

2024 R

Condition/Ht: T3
Form: Sheet
Specimen Type: CCP (max stress specified)
Orientation: T–L
Frequency: 30 Hz
Environment: LAB AIR; RT

Yield Strength: 47.2 ksi
Ult. Strength: 68.2 ksi
Specimen Thk: 0.09 in.
Specimen Width: 13.985–14.03 in.
Ref: EFM01




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.58 (min) | 0.248 |
| 4. | 0.361 |
| 5. | 1.24 |
| 5.02 (max) | 1.23 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 4.94 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

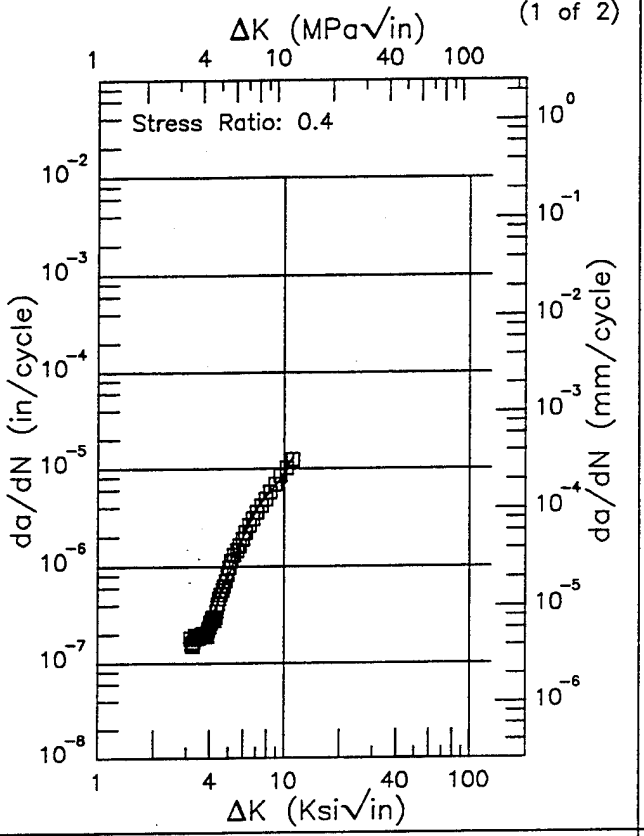
**Figure 7.5.3.1.21 (Concluded)**

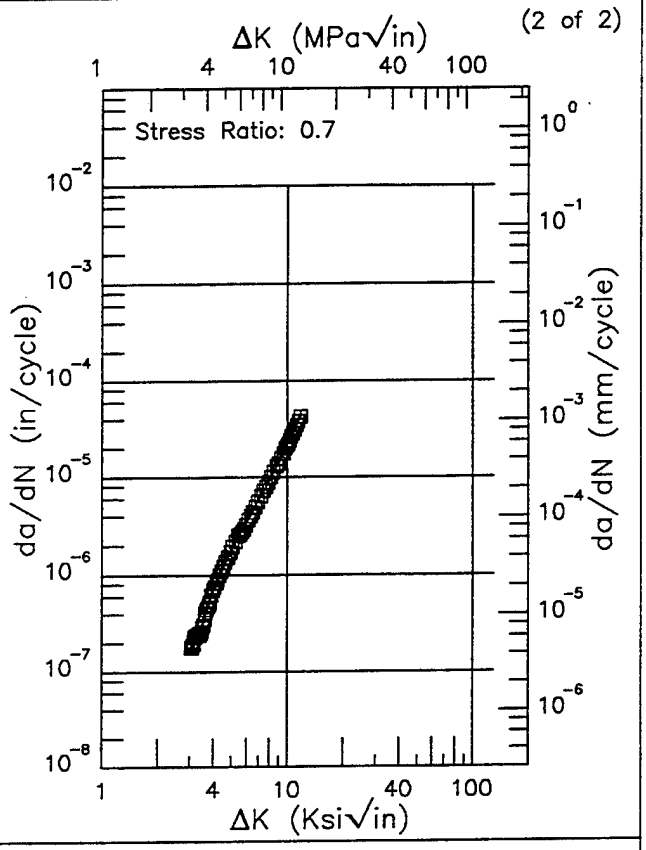
## 2024

R

Condition/Ht: T3
Form: Sheet
Specimen Type: CCP (max stress specified)
Orientation: T–L
Frequency: 5 – 10 Hz
Environment: LAB AIR;140°F

Yield Strength: 47.2 ksi
Ult. Strength: 68.2 ksi
Specimen Thk: 0.09 in.
Specimen Width: 36 in.
Ref: EFM01




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.16 (min) | 0.153 |
| 3.5 | 0.181 |
| 4. | 0.279 |
| 5. | 0.790 |
| 6. | 1.95 |
| 7. | 3.66 |
| 8. | 5.25 |
| 9. | 6.77 |
| 10. | 8.90 |
| 11.11 (max) | 13.3 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.05 (min) | 0.153 |
| 3.5 | 0.341 |
| 4. | 0.675 |
| 5. | 1.78 |
| 6. | 3.47 |
| 7. | 5.83 |
| 8. | 9.17 |
| 9. | 14.1 |
| 10. | 21.6 |
| 11.74 (max) | 41.5 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 10.55 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 7.08 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.22**

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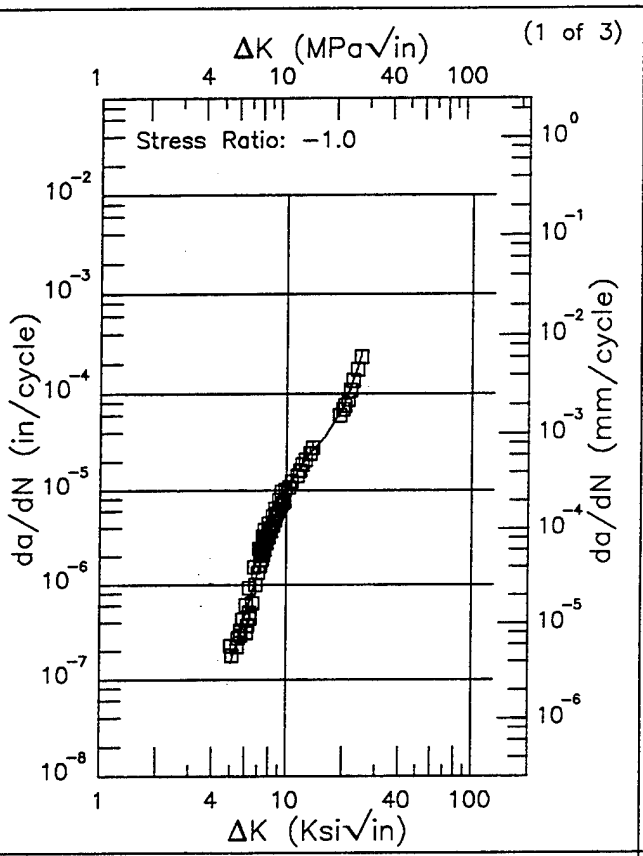
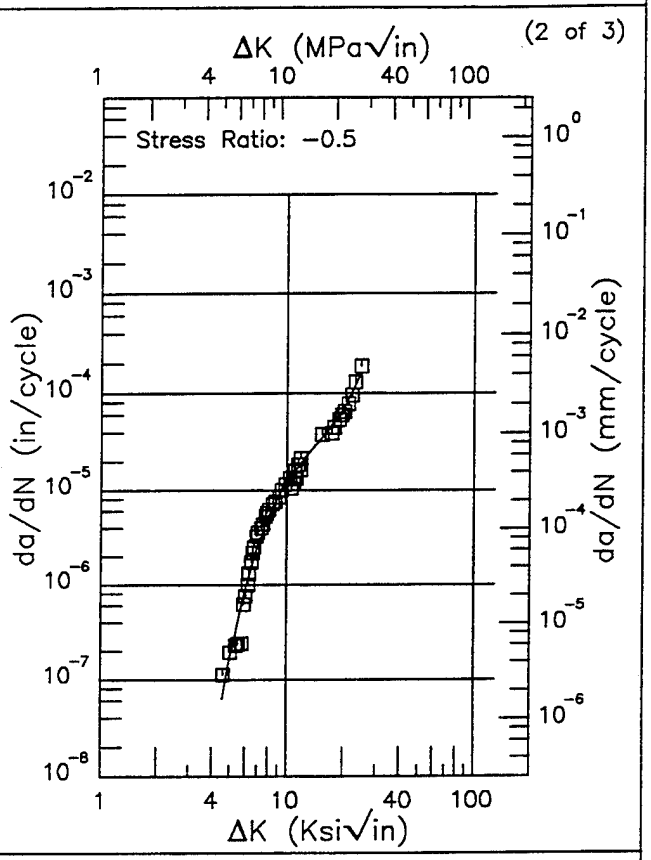
## 2024

R

Condition/Ht: T3
Form: 0.25 in. Plate
Specimen Type: CCP (max stress specified)
Orientation: L–T
Frequency: 20 Hz
Environment: LAB AIR; RT

Yield Strength: 50.9 ksi
Ult. Strength: 68.5 ksi
Specimen Thk: 0.25 in.
Specimen Width: 3 in.
Ref: UD006




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.03 (min) | 0.148 |
| 6. | 0.464 |
| 7. | 1.33 |
| 8. | 3.17 |
| 9. | 6.28 |
| 10. | 10.4 |
| 13. | 22.8 |
| 16. | 36.1 |
| 20. | 72.5 |
| 24.85 (max) | 241. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.59 (min) | 0.0630 |
| 5. | 0.165 |
| 6. | 0.880 |
| 7. | 2.55 |
| 8. | 5.19 |
| 9. | 8.52 |
| 10. | 12.2 |
| 13. | 24.0 |
| 16. | 37.9 |
| 20. | 68.3 |
| 24.91 (max) | 158. |

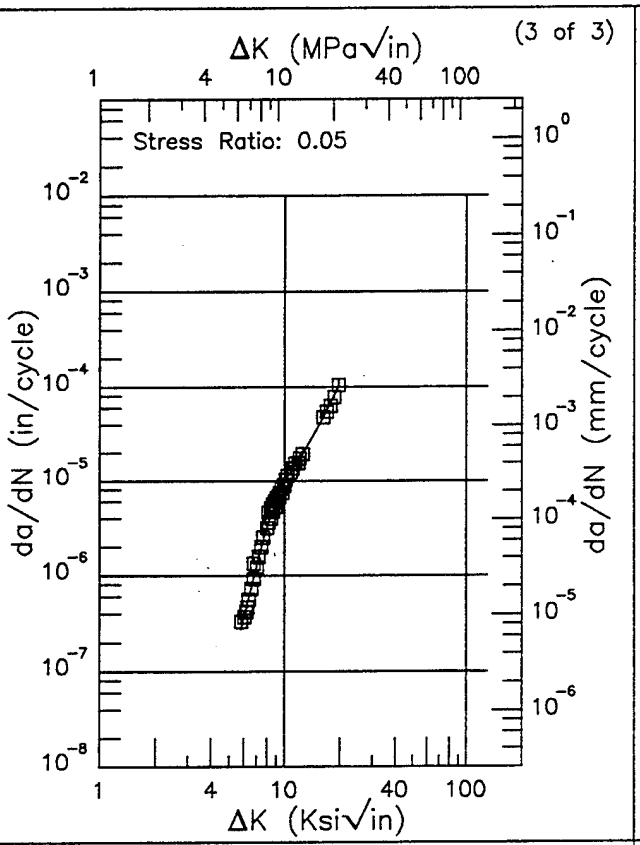
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 23.58 | 0. .5 .8 1.25 2. |

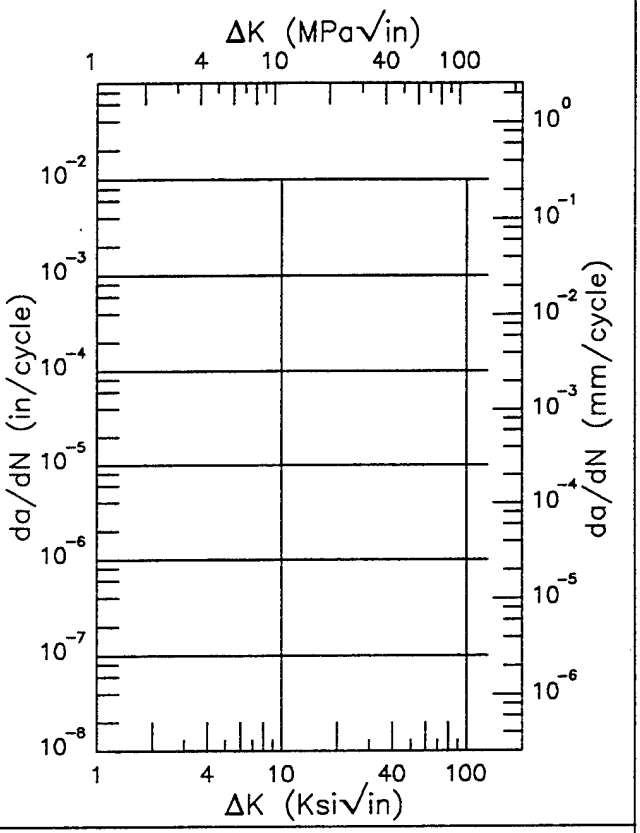
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 24.24 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.23**

Condition/Ht: T3
Form: 0.25 in. Plate
Specimen Type: CCP (max stress specified)
Orientation: L–T
Frequency: 20 Hz
Environment: LAB AIR; RT

Yield Strength: 50.9 ksi
Ult. Strength: 68.5 ksi
Specimen Thk: 0.25 in.
Specimen Width: 3 in.
Ref: UD006




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.78 (min) | 0.269 |
| 6. | 0.367 |
| 7. | 1.26 |
| 8. | 3.25 |
| 9. | 6.35 |
| 10. | 9.80 |
| 13. | 21.9 |
| 16. | 46.7 |
| 19.55 (max) | 105. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 10.60 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

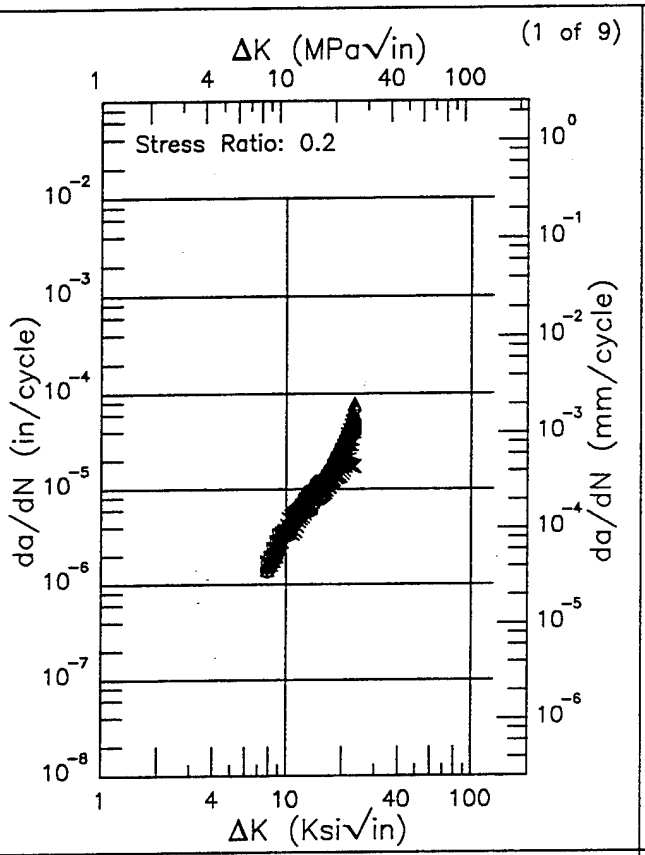
**Figure 7.5.3.1.23 (Concluded)**

2024

R

Condition/Ht: T3
Form:
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 20 Hz
Environment: DRY AIR; RT

Yield Strength:
Ult. Strength:
Specimen Thk: 0.1 in.
Specimen Width: 6 in.
Ref: PU001

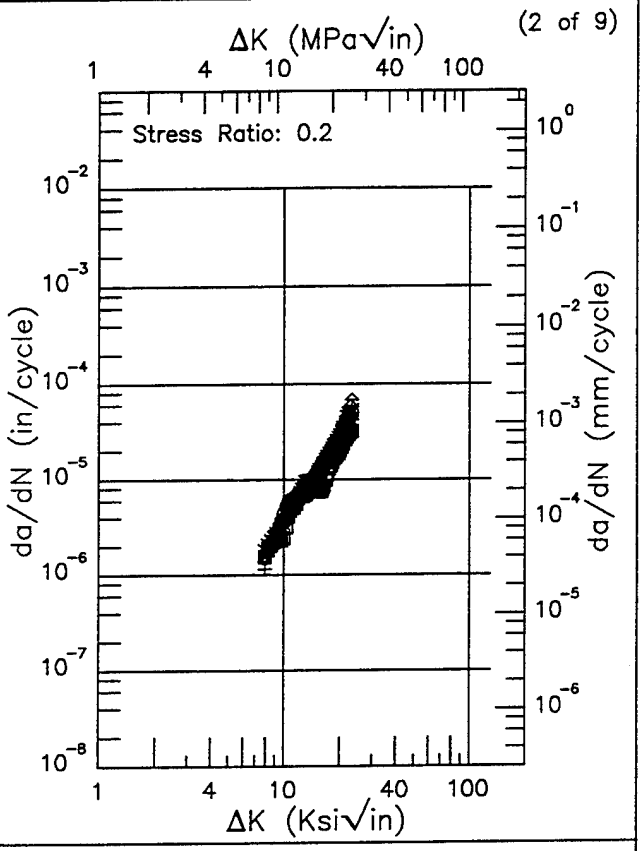



| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 7.86 (min) | 1.43 |
| 8. | 1.55 |
| 9. | 2.53 |
| 10. | 3.66 |
| 13. | 7.53 |
| 16. | 12.0 |
| 20. | 23.0 |
| 23.17 (max) | 54.0 |

| RMS % Error |
|---|
| 15.44 |

Life Prediction Ratio Summary

0. .5 .8 1.25 2.




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 7.86 (min) | 1.57 |
| 8. | 1.68 |
| 9. | 2.54 |
| 10. | 3.63 |
| 13. | 7.78 |
| 16. | 12.7 |
| 20. | 27.0 |
| 23.18 (max) | 48.8 |

| RMS % Error |
|---|
| 13.15 |

Life Prediction Ratio Summary

0. .5 .8 1.25 2.

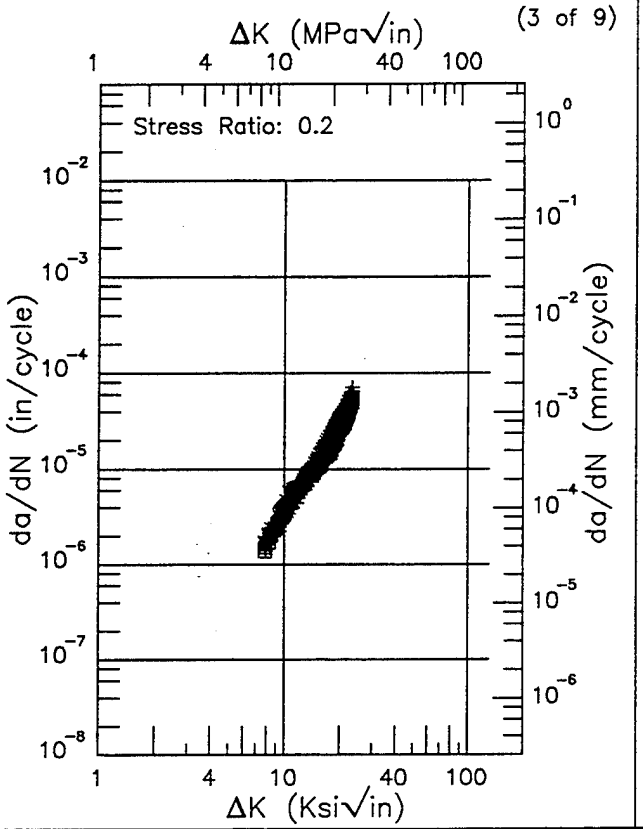
**Figure 7.5.3.1.24**

2024 R

Condition/Ht: T3
Form:
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 20 Hz
Environment: DRY AIR; RT

Yield Strength:
Ult. Strength:
Specimen Thk: 0.1 in.
Specimen Width: 6 in.
Ref: PU001

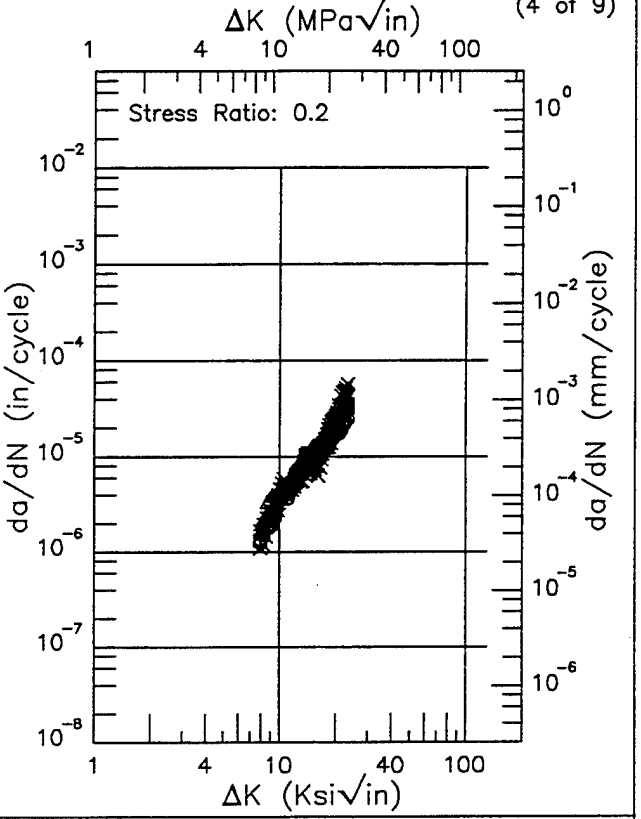
(3 of 9)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 7.86 (min) | 1.48 |
| 8. | 1.61 |
| 9. | 2.62 |
| 10. | 3.72 |
| 13. | 7.69 |
| 16. | 13.7 |
| 20. | 26.7 |
| 23.16 (max) | 55.2 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 11.58 | 0. .5 .8 1.25 2. |

(4 of 9)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 7.84 (min) | 1.49 |
| 8. | 1.63 |
| 9. | 2.60 |
| 10. | 3.61 |
| 13. | 6.66 |
| 16. | 10.7 |
| 20. | 22.2 |
| 23.16 (max) | 45.1 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 16.78 | 0. .5 .8 1.25 2. |

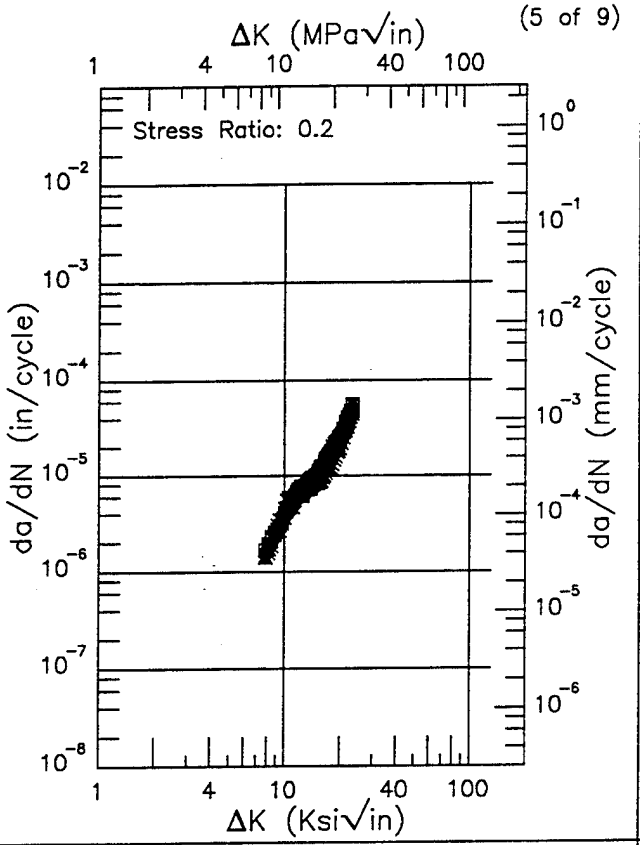
**Figure 7.5.3.1.24 (Continued)**

R 2024

Condition/Ht: T3
Form:
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 20 Hz
Environment: DRY AIR; RT

Yield Strength:
Ult. Strength:
Specimen Thk: 0.1 in.
Specimen Width: 6 in.
Ref: PU001

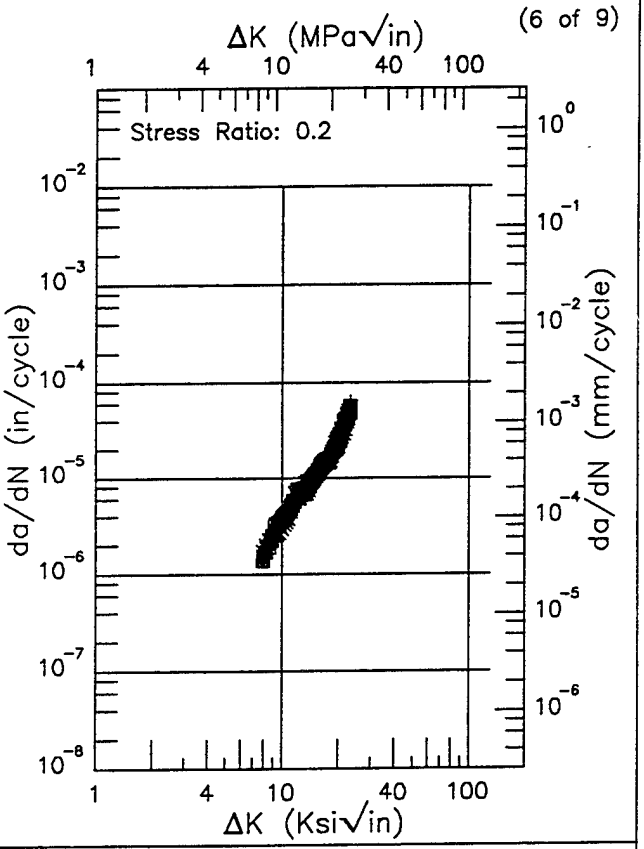
(5 of 9)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 7.86 (min) | 1.37 |
| 8. | 1.51 |
| 9. | 2.70 |
| 10. | 3.98 |
| 13. | 7.66 |
| 16. | 12.0 |
| 20. | 24.5 |
| 23.16 (max) | 51.2 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 12.62 | 0. .5 .8 1.25 2. |

(6 of 9)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 7.86 (min) | 1.43 |
| 8. | 1.57 |
| 9. | 2.65 |
| 10. | 3.87 |
| 13. | 7.82 |
| 16. | 12.6 |
| 20. | 25.6 |
| 23.18 (max) | 57.0 |

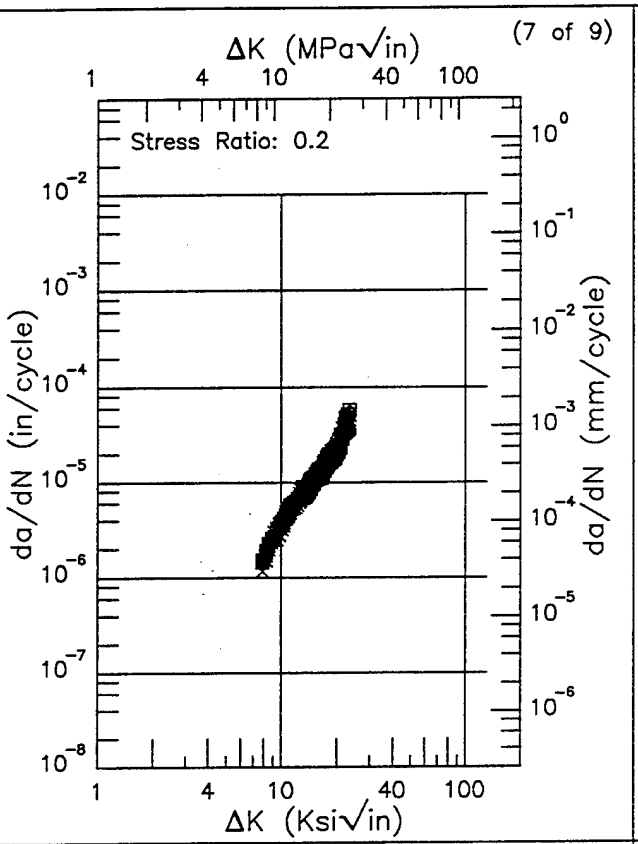
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 10.68 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.24 (Continued)**

Condition/Ht: T3
Form:
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 20 Hz
Environment: DRY AIR; RT

Yield Strength:
Ult. Strength:
Specimen Thk: 0.1 in.
Specimen Width: 6 in.
Ref: PU001

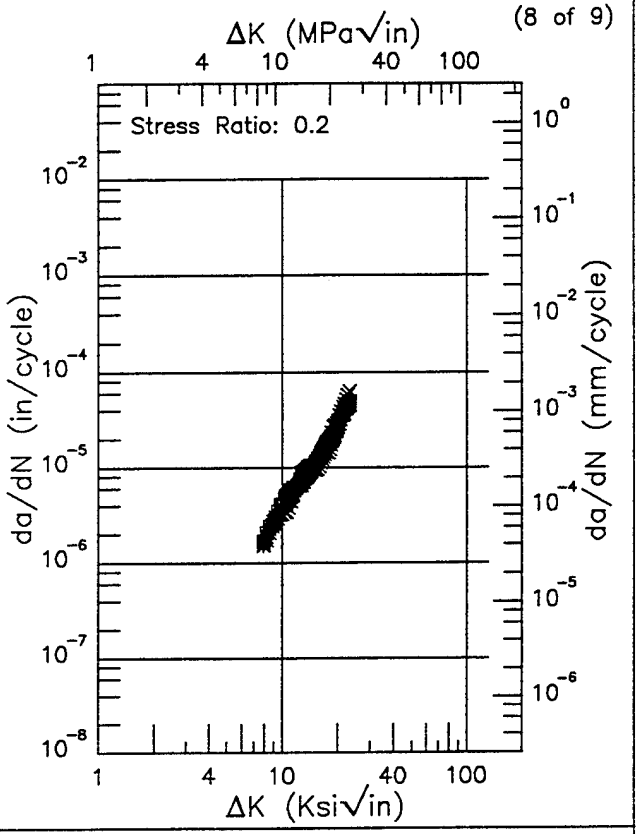
(7 of 9)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 7.86 (min) | 1.59 |
| 8. | 1.70 |
| 9. | 2.57 |
| 10. | 3.61 |
| 13. | 7.66 |
| 16. | 13.1 |
| 20. | 25.3 |
| 23.17 (max) | 49.1 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 10.79 | 0. .5 .8 1.25 2. |

(8 of 9)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 7.85 (min) | 1.65 |
| 8. | 1.76 |
| 9. | 2.64 |
| 10. | 3.69 |
| 13. | 7.74 |
| 16. | 13.4 |
| 20. | 27.4 |
| 23.15 (max) | 52.5 |

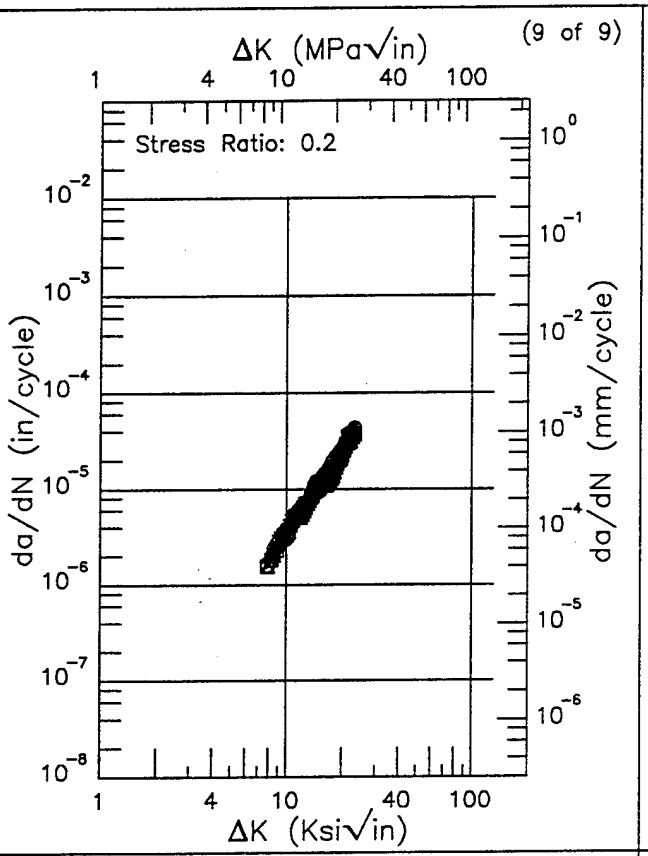
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 11.20 | 0. .5 .8 1.25 2. |

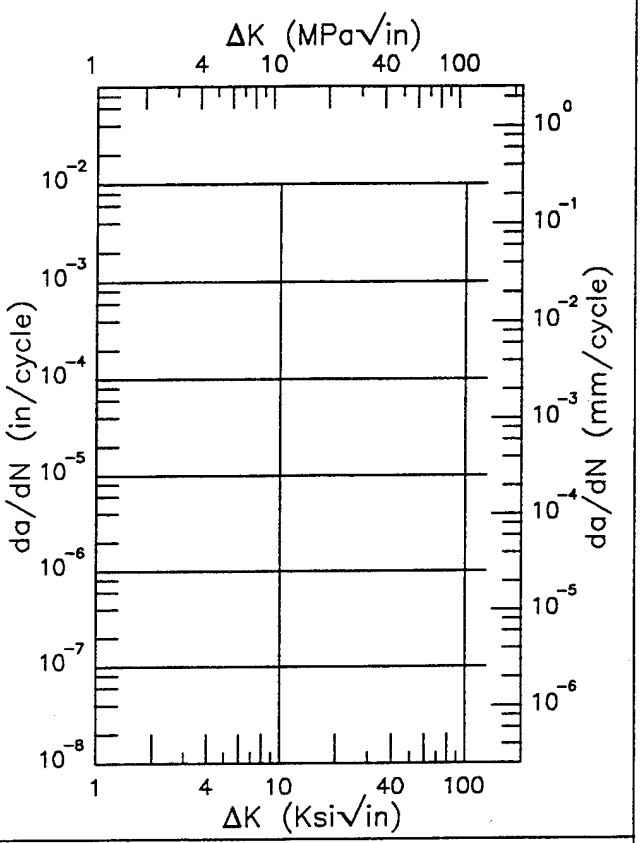
**Figure 7.5.3.1.24 (Continued)**

R | 2024 |

Condition/Ht: T3
Form:
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 20 Hz
Environment: DRY AIR; RT

Yield Strength:
Ult. Strength:
Specimen Thk: 0.1 in.
Specimen Width: 6 in.
Ref: PU001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 7.79 (min) | 1.54 |
| 8. | 1.74 |
| 9. | 2.85 |
| 10. | 4.06 |
| 13. | 7.84 |
| 16. | 12.4 |
| 20. | 24.9 |
| 23.16 (max) | 40.0 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 9.67 | 0. .5 .8 1.25 2. |

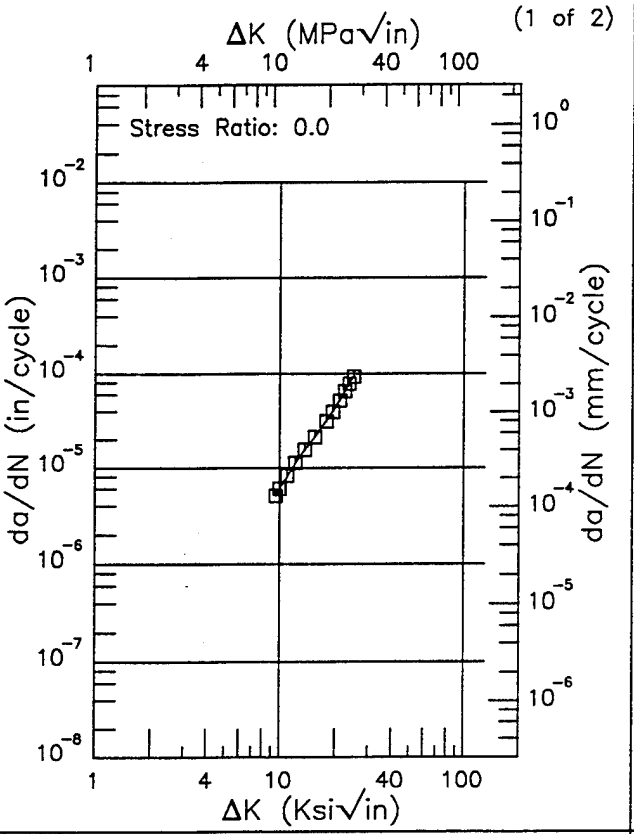
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

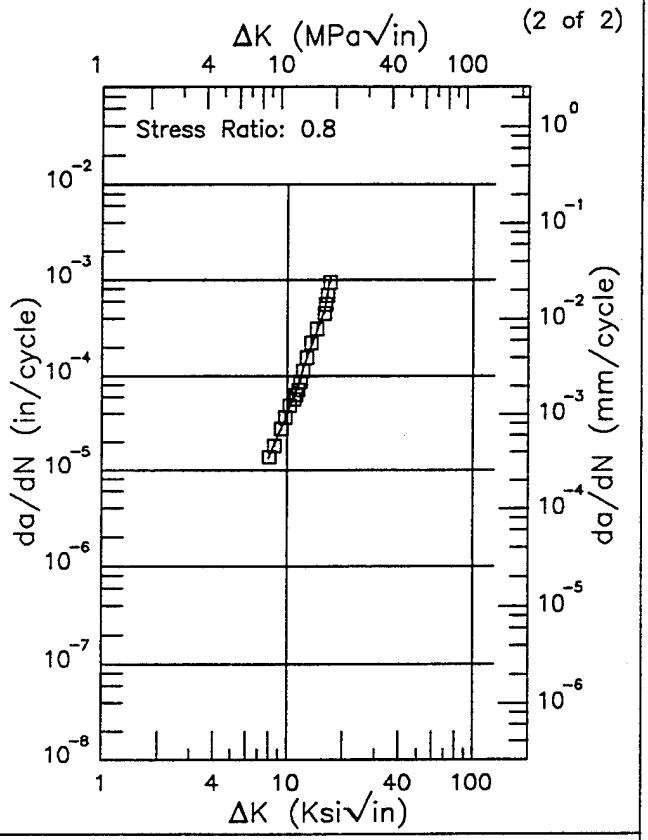
**Figure 7.5.3.1.24 (Concluded)**

2024 R

Condition/Ht: T351
Form: Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 6 Hz
Environment: LAB AIR; RT

Yield Strength: 56.9 ksi
Ult. Strength:
Specimen Thk: 0.181–0.186 in.
Specimen Width: 11.998–12.009 in.
Ref: DA001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 9.51 (min) | 5.09 |
| 10. | 6.14 |
| 13. | 13.7 |
| 16. | 23.4 |
| 20. | 44.2 |
| 24.94 (max) | 92.7 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 7.98 (min) | 13.4 |
| 8. | 13.5 |
| 9. | 24.0 |
| 10. | 39.3 |
| 13. | 171. |
| 16. | 497. |
| 17.04 (max) | 995. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 1.37 | 0. .5 .8 1.25 2. |

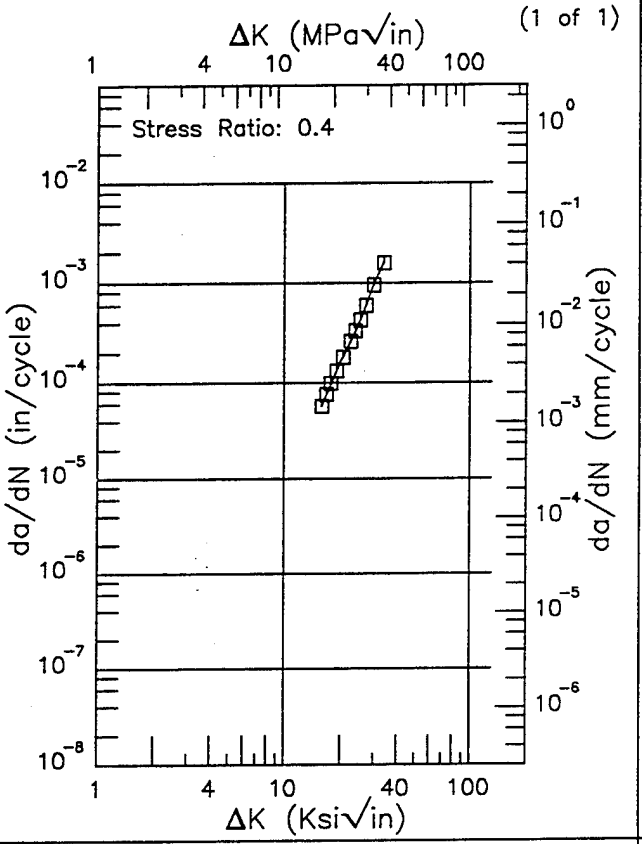
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 7.13 | 0. .5 .8 1.25 2. |

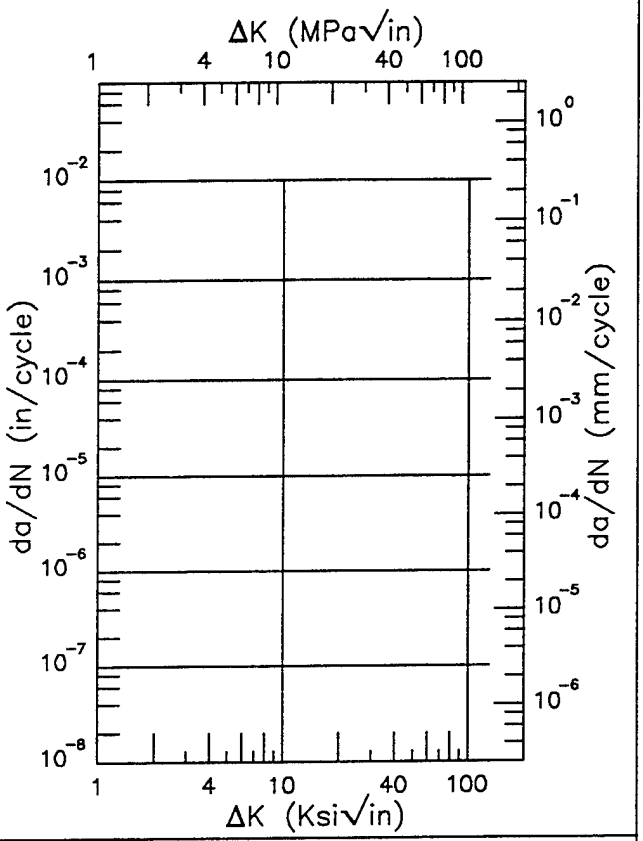
**Figure 7.5.3.1.25**

R 2024

Condition/Ht: T351
Form: Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 3 Hz
Environment: LAB AIR; RT

Yield Strength: 56.9 ksi
Ult. Strength:
Specimen Thk: 0.184 in.
Specimen Width: 12.002 in.
Ref: DA001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 15.81 (min) | 57.8 |
| 16. | 61.5 |
| 20. | 165. |
| 25. | 406. |
| 30. | 989. |
| 33.80 (max) | 1576. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

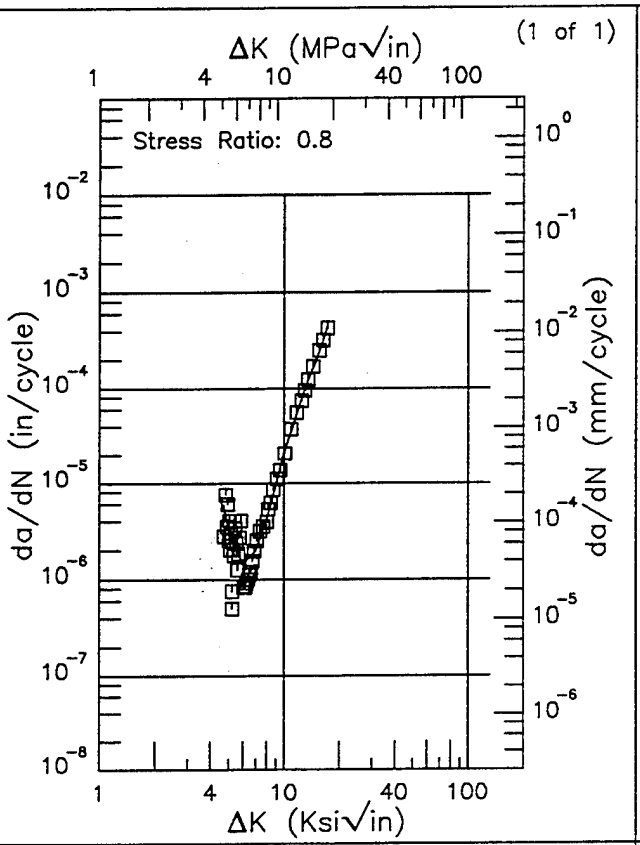
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 1.77 | 0. .5 .8 1.25 2. |

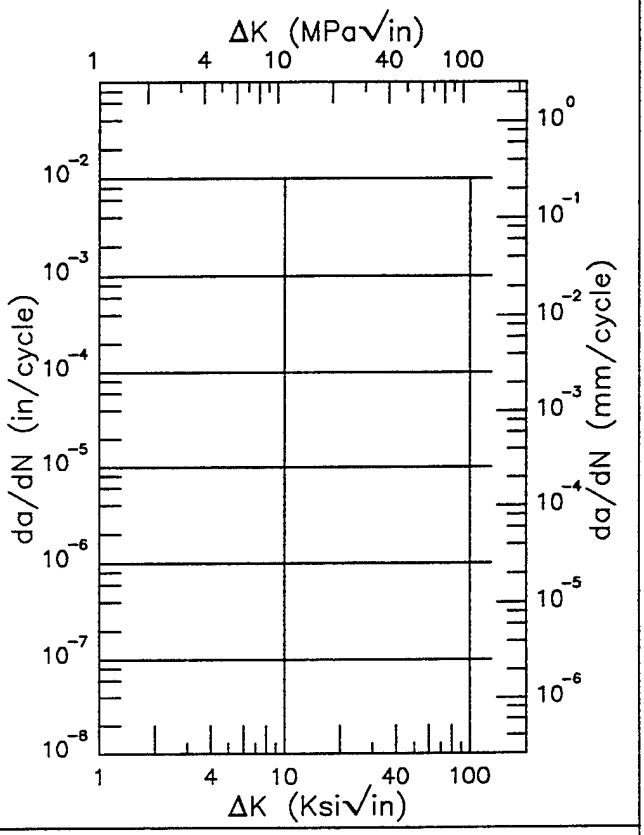
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.26**

Condition/Ht: T351
Form: Sheet
Specimen Type: CCP (max stress specified)
Orientation: L–T
Frequency: 10 Hz
Environment: LAB AIR;–65°F

Yield Strength: 56.9 ksi
Ult. Strength:
Specimen Thk: 0.184 in.
Specimen Width: 12 in.
Ref: DA001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.72 (min) | 5.92 |
| 5. | 3.25 |
| 6. | 1.44 |
| 7. | 1.96 |
| 8. | 4.12 |
| 9. | 9.62 |
| 10. | 21.2 |
| 13. | 102. |
| 16. | 296. |
| 17.13 (max) | 455. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 37.63 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.27**

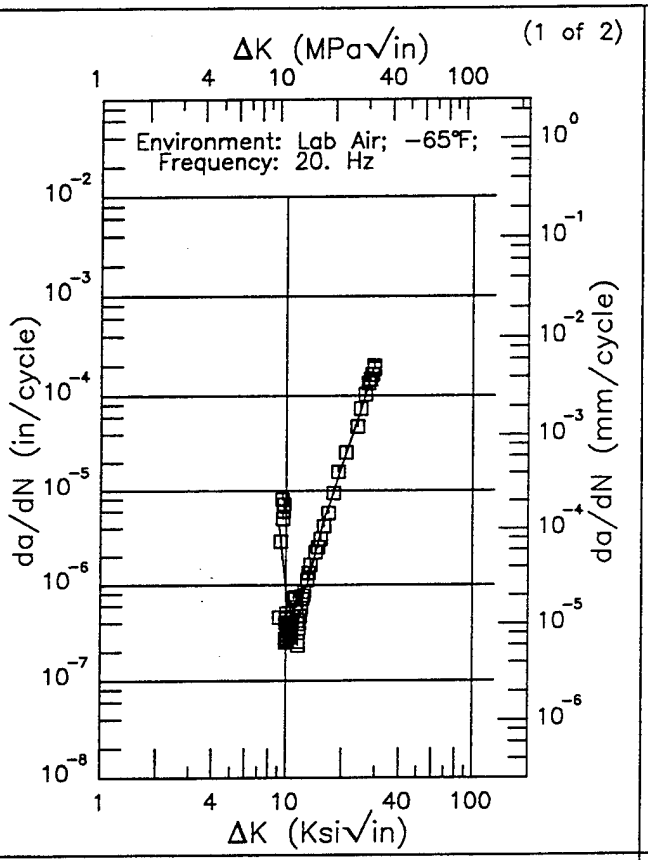
## 2024

EF

Condition/Ht: T351
Form: Sheet
Specimen Type: CCP (max stress specified)
Orientation: L–T
Stress Ratio: 0.

Yield Strength: 56.9 ksi
Ult. Strength:
Specimen Thk: 0.182 – 0.188 in.
Specimen Width: 11.997 – 12 in.
Ref: DA001

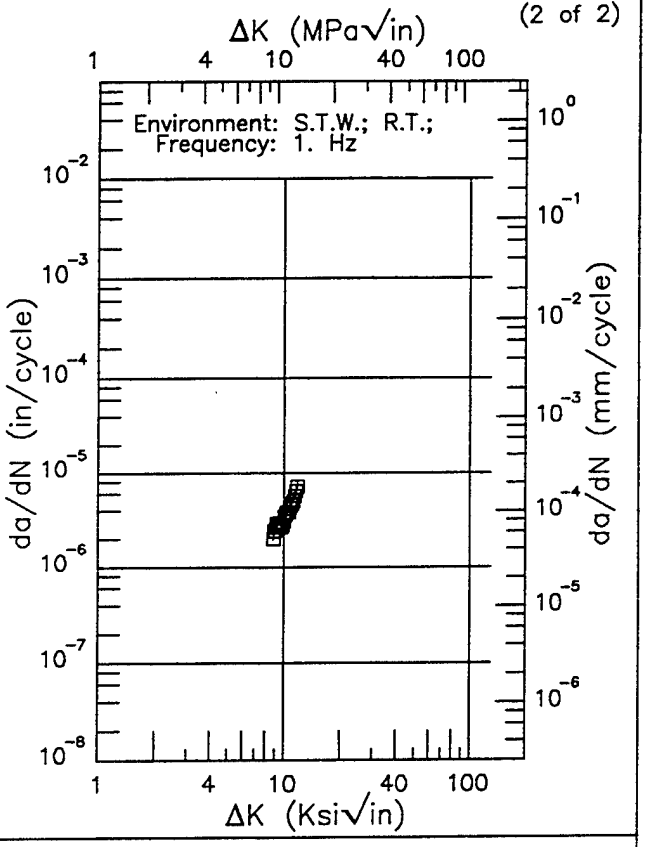
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 9.16 (min) | 4.14 |
| 10. | 0.831 |
| 13. | 0.951 |
| 16. | 4.90 |
| 20. | 18.8 |
| 25. | 71.1 |
| 29.42 (max) | 195. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 83.08 | 0. .5 .8 1.25 2. |

(2 of 2)



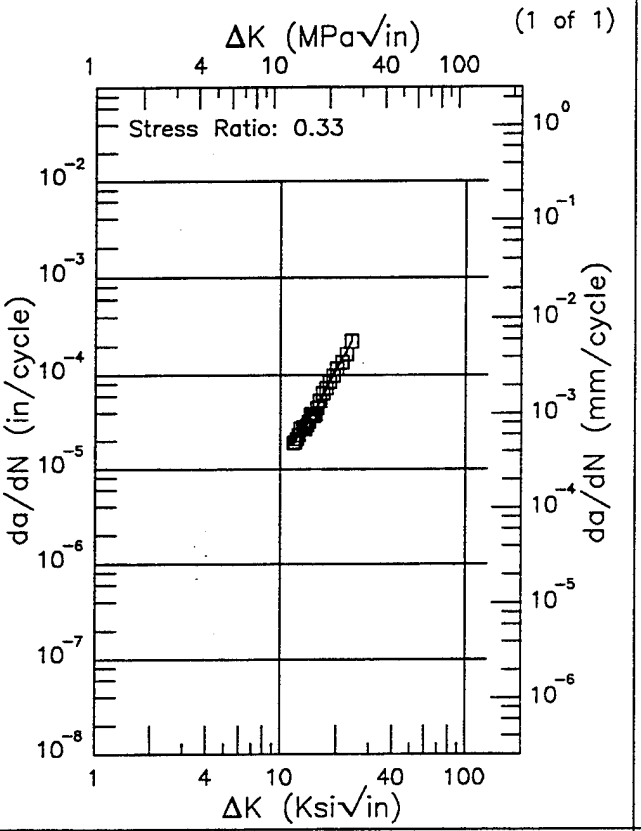

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 8.77 (min) | 1.94 |
| 9. | 2.63 |
| 10. | 3.16 |
| 11.81 (max) | 7.03 |

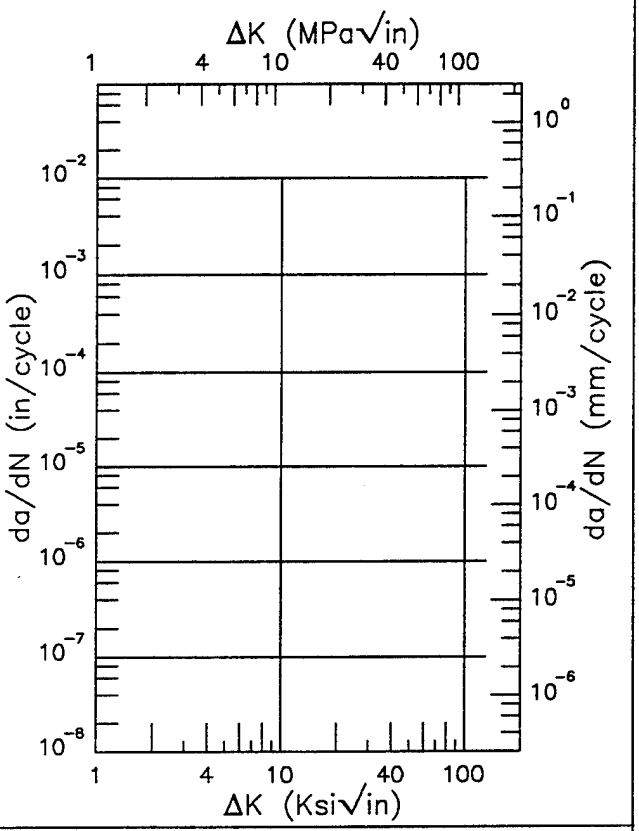
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 6.03 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.28**

Condition/Ht: T351
Form: Sheet
Specimen Type: CCP (max stress specified)
Orientation: L–T
Frequency: 10 Hz
Environment: S.T.W.; RT

Yield Strength: 56.9 ksi
Ult. Strength:
Specimen Thk: 0.192 in.
Specimen Width: 12 in.
Ref: DA001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 11.68 (min) | 18.6 |
| 13. | 25.6 |
| 16. | 48.4 |
| 20. | 116. |
| 24.00 (max) | 225. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 5.22 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.29**

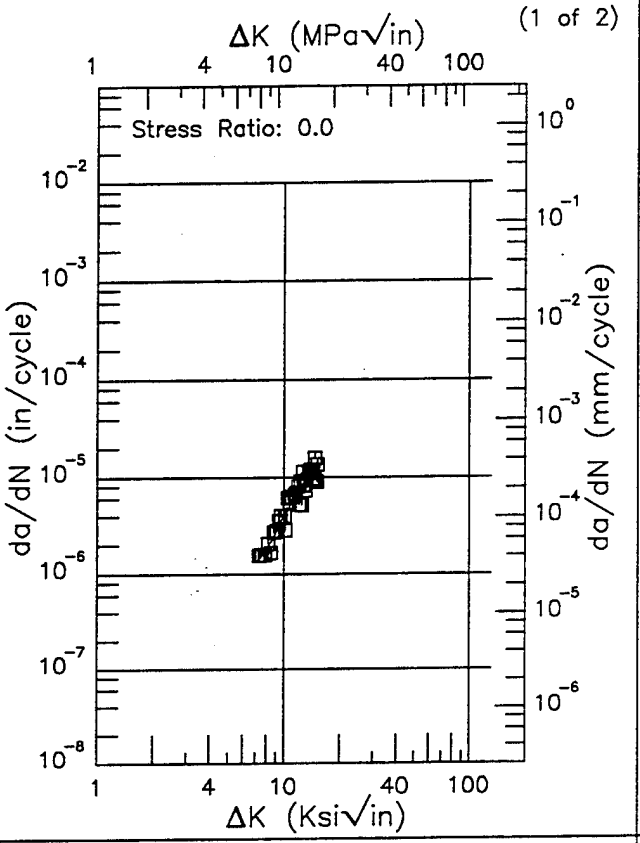
## 2024

R

Condition/Ht: T351
Form: Sheet
Specimen Type: CCP (max stress specified)
Orientation: L–T
Frequency: 9 Hz
Environment: H.H.A.; RT

Yield Strength:
Ult. Strength:
Specimen Thk: 0.163 in.
Specimen Width: 5 in.
Ref: BW002

(1 of 2)



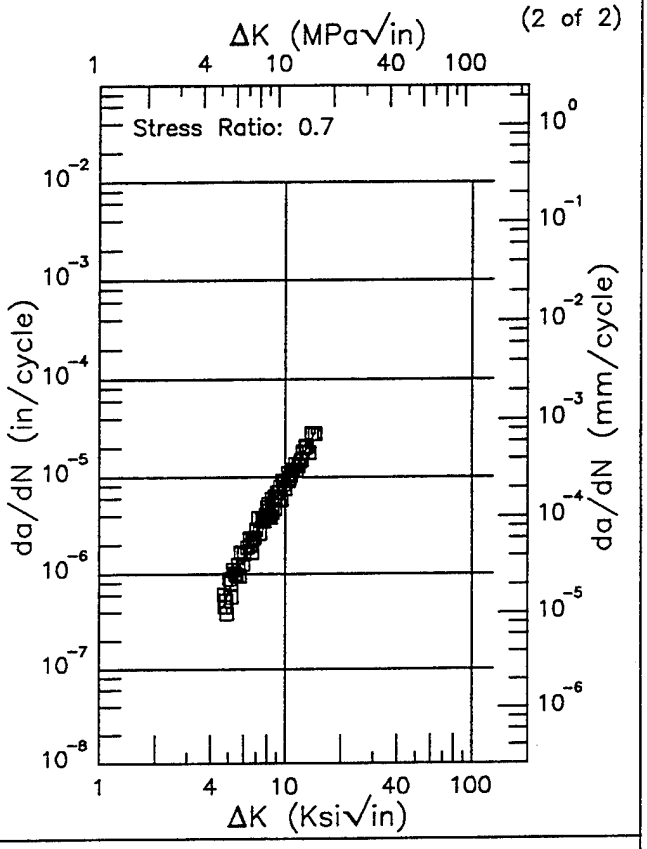

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 7.32 (min) | 1.43 |
| 8. | 1.76 |
| 9. | 2.70 |
| 10. | 4.18 |
| 13. | 8.90 |
| 15.05 (max) | 12.4 |

| RMS % Error |
|---|
| 18.10 |

Life Prediction Ratio Summary

0. .5 .8 1.25 2.

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.72 (min) | 0.463 |
| 5. | 0.636 |
| 6. | 1.50 |
| 7. | 2.72 |
| 8. | 4.25 |
| 9. | 6.13 |
| 10. | 8.42 |
| 13. | 19.4 |
| 14.38 (max) | 28.1 |

| RMS % Error |
|---|
| 14.45 |

Life Prediction Ratio Summary

0. .5 .8 1.25 2.

**Figure 7.5.3.1.30**

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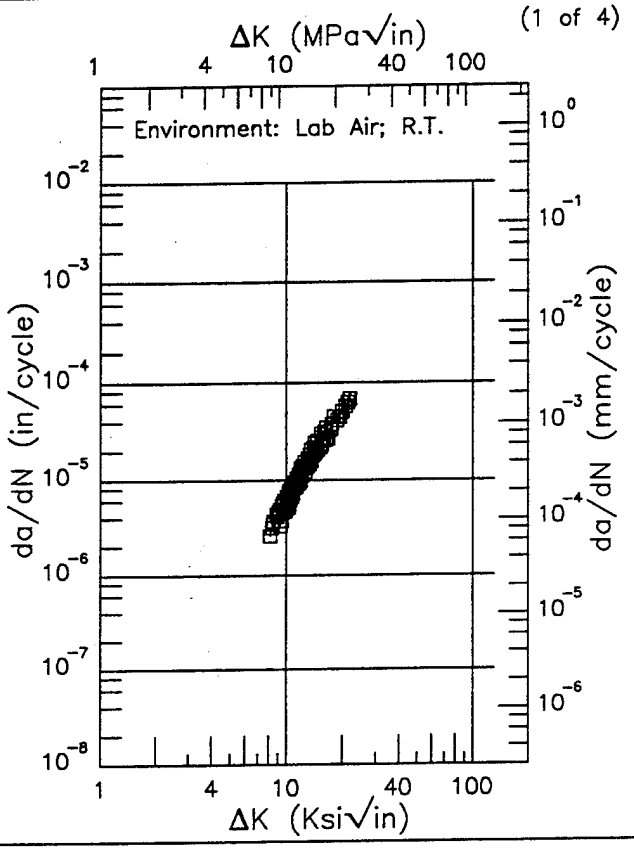
2024

E

Condition/Ht: T351
Form: 0.5 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.01
Frequency: 20 Hz

Yield Strength: 51.5 ksi
Ult. Strength: 65.9 ksi
Specimen Thk: 0.5 in.
Specimen Width: 2 in.
Ref: UD009

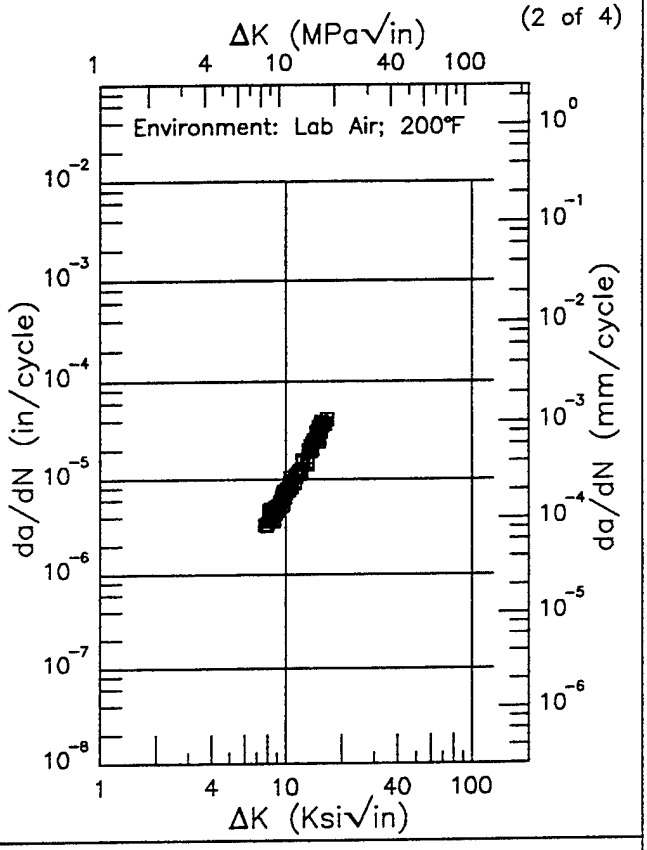
(1 of 4)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 8.19 (min) | 2.85 |
| 9. | 4.05 |
| 10. | 5.96 |
| 13. | 14.8 |
| 16. | 28.3 |
| 20. | 52.1 |
| 21.86 (max) | 64.5 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 13.29 | 0. .5 .8 1.25 2. |

(2 of 4)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 7.67 (min) | 3.14 |
| 8. | 3.56 |
| 9. | 5.04 |
| 10. | 6.94 |
| 13. | 17.4 |
| 16. | 36.9 |
| 16.64 (max) | 41.0 |

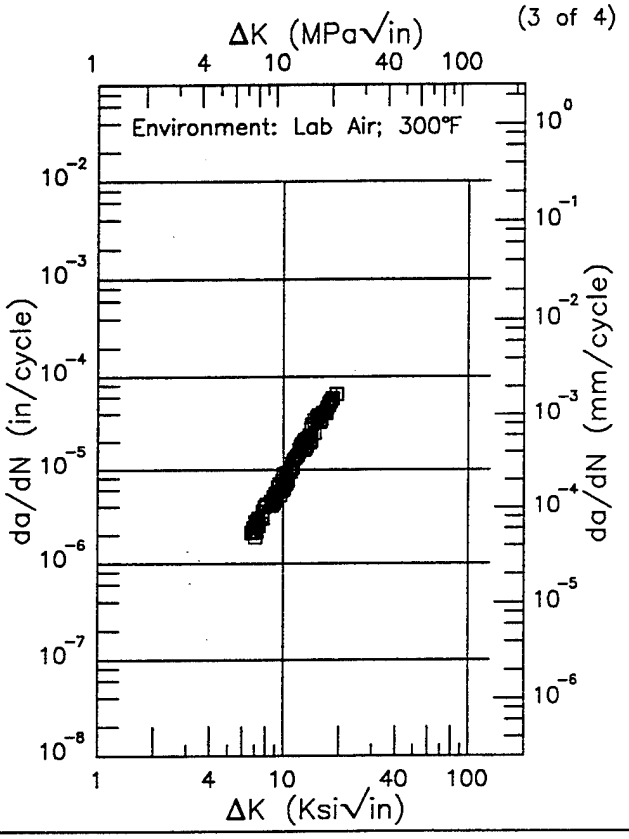
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 9.98 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.31**

Condition/Ht: T351
Form: 0.5 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.01
Frequency: 20 Hz

Yield Strength: 51.5 ksi
Ult. Strength: 65.9 ksi
Specimen Thk: 0.5 in.
Specimen Width: 2 in.
Ref: UD009

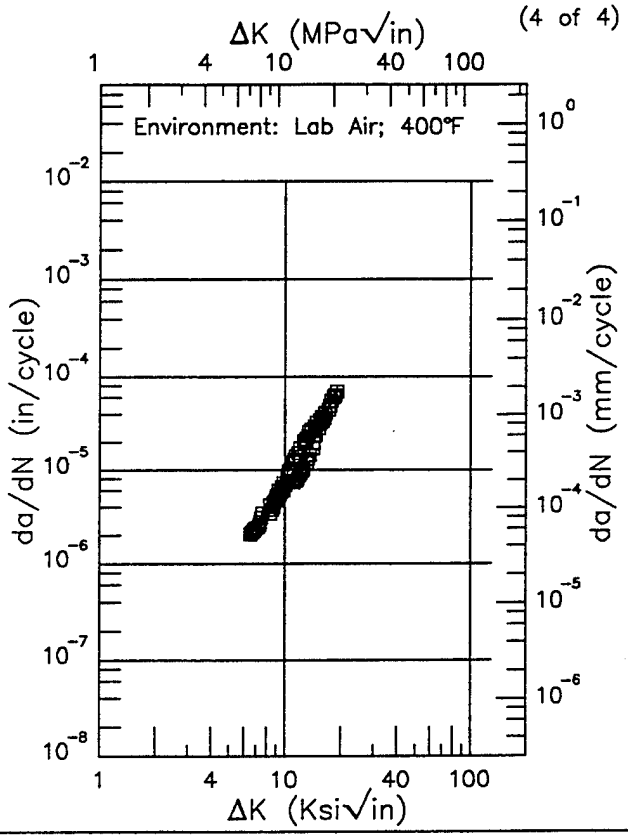
(3 of 4)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 6.72 (min) | 1.92 |
| 7. | 2.31 |
| 8. | 3.69 |
| 9. | 5.12 |
| 10. | 7.09 |
| 13. | 19.8 |
| 16. | 38.3 |
| 19.19 (max) | 65.2 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 10.66 | 0. .5 .8 1.25 2. |

(4 of 4)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 6.52 (min) | 2.00 |
| 7. | 2.44 |
| 8. | 3.55 |
| 9. | 5.01 |
| 10. | 6.88 |
| 13. | 16.3 |
| 16. | 35.8 |
| 19.04 (max) | 67.8 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 17.98 | 0. .5 .8 1.25 2. |

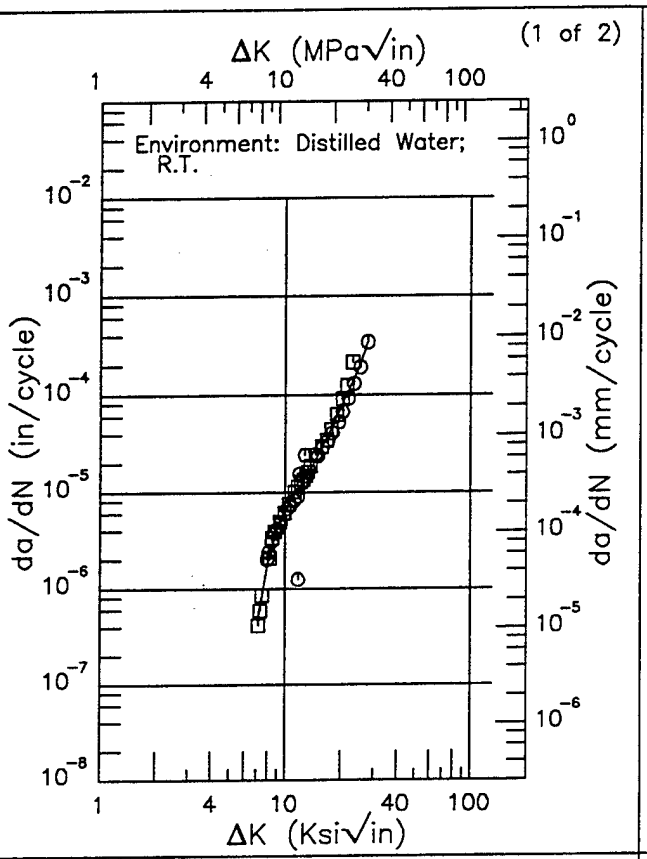
**Figure 7.5.3.1.31 (Concluded)**

## 2024

E

Condition/Ht: T351
Form: 1 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.05
Frequency: 1 Hz

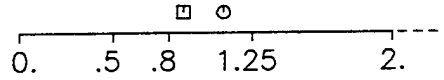
Yield Strength: 54.3 – 57 ksi
Ult. Strength: 70 ksi
Specimen Thk: 0.246 – 0.25 in.
Specimen Width: 2 – 2.008 in.
Ref: DA004;DA005

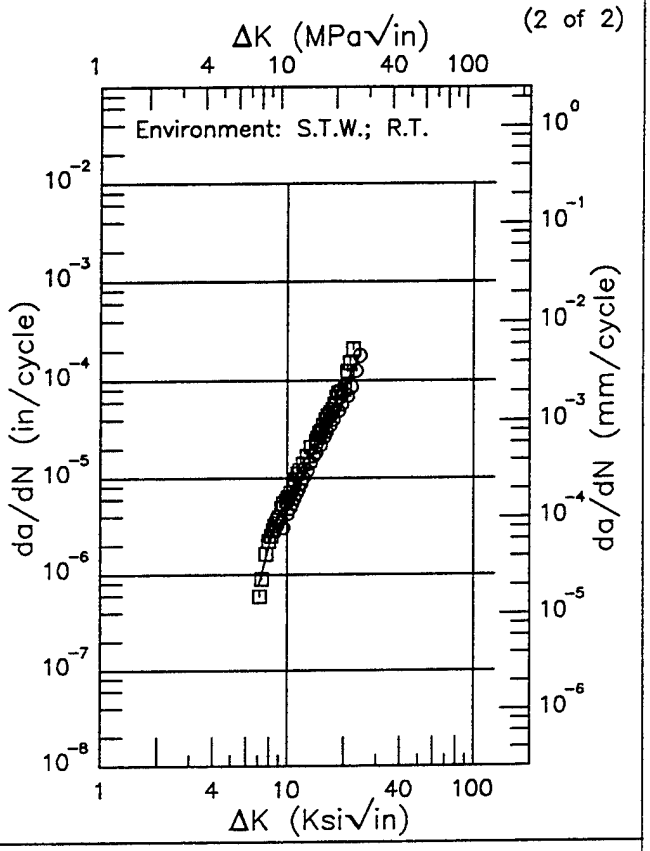



| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 7.12 (min) | 0.467 |
| 8. | 1.75 |
| 9. | 4.12 |
| 10. | 6.67 |
| 13. | 14.5 |
| 16. | 30.5 |
| 20. | 74.9 |
| 25. | 191. |
| 27.81 (max) | 334. |

RMS % Error: 22.37

Life Prediction Ratio Summary




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 7.10 (min) | 0.777 |
| 8. | 2.00 |
| 9. | 3.87 |
| 10. | 5.95 |
| 13. | 14.4 |
| 16. | 34.5 |
| 20. | 85.0 |
| 24.38 (max) | 180. |

RMS % Error: 19.03

Life Prediction Ratio Summary

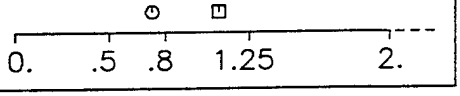



**Figure 7.5.3.1.32**

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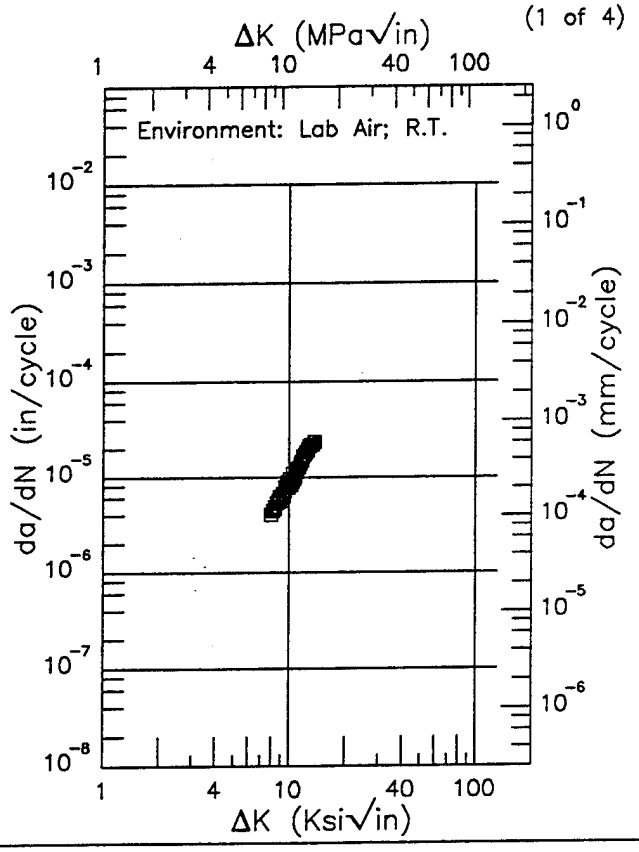
2024

E

Condition/Ht: T351
Form: 0.5 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.1
Frequency: 20 Hz

Yield Strength: 51.5 ksi
Ult. Strength: 65.9 ksi
Specimen Thk: 0.5 in.
Specimen Width: 2 in.
Ref: UD009

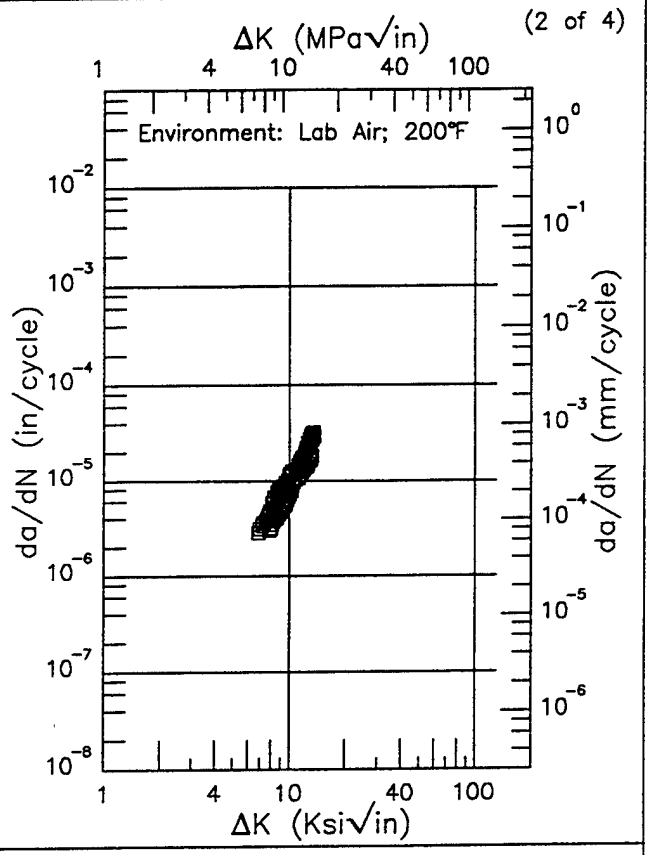
(1 of 4)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 7.96 (min) | 4.02 |
| 8. | 4.07 |
| 9. | 6.21 |
| 10. | 8.51 |
| 13. | 21.4 |
| 13.55 (max) | 23.0 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 6.32 | 0. .5 .8 1.25 2. |

(2 of 4)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.84 (min) | 2.90 |
| 7. | 3.10 |
| 8. | 4.36 |
| 9. | 6.04 |
| 10. | 8.77 |
| 13. | 21.9 |
| 13.54 (max) | 28.0 |

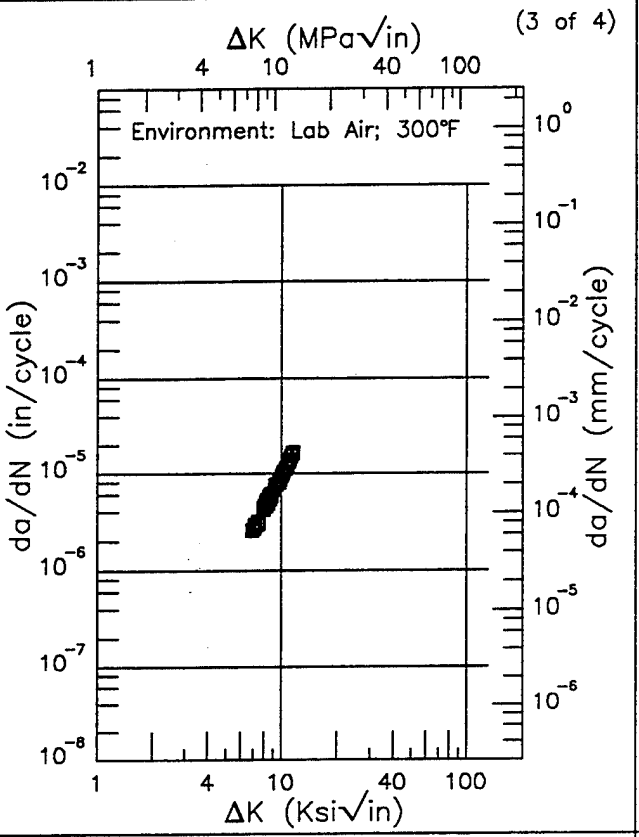
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 21.69 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.33**

Condition/Ht: T351
Form: 0.5 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.1
Frequency: 20 Hz

Yield Strength: 51.5 ksi
Ult. Strength: 65.9 ksi
Specimen Thk: 0.5 in.
Specimen Width: 2 in.
Ref: UD009

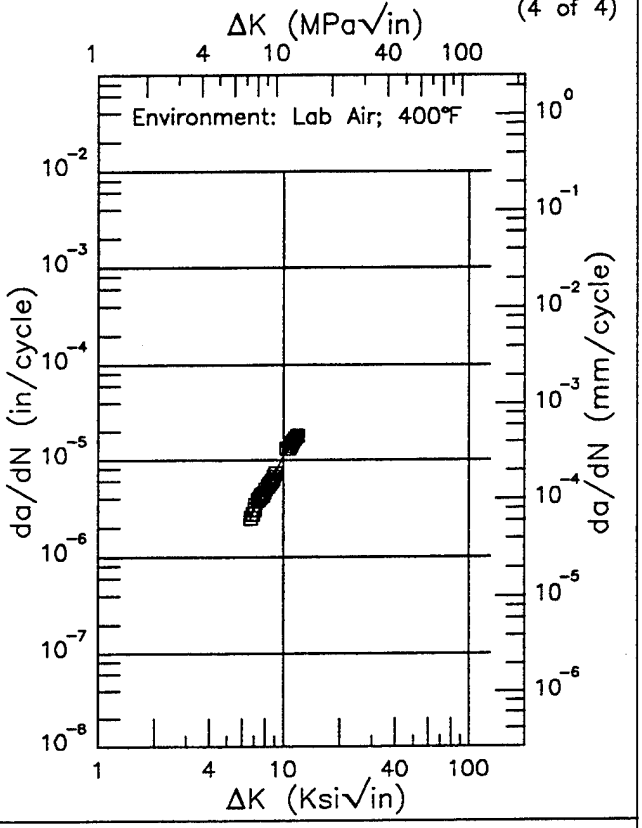
(3 of 4)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 6.93 (min) | 2.46 |
| 7. | 2.55 |
| 8. | 4.24 |
| 9. | 6.58 |
| 10. | 9.30 |
| 11.58 (max) | 17.1 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 4.50 | 0. .5 .8 1.25 2. |

(4 of 4)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 6.68 (min) | 2.39 |
| 7. | 3.18 |
| 8. | 4.74 |
| 9. | 7.08 |
| 10. | 11.2 |
| 11.82 (max) | 17.9 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 3.12 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.33 (Concluded)**

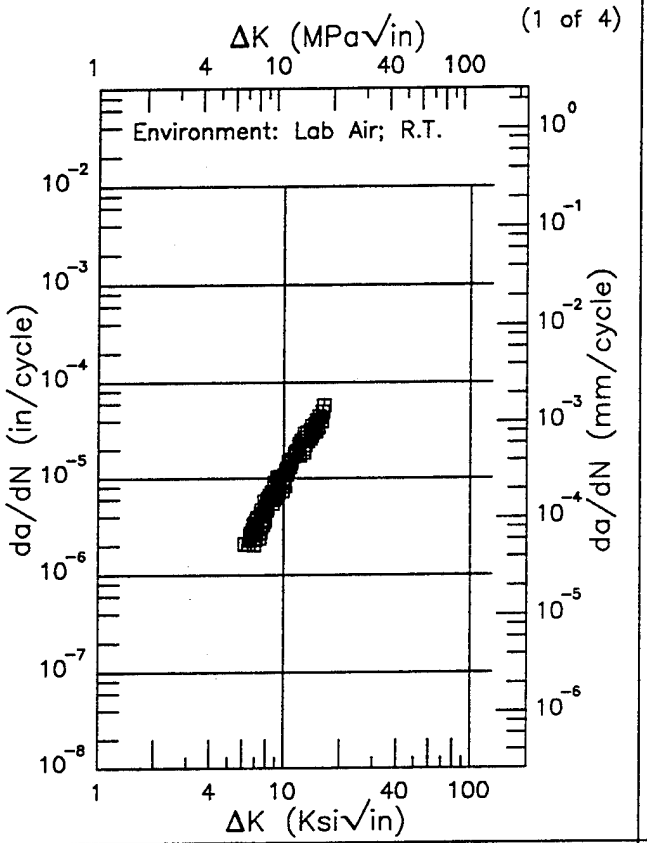
2024

E

Condition/Ht: T351
Form: 0.5 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.3
Frequency: 20 Hz

Yield Strength: 51.5 ksi
Ult. Strength: 65.9 ksi
Specimen Thk: 0.5 in.
Specimen Width: 2 in.
Ref: UD009

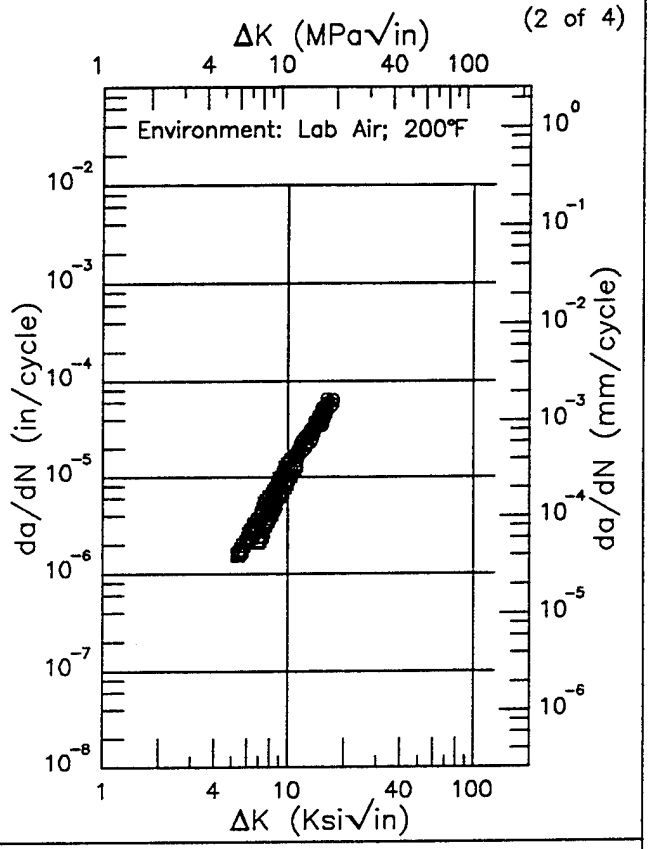
(1 of 4)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 6.16 (min) | 2.09 |
| 7. | 2.79 |
| 8. | 4.63 |
| 9. | 7.34 |
| 10. | 10.5 |
| 13. | 25.0 |
| 16. | 47.0 |
| 16.29 (max) | 53.2 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 14.91 | 0. .5 .8 1.25 2. |

(2 of 4)



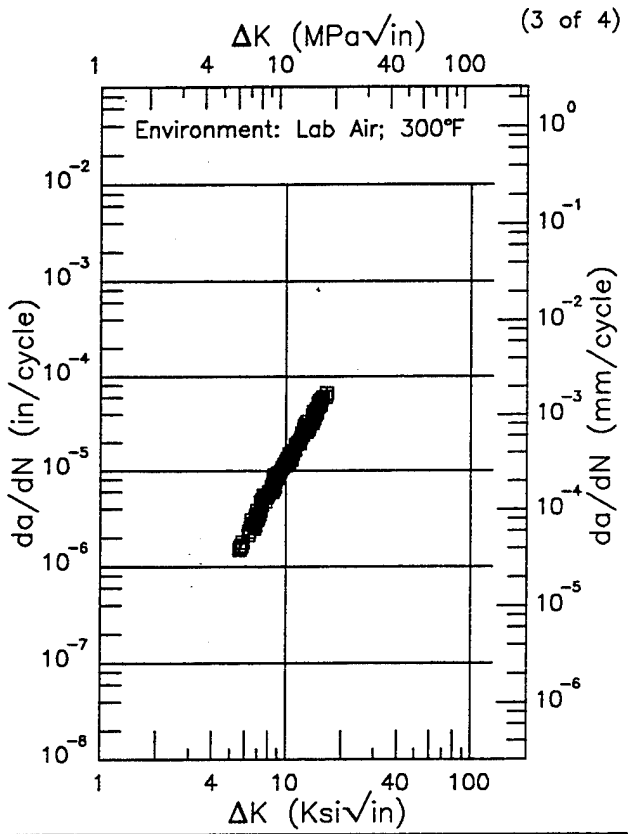

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 5.35 (min) | 1.54 |
| 6. | 2.19 |
| 7. | 3.24 |
| 8. | 4.70 |
| 9. | 7.21 |
| 10. | 11.1 |
| 13. | 26.1 |
| 16. | 52.8 |
| 17.32 (max) | 56.3 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 16.71 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.34**

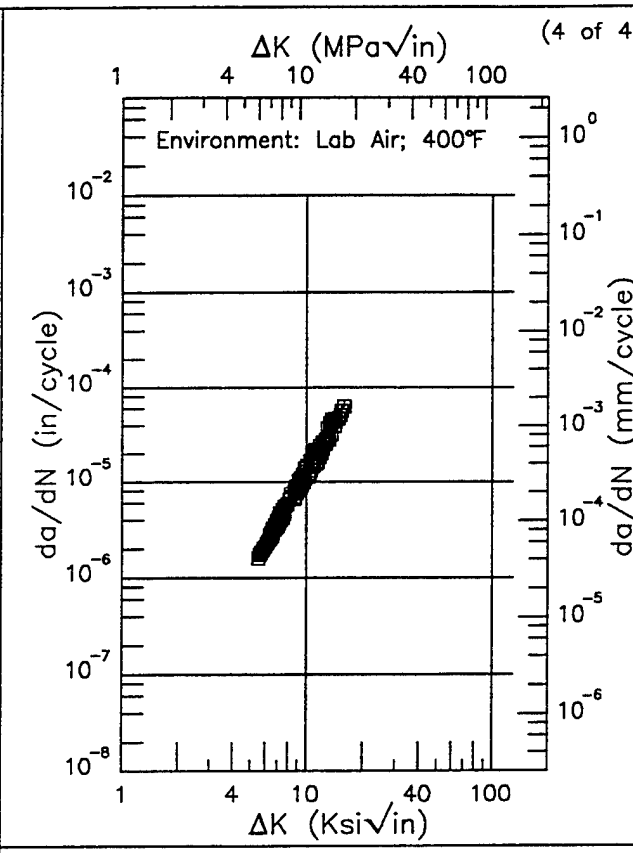
Condition/Ht: T351
Form: 0.5 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.3
Frequency: 20 Hz

Yield Strength: 51.5 ksi
Ult. Strength: 65.9 ksi
Specimen Thk: 0.5 in.
Specimen Width: 2 in.
Ref: UD009




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.60 (min) | 1.48 |
| 6. | 1.94 |
| 7. | 3.46 |
| 8. | 5.64 |
| 9. | 8.56 |
| 10. | 12.3 |
| 13. | 29.5 |
| 16. | 60.2 |
| 16.43 (max) | 66.3 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 8.62 | 0. .5 .8 1.25 2. |




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.49 (min) | 1.54 |
| 6. | 2.17 |
| 7. | 3.78 |
| 8. | 5.96 |
| 9. | 8.80 |
| 10. | 12.4 |
| 13. | 30.3 |
| 15.83 (max) | 62.8 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 10.98 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.34 (Concluded)**

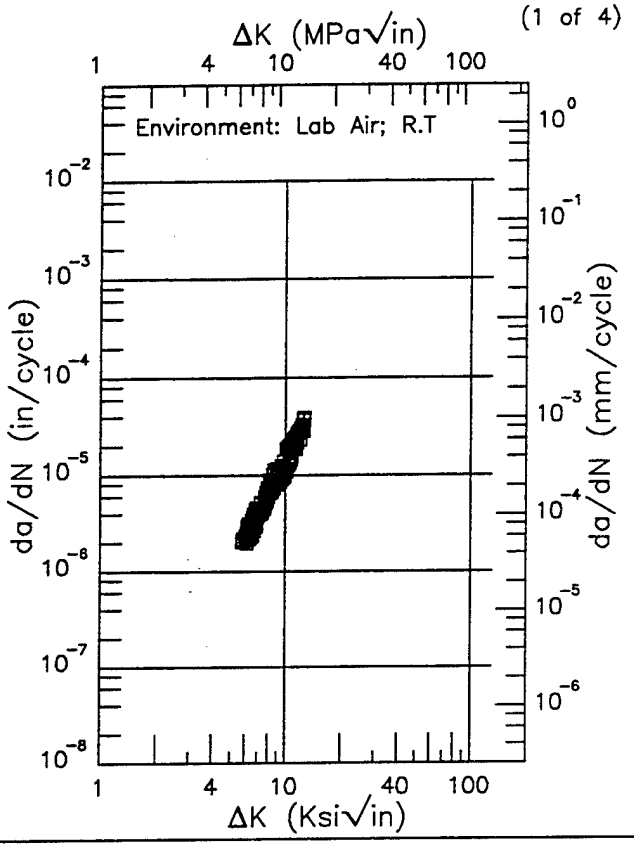
2024

E

Condition/Ht: T351
Form: 0.5 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.5
Frequency: 20 Hz

Yield Strength: 51.5 ksi
Ult. Strength: 65.9 ksi
Specimen Thk: 0.5 in.
Specimen Width: 2 in.
Ref: UD009

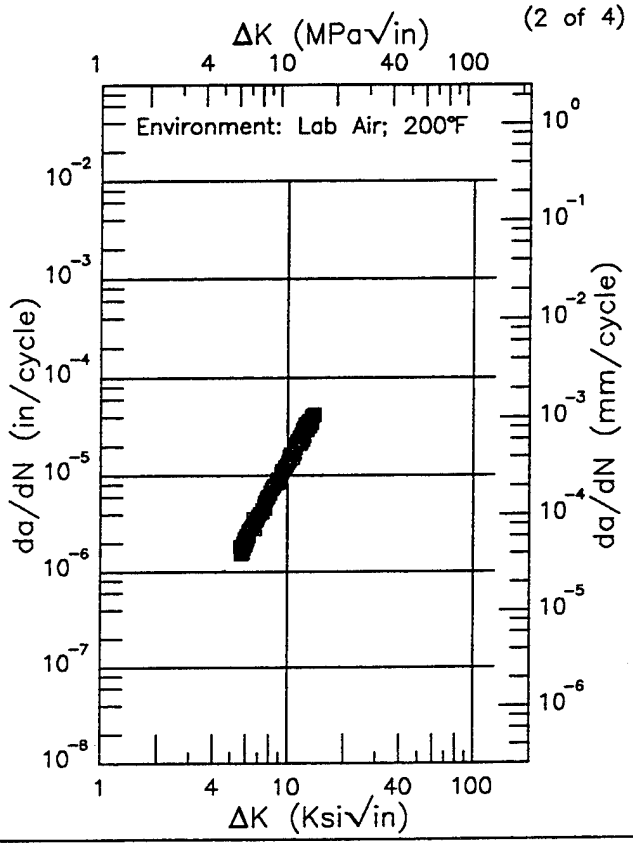
(1 of 4)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.77 (min) | 1.93 |
| 6. | 2.25 |
| 7. | 3.94 |
| 8. | 6.13 |
| 9. | 9.07 |
| 10. | 13.2 |
| 12.59 (max) | 34.9 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 15.68 | 0. .5 .8 1.25 2. |

(2 of 4)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.60 (min) | 1.57 |
| 6. | 2.09 |
| 7. | 3.80 |
| 8. | 6.14 |
| 9. | 9.25 |
| 10. | 13.3 |
| 13. | 34.0 |
| 13.83 (max) | 40.4 |

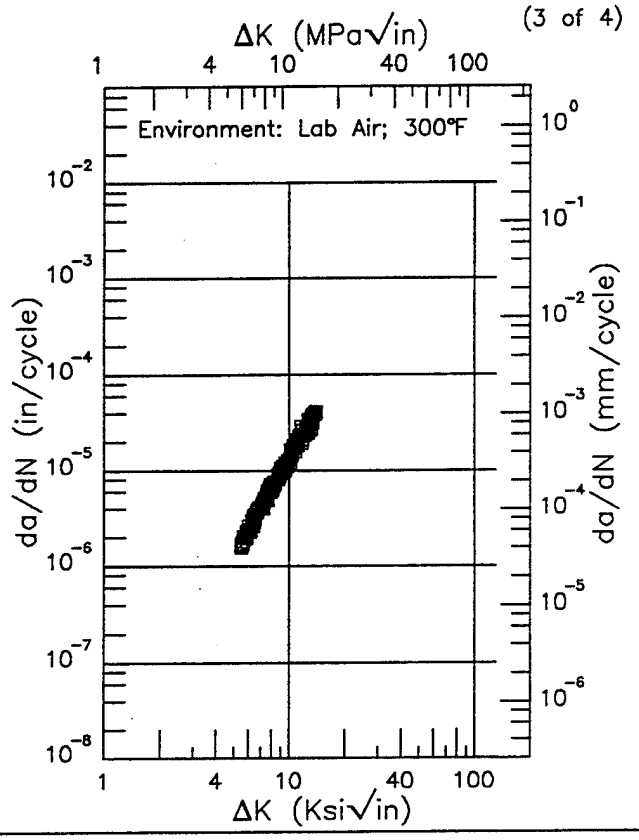
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 6.66 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.35**

Condition/Ht: T351
Form: 0.5 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.5
Frequency: 20 Hz

Yield Strength: 51.5 ksi
Ult. Strength: 65.9 ksi
Specimen Thk: 0.5 in.
Specimen Width: 2 in.
Ref: UD009

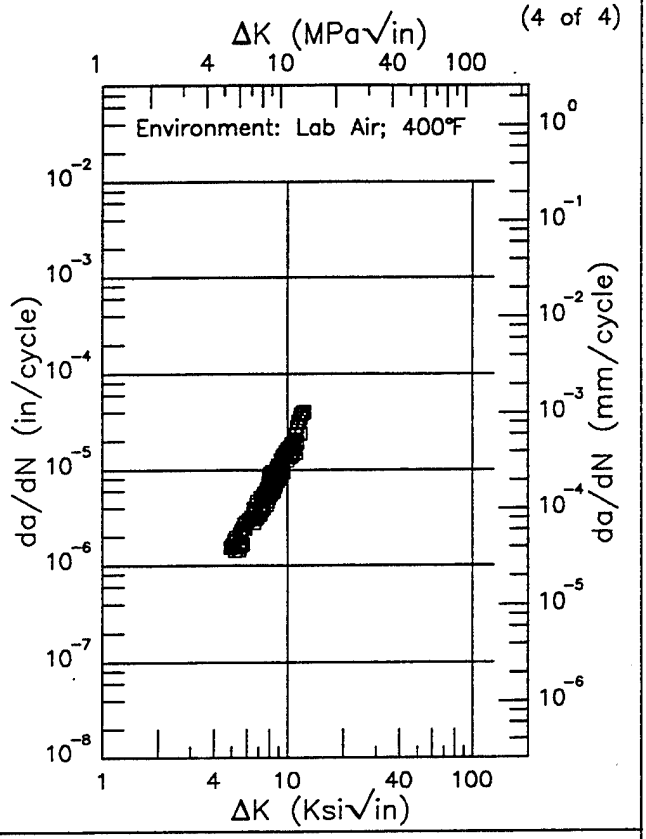
(3 of 4)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 5.46 (min) | 1.65 |
| 6. | 2.32 |
| 7. | 4.22 |
| 8. | 6.59 |
| 9. | 9.31 |
| 10. | 13.4 |
| 13. | 30.2 |
| 13.79 (max) | 41.9 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 8.49 | 0. .5 .8 1.25 2. |

(4 of 4)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.93 (min) | 1.50 |
| 5. | 1.54 |
| 6. | 2.50 |
| 7. | 4.11 |
| 8. | 6.48 |
| 9. | 9.64 |
| 10. | 14.1 |
| 12.26 (max) | 43.2 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 16.69 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.35 (Concluded)**

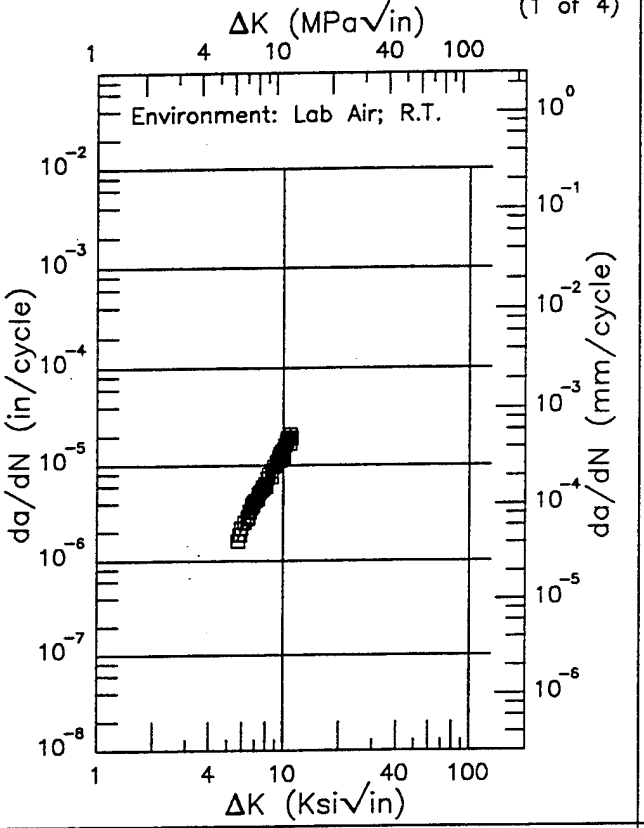
2024

E

Condition/Ht: T351
Form: 0.5 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.6
Frequency: 20 Hz

Yield Strength: 51.5 ksi
Ult. Strength: 65.9 ksi
Specimen Thk: 0.5 in.
Specimen Width: 2 in.
Ref: UD009

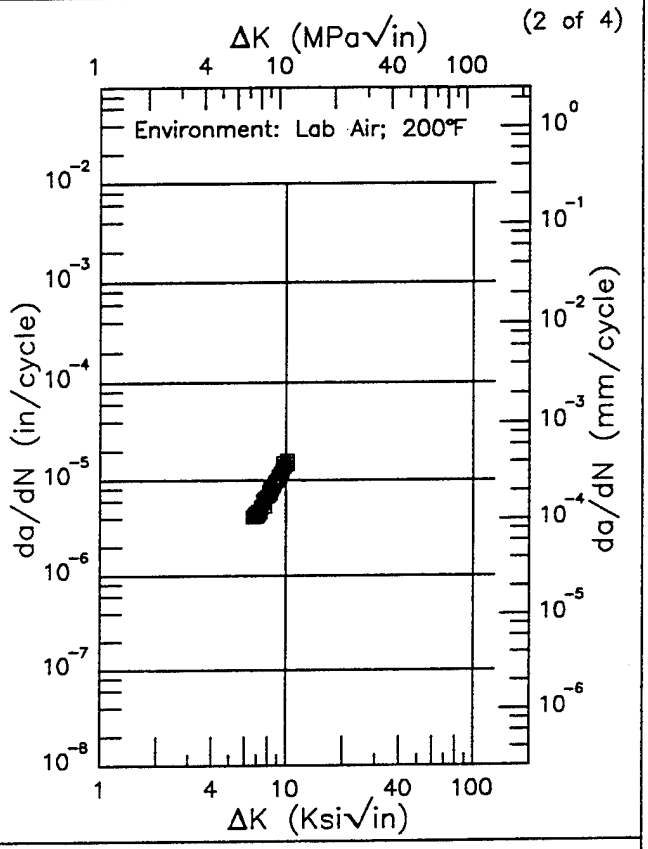
(1 of 4)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 5.67 (min) | 1.63 |
| 6. | 2.19 |
| 7. | 4.12 |
| 8. | 6.54 |
| 9. | 9.92 |
| 10. | 14.7 |
| 10.96 (max) | 19.5 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 6.32 | 0. .5 .8 1.25 2. |

(2 of 4)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 6.63 (min) | 4.22 |
| 7. | 4.30 |
| 8. | 6.90 |
| 9. | 10.0 |
| 10. | 14.4 |
| 10.11 (max) | 14.7 |

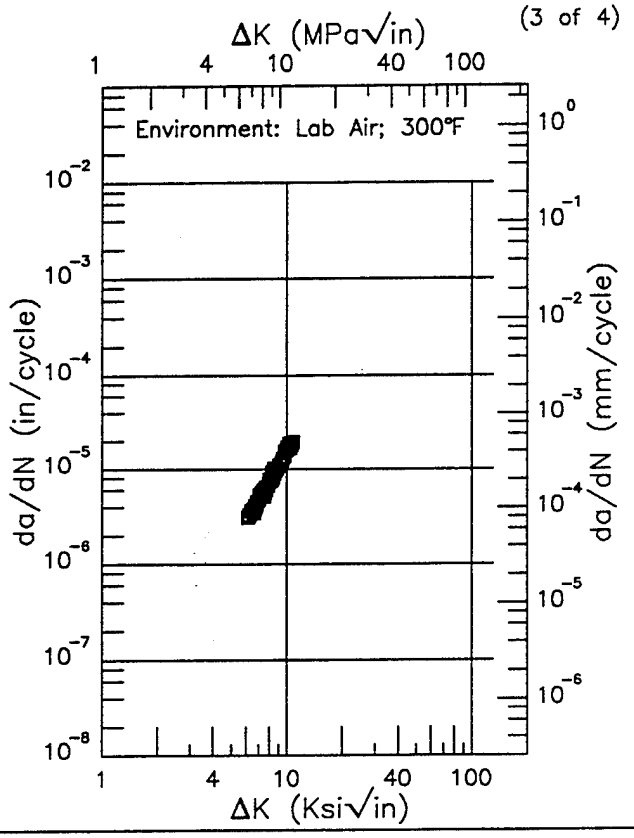
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 5.17 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.36**

Condition/Ht: T351
Form: 0.5 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.6
Frequency: 20 Hz

Yield Strength: 51.5 ksi
Ult. Strength: 65.9 ksi
Specimen Thk: 0.5 in.
Specimen Width: 2 in.
Ref: UD009

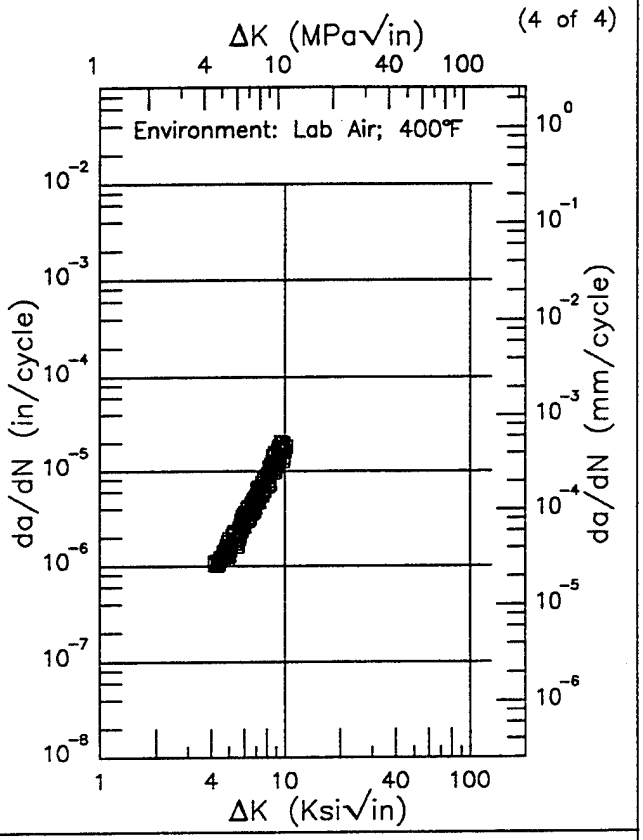
(3 of 4)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.14 (min) | 3.03 |
| 7. | 4.62 |
| 8. | 7.24 |
| 9. | 10.9 |
| 10. | 15.6 |
| 10.71 (max) | 19.8 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 5.84 | 0. .5 .8 1.25 2. |

(4 of 4)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.18 (min) | 1.02 |
| 5. | 1.58 |
| 6. | 2.88 |
| 7. | 4.97 |
| 8. | 8.33 |
| 9. | 13.5 |
| 10. | 16.3 |
| 10.12 (max) | 16.1 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 15.04 | 0. .5 .8 1.25 2. |

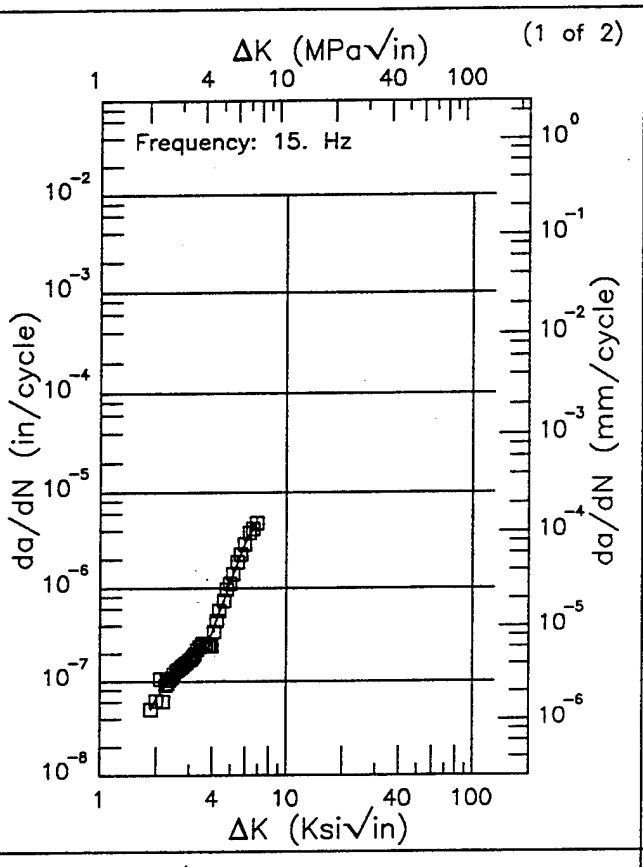
**Figure 7.5.3.1.36 (Concluded)**

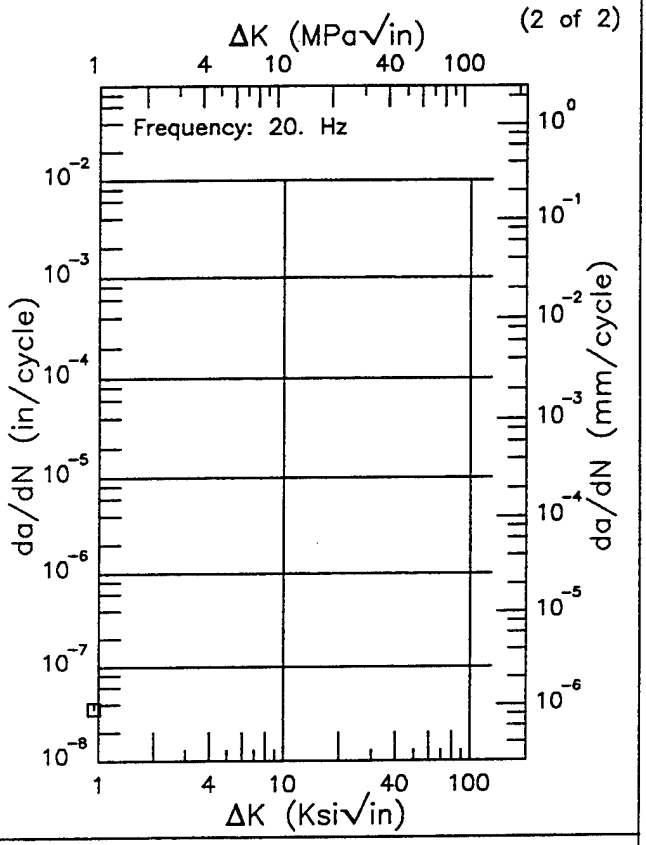
2024

F

Condition/Ht: T351
Form: 1 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.8
Environment: LAB AIR; RT

Yield Strength: 54.2 – 57 ksi
Ult. Strength:
Specimen Thk: 0.247 – 0.25 in.
Specimen Width: 2.006 – 2.007 in.
Ref: DA005




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 1.87 (min) | 0.0506 |
| 2. | 0.0657 |
| 2.5 | 0.120 |
| 3. | 0.167 |
| 3.5 | 0.227 |
| 4. | 0.342 |
| 5. | 1.19 |
| 6. | 3.00 |
| 6.84 (max) | 4.86 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 10.02 | 0. .5 .8 1.25 2. |

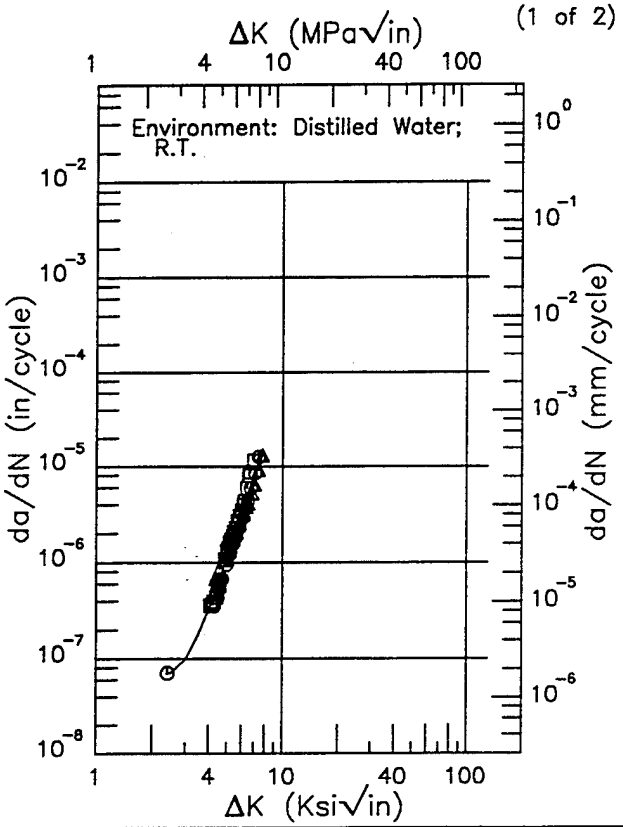
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.37**

Condition/Ht: T351
Form: 1 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.8
Frequency: 1 Hz

Yield Strength: 54.3 – 57 ksi
Ult. Strength: 70 ksi
Specimen Thk: 0.245 – 0.25 in.
Specimen Width: 2 – 2.008 in.
Ref: DA004;DA005

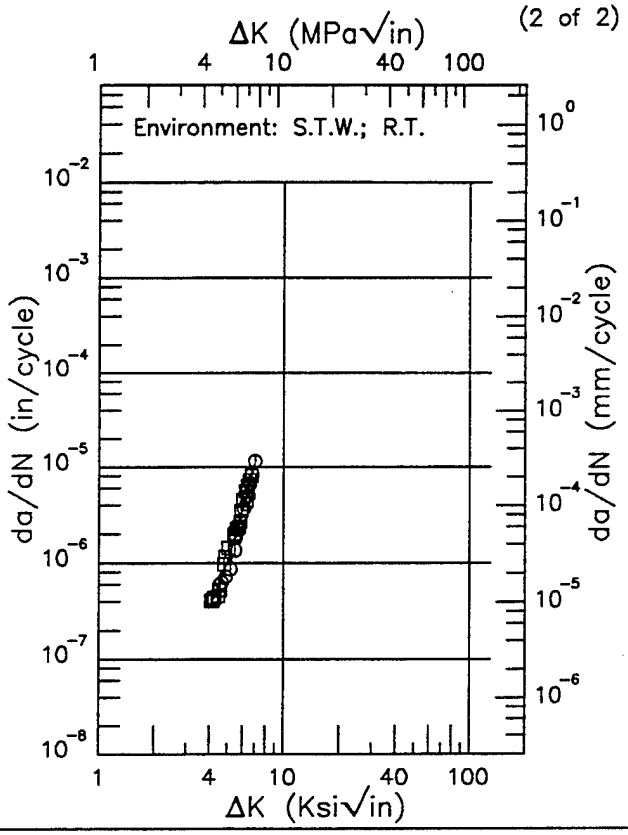
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 2.40 (min) | 0.0700 |
| 2.5 | 0.0711 |
| 3. | 0.0993 |
| 3.5 | 0.174 |
| 4. | 0.329 |
| 5. | 1.15 |
| 6. | 3.38 |
| 7. | 8.02 |
| 7.76 (max) | 13.4 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 17.63 | ⊙ ⊡ △ 0. .5 .8 1.25 2. |

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.07 (min) | 0.370 |
| 5. | 1.00 |
| 6. | 3.56 |
| 6.98 (max) | 10.9 |

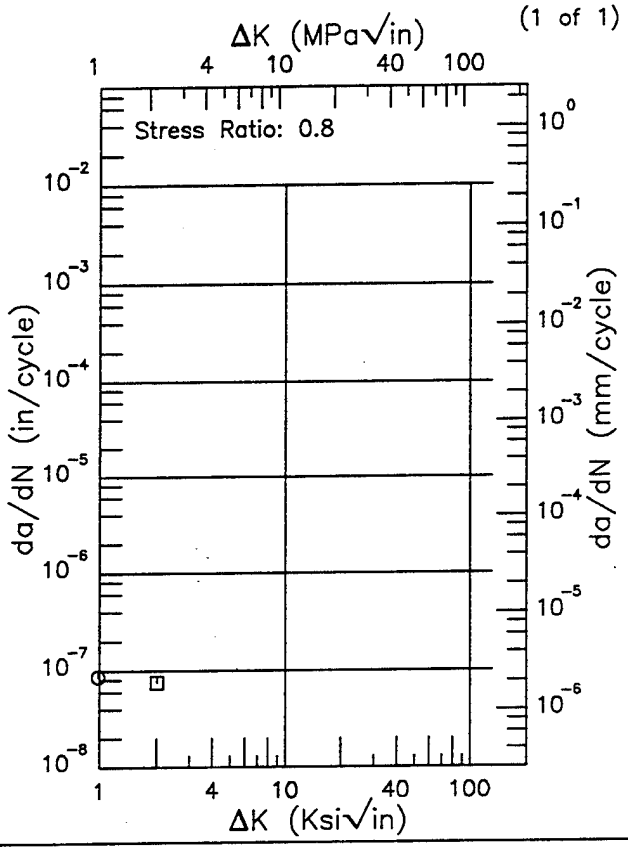
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 15.00 | ⊙ ⊡ 0. .5 .8 1.25 2. |

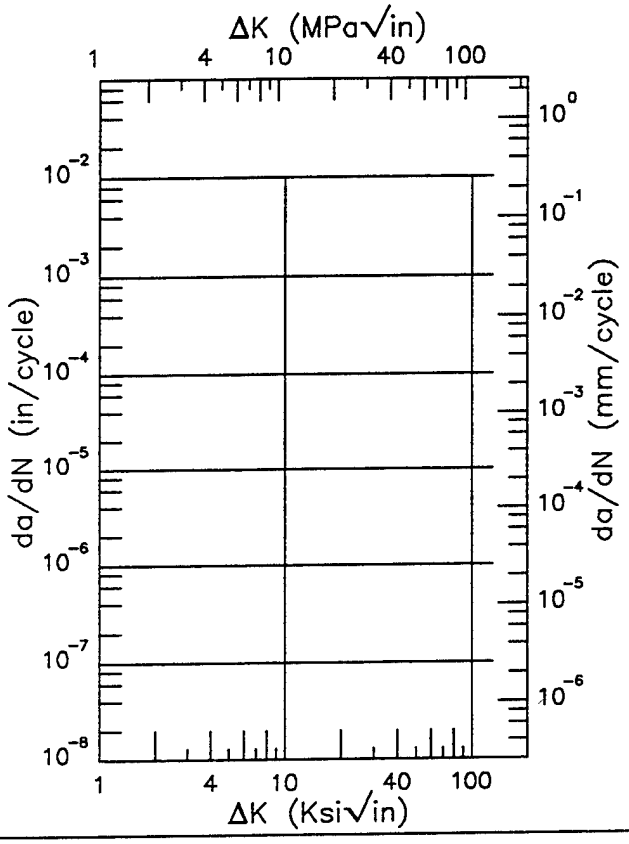
**Figure 7.5.3.1.38**

R 2024

Condition/Ht: T351
Form: 1 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 1 – 5 Hz
Environment: S.T.W.; RT

Yield Strength: 54.2 – 54.3 ksi
Ult. Strength:
Specimen Thk: 0.245 – 0.247 in.
Specimen Width: 2.006 – 2.008 in.
Ref: DA005




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

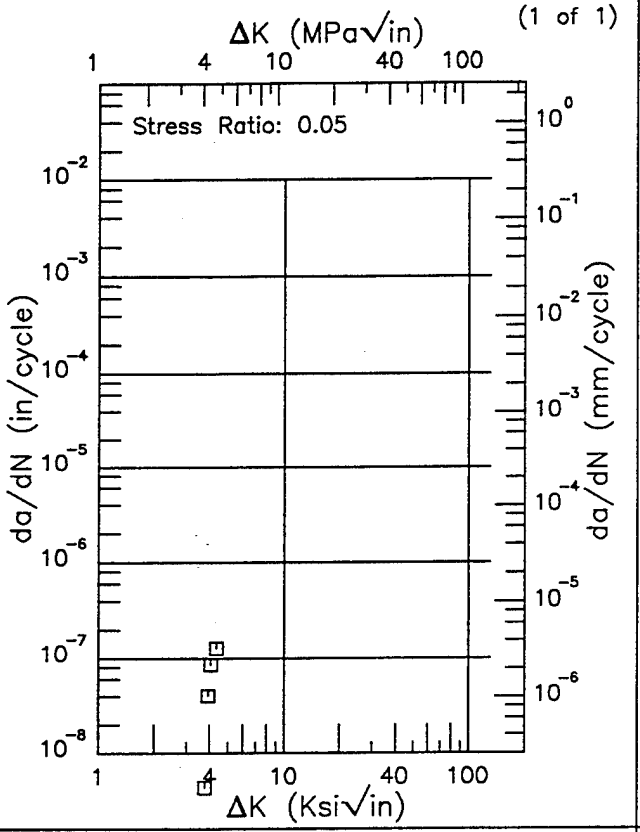
| RMS % Error | Life Prediction Ratio Summary | RMS % Error | Life Prediction Ratio Summary |
|---|---|---|---|
| | 0. .5 .8 1.25 2. | | 0. .5 .8 1.25 2. |

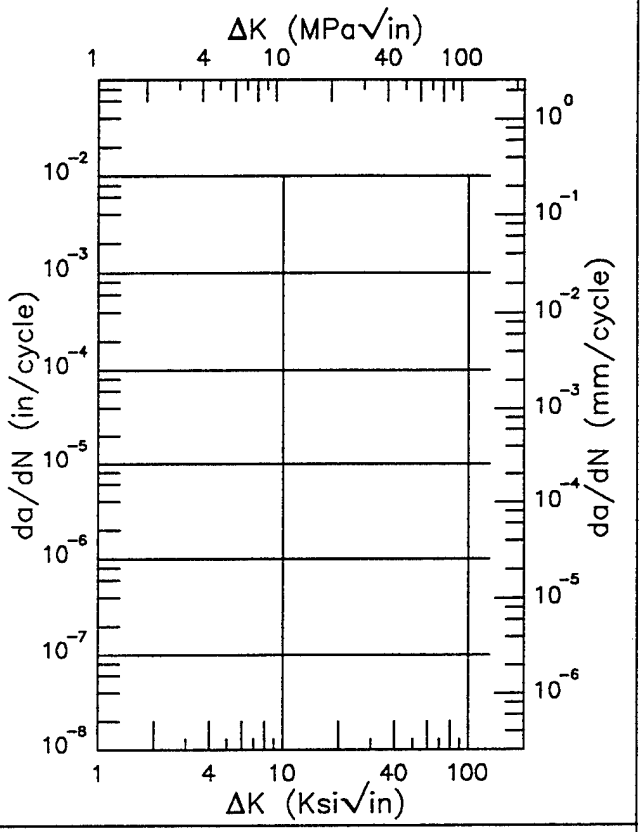
**Figure 7.5.3.1.39**

2024 R

Condition/Ht: T351
Form: 1 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 1 – 20 Hz
Environment: LAB AIR; RT

Yield Strength: 54.3 ksi
Ult. Strength:
Specimen Thk: 0.246 in.
Specimen Width: 2.006 in.
Ref: DA005




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

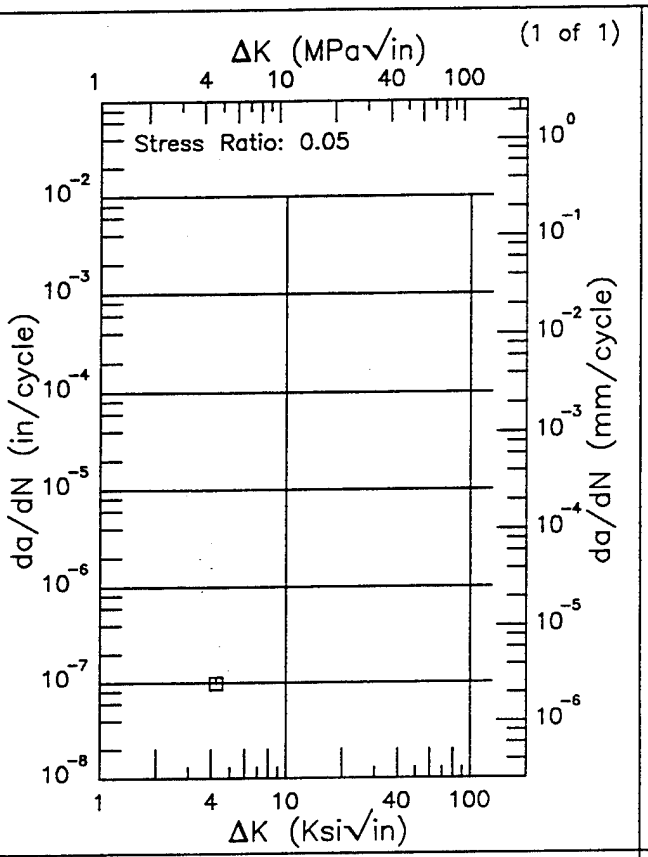
| RMS % Error | Life Prediction Ratio Summary | RMS % Error | Life Prediction Ratio Summary |
|---|---|---|---|
| | 0. .5 .8 1.25 2. | | 0. .5 .8 1.25 2. |

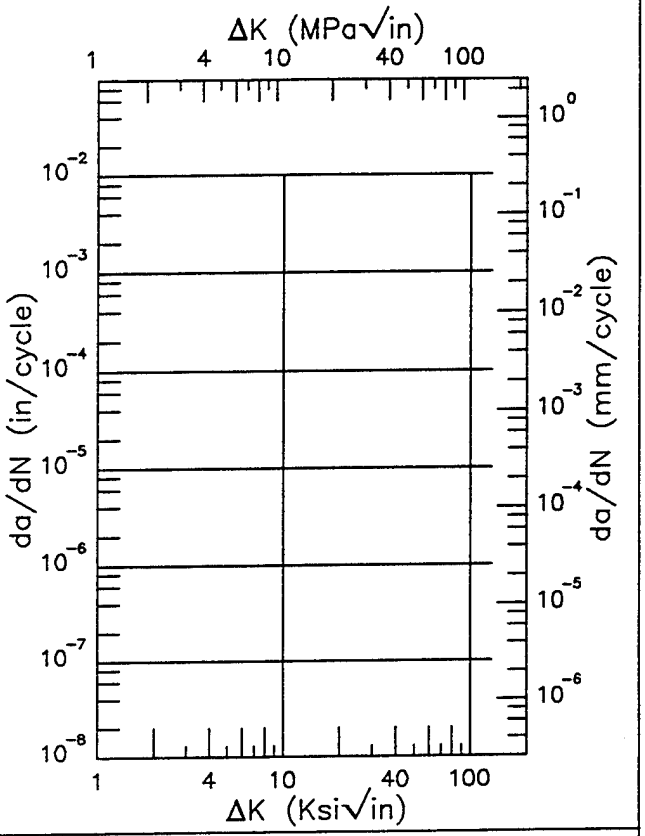
**Figure 7.5.3.1.40**

R 2024

Condition/Ht: T351
Form: 1 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 10 Hz
Environment: DIST WATER; RT

Yield Strength: 54.3 ksi
Ult. Strength:
Specimen Thk: 0.25 in.
Specimen Width: 2 in.
Ref: DA005




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

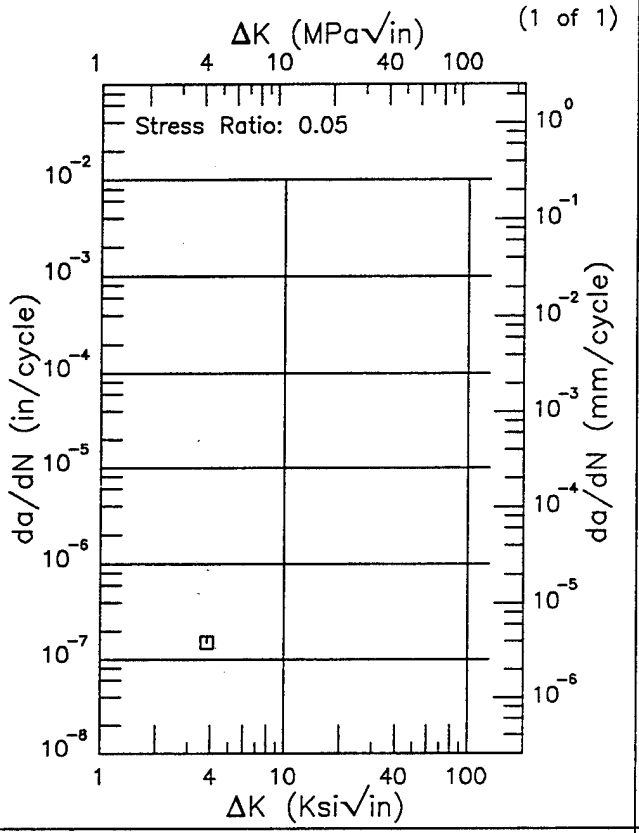
| RMS % Error | Life Prediction Ratio Summary | RMS % Error | Life Prediction Ratio Summary |
|---|---|---|---|
| | 0. .5 .8 1.25 2. | | 0. .5 .8 1.25 2. |

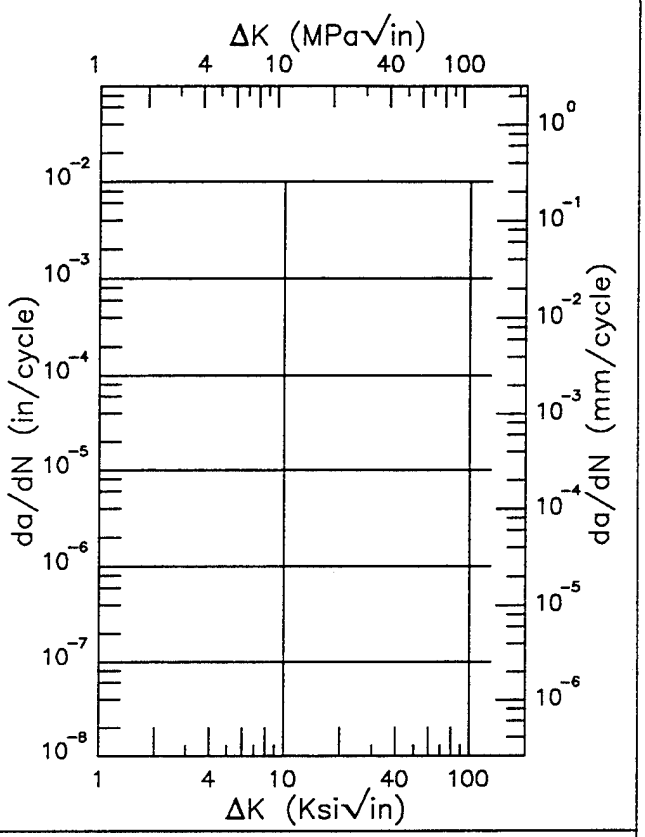
**Figure 7.5.3.1.41**

2024 R

Condition/Ht: T351
Form: 1 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 1 – 5 Hz
Environment: S.T.W.; RT

Yield Strength: 54.3 ksi
Ult. Strength:
Specimen Thk: 0.246 in.
Specimen Width: 2.006 in.
Ref: DA005




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

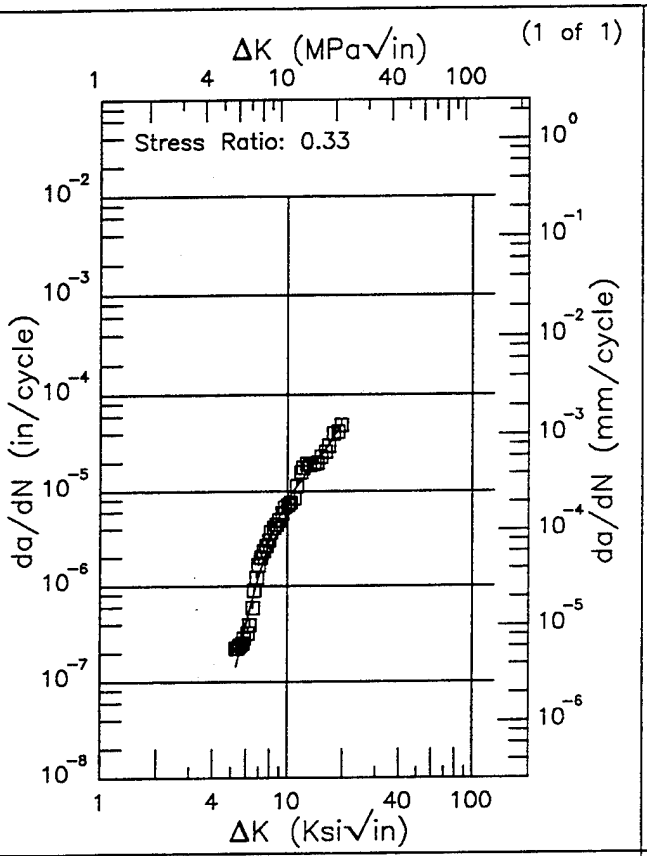
| RMS % Error | Life Prediction Ratio Summary | RMS % Error | Life Prediction Ratio Summary |
|---|---|---|---|
| | 0. .5 .8 1.25 2. | | 0. .5 .8 1.25 2. |

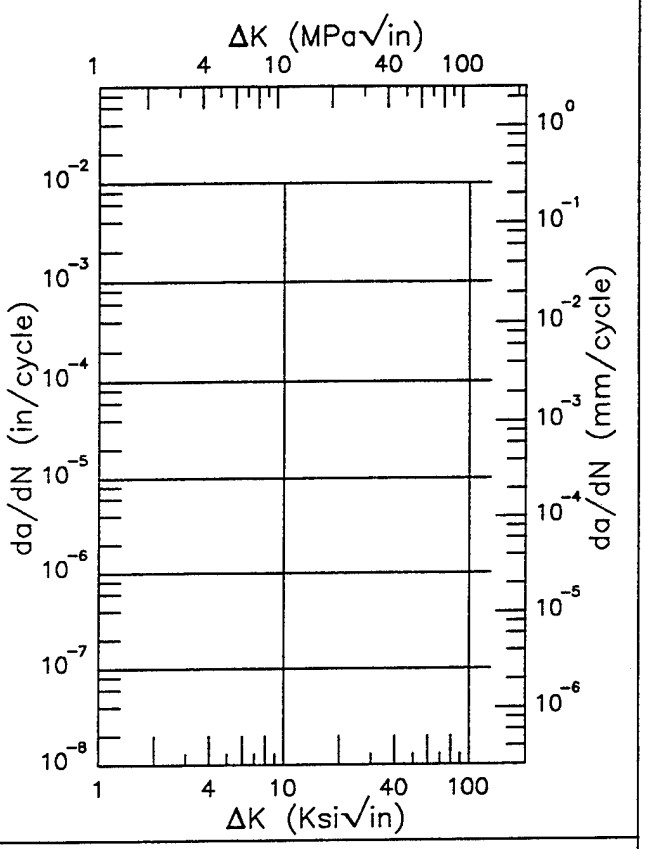
**Figure 7.5.3.1.42**

R | 2024

Condition/Ht: T351
Form: 0.75 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 25 Hz
Environment: LAB AIR; RT

Yield Strength: 54.4 ksi
Ult. Strength: 69.3 ksi
Specimen Thk: 0.248 in.
Specimen Width: 2.5 in.
Ref: AL002




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 5.32 (min) | 0.145 |
| 6. | 0.402 |
| 7. | 1.28 |
| 8. | 2.97 |
| 9. | 5.41 |
| 10. | 8.21 |
| 13. | 16.7 |
| 16. | 26.8 |
| 19.53 (max) | 48.4 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|

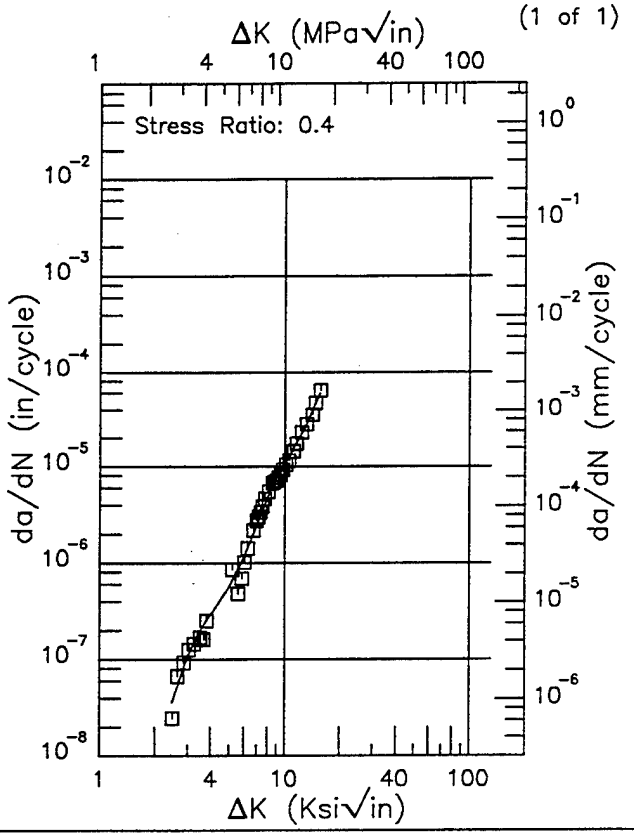
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 17.77 | 0. .5 .8 1.25 2. |

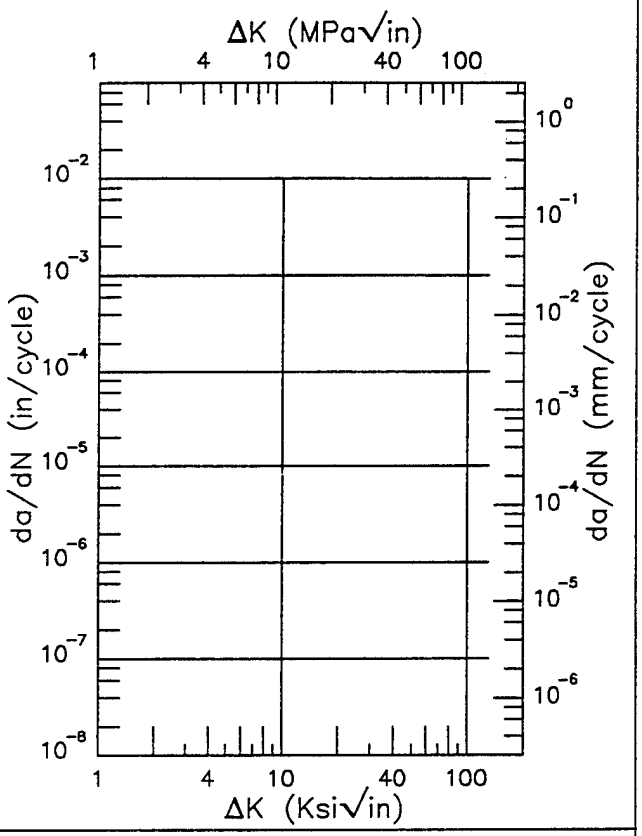
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.43**

Condition/Ht: T351
Form: 1 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 12 Hz
Environment: LAB AIR; RT

Yield Strength: 57 ksi
Ult. Strength:
Specimen Thk: 0.25 in.
Specimen Width: 2.01 in.
Ref: DA005




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.47 (min) | 0.0361 |
| 2.5 | 0.0391 |
| 3. | 0.108 |
| 3.5 | 0.196 |
| 4. | 0.294 |
| 5. | 0.570 |
| 6. | 1.16 |
| 7. | 2.49 |
| 8. | 4.81 |
| 9. | 7.80 |
| 10. | 10.7 |
| 13. | 26.3 |
| 15.52 (max) | 60.5 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 15.63 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

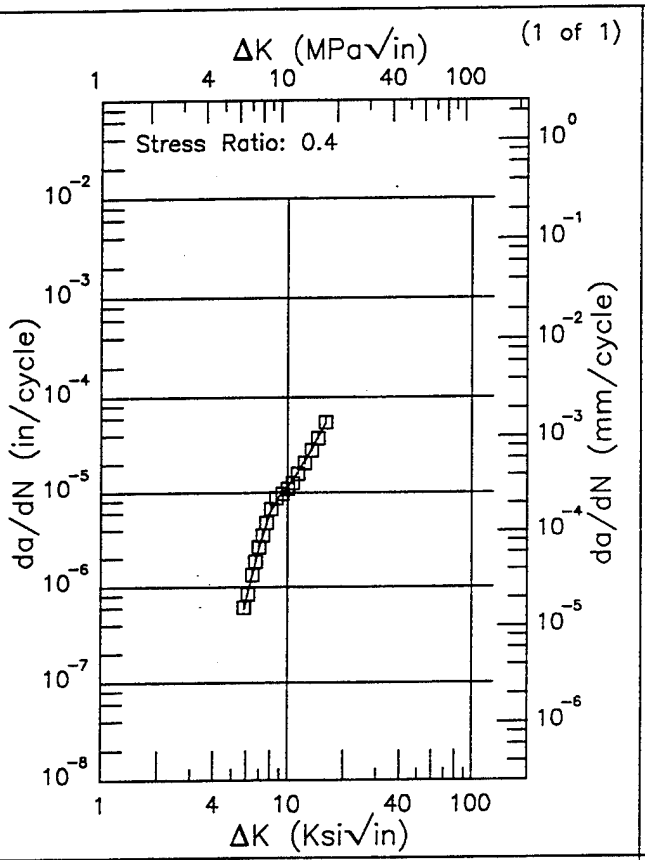
**Figure 7.5.3.1.44**

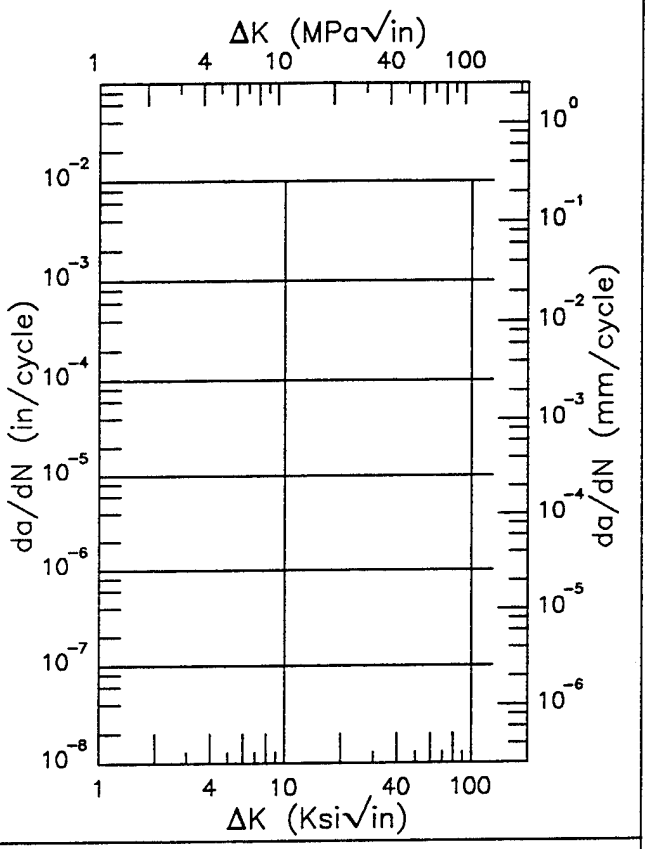
## 2024

R

Condition/Ht: T351
Form: 1 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 1 Hz
Environment: S.T.W.; RT

Yield Strength: 54.2 ksi
Ult. Strength:
Specimen Thk: 0.247 in.
Specimen Width: 2.006 in.
Ref: DA005




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.85 (min) | 0.585 |
| 6. | 0.729 |
| 7. | 2.59 |
| 8. | 6.11 |
| 9. | 9.29 |
| 10. | 11.3 |
| 13. | 25.7 |
| 15.93 (max) | 54.3 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 3.64 | 0. .5 .8 1.25 2. |

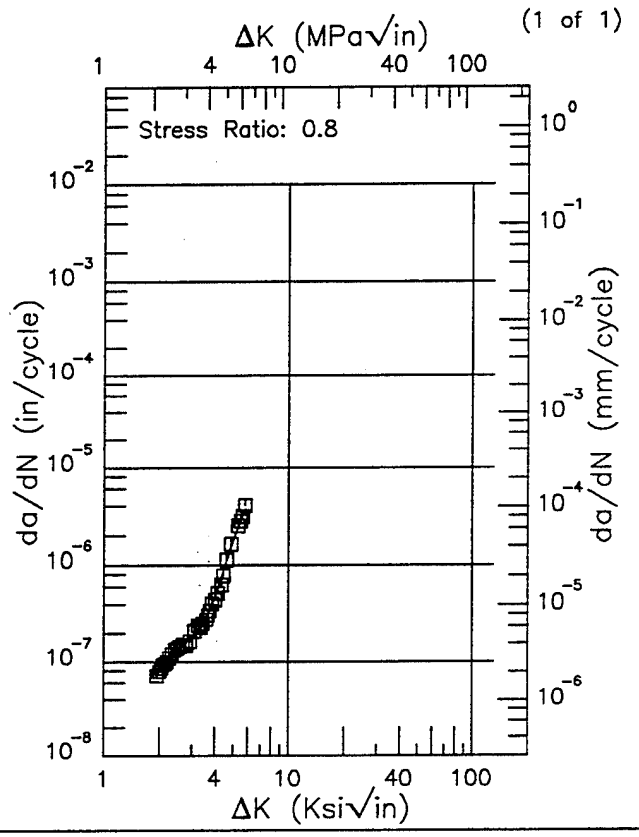
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

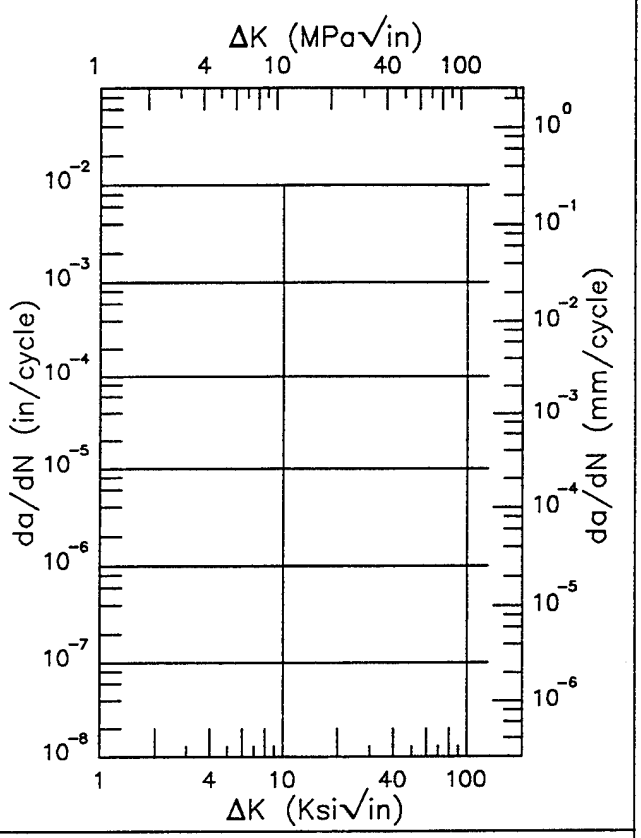
**Figure 7.5.3.1.45**

2024 R

Condition/Ht: T351
Form: 1 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 20 Hz
Environment: LAB AIR; RT

Yield Strength: 57 ksi
Ult. Strength: 70 ksi
Specimen Thk: 0.499 in.
Specimen Width: 2.003 in.
Ref: DA004




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 1.92 (min) | 0.0718 |
| 2. | 0.0810 |
| 2.5 | 0.134 |
| 3. | 0.184 |
| 3.5 | 0.261 |
| 4. | 0.455 |
| 5. | 1.79 |
| 5.80 (max) | 3.68 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 5.60 | 0. .5 .8 1.25 2. |

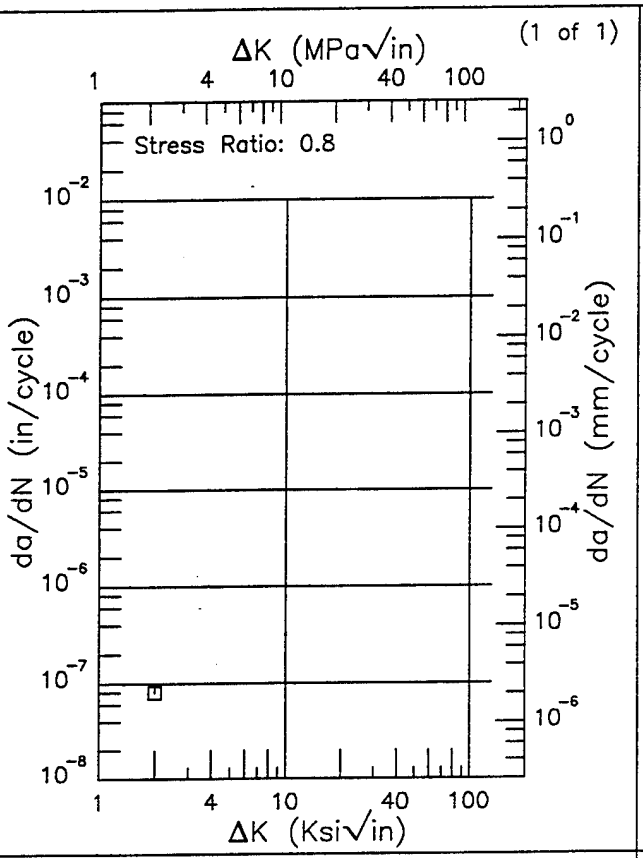
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

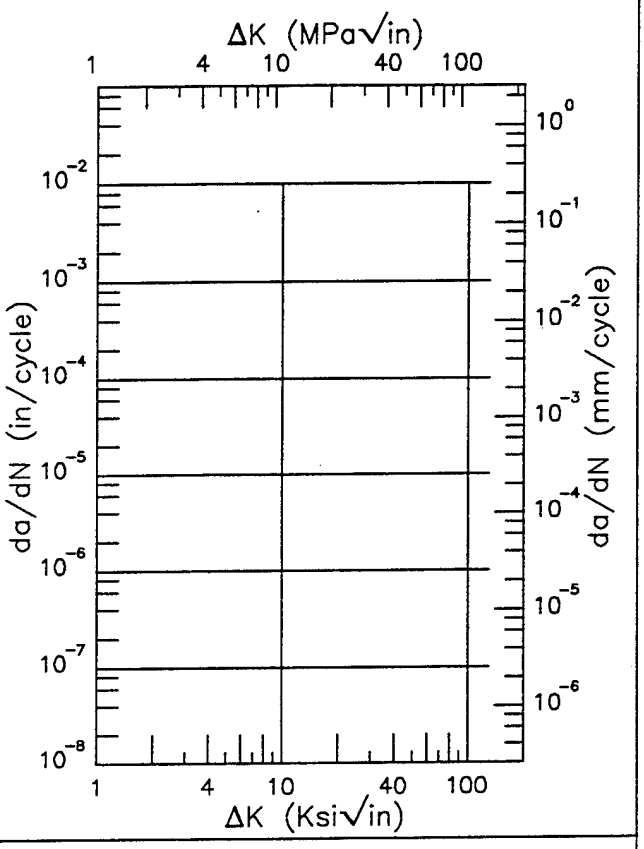
**Figure 7.5.3.1.46**

R 2024

Condition/Ht: T351
Form: 1 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 20 Hz
Environment: DIST WATER; RT

Yield Strength: 54.3 ksi
Ult. Strength:
Specimen Thk: 0.25 in.
Specimen Width: 2 in.
Ref: DA005




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

| RMS % Error | Life Prediction Ratio Summary | RMS % Error | Life Prediction Ratio Summary |
|---|---|---|---|
| | 0. .5 .8 1.25 2. | | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.47**

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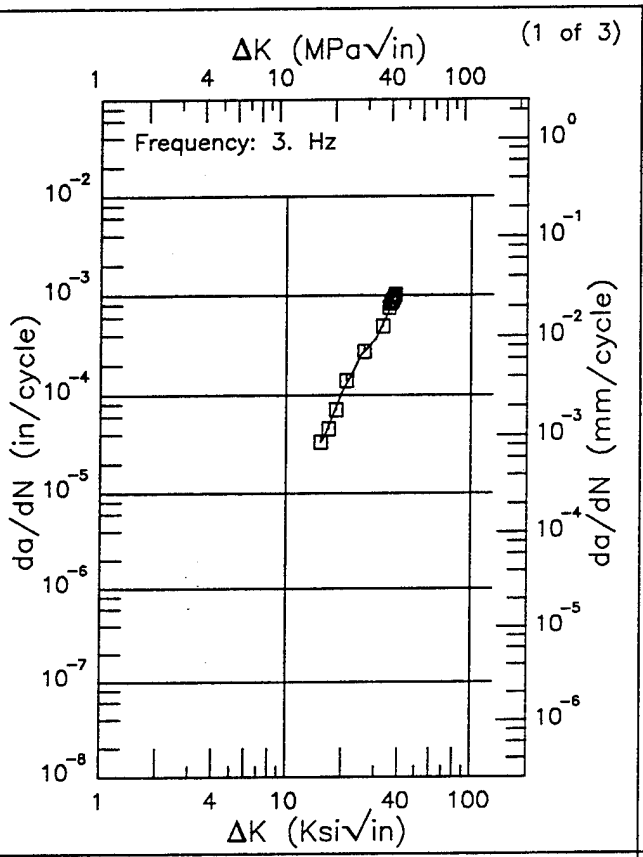
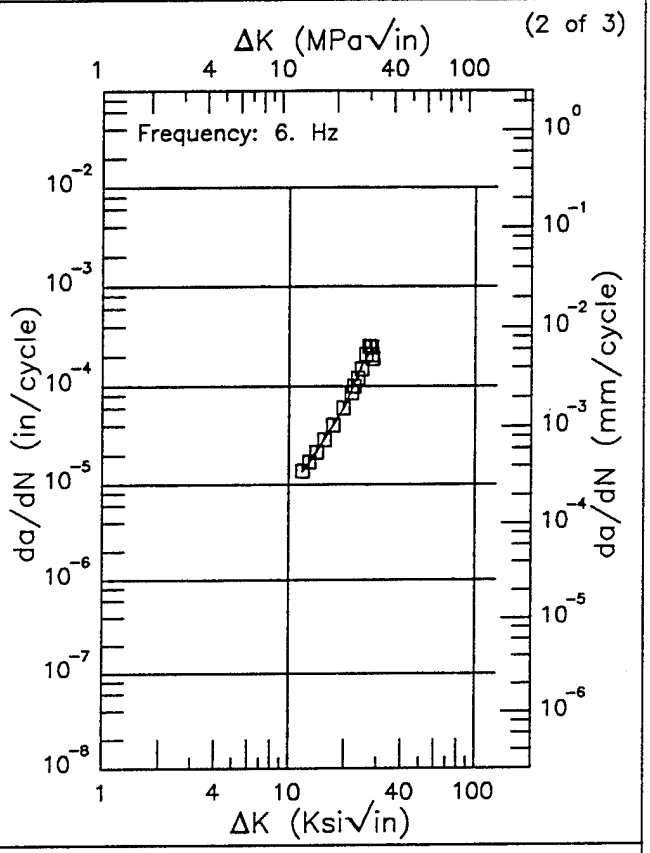
2024

F

Condition/Ht: T351
Form: 0.25 – 1 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Stress Ratio: –1
Environment: LAB AIR; RT

Yield Strength: 56.9–57.0 ksi
Ult. Strength: 70 ksi
Specimen Thk: 0.189–0.260 in.
Specimen Width: 11.939–12.005 in.
Ref: DA001;DA004




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 15.24 (min) | 33.5 |
| 16. | 37.6 |
| 20. | 108. |
| 25. | 253. |
| 30. | 361. |
| 35. | 673. |
| 38.29 (max) | 1045. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 11.83 (min) | 13.7 |
| 13. | 17.0 |
| 16. | 31.8 |
| 20. | 62.3 |
| 25. | 170. |
| 28.16 (max) | 241. |

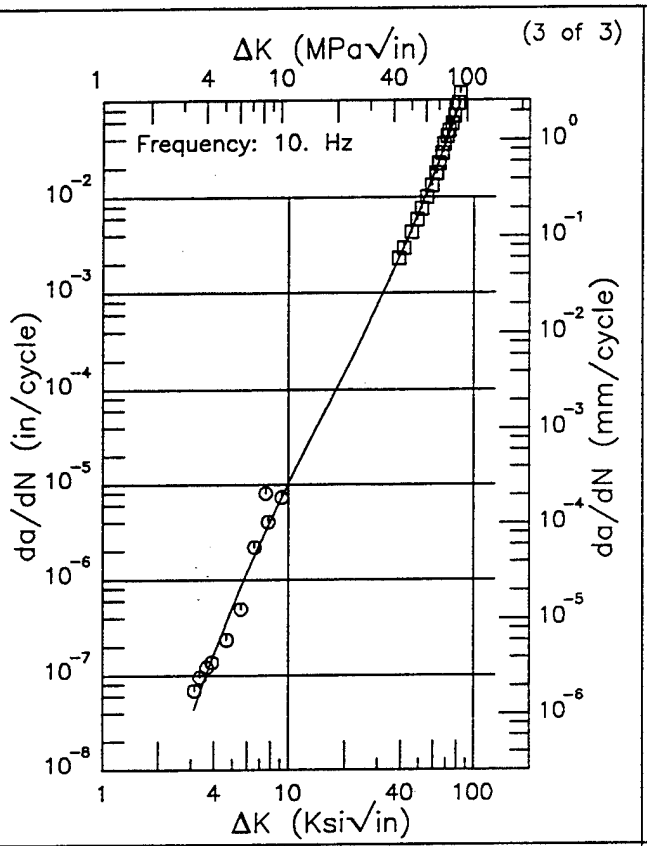
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 3.77 | 0. .5 .8 1.25 2. |

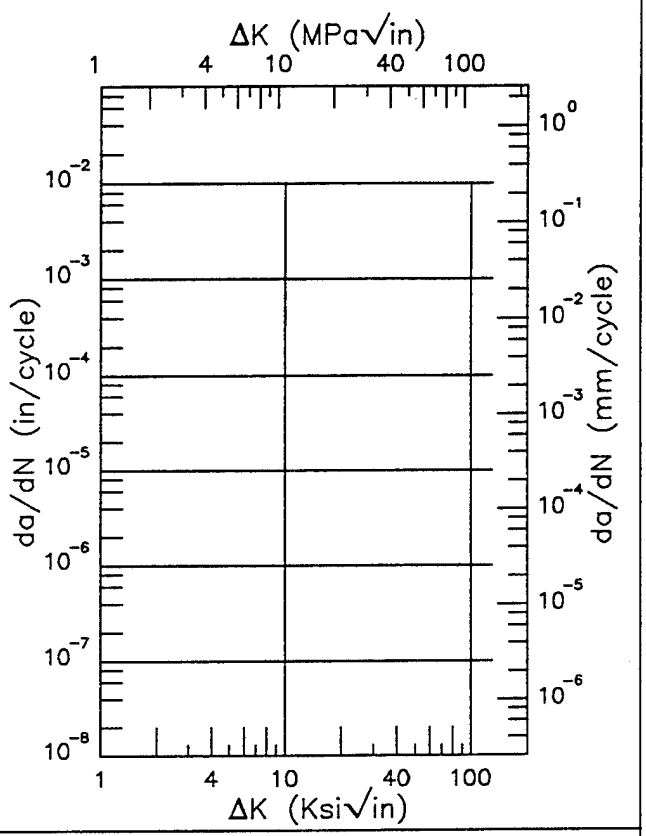
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 8.99 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.48**

Condition/Ht: T351
Form: 0.25 – 1 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Stress Ratio: –1
Environment: LAB AIR; RT

Yield Strength: 56.9–57.0 ksi
Ult. Strength: 70. ksi
Specimen Thk: 0.189–0.260 in.
Specimen Width: 11.939–12.005 in.
Ref: DA001;DA004




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.13 (min) | 0.0438 |
| 3.5 | 0.0815 |
| 4. | 0.166 |
| 5. | 0.505 |
| 6. | 1.18 |
| 7. | 2.34 |
| 8. | 4.13 |
| 9. | 6.72 |
| 10. | 10.3 |
| 16. | 64.4 |
| 20. | 152. |
| 30. | 755. |
| 40. | 2534. |
| 60. | 16606. |
| 80. | 74461. |
| 83.68 (max) | 95591. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 35.21 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

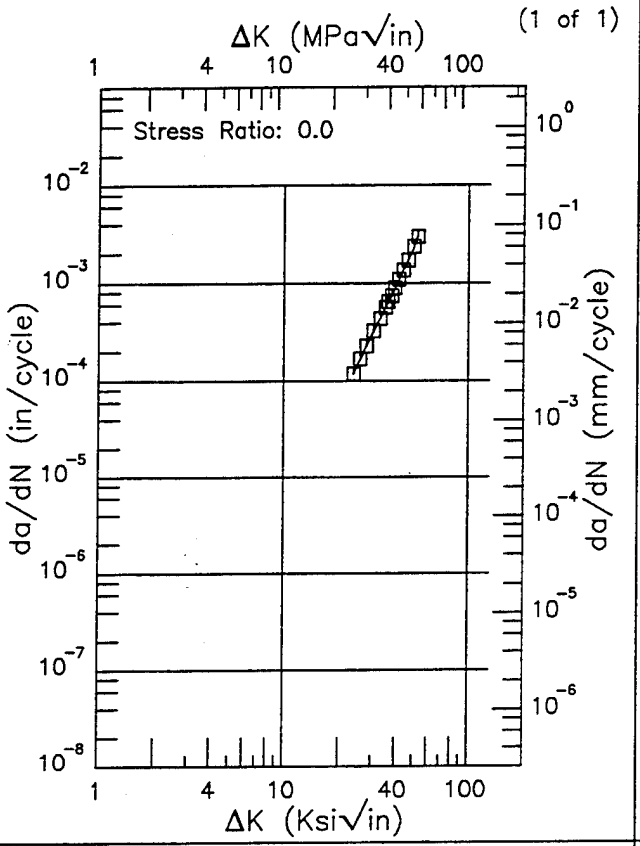
**Figure 7.5.3.1.48 (Concluded)**

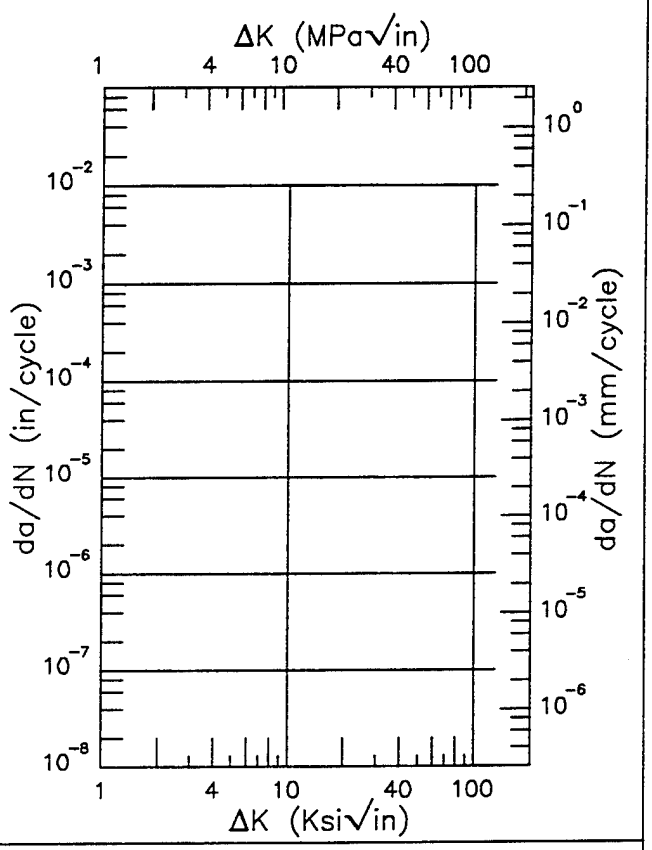
## 2024

R

Condition/Ht: T351
Form: 0.25 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 1 – 6 Hz
Environment: LAB AIR; RT

Yield Strength: 56.9 ksi
Ult. Strength:
Specimen Thk: 0.26 in.
Specimen Width: 12.007 in.
Ref: DA001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 23.72 (min) | 118. |
| 25. | 149. |
| 30. | 306. |
| 35. | 548. |
| 40. | 931. |
| 50. | 2284. |
| 52.44 (max) | 2961. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 0.63 | 0. .5 .8 1.25 2. |

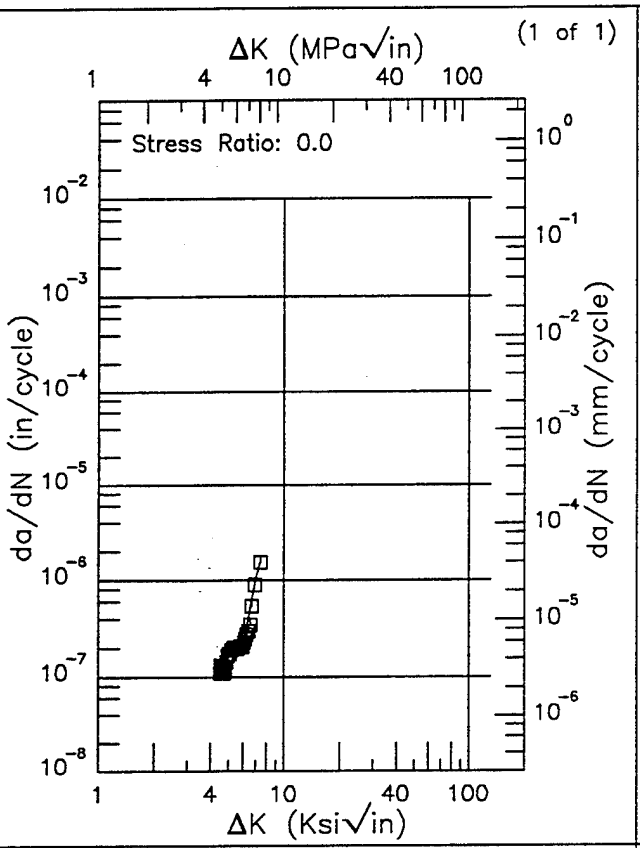
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

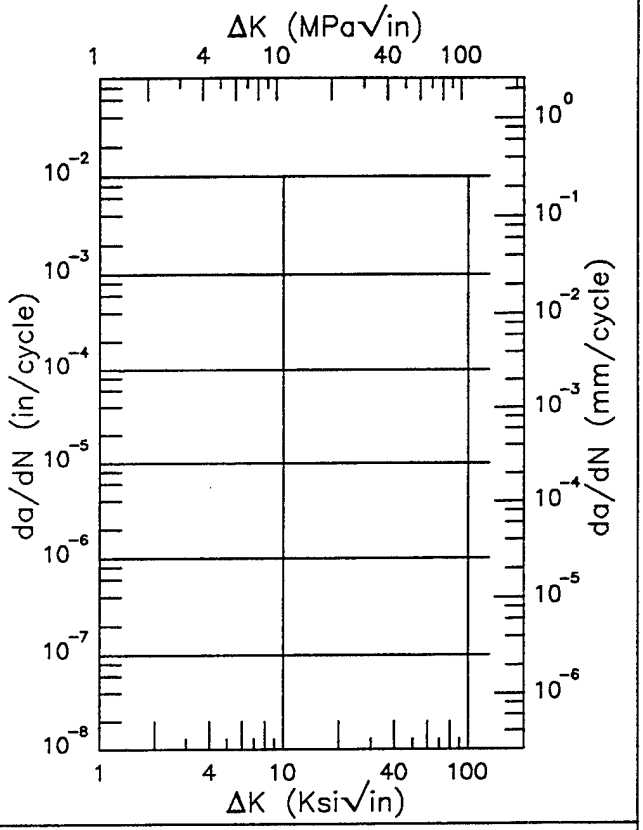
**Figure 7.5.3.1.49**

2024 R

Condition/Ht: T351
Form: 0.25 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 10 – 20 Hz
Environment: LAB AIR; RT

Yield Strength: 56.9 ksi
Ult. Strength:
Specimen Thk: 0.192 in.
Specimen Width: 4.003 in.
Ref: DA001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.49 (min) | 0.113 |
| 5. | 0.158 |
| 6. | 0.214 |
| 7. | 1.02 |
| 7.41 (max) | 1.51 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 12.07 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.50**

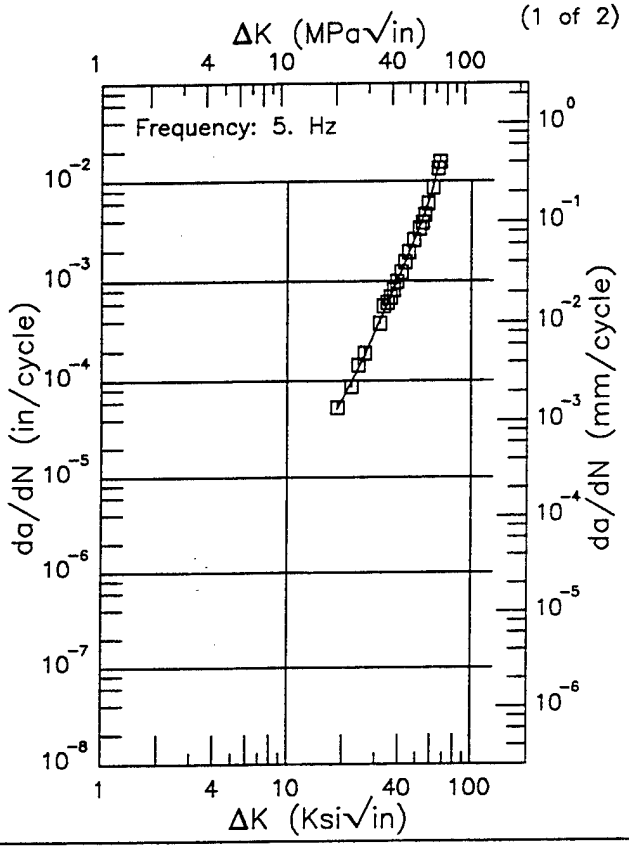
2024

F

Condition/Ht: T351
Form: 1 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Stress Ratio: 0.05
Environment: LAB AIR; RT

Yield Strength: 57 ksi
Ult. Strength: 70 ksi
Specimen Thk: 0.494–0.496 in.
Specimen Width: 11.895–11.937 in.
Ref: DA004

(1 of 2)



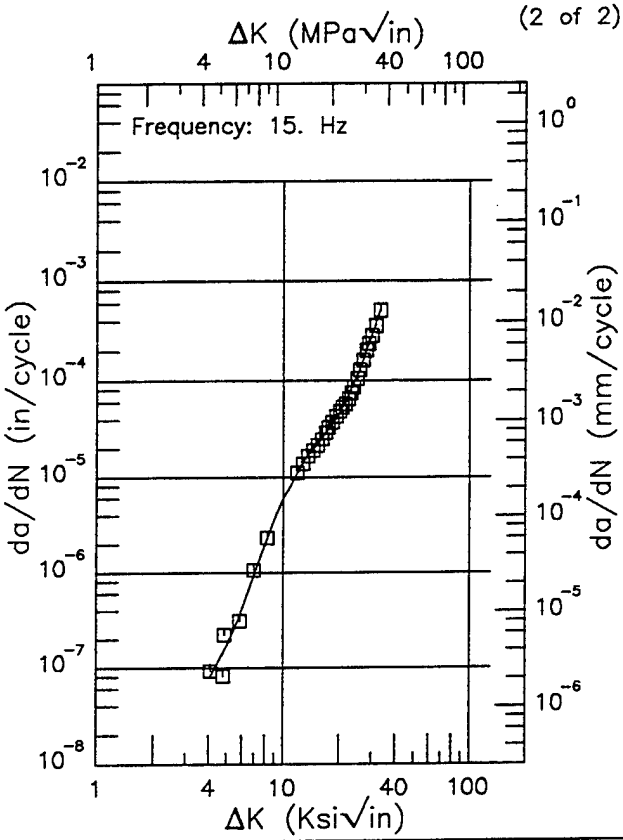

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 18.57 (min) | 51.8 |
| 20. | 65.0 |
| 25. | 151. |
| 30. | 327. |
| 35. | 625. |
| 40. | 1090. |
| 50. | 2883. |
| 60. | 7161. |
| 66.78 (max) | 15731. |

RMS % Error: 5.19

Life Prediction Ratio Summary

0. .5 .8 1.25 2.

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.09 (min) | 0.0825 |
| 5. | 0.168 |
| 6. | 0.407 |
| 7. | 0.941 |
| 8. | 1.97 |
| 9. | 3.65 |
| 10. | 6.04 |
| 13. | 15.2 |
| 16. | 24.7 |
| 20. | 45.4 |
| 25. | 111. |
| 30. | 286. |
| 33.13 (max) | 498. |

RMS % Error: 12.77

Life Prediction Ratio Summary

0. .5 .8 1.25 2.

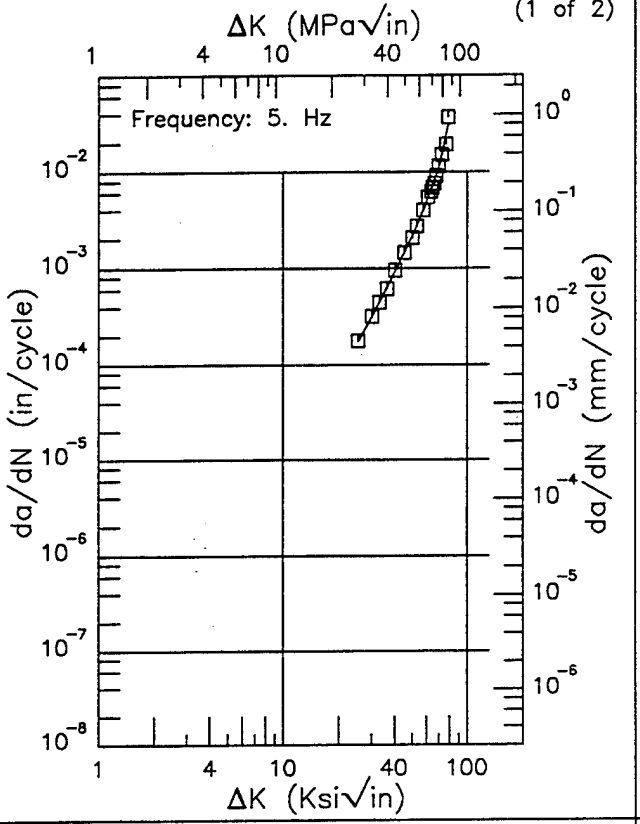
**Figure 7.5.3.1.51**

2024 F

Condition/Ht: T351
Form: 1 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Stress Ratio: 0.05
Environment: LAB AIR; RT

Yield Strength: 54.3–57.0 ksi
Ult. Strength: 70 ksi
Specimen Thk: 0.199–0.201 in.
Specimen Width: 11.895–12.014 in.
Ref: DA004;DA005

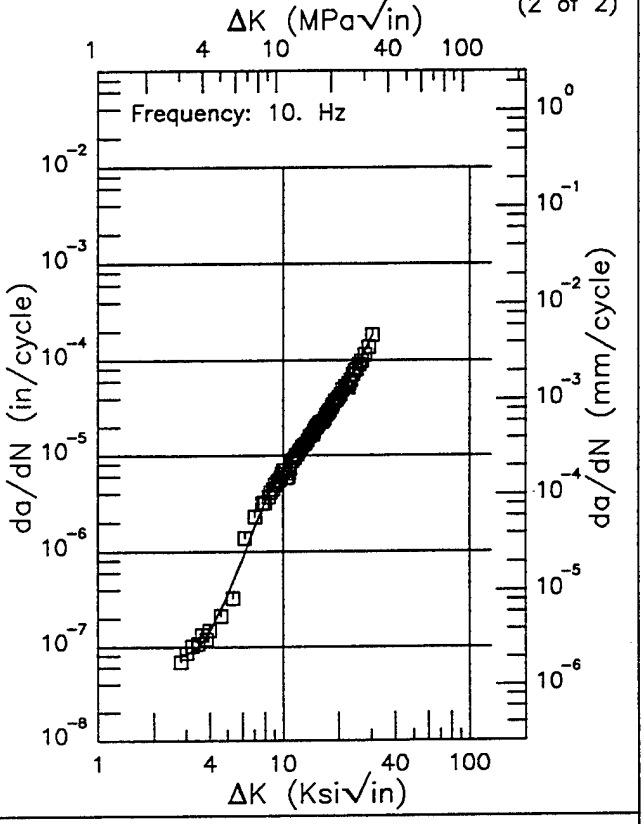
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 25.33 (min) | 177. |
| 30. | 312. |
| 35. | 556. |
| 40. | 910. |
| 50. | 2079. |
| 60. | 4902. |
| 70. | 11048. |
| 78.46 (max) | 30566. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 7.16 | 0. .5 .8 1.25 2. |

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.80 (min) | 0.0846 |
| 3. | 0.0836 |
| 3.5 | 0.101 |
| 4. | 0.144 |
| 5. | 0.349 |
| 6. | 0.834 |
| 7. | 1.77 |
| 8. | 3.25 |
| 9. | 5.19 |
| 10. | 7.28 |
| 13. | 13.0 |
| 16. | 20.5 |
| 20. | 42.3 |
| 25. | 82.4 |
| 30. | 176. |
| 30.27 (max) | 187. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 11.27 | 0. .5 .8 1.25 2. |

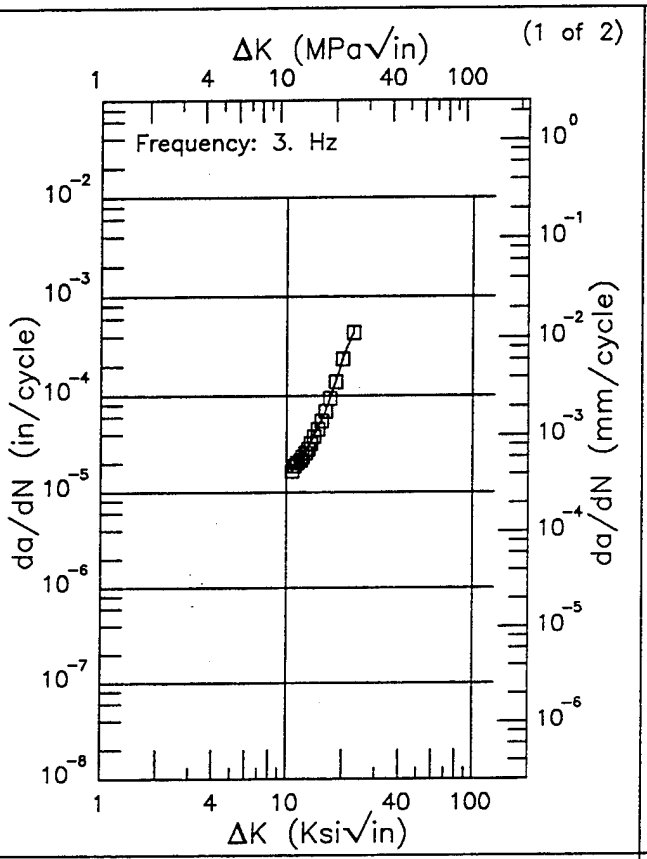
**Figure 7.5.3.1.52**

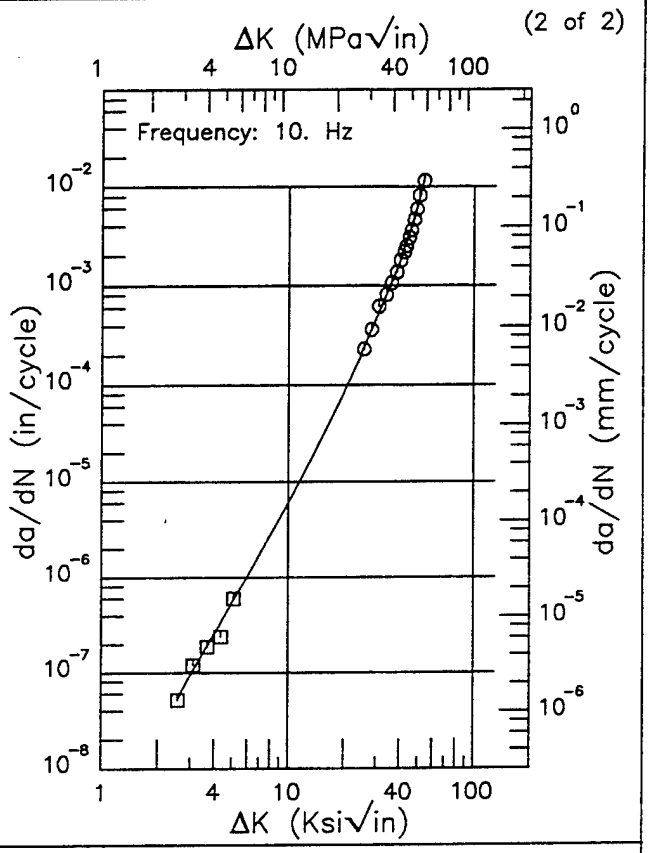
## 2024

F

Condition/Ht: T351
Form: 0.25 – 1 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Stress Ratio: 0.4
Environment: LAB AIR; RT

Yield Strength: 56.9–57.0 ksi
Ult. Strength: 70 ksi
Specimen Thk: 0.197–0.261 in.
Specimen Width: 11.880–12.007 in.
Ref: DA001;DA004




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 10.67 (min) | 16.9 |
| 13. | 28.6 |
| 16. | 67.9 |
| 20. | 242. |
| 22.69 (max) | 433. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.57 (min) | 0.0539 |
| 3. | 0.0938 |
| 3.5 | 0.161 |
| 4. | 0.255 |
| 5. | 0.546 |
| 6. | 1.02 |
| 7. | 1.72 |
| 8. | 2.74 |
| 9. | 4.13 |
| 10. | 6.00 |
| 16. | 34.4 |
| 20. | 83.9 |
| 30. | 475. |
| 40. | 1746. |
| 53.56 (max) | 12144. |

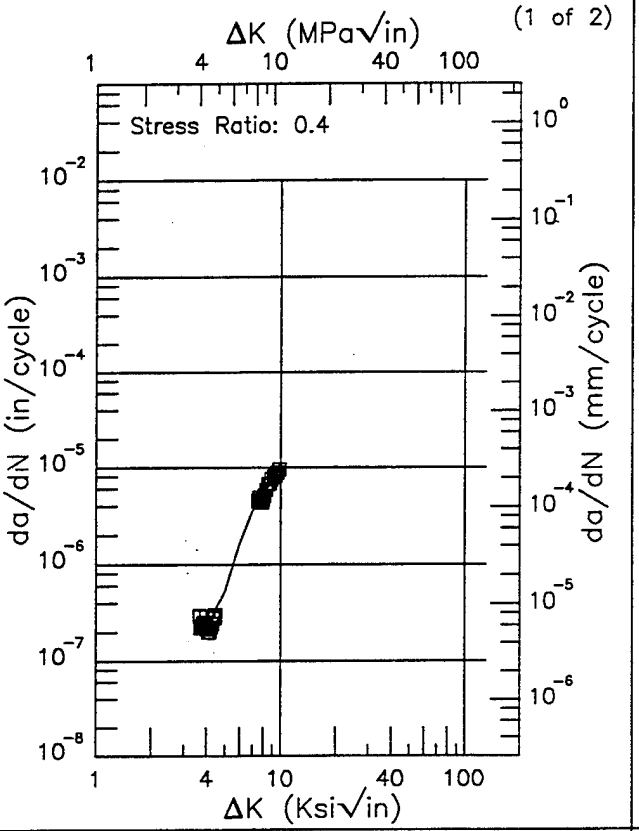
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 2.49 | 0. .5 .8 1.25 2. |

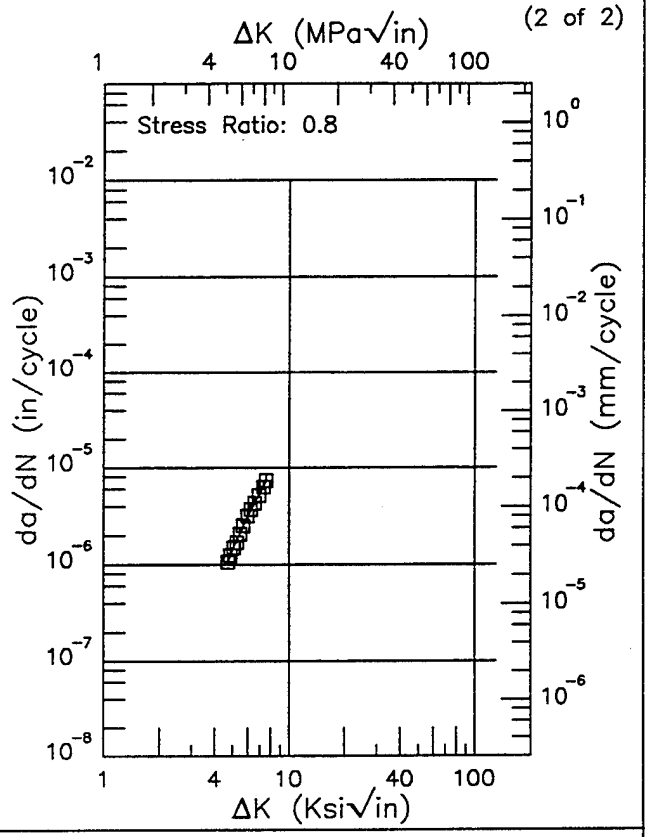
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 9.92 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.53**

Condition/Ht: T351
Form: 0.25 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 5 – 10 Hz
Environment: LAB AIR; RT

Yield Strength: 56.9 ksi
Ult. Strength:
Specimen Thk: 0.188 – 0.19 in.
Specimen Width: 3.999 – 4.002 in.
Ref: DA001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.67 (min) | 0.234 |
| 4. | 0.224 |
| 5. | 0.524 |
| 6. | 1.62 |
| 7. | 3.53 |
| 8. | 5.30 |
| 9. | 7.32 |
| 9.80 (max) | 9.99 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.71 (min) | 1.05 |
| 5. | 1.42 |
| 6. | 3.12 |
| 7. | 5.36 |
| 7.53 (max) | 7.24 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 9.76 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 1.05 | 0. .5 .8 1.25 2. |

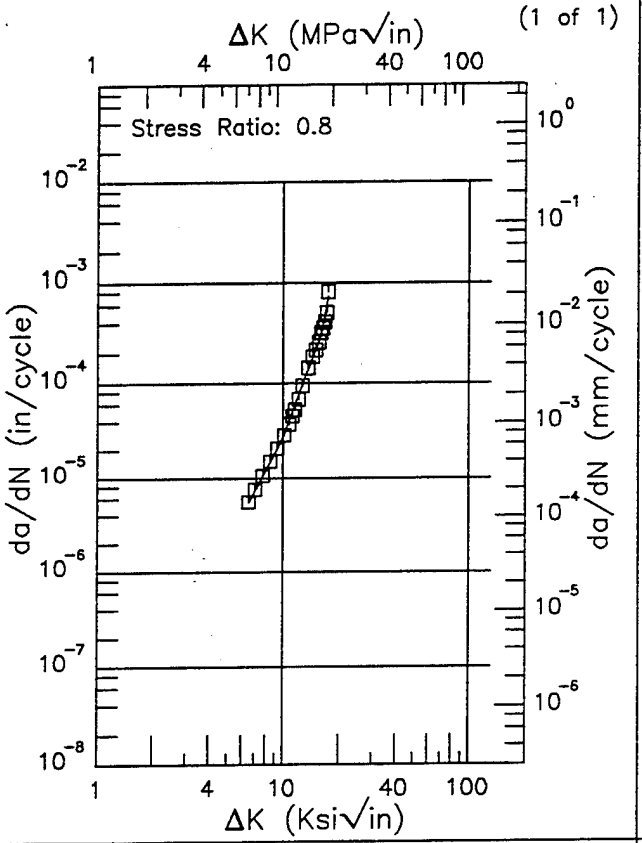
**Figure 7.5.3.1.54**

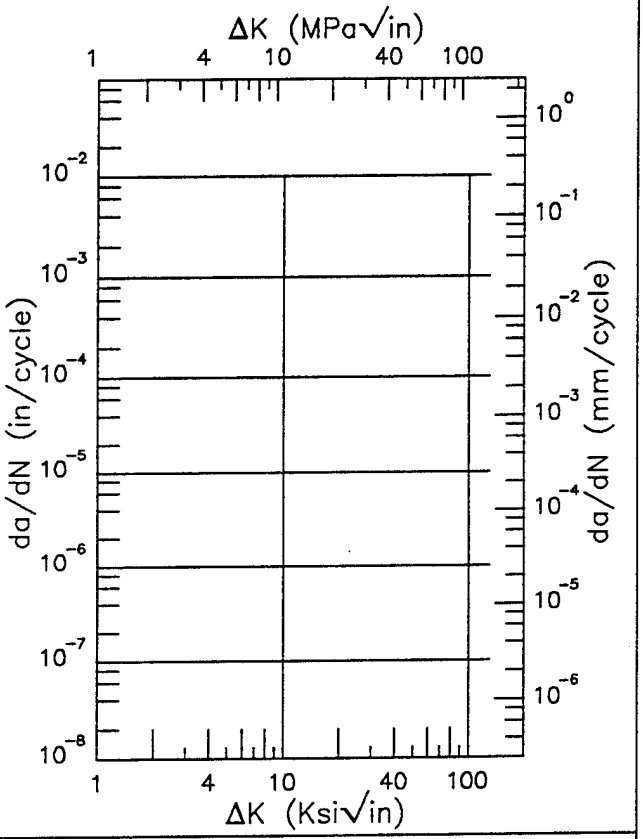
## 2024

R

Condition/Ht: T351
Form: 1 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 5 – 10 Hz
Environment: LAB AIR; RT

Yield Strength: 57 ksi
Ult. Strength: 70 ksi
Specimen Thk: 0.201 in.
Specimen Width: 11.897 in.
Ref: DA004




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.51 (min) | 5.50 |
| 7. | 7.26 |
| 8. | 11.9 |
| 9. | 18.4 |
| 10. | 27.7 |
| 13. | 107. |
| 16. | 303. |
| 17.41 (max) | 742. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 6.37 | 0. .5 .8 1.25 2. |

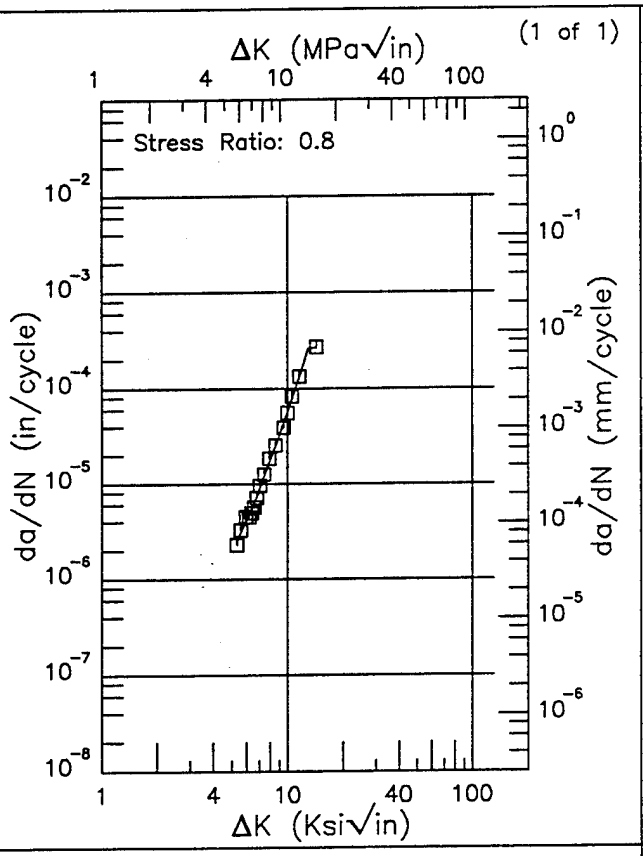
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

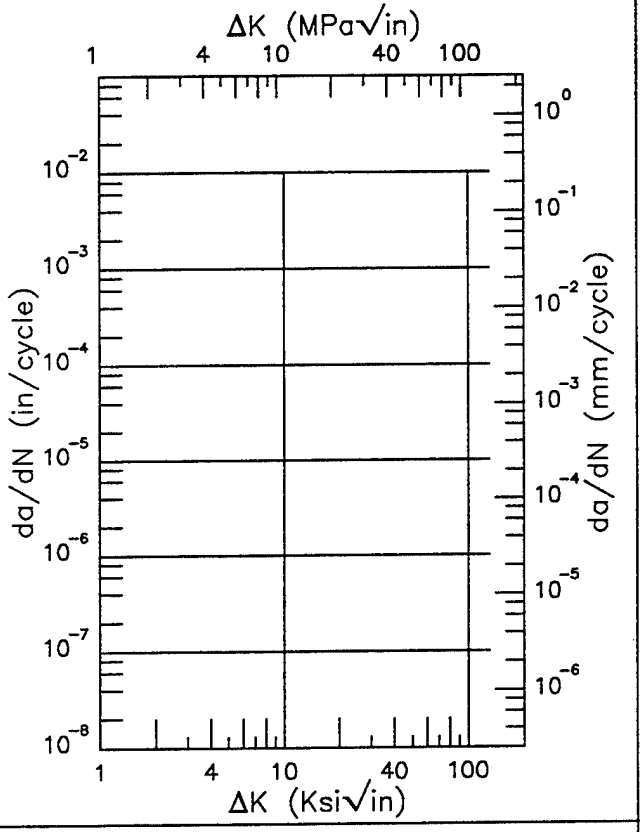
**Figure 7.5.3.1.55**

Condition/Ht: T351
Form: 0.25 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 3 – 16 Hz
Environment: LAB AIR; RT

Yield Strength: 56.9 ksi
Ult. Strength:
Specimen Thk: 0.26 in.
Specimen Width: 12.007 in.
Ref: DA001

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.32 (min) | 2.56 |
| 6. | 4.19 |
| 7. | 8.87 |
| 8. | 17.8 |
| 9. | 32.6 |
| 10. | 56.8 |
| 13. | 263. |
| 14.31 (max) | 268. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 7.44 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

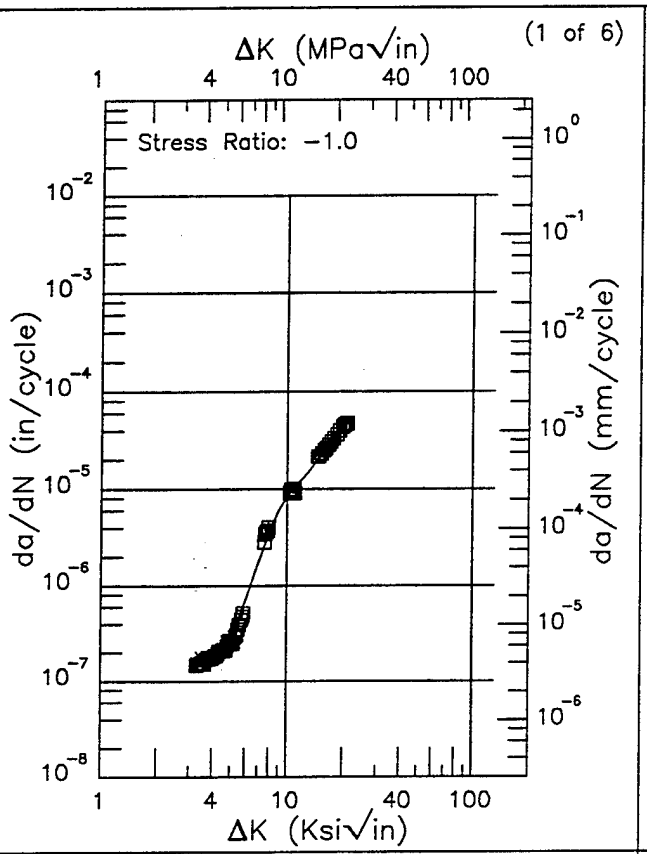
**Figure 7.5.3.1.56**

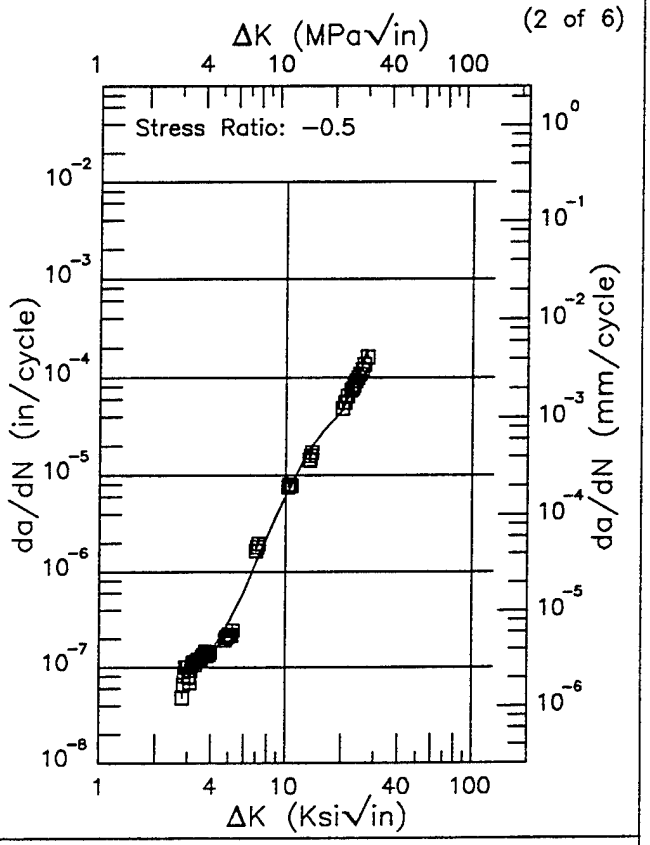
## 2024

R

Condition/Ht: T351
Form: Plate
Specimen Type: CCP (max stress specified)
Orientation: L–T
Frequency: 1 – 10 Hz
Environment: LAB AIR; RT

Yield Strength: 54.5 ksi
Ult. Strength:
Specimen Thk: 0.241 – 0.242 in.
Specimen Width: 8.995 – 9 in.
Ref: DA001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.28 (min) | 0.201 |
| 3.5 | 0.163 |
| 4. | 0.149 |
| 5. | 0.272 |
| 6. | 0.691 |
| 7. | 1.70 |
| 8. | 3.54 |
| 9. | 6.07 |
| 10. | 8.60 |
| 13. | 15.0 |
| 16. | 25.9 |
| 20. | 43.7 |
| 20.76 (max) | 43.5 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.80 (min) | 0.0851 |
| 3. | 0.0866 |
| 3.5 | 0.104 |
| 4. | 0.141 |
| 5. | 0.295 |
| 6. | 0.625 |
| 7. | 1.25 |
| 8. | 2.31 |
| 9. | 3.94 |
| 10. | 6.24 |
| 13. | 16.7 |
| 16. | 28.6 |
| 20. | 45.7 |
| 25. | 111. |
| 27.15 (max) | 192. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 11.80 | 0. .5 .8 1.25 2. |

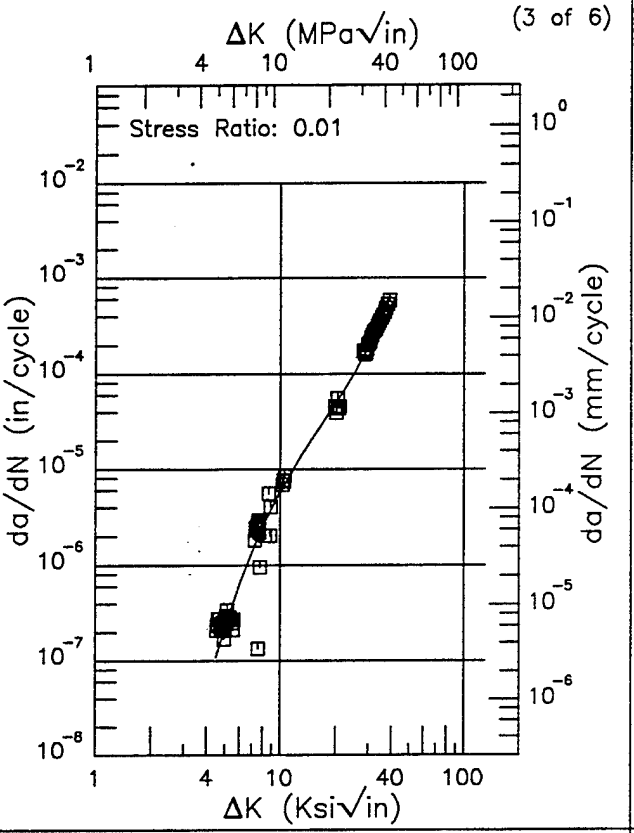
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 18.86 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.57**

Condition/Ht: T351
Form: Plate
Specimen Type: CCP (max stress specified)
Orientation: L–T
Frequency: 1 – 10 Hz
Environment: LAB AIR; RT

Yield Strength: 54.5 ksi
Ult. Strength:
Specimen Thk: 0.241 – 0.242 in.
Specimen Width: 8.995 – 9 in.
Ref: DA001

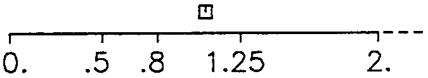
(3 of 6)



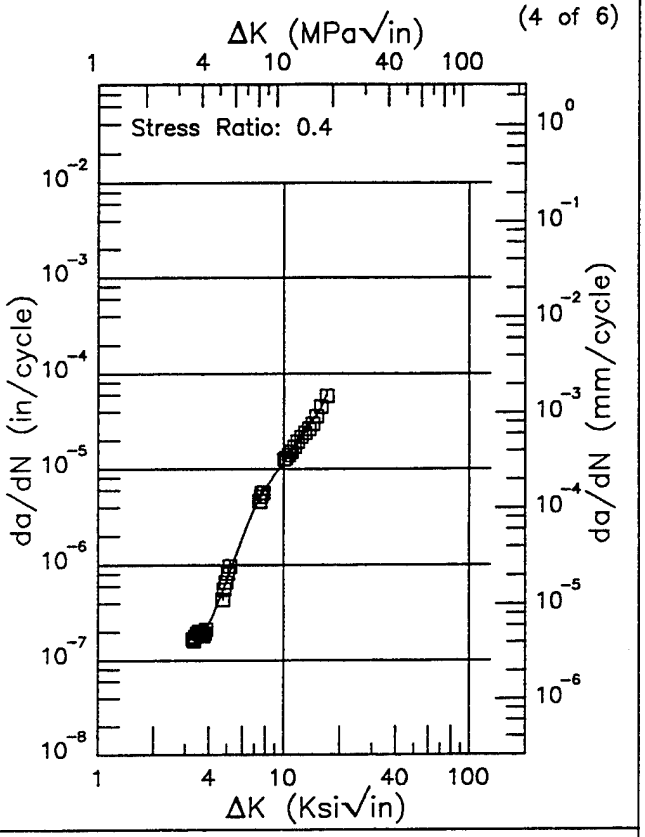

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.49 (min) | 0.108 |
| 5. | 0.219 |
| 6. | 0.632 |
| 7. | 1.37 |
| 8. | 2.47 |
| 9. | 3.96 |
| 10. | 5.84 |
| 13. | 13.8 |
| 16. | 25.8 |
| 20. | 49.8 |
| 25. | 100. |
| 30. | 193. |
| 35. | 373. |
| 39.11 (max) | 648. |

RMS % Error: 38.30

Life Prediction Ratio Summary




(4 of 6)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.27 (min) | 0.169 |
| 3.5 | 0.176 |
| 4. | 0.244 |
| 5. | 0.695 |
| 6. | 1.90 |
| 7. | 3.94 |
| 8. | 6.32 |
| 9. | 8.85 |
| 10. | 11.7 |
| 13. | 24.2 |
| 16. | 44.0 |
| 17.04 (max) | 59.1 |

RMS % Error: 6.97

Life Prediction Ratio Summary

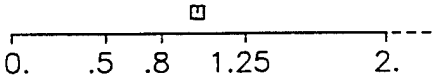
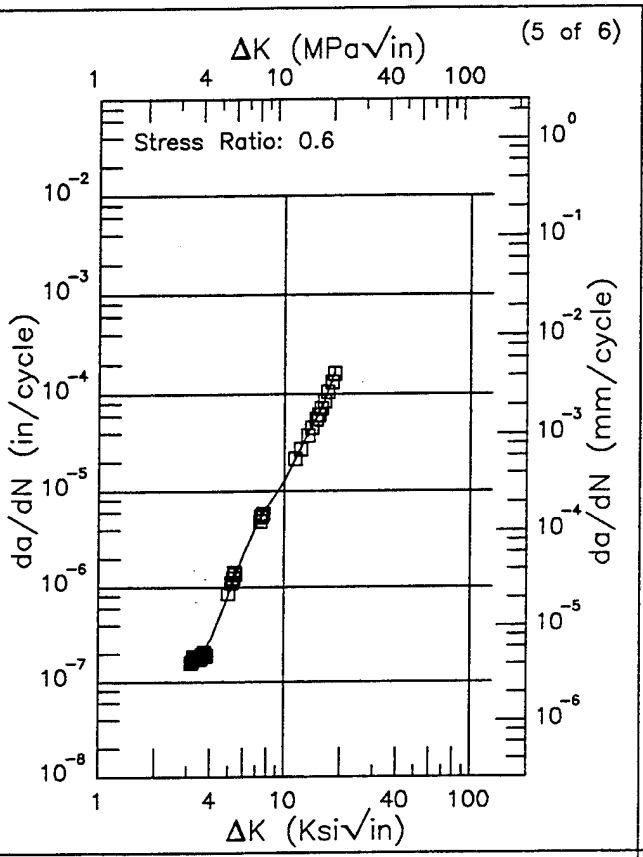


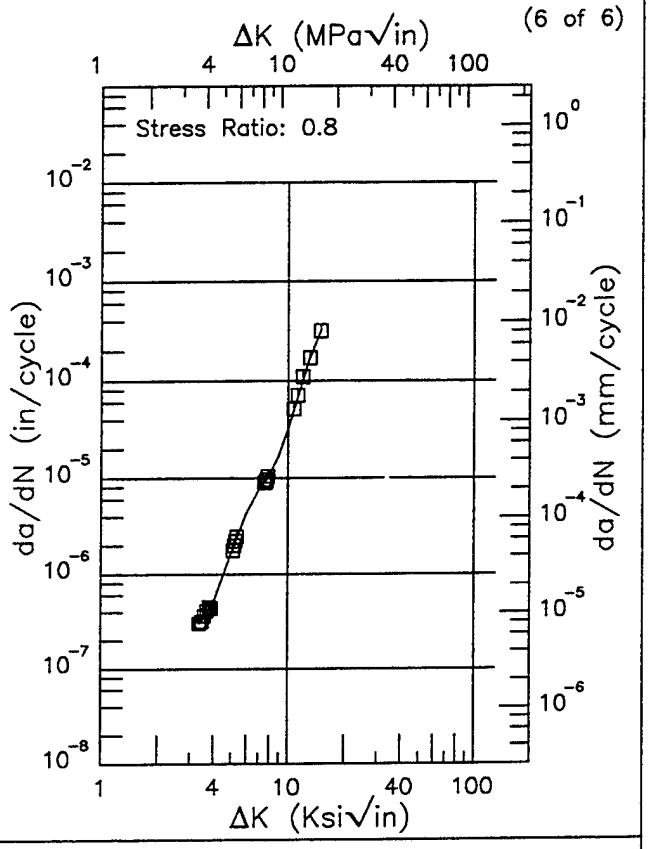

**Figure 7.5.3.1.57 (Continued)**

R 2024

Condition/Ht: T351
Form: Plate
Specimen Type: CCP (max stress specified)
Orientation: L–T
Frequency: 1 – 10 Hz
Environment: LAB AIR; RT

Yield Strength: 54.5 ksi
Ult. Strength:
Specimen Thk: 0.241 – 0.242 in.
Specimen Width: 8.995 – 9 in.
Ref: DA001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.15 (min) | 0.142 |
| 3.5 | 0.171 |
| 4. | 0.270 |
| 5. | 0.811 |
| 6. | 2.14 |
| 7. | 4.32 |
| 8. | 6.76 |
| 9. | 9.38 |
| 10. | 12.7 |
| 13. | 35.4 |
| 16. | 76.1 |
| 18.46 (max) | 164. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.34 (min) | 0.314 |
| 3.5 | 0.332 |
| 4. | 0.503 |
| 5. | 1.65 |
| 6. | 4.36 |
| 7. | 7.48 |
| 8. | 10.9 |
| 9. | 17.4 |
| 10. | 32.4 |
| 13. | 169. |
| 14.85 (max) | 313. |

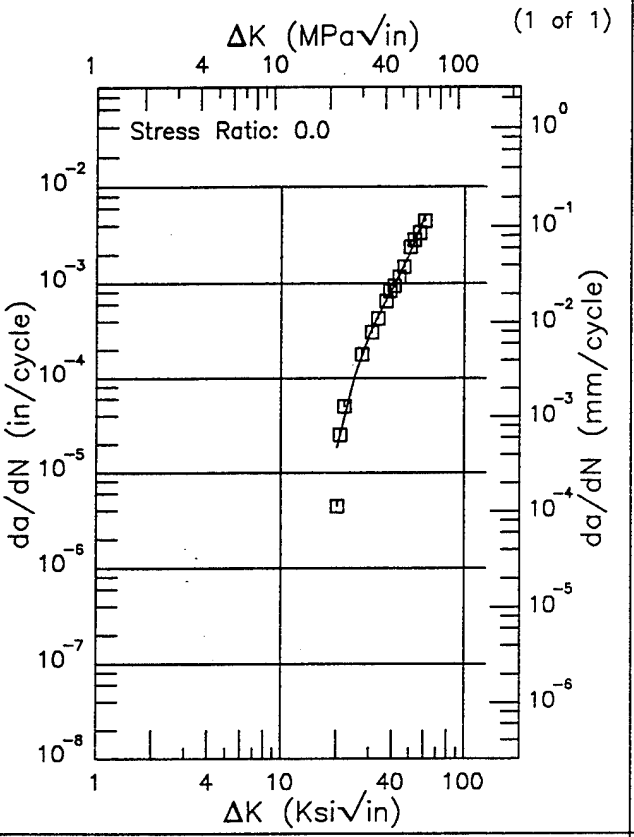
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 8.95 | 0. .5 .8 1.25 2. |

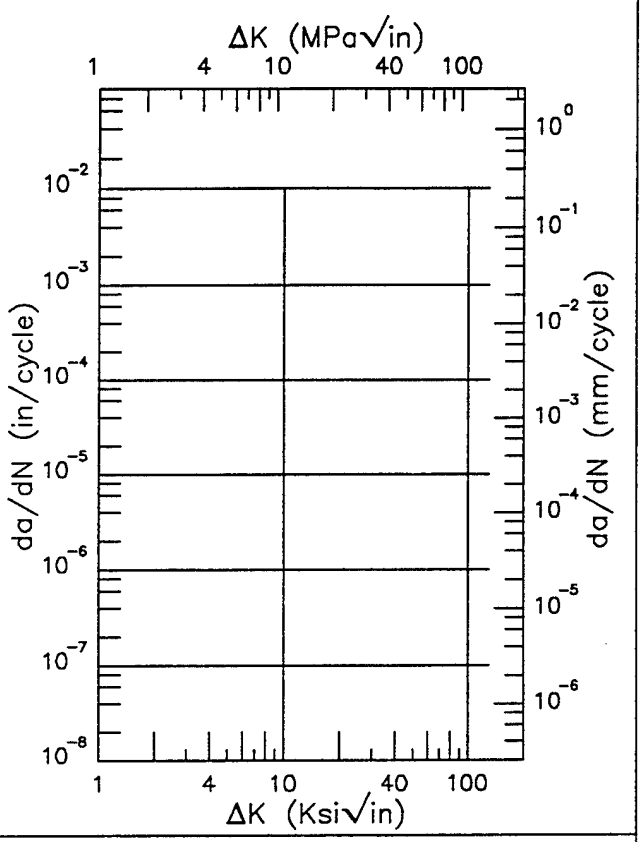
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 4.31 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.57 (Concluded)**

Condition/Ht: T351
Form: 0.25 in. Plate
Specimen Type: CCP (max stress specified)
Orientation: L–T
Frequency: 1 – 2 Hz
Environment: LAB AIR;–65°F

Yield Strength: 56.9 ksi
Ult. Strength:
Specimen Thk: 0.259 in.
Specimen Width: 12.002 in.
Ref: DA001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 20.19 (min) | 18.6 |
| 25. | 103. |
| 30. | 280. |
| 35. | 529. |
| 40. | 856. |
| 50. | 1982. |
| 60. | 4878. |
| 60.32 (max) | 5031. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 23.36 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

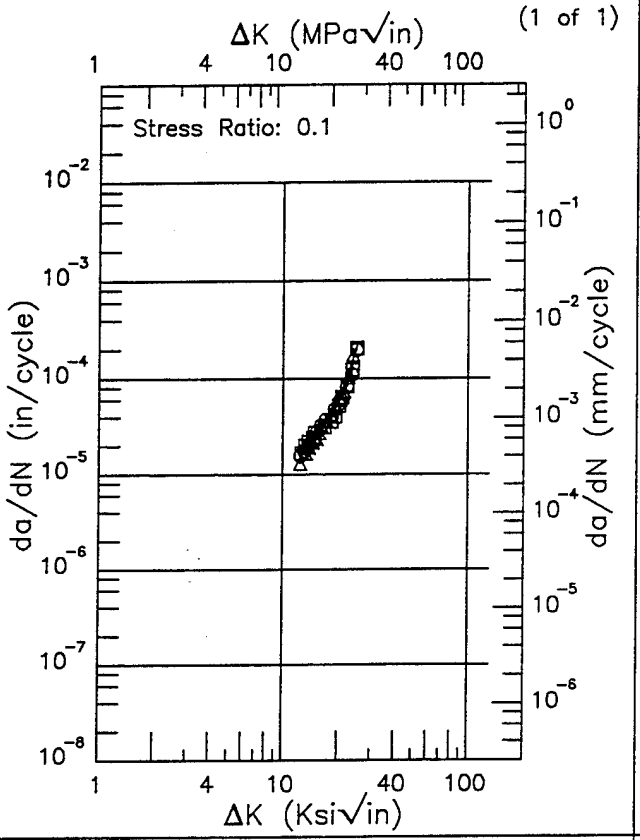
**Figure 7.5.3.1.58**

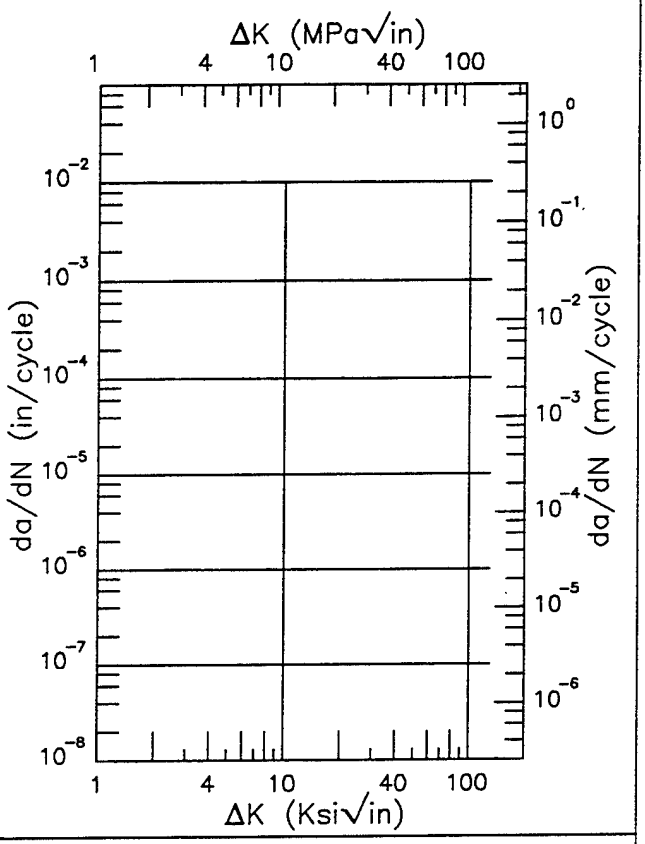
## 2024

R

Condition/Ht: T351
Form: 0.25 in. Plate
Specimen Type: CCP (max stress specified)
Orientation: L–T
Frequency: 3 Hz
Environment: LAB AIR; RT

Yield Strength:
Ult. Strength:
Specimen Thk: 0.25 in.
Specimen Width: 5 in.
Ref: FR001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 12.37 (min) | 14.6 |
| 13. | 17.5 |
| 16. | 29.5 |
| 20. | 55.0 |
| 24.93 (max) | 209. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 9.42 | 0. .5 .8 1.25 2. |

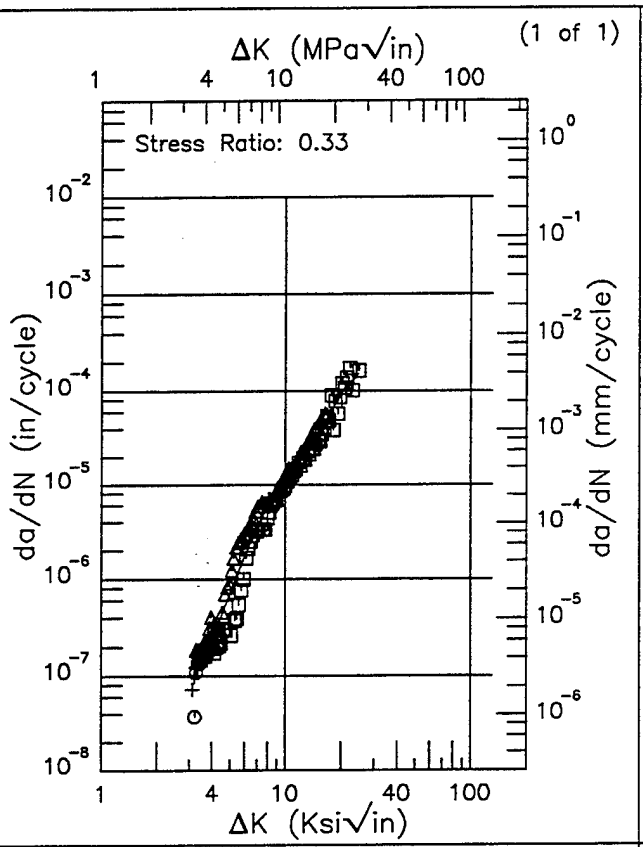
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

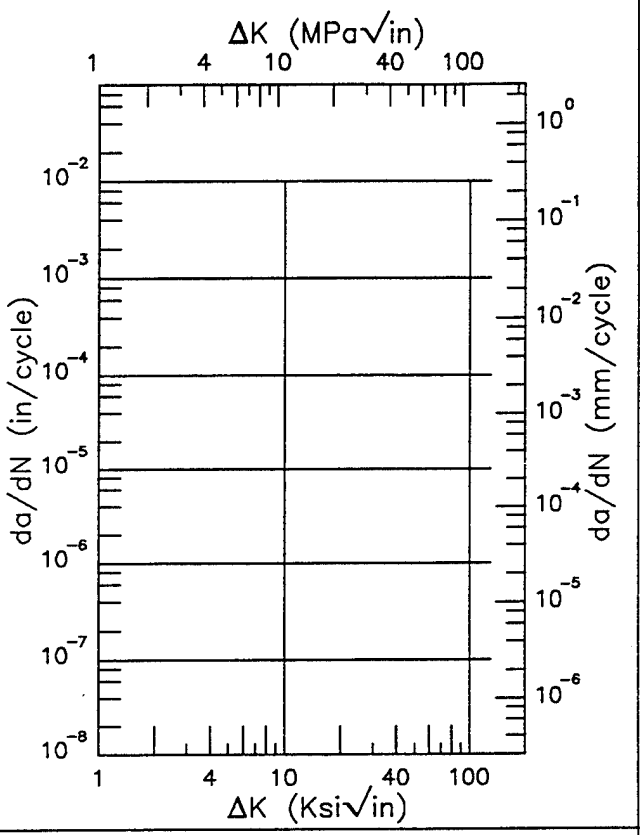
**Figure 7.5.3.1.59**

2024 R

Condition/Ht: T351
Form: 0.75 – 1.25 in. Plate
Specimen Type: WOL
Orientation: L–T
Frequency: 25 Hz
Environment: H.H.A.; RT

Yield Strength:
Ult. Strength:
Specimen Thk: 0.248 – 0.249 in.
Specimen Width: 2.545 – 2.546 in.
Ref: AL010




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.11 (min) | 0.0934 |
| 3.5 | 0.140 |
| 4. | 0.243 |
| 5. | 0.702 |
| 6. | 1.72 |
| 7. | 3.50 |
| 8. | 5.99 |
| 9. | 8.79 |
| 10. | 11.6 |
| 13. | 22.1 |
| 16. | 43.3 |
| 20. | 94.9 |
| 24.63 (max) | 151. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 32.42 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.60**

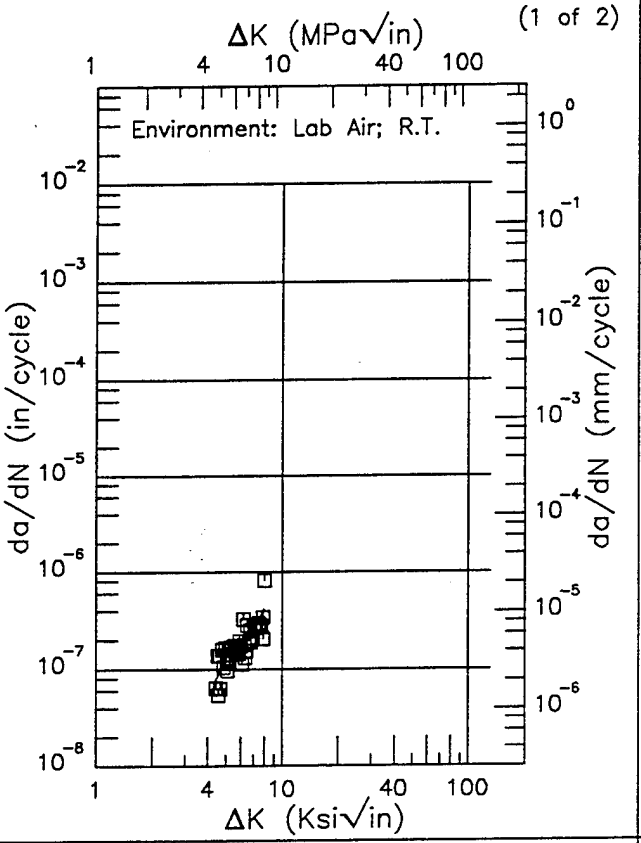
2024

E

Condition/Ht: T3511
Form: Extrusion
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.05
Frequency: 9 Hz

Yield Strength: 58.7 ksi
Ult. Strength: 79.3 ksi
Specimen Thk: 0.37 in.
Specimen Width: 4 in.
Ref: BW001

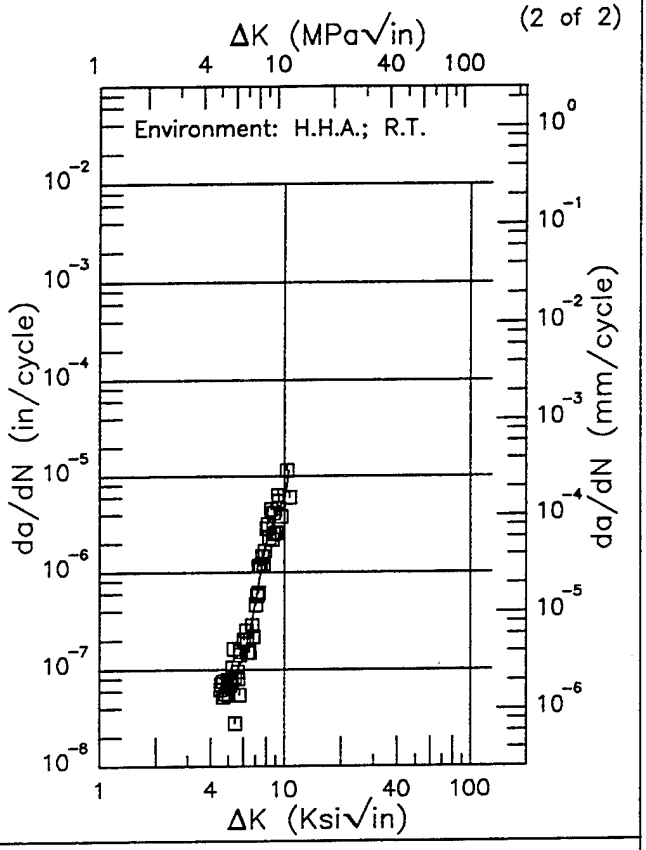
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.39 (min) | 0.0751 |
| 5. | 0.133 |
| 6. | 0.171 |
| 7. | 0.242 |
| 7.98 (max) | 0.417 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 30.30 | 0. .5 .8 1.25 2. |

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.51 (min) | 0.0569 |
| 5. | 0.0677 |
| 6. | 0.130 |
| 7. | 0.489 |
| 8. | 2.02 |
| 9. | 3.98 |
| 10. | 5.99 |
| 10.62 (max) | 11.4 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 33.53 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.61**

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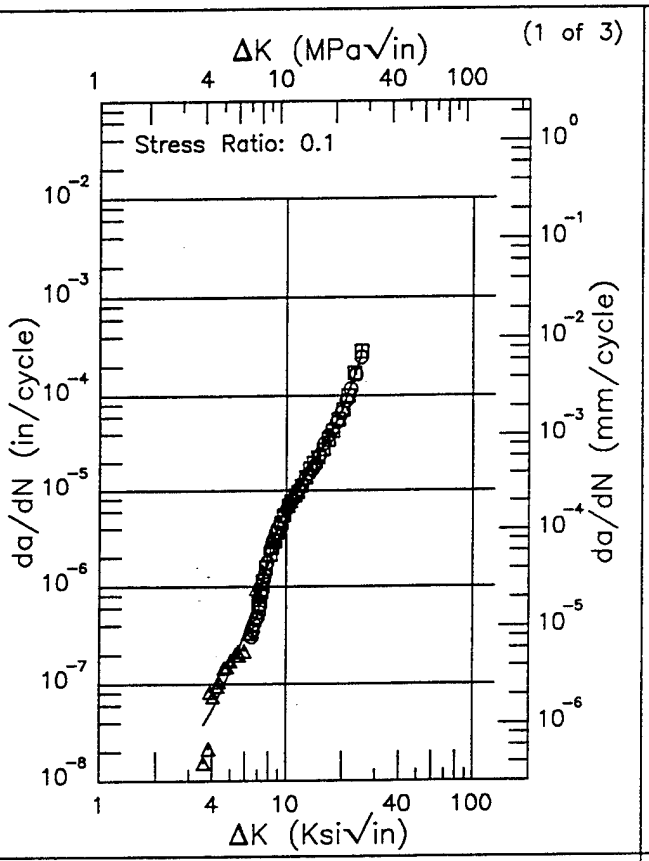
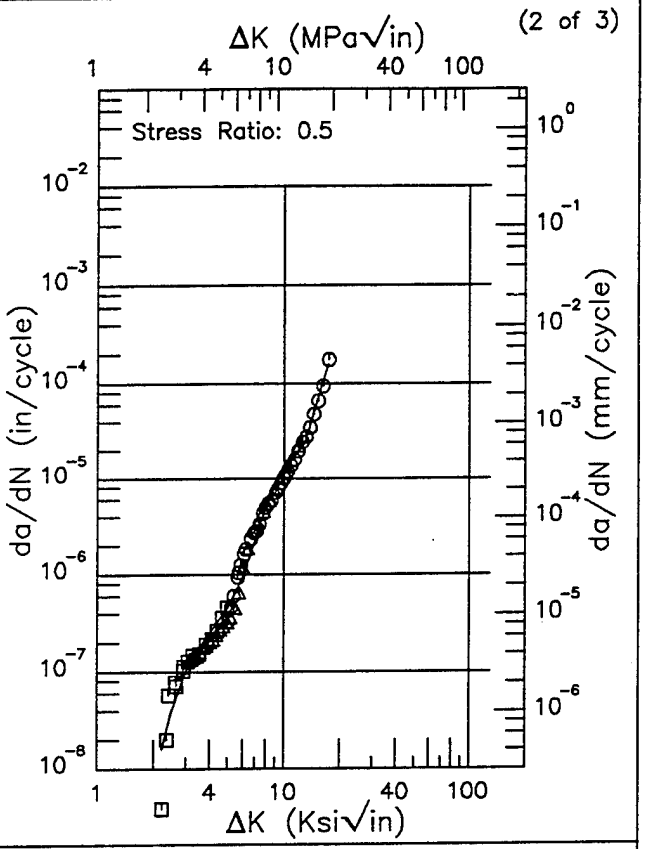
R | 2024 |

Condition/Ht: T3511
Form: 1 in. Extrusion
Specimen Type: CT
Orientation: L–T
Frequency: 20 Hz
Environment: LAB AIR; RT

Yield Strength: 54.7 ksi
Ult. Strength:
Specimen Thk: 0.244 – 0.246 in.
Specimen Width: 2 in.
Ref: SW001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.59 (min) | 0.0378 |
| 4. | 0.0531 |
| 5. | 0.137 |
| 6. | 0.351 |
| 7. | 0.819 |
| 8. | 1.71 |
| 9. | 3.17 |
| 10. | 5.32 |
| 13. | 15.4 |
| 16. | 31.4 |
| 20. | 73.0 |
| 25. | 260. |
| 25.05 (max) | 263. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.22 (min) | 0.0159 |
| 2.5 | 0.0388 |
| 3. | 0.102 |
| 3.5 | 0.174 |
| 4. | 0.250 |
| 5. | 0.458 |
| 6. | 0.939 |
| 7. | 2.22 |
| 8. | 4.91 |
| 9. | 8.97 |
| 10. | 13.0 |
| 13. | 23.9 |
| 16. | 96.1 |
| 17.34 (max) | 158. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 23.90 | ⊙ □ 0. .5 .8 1.25 2. |

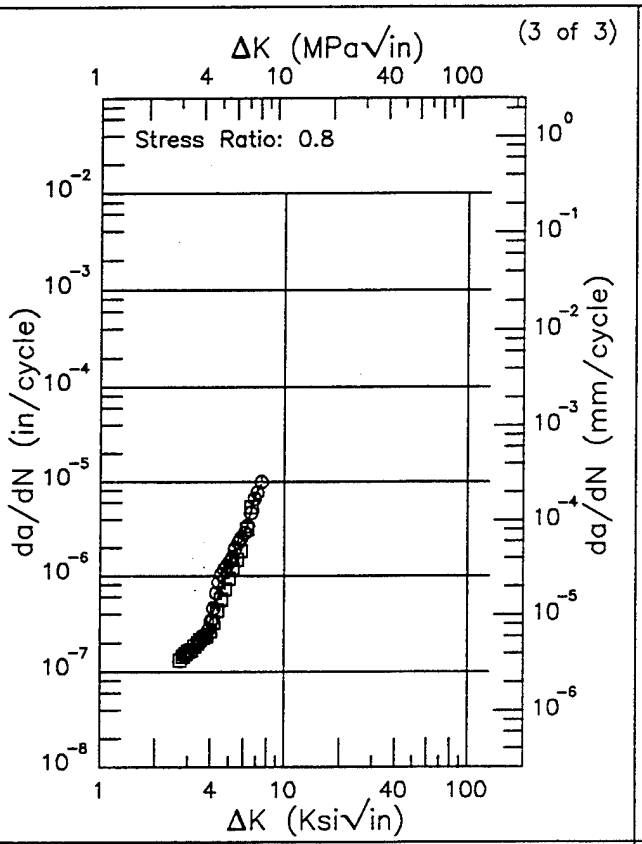
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 26.42 | ⊙ 0. .5 .8 1.25 2. |

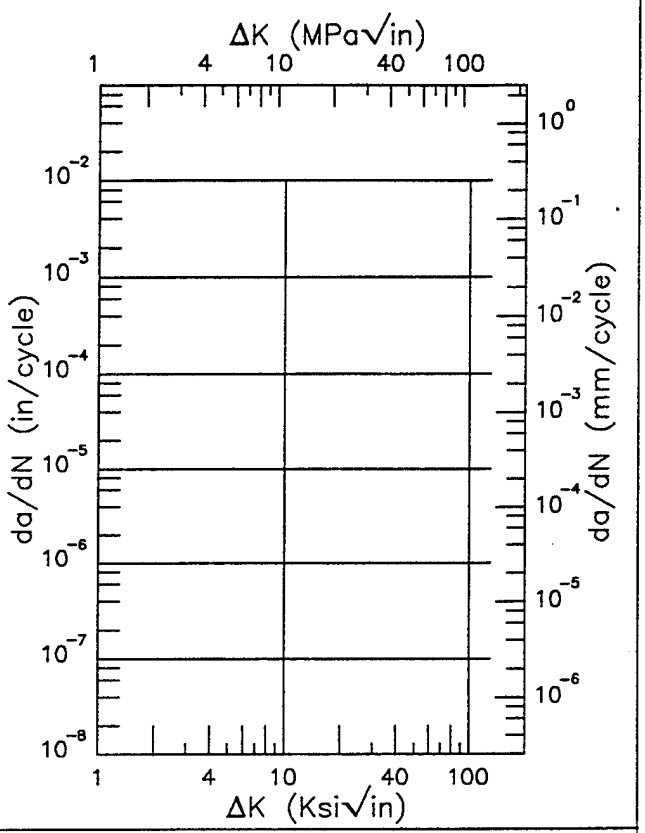
**Figure 7.5.3.1.62**

2024 R

Condition/Ht: T3511
Form: 1 in. Extrusion
Specimen Type: CT
Orientation: L–T
Frequency: 20 Hz
Environment: LAB AIR; RT

Yield Strength: 54.7 ksi
Ult. Strength:
Specimen Thk: 0.244 – 0.246 in.
Specimen Width: 2 in.
Ref: SW001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.72 (min) | 0.132 |
| 3. | 0.158 |
| 3.5 | 0.206 |
| 4. | 0.340 |
| 5. | 1.30 |
| 6. | 2.53 |
| 7. | 7.52 |
| 7.47 (max) | 9.39 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 15.75 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.62 (Concluded)**

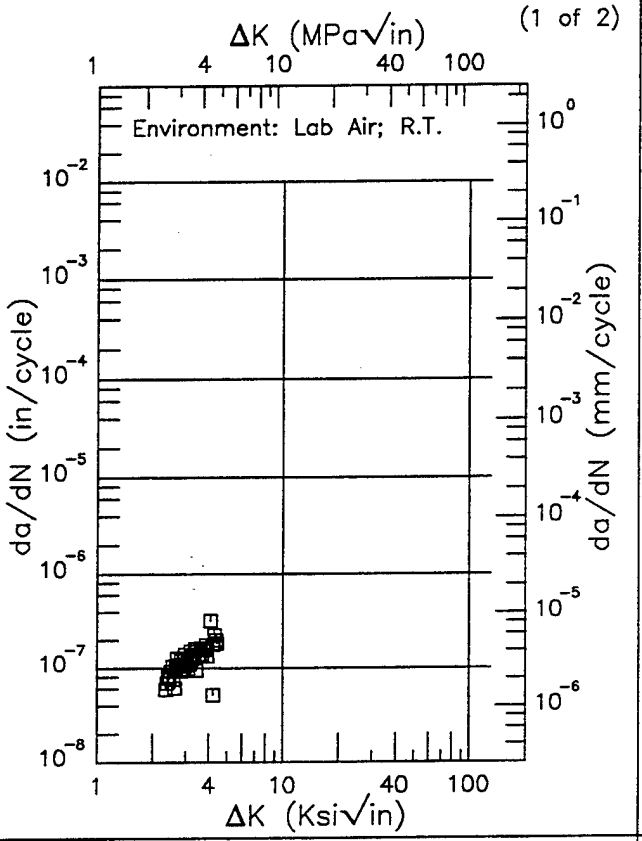
2024

E

Condition/Ht: T3511
Form: Extrusion
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.5
Frequency: 9 Hz

Yield Strength: 58.7 ksi
Ult. Strength: 79.3 ksi
Specimen Thk: 0.37 in.
Specimen Width: 4 in.
Ref: BW001

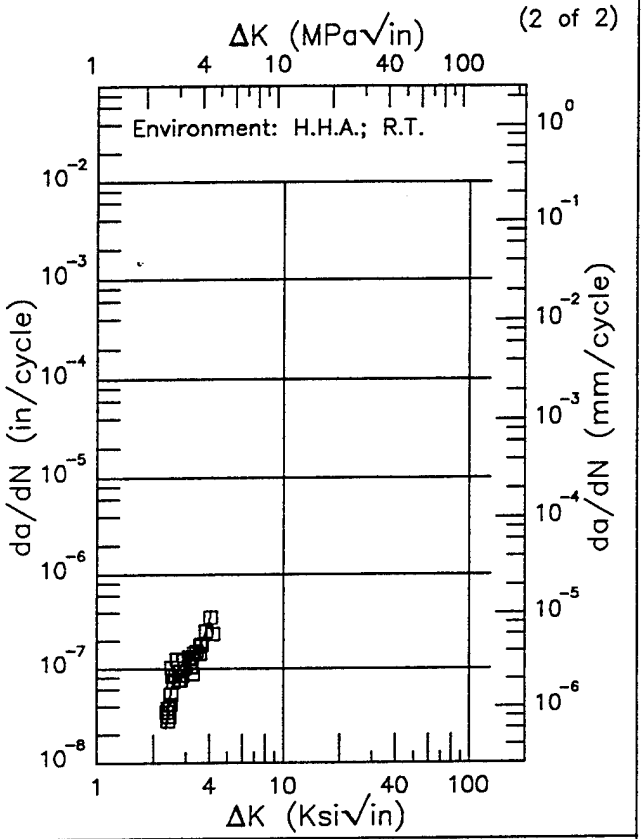
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 2.35 (min) | 0.0638 |
| 2.5 | 0.0835 |
| 3. | 0.112 |
| 3.5 | 0.139 |
| 4. | 0.188 |
| 4.38 (max) | 0.192 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 21.49 | 0. .5 .8 1.25 2. |

(2 of 2)



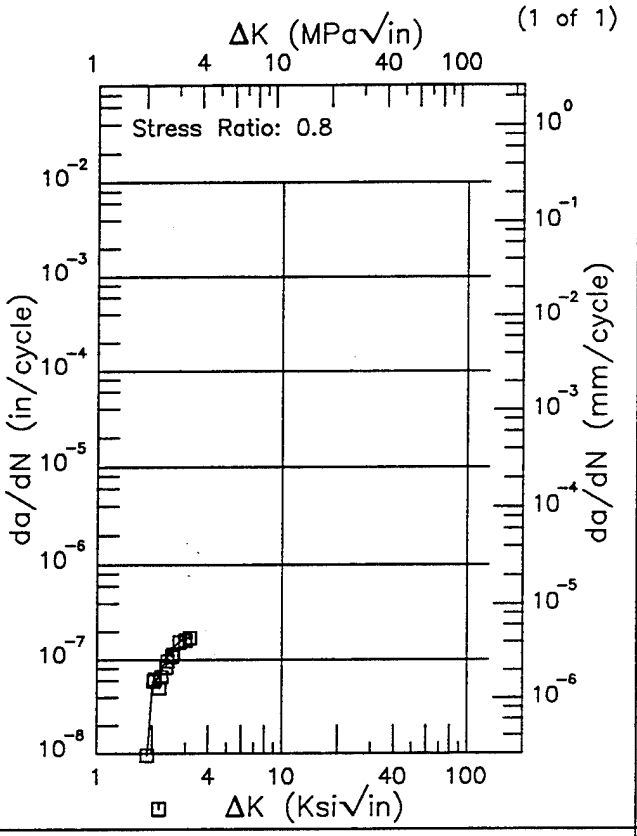

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 2.35 (min) | 0.0233 |
| 2.5 | 0.0632 |
| 3. | 0.106 |
| 3.5 | 0.152 |
| 4. | 0.339 |
| 4.18 (max) | 0.238 |

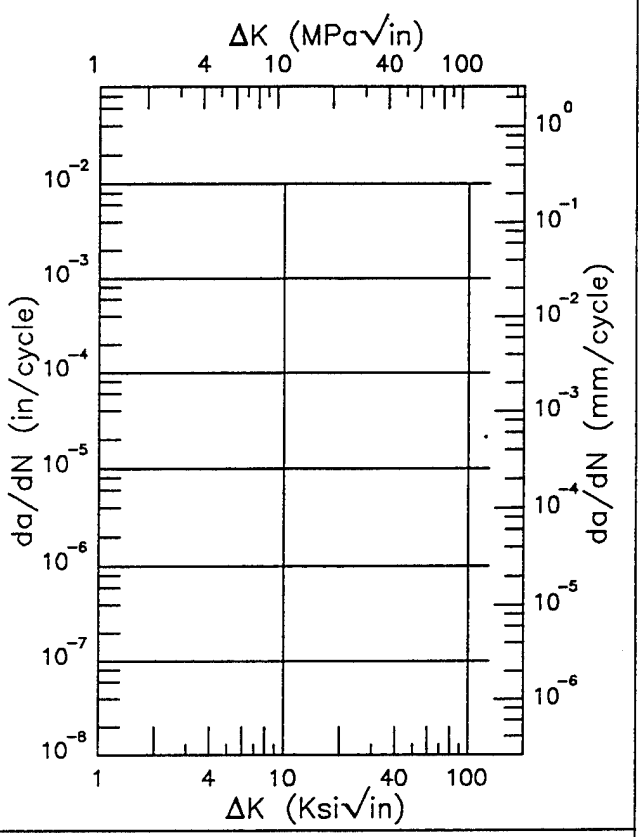
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 22.65 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.63**

Condition/Ht: T3511
Form: 1 in. Extrusion
Specimen Type: CT
Orientation: L–T
Frequency: 25 Hz
Environment: LAB AIR; RT

Yield Strength: 54.7 ksi
Ult. Strength:
Specimen Thk: 0.246 in.
Specimen Width: 2 in.
Ref: SW001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 1.87 (min) | 0.00995 |
| 2. | 0.0485 |
| 2.5 | 0.131 |
| 3. | 0.175 |
| 3.15 (max) | 0.167 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 30.41 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

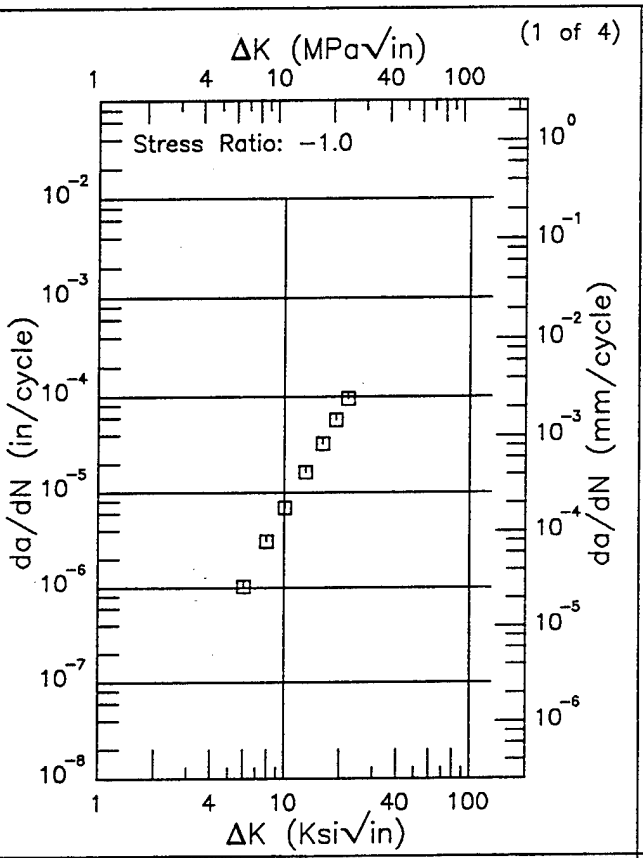
**Figure 7.5.3.1.64**

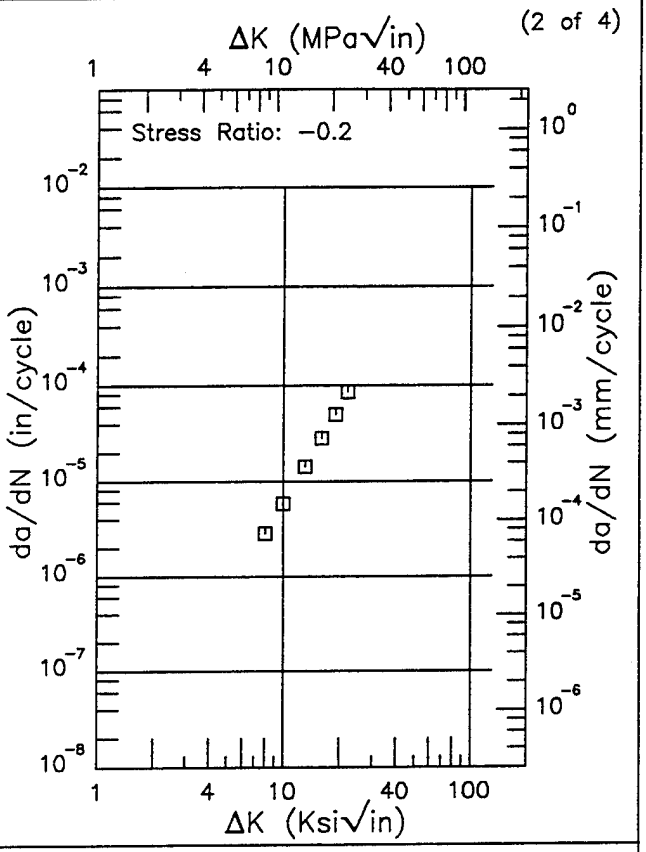
2024

R

Condition/Ht: T3511
Form: 0.2 in. Extrusion
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 6 Hz
Environment: H.H.A.; RT

Yield Strength: 61.2 ksi
Ult. Strength: 80.4 ksi
Specimen Thk:
Specimen Width: 4 in.
Ref: BW005




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

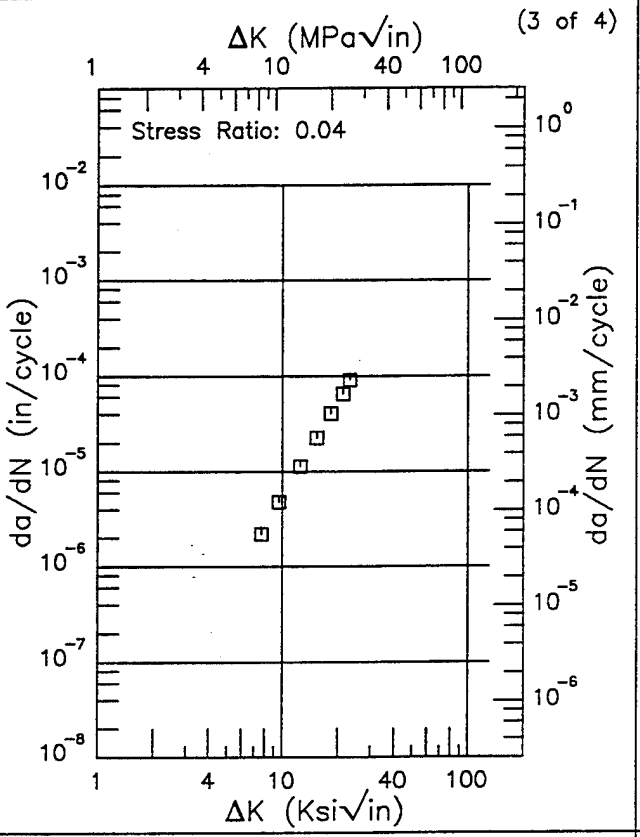
ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

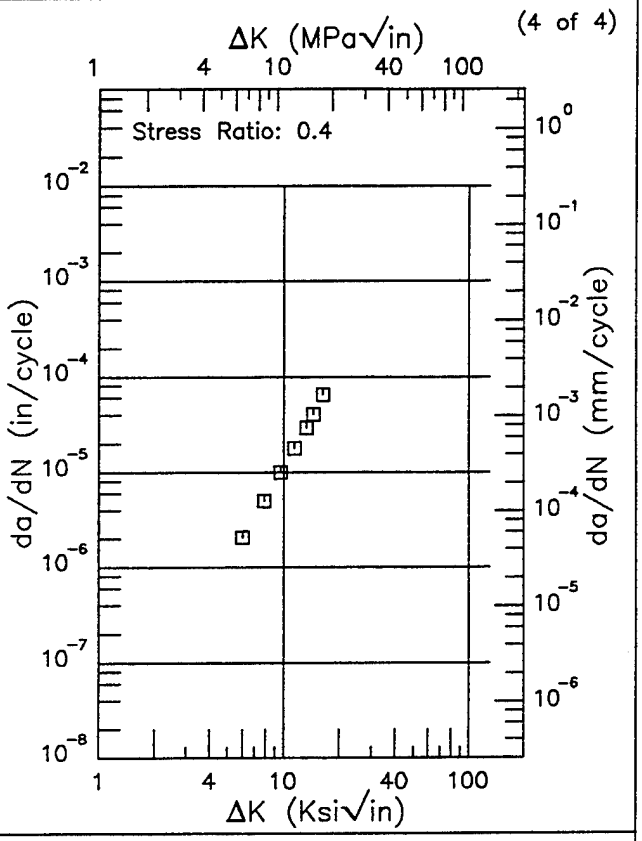
| RMS % Error | Life Prediction Ratio Summary | RMS % Error | Life Prediction Ratio Summary |
|---|---|---|---|
| | 0. .5 .8 1.25 2. | | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.65**

Condition/Ht: T3511
Form: 0.2 in. Extrusion
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 6 Hz
Environment: H.H.A.; RT

Yield Strength: 61.2 ksi
Ult. Strength: 80.4 ksi
Specimen Thk:
Specimen Width: 4 in.
Ref: BW005




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

| RMS % Error | Life Prediction Ratio Summary | RMS % Error | Life Prediction Ratio Summary |
|---|---|---|---|
| | 0. .5 .8 1.25 2. | | 0. .5 .8 1.25 2. |

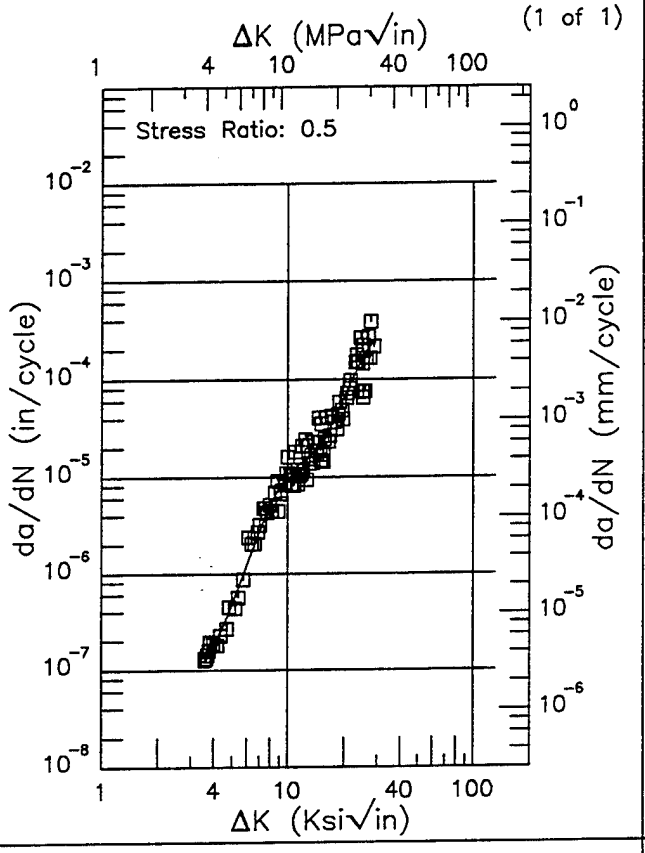
**Figure 7.5.3.1.65 (Concluded)**

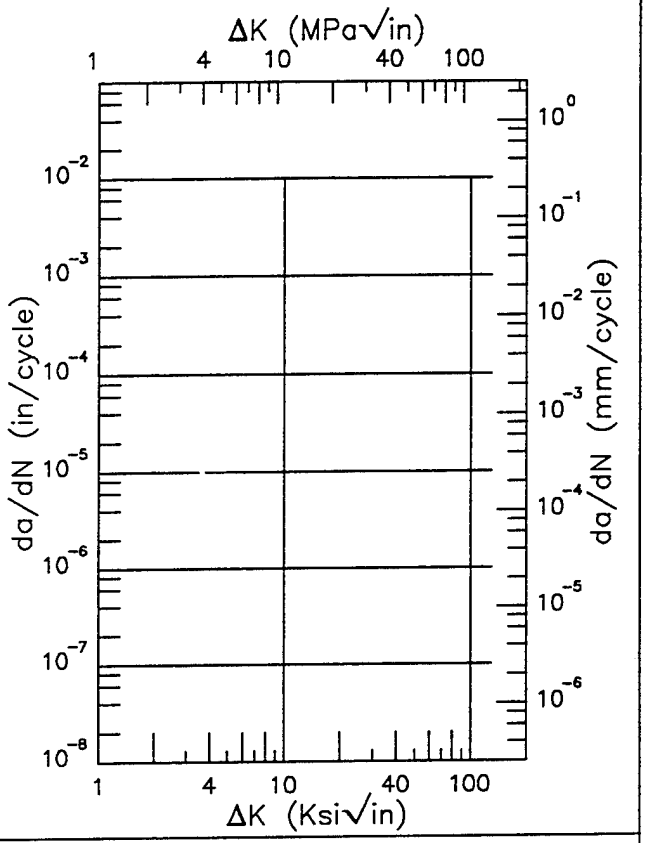
R 2024

Condition/Ht: T3511
Form: Extrusion
Specimen Type: CCP (max stress specified)
Orientation: L–T
Frequency: 9 Hz
Environment: H.H.A.; RT

Yield Strength: 58.7 ksi
Ult. Strength: 79.3 ksi
Specimen Thk: 0.37 in.
Specimen Width: 5 in.
Ref: BW001

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.57 (min) | 0.121 |
| 4. | 0.175 |
| 5. | 0.474 |
| 6. | 1.22 |
| 7. | 2.71 |
| 8. | 5.04 |
| 9. | 7.92 |
| 10. | 10.7 |
| 13. | 16.1 |
| 16. | 25.0 |
| 20. | 65.8 |
| 25. | 170. |
| 28.79 (max) | 252. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

RMS % Error
30.82

Life Prediction Ratio Summary
0. .5 .8 1.25 2.

RMS % Error

Life Prediction Ratio Summary
0. .5 .8 1.25 2.

**Figure 7.5.3.1.66**

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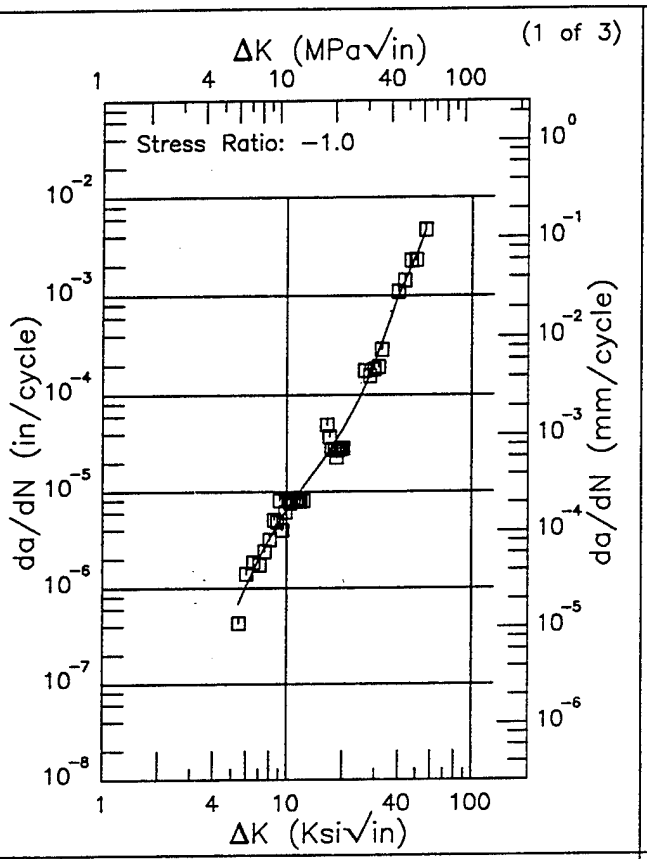
## 2024

R

Condition/Ht: T42
Form: 0.75 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 10 Hz
Environment: LAB AIR; RT

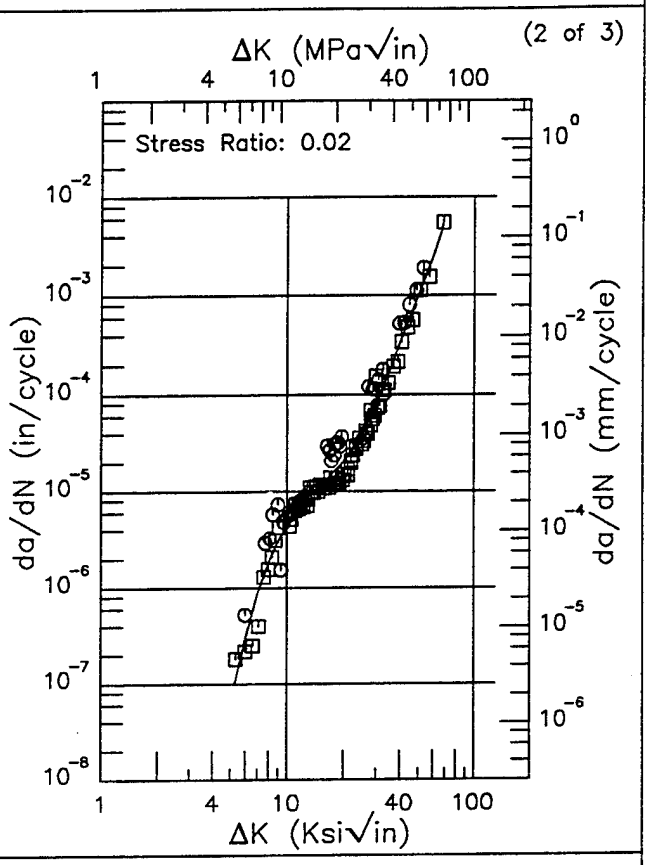
Yield Strength: 45.4 ksi
Ult. Strength: 68.5 ksi
Specimen Thk: 0.25 in.
Specimen Width: 4 in.
Ref: MA006




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 5.48 (min) | 0.680 |
| 6. | 1.05 |
| 7. | 1.99 |
| 8. | 3.22 |
| 9. | 4.70 |
| 10. | 6.41 |
| 13. | 13.0 |
| 16. | 22.7 |
| 20. | 43.8 |
| 25. | 97.2 |
| 30. | 220. |
| 35. | 497. |
| 40. | 1006. |
| 50. | 2563. |
| 55.92 (max) | 4494. |

RMS % Error
28.82

Life Prediction Ratio Summary
0. .5 .8 1.25 2.




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 5.32 (min) | 0.103 |
| 6. | 0.296 |
| 7. | 0.875 |
| 8. | 1.82 |
| 9. | 3.04 |
| 10. | 4.41 |
| 13. | 8.67 |
| 16. | 13.0 |
| 20. | 20.7 |
| 25. | 38.9 |
| 30. | 80.9 |
| 35. | 170. |
| 40. | 335. |
| 50. | 999. |
| 60. | 2462. |
| 67.71 (max) | 5220. |

RMS % Error
44.77

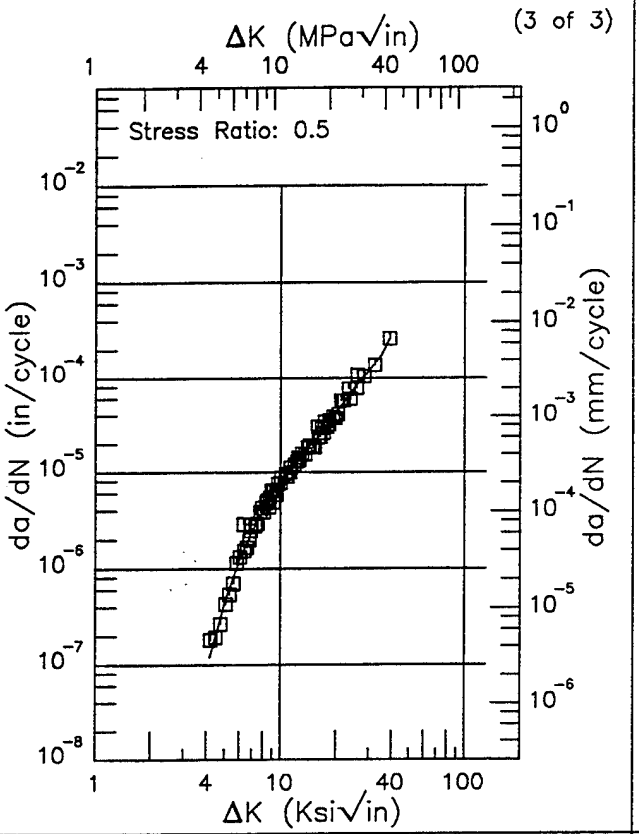
Life Prediction Ratio Summary
0. .5 .8 1.25 2.

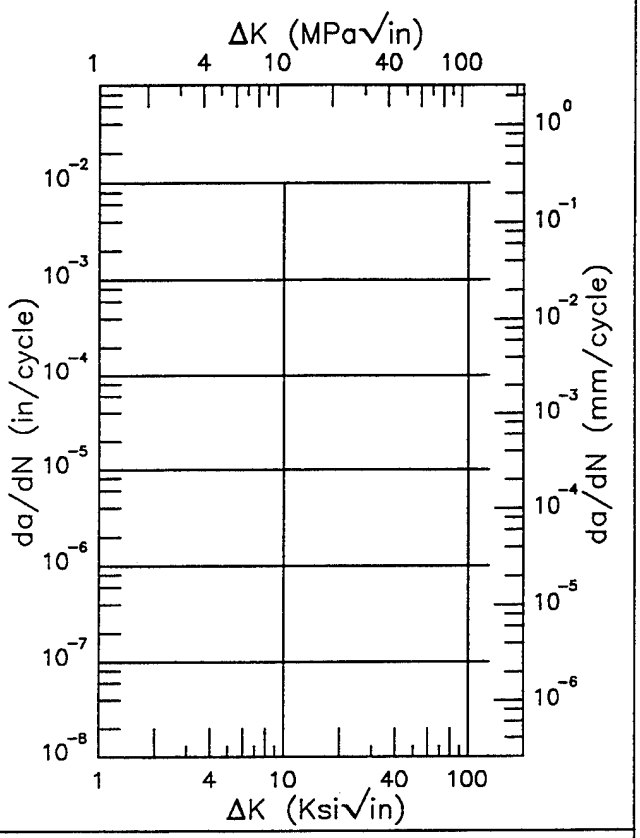
**Figure 7.5.3.1.67**

2024 R

Condition/Ht: T42
Form: 0.75 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 10 Hz
Environment: LAB AIR; RT

Yield Strength: 45.4 ksi
Ult. Strength: 68.5 ksi
Specimen Thk: 0.25 in.
Specimen Width: 4 in.
Ref: MA006




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.18 (min) | 0.120 |
| 5. | 0.434 |
| 6. | 1.22 |
| 7. | 2.44 |
| 8. | 4.00 |
| 9. | 5.80 |
| 10. | 7.79 |
| 13. | 14.8 |
| 16. | 24.4 |
| 20. | 43.9 |
| 25. | 78.3 |
| 30. | 118. |
| 35. | 175. |
| 39.01 (max) | 260. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 16.04 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.67 (Concluded)**

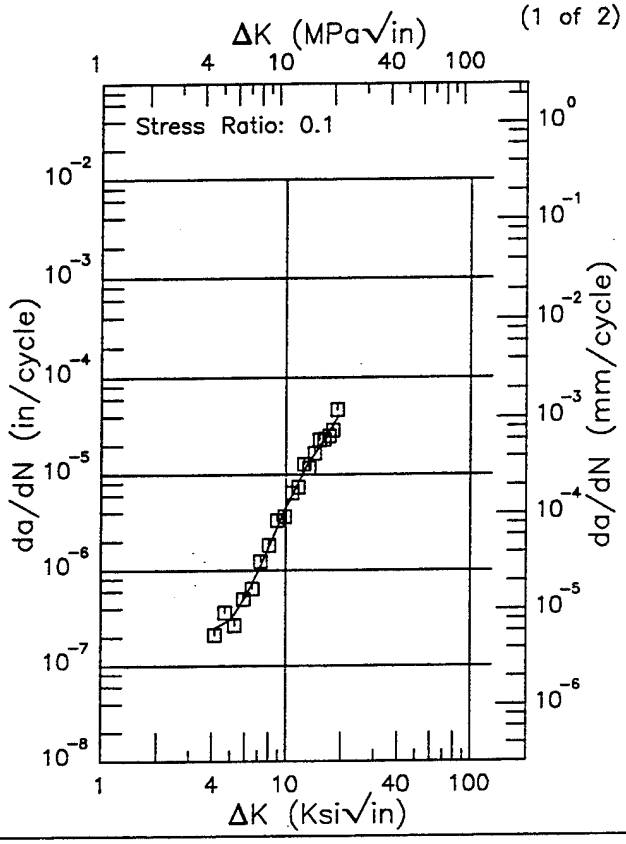
## 2024

R

Condition/Ht: T62
Form: 0.13 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 1 Hz
Environment: H.H.A.; RT

Yield Strength: 60.3 ksi
Ult. Strength: 74.9 ksi
Specimen Thk: 0.125 in.
Specimen Width: 6 in.
Ref: GD004

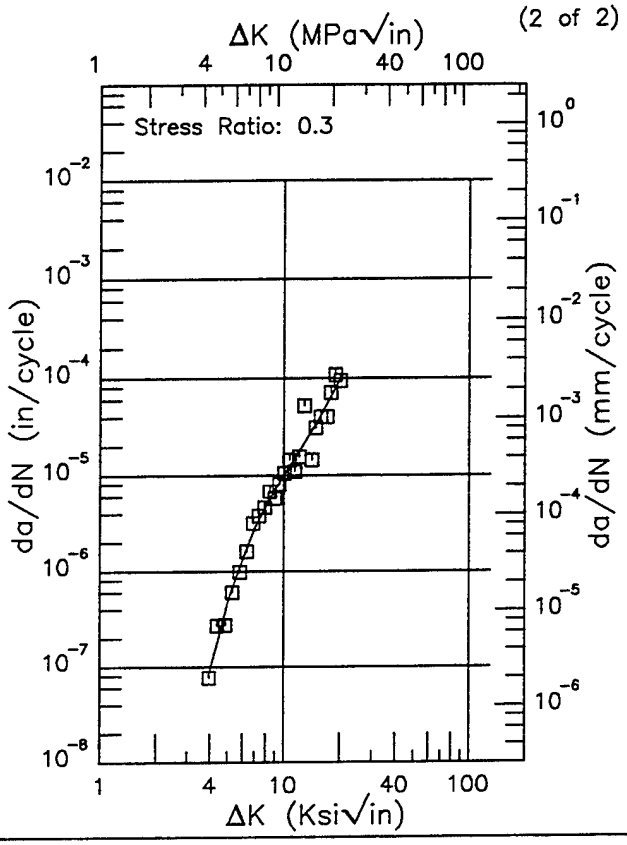
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.12 (min) | 0.249 |
| 5. | 0.307 |
| 6. | 0.516 |
| 7. | 0.942 |
| 8. | 1.69 |
| 9. | 2.89 |
| 10. | 4.60 |
| 13. | 12.2 |
| 16. | 22.6 |
| 19.00 (max) | 38.9 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 14.52 | 0. .5 .8 1.25 2. |

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.95 (min) | 0.0822 |
| 4. | 0.0913 |
| 5. | 0.465 |
| 6. | 1.32 |
| 7. | 2.74 |
| 8. | 4.68 |
| 9. | 7.13 |
| 10. | 10.1 |
| 13. | 22.4 |
| 16. | 42.9 |
| 20. | 96.4 |
| 20.04 (max) | 97.2 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 36.44 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.68**

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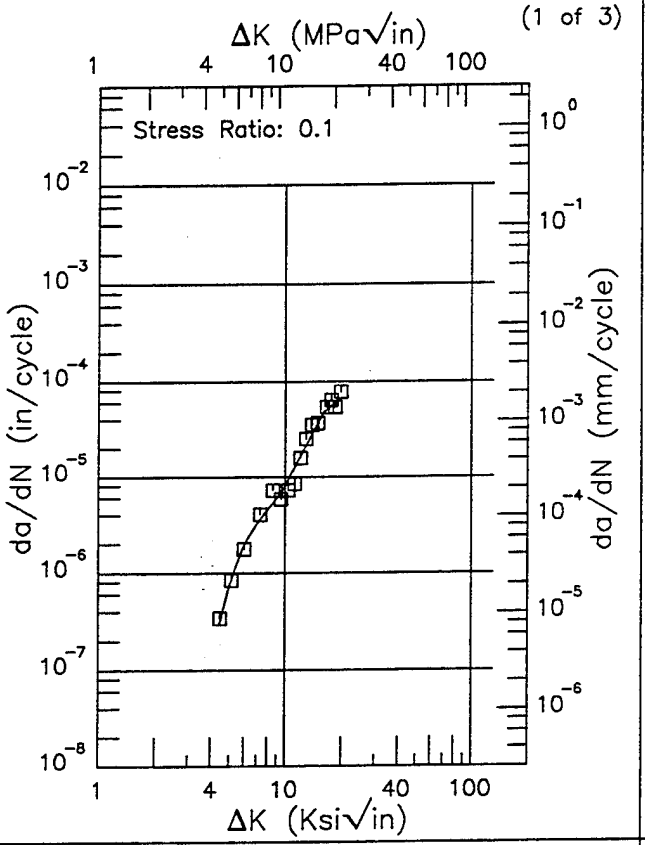
## R 2024

Condition/Ht: T62
Form: 0.13 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 1 Hz
Environment: S.T.W.; RT

Yield Strength: 60.3 ksi
Ult. Strength: 74.9 ksi
Specimen Thk: 0.125 in.
Specimen Width: 6 in.
Ref: GD004

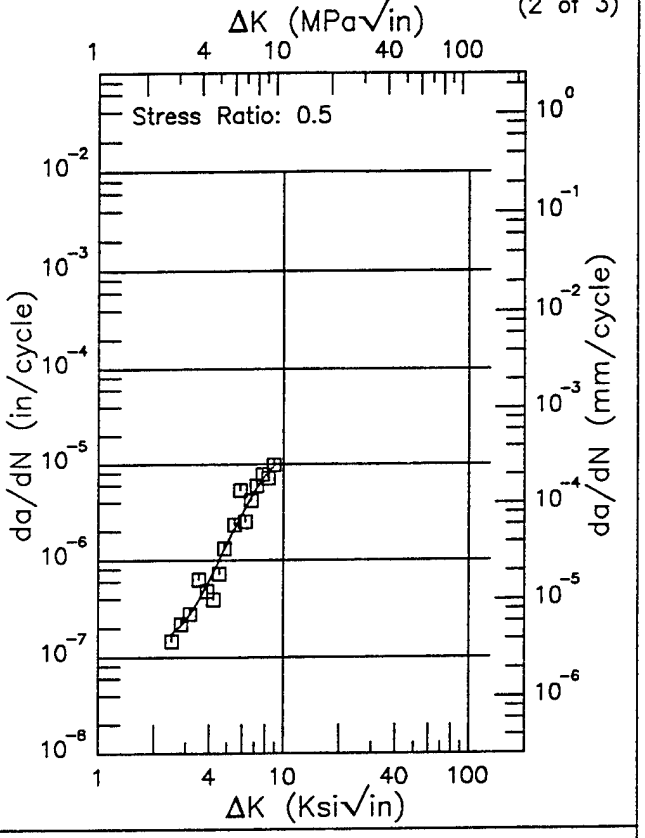
(1 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.46 (min) | 0.303 |
| 5. | 0.739 |
| 6. | 1.93 |
| 7. | 3.22 |
| 8. | 4.51 |
| 9. | 6.03 |
| 10. | 8.18 |
| 13. | 21.5 |
| 16. | 48.1 |
| 19.67 (max) | 66.0 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 17.88 | 0. .5 .8 1.25 2. |

(2 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.50 (min) | 0.172 |
| 3. | 0.241 |
| 3.5 | 0.379 |
| 4. | 0.610 |
| 5. | 1.48 |
| 6. | 3.03 |
| 7. | 5.21 |
| 8. | 7.62 |
| 8.83 (max) | 9.38 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 33.44 | 0. .5 .8 1.25 2. |

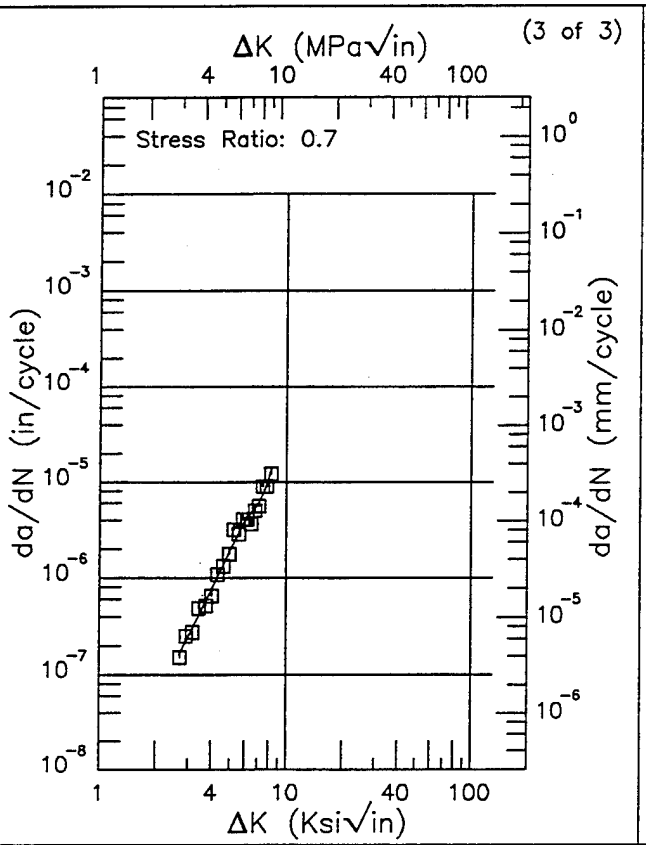
**Figure 7.5.3.1.69**

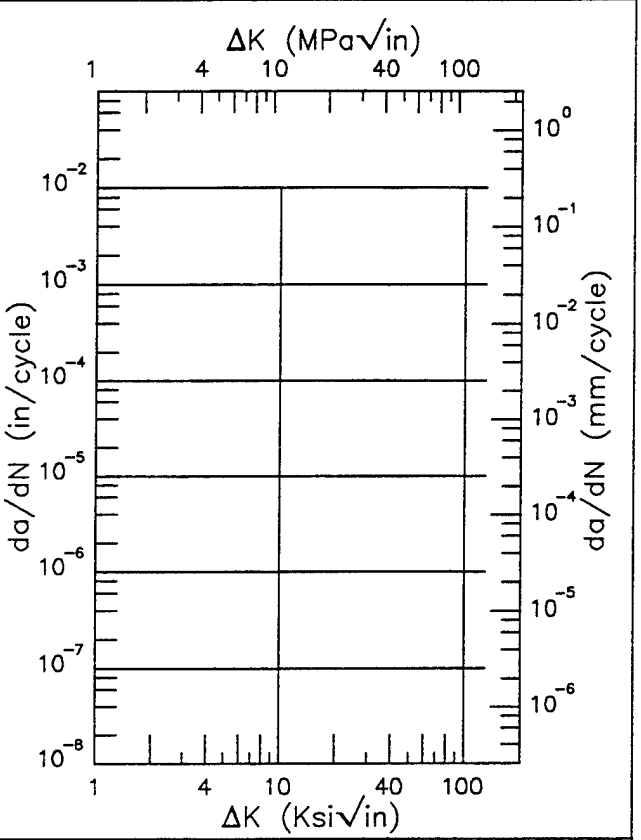
2024 R

Condition/Ht: T62
Form: 0.13 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 1 Hz
Environment: S.T.W.; RT

Yield Strength: 60.3 ksi
Ult. Strength: 74.9 ksi
Specimen Thk: 0.125 in.
Specimen Width: 6 in.
Ref: GD004

(3 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 2.69 (min) | 0.165 |
| 3. | 0.247 |
| 3.5 | 0.441 |
| 4. | 0.744 |
| 5. | 1.92 |
| 6. | 3.89 |
| 7. | 5.74 |
| 8. | 10.6 |
| 8.21 (max) | 13.1 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 13.47 | 0. .5 .8 1.25 2. |

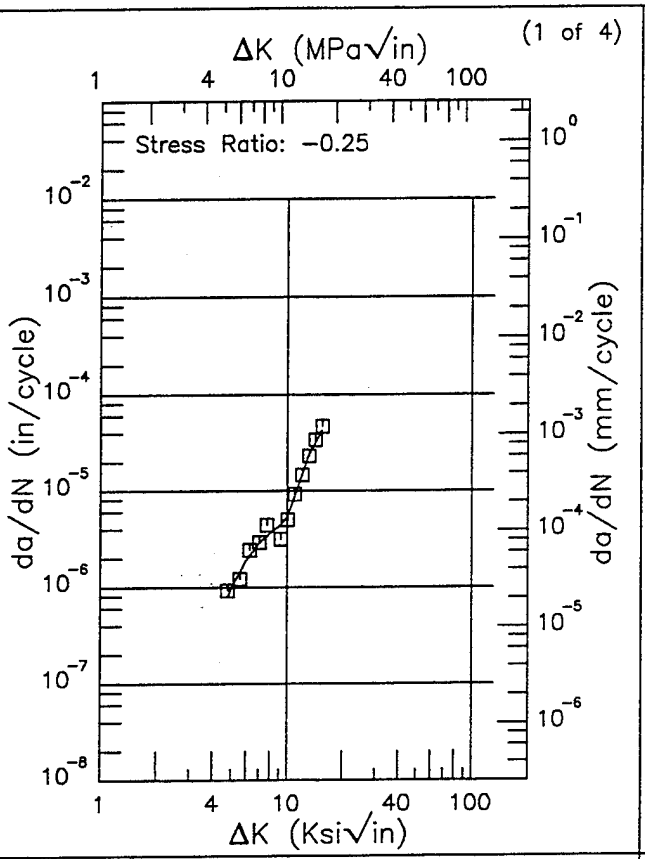
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

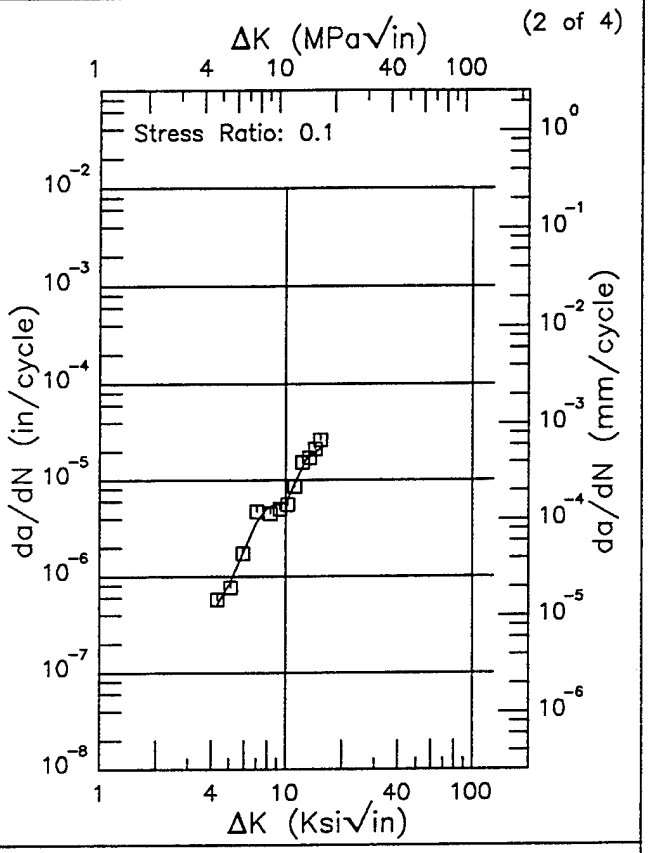
**Figure 7.5.3.1.69 (Concluded)**

R | 2024

Condition/Ht: T62
Form: 0.13 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 1 Hz
Environment: S.T.W.; RT

Yield Strength: 58.2 ksi
Ult. Strength: 73.5 ksi
Specimen Thk: 0.125 in.
Specimen Width: 6 in.
Ref: GD004




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.80 (min) | 0.803 |
| 5. | 0.970 |
| 6. | 1.91 |
| 7. | 2.83 |
| 8. | 3.62 |
| 9. | 4.31 |
| 10. | 5.33 |
| 13. | 22.9 |
| 15.39 (max) | 43.0 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.32 (min) | 0.518 |
| 5. | 0.822 |
| 6. | 1.88 |
| 7. | 3.63 |
| 8. | 5.16 |
| 9. | 5.58 |
| 10. | 5.86 |
| 13. | 17.3 |
| 15.29 (max) | 21.5 |

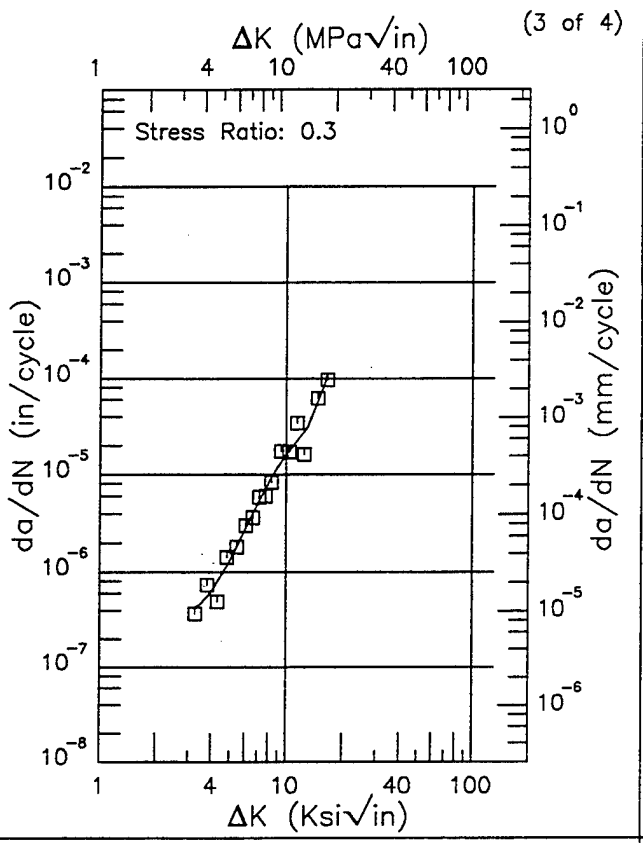
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 14.63 | 0. .5 .8 1.25 2. |

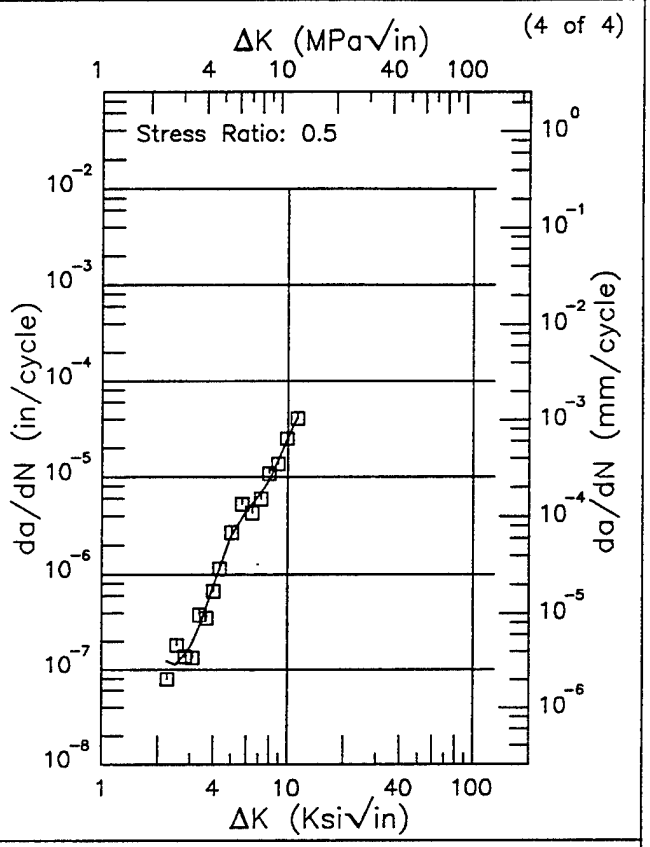
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 14.17 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.70**

Condition/Ht: T62
Form: 0.13 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 1 Hz
Environment: S.T.W.; RT

Yield Strength: 58.2 ksi
Ult. Strength: 73.5 ksi
Specimen Thk: 0.125 in.
Specimen Width: 6 in.
Ref: GD004




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.26 (min) | 0.424 |
| 3.5 | 0.463 |
| 4. | 0.617 |
| 5. | 1.30 |
| 6. | 2.70 |
| 7. | 5.04 |
| 8. | 8.24 |
| 9. | 12.0 |
| 10. | 16.2 |
| 13. | 30.7 |
| 16. | 89.9 |
| 16.37 (max) | 112. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.24 (min) | 0.123 |
| 2.5 | 0.112 |
| 3. | 0.173 |
| 3.5 | 0.361 |
| 4. | 0.770 |
| 5. | 2.50 |
| 6. | 4.52 |
| 7. | 6.37 |
| 8. | 9.28 |
| 9. | 15.3 |
| 10. | 25.4 |
| 11.22 (max) | 40.3 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 24.58 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 24.08 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.70 (Concluded)**

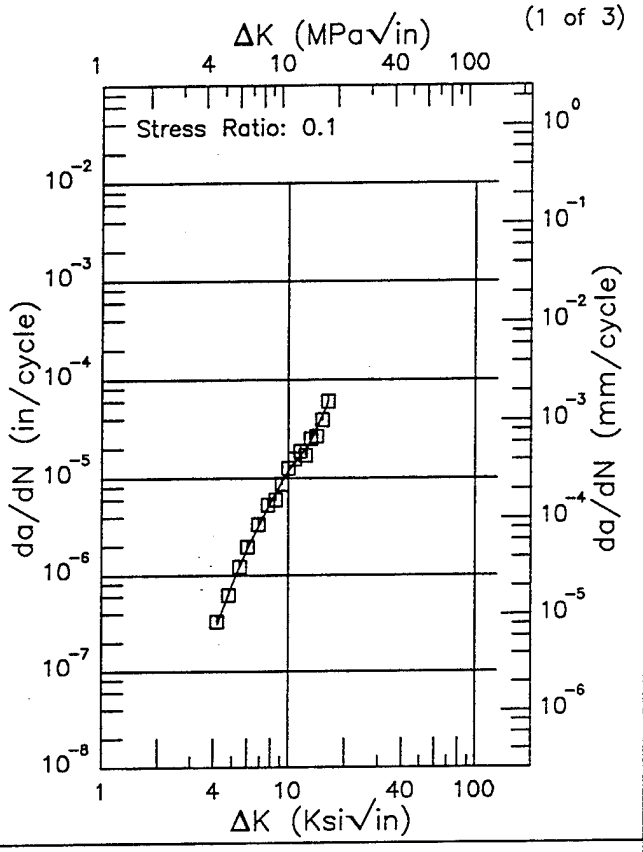
## 2024

R

Condition/Ht: T62
Form: 0.13 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 6 Hz
Environment: DRY AIR; RT

Yield Strength: 58.2 ksi
Ult. Strength: 73.5 ksi
Specimen Thk: 0.125 in.
Specimen Width: 6 in.
Ref: GD004

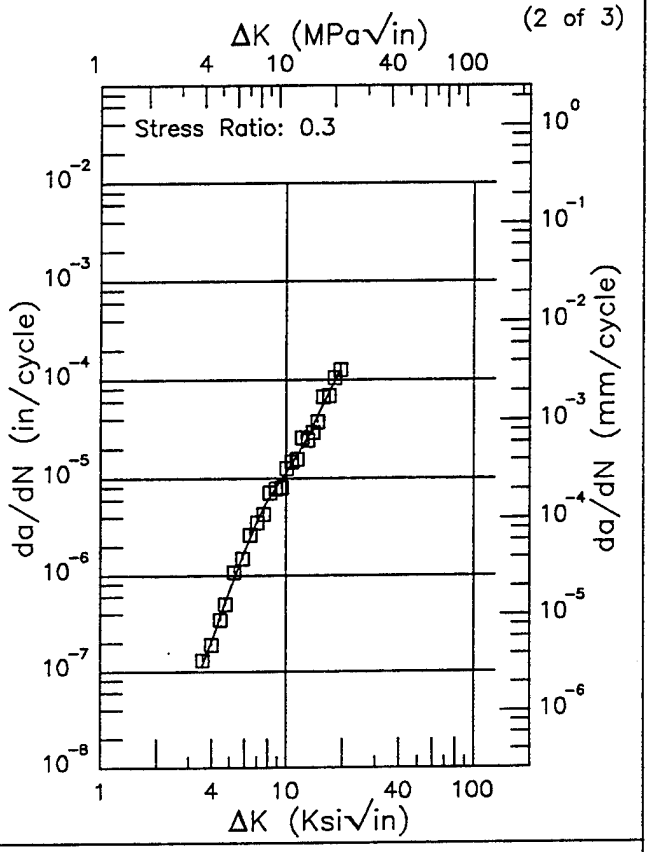
(1 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.17 (min) | 0.311 |
| 5. | 0.800 |
| 6. | 1.84 |
| 7. | 3.44 |
| 8. | 5.66 |
| 9. | 8.50 |
| 10. | 11.8 |
| 13. | 22.7 |
| 16. | 55.3 |
| 16.21 (max) | 61.5 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 8.39 | 0. .5 .8 1.25 2. |

(2 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 3.56 (min) | 0.115 |
| 4. | 0.207 |
| 5. | 0.684 |
| 6. | 1.76 |
| 7. | 3.57 |
| 8. | 5.90 |
| 9. | 8.48 |
| 10. | 11.4 |
| 13. | 25.4 |
| 16. | 59.3 |
| 19.40 (max) | 125. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 10.98 | 0. .5 .8 1.25 2. |

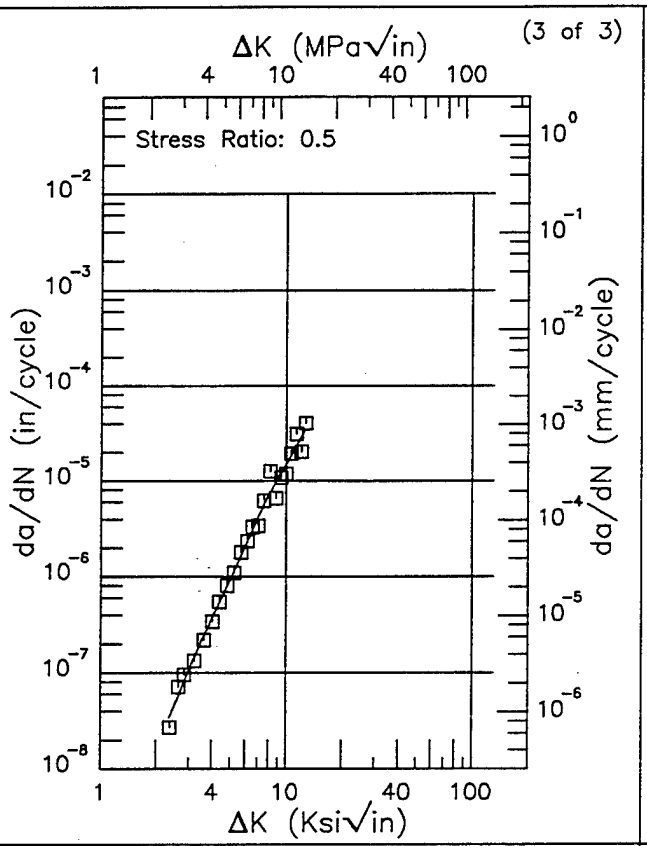
**Figure 7.5.3.1.71**

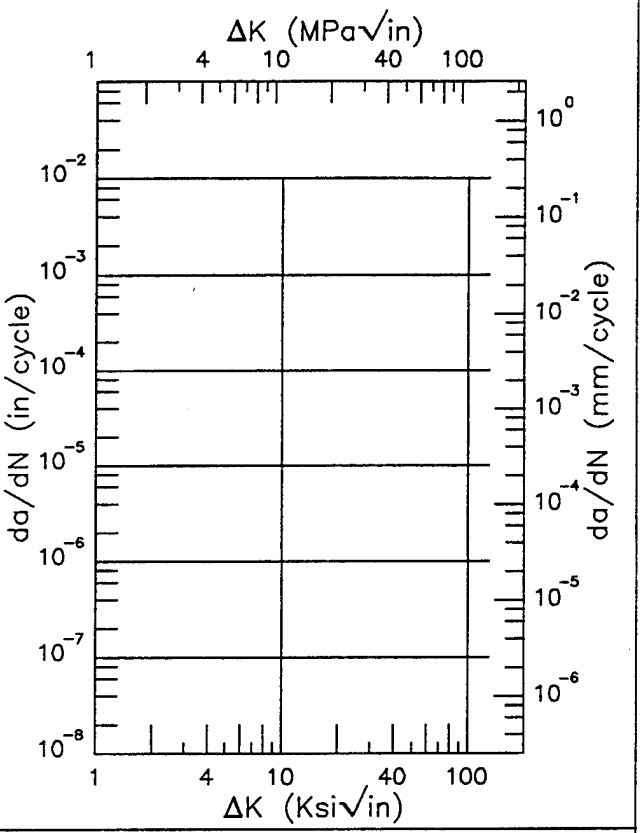
2024 R

Condition/Ht: T62
Form: 0.13 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 6 Hz
Environment: DRY AIR; RT

Yield Strength: 58.2 ksi
Ult. Strength: 73.5 ksi
Specimen Thk: 0.125 in.
Specimen Width: 6 in.
Ref: GD004

(3 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.36 (min) | 0.0342 |
| 2.5 | 0.0454 |
| 3. | 0.106 |
| 3.5 | 0.208 |
| 4. | 0.367 |
| 5. | 0.941 |
| 6. | 2.07 |
| 7. | 4.07 |
| 8. | 7.07 |
| 9. | 10.8 |
| 10. | 14.9 |
| 12.69 (max) | 34.8 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 21.36 | 0. .5 .8 1.25 2. |

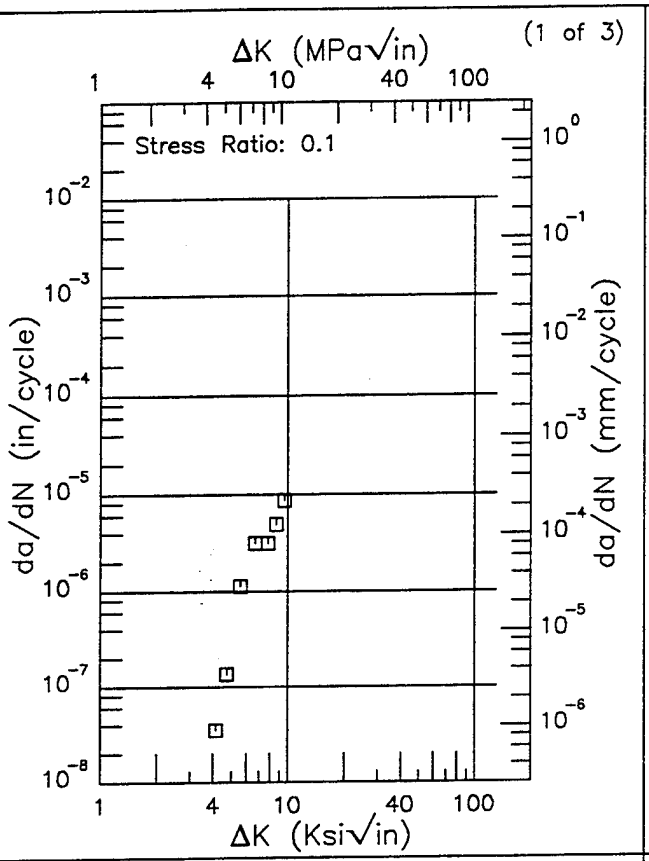
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

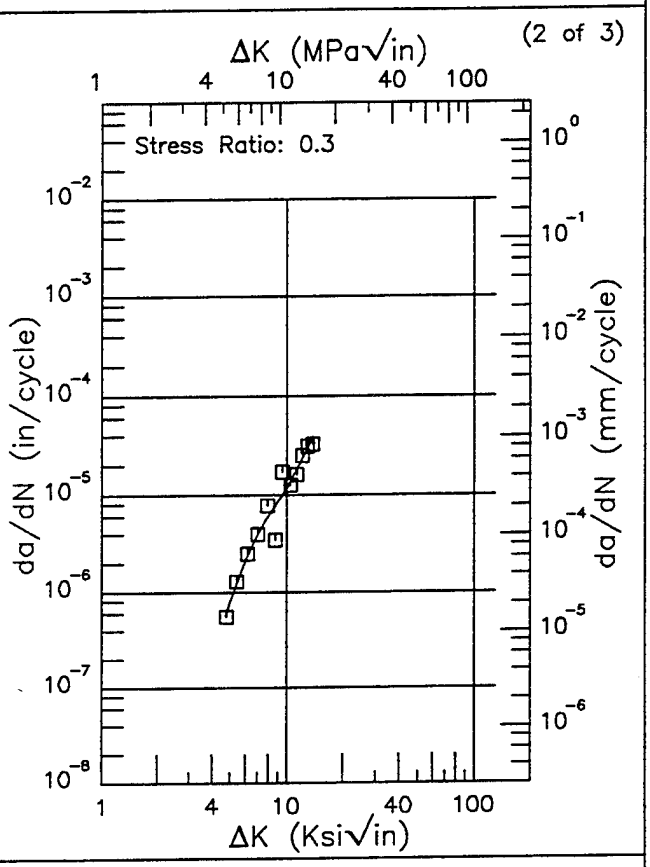
**Figure 7.5.3.1.71 (Concluded)**

R | 2024 |

Condition/Ht: T62
Form: 0.13 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 1 Hz
Environment: H.H.A.; RT

Yield Strength: 58.2 ksi
Ult. Strength: 73.5 ksi
Specimen Thk: 0.125 in.
Specimen Width: 6 in.
Ref: GD004




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.77 (min) | 0.573 |
| 5. | 0.787 |
| 6. | 2.12 |
| 7. | 3.94 |
| 8. | 6.07 |
| 9. | 8.59 |
| 10. | 11.7 |
| 13. | 29.9 |
| 13.80 (max) | 39.3 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

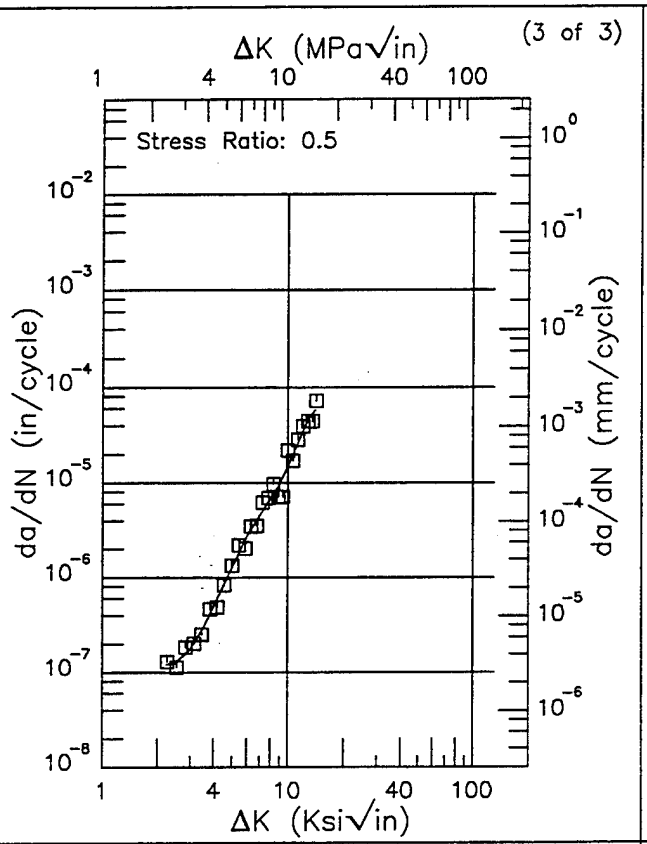
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 28.43 | 0. .5 .8 1.25 2. |

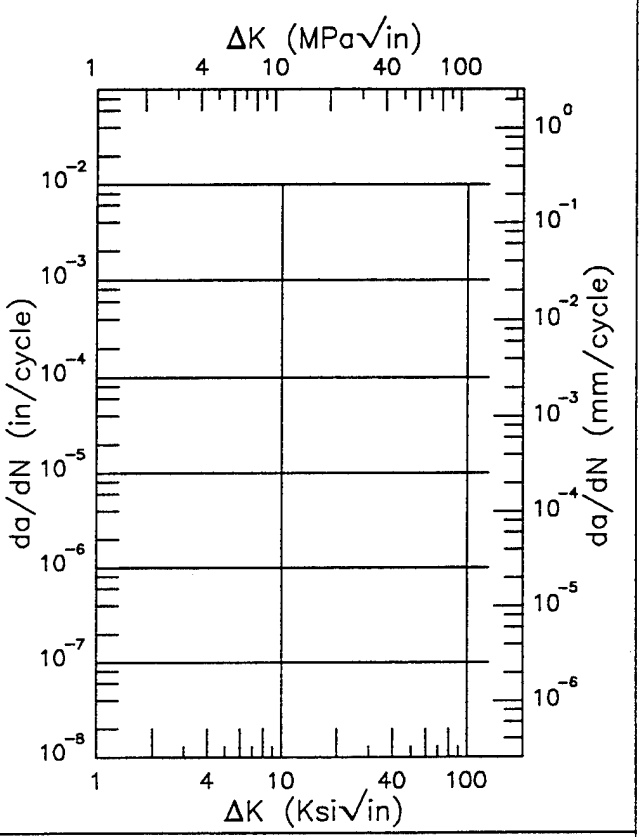
**Figure 7.5.3.1.72**

2024 R

Condition/Ht: T62
Form: 0.13 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 1 Hz
Environment: H.H.A.; RT

Yield Strength: 58.2 ksi
Ult. Strength: 73.5 ksi
Specimen Thk: 0.125 in.
Specimen Width: 6 in.
Ref: GD004




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 2.25 (min) | 0.121 |
| 2.5 | 0.125 |
| 3. | 0.176 |
| 3.5 | 0.288 |
| 4. | 0.489 |
| 5. | 1.28 |
| 6. | 2.69 |
| 7. | 4.50 |
| 8. | 6.75 |
| 9. | 9.93 |
| 10. | 14.9 |
| 13. | 47.8 |
| 14.13 (max) | 58.4 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 19.13 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

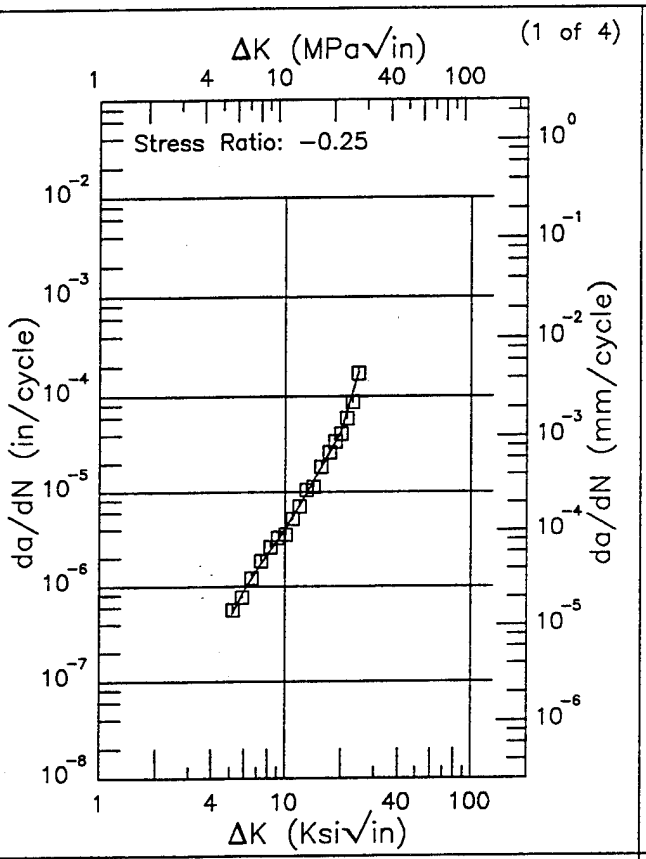
**Figure 7.5.3.1.72 (Concluded)**

## 2024

R

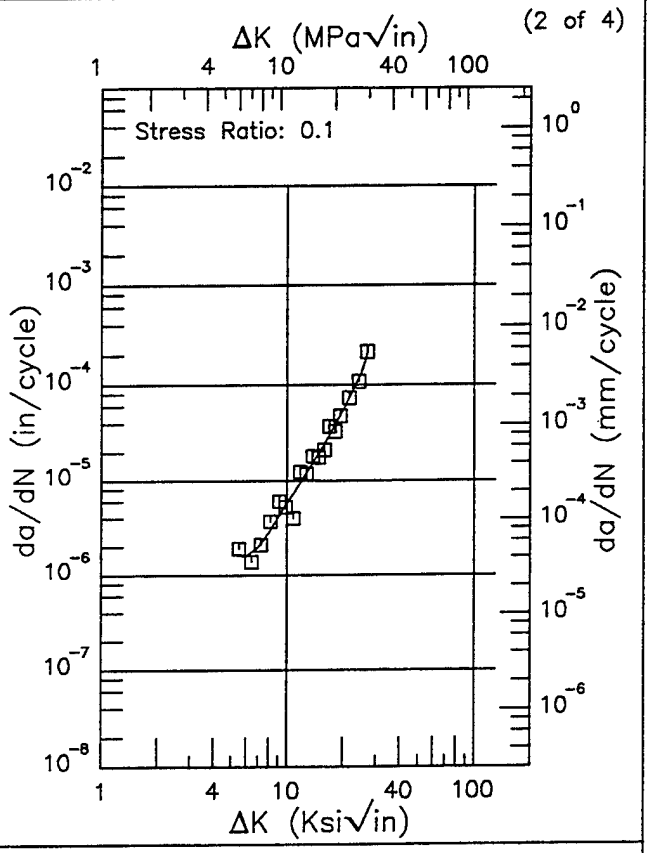
Condition/Ht: T81
Form: 0.13 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 6 Hz
Environment: DRY AIR; RT

Yield Strength: 65.3 ksi
Ult. Strength: 70.9 ksi
Specimen Thk: 0.125 in.
Specimen Width: 6 in.
Ref: GD004




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.19 (min) | 0.517 |
| 6. | 0.906 |
| 7. | 1.49 |
| 8. | 2.17 |
| 9. | 3.00 |
| 10. | 4.01 |
| 13. | 9.31 |
| 16. | 19.9 |
| 20. | 43.6 |
| 24.54 (max) | 168. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 7.66 | 0. .5 .8 1.25 2. |



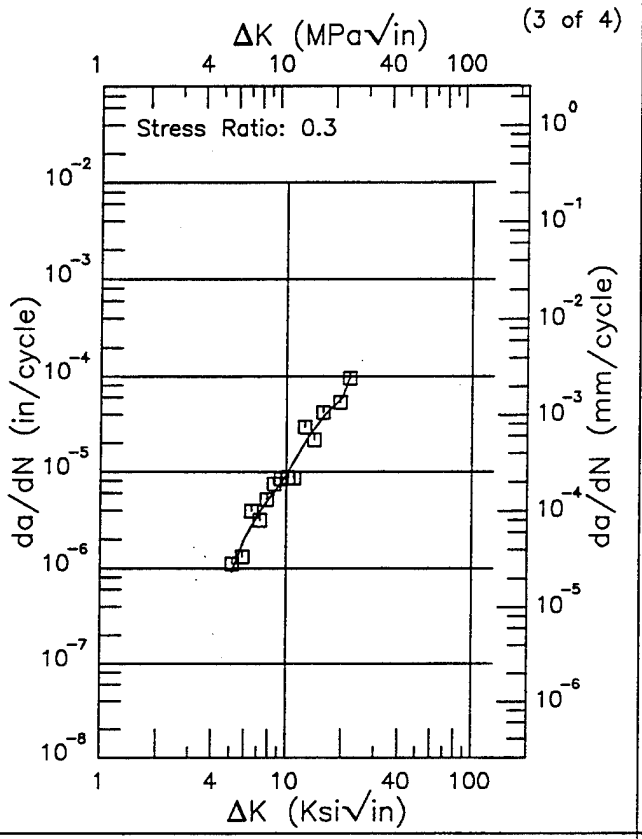

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.48 (min) | 1.60 |
| 6. | 1.59 |
| 7. | 1.97 |
| 8. | 2.79 |
| 9. | 4.07 |
| 10. | 5.81 |
| 13. | 12.9 |
| 16. | 24.2 |
| 20. | 55.0 |
| 25. | 129. |
| 26.90 (max) | 215. |

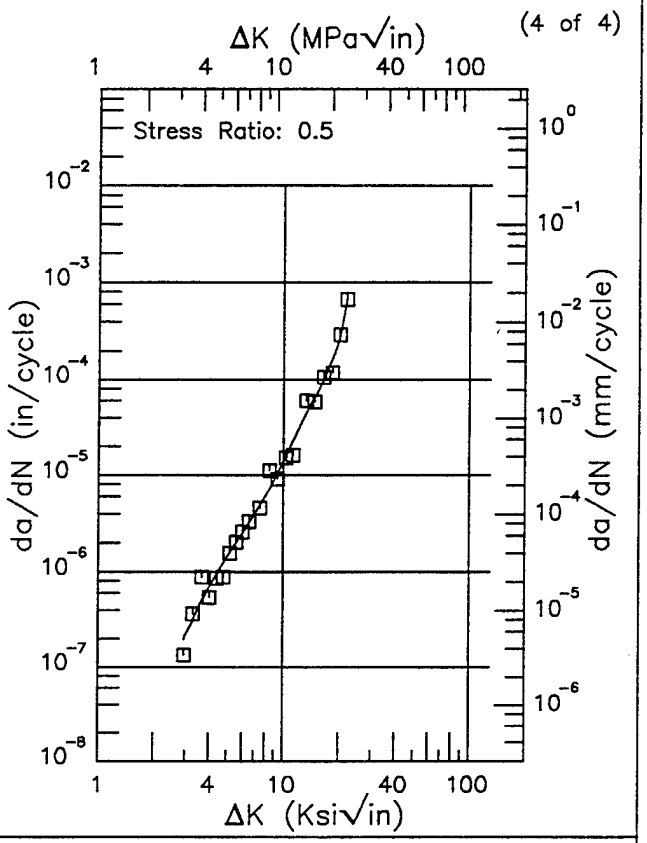
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 20.55 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.73**

Condition/Ht: T81
Form: 0.13 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 6 Hz
Environment: DRY AIR; RT

Yield Strength: 65.3 ksi
Ult. Strength: 70.9 ksi
Specimen Thk: 0.125 in.
Specimen Width: 6 in.
Ref: GD004




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.14 (min) | 0.911 |
| 6. | 2.01 |
| 7. | 3.52 |
| 8. | 5.14 |
| 9. | 6.97 |
| 10. | 9.26 |
| 13. | 22.3 |
| 16. | 39.5 |
| 20. | 59.6 |
| 21.75 (max) | 94.6 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.94 (min) | 0.198 |
| 3. | 0.218 |
| 3.5 | 0.424 |
| 4. | 0.697 |
| 5. | 1.43 |
| 6. | 2.45 |
| 7. | 3.90 |
| 8. | 5.99 |
| 9. | 9.10 |
| 10. | 13.8 |
| 13. | 41.3 |
| 16. | 87.6 |
| 20. | 259. |
| 21.91 (max) | 696. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 23.71 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 27.11 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.73 (Concluded)**

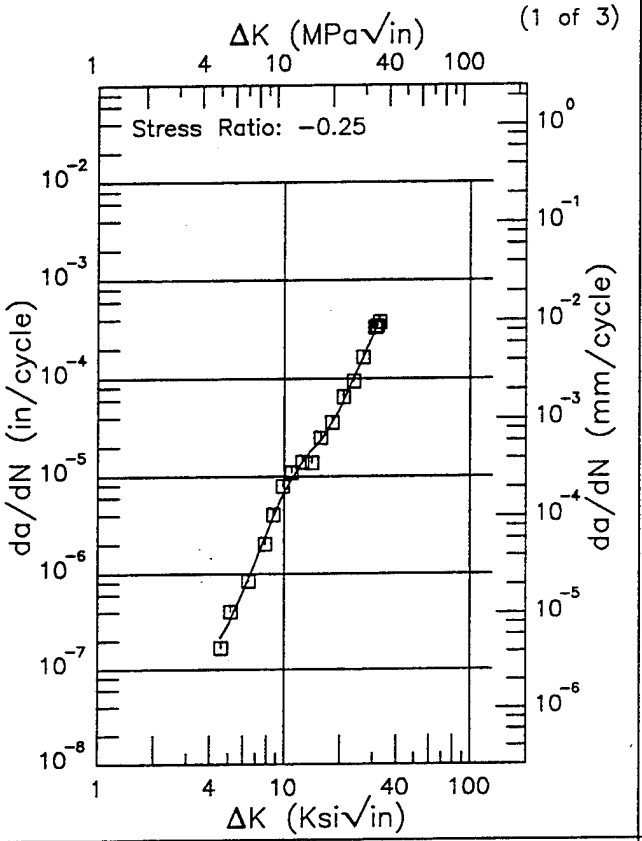
2024

R

Condition/Ht: T81
Form: 0.13 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 1 Hz
Environment: H.H.A.; RT

Yield Strength: 65.3 ksi
Ult. Strength: 70.9 ksi
Specimen Thk: 0.125 in.
Specimen Width: 6 in.
Ref: GD004

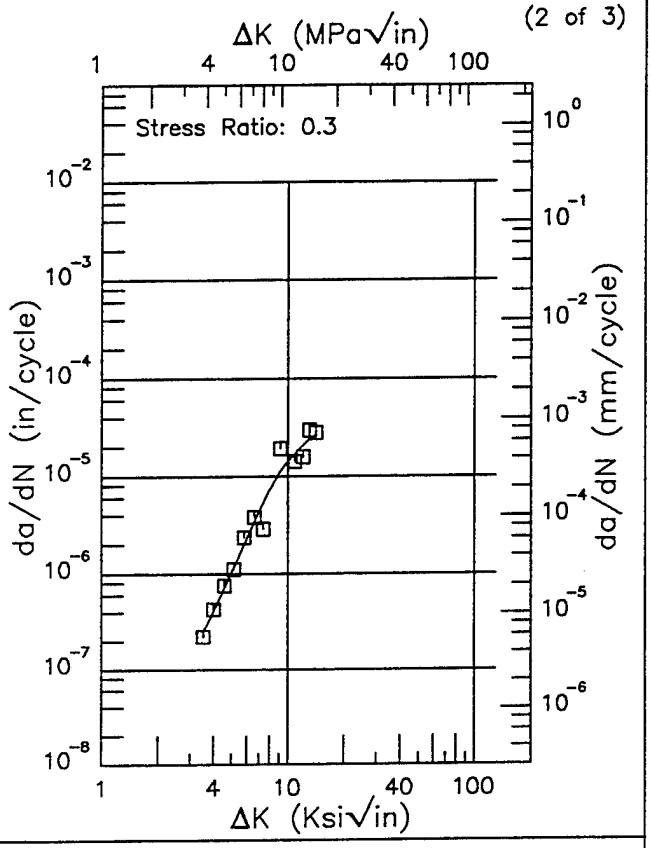
(1 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.56 (min) | 0.214 |
| 5. | 0.297 |
| 6. | 0.650 |
| 7. | 1.36 |
| 8. | 2.61 |
| 9. | 4.50 |
| 10. | 7.00 |
| 13. | 15.6 |
| 16. | 24.4 |
| 20. | 49.2 |
| 25. | 130. |
| 30. | 275. |
| 32.56 (max) | 415. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 13.29 | 0. .5 .8 1.25 2. |

(2 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.52 (min) | 0.254 |
| 4. | 0.407 |
| 5. | 1.04 |
| 6. | 2.30 |
| 7. | 4.39 |
| 8. | 7.32 |
| 9. | 10.8 |
| 10. | 14.5 |
| 13. | 23.9 |
| 14.10 (max) | 26.2 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 27.92 | 0. .5 .8 1.25 2. |

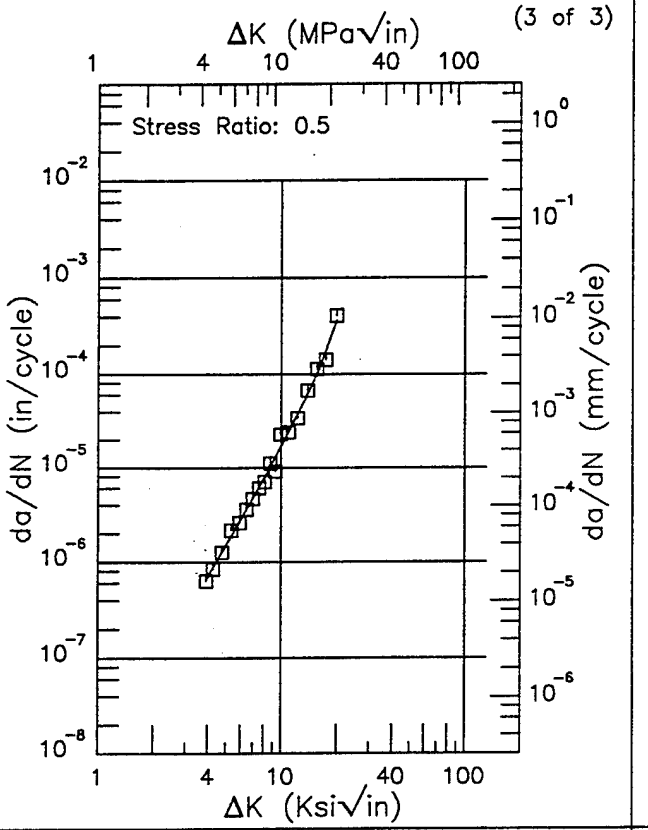
**Figure 7.5.3.1.74**

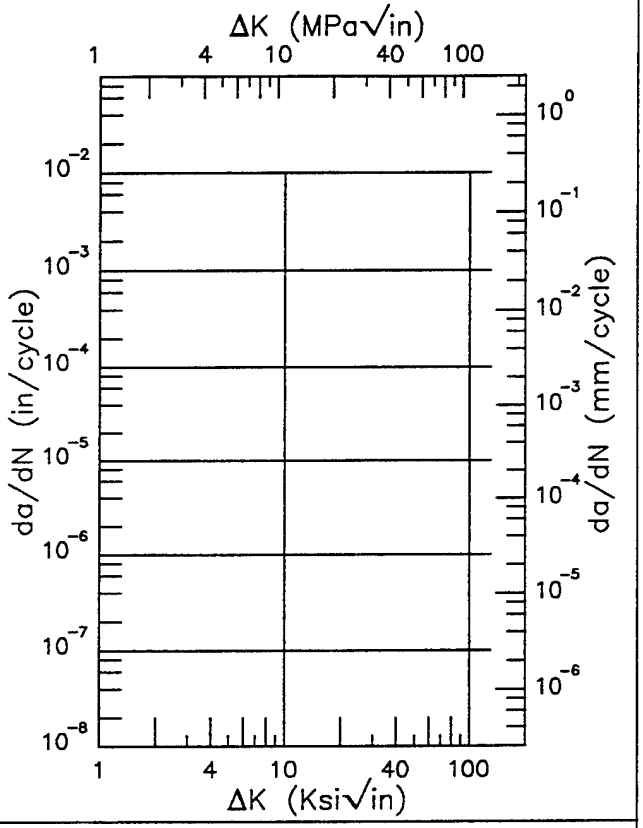
2024 R

Condition/Ht: T81
Form: 0.13 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 1 Hz
Environment: H.H.A.; RT

Yield Strength: 65.3 ksi
Ult. Strength: 70.9 ksi
Specimen Thk: 0.125 in.
Specimen Width: 6 in.
Ref: GD004

(3 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 3.89 (min) | 0.634 |
| 4. | 0.697 |
| 5. | 1.48 |
| 6. | 2.77 |
| 7. | 4.74 |
| 8. | 7.62 |
| 9. | 11.7 |
| 10. | 17.2 |
| 13. | 46.8 |
| 16. | 114. |
| 19.90 (max) | 367. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 14.20 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.74 (Concluded)**

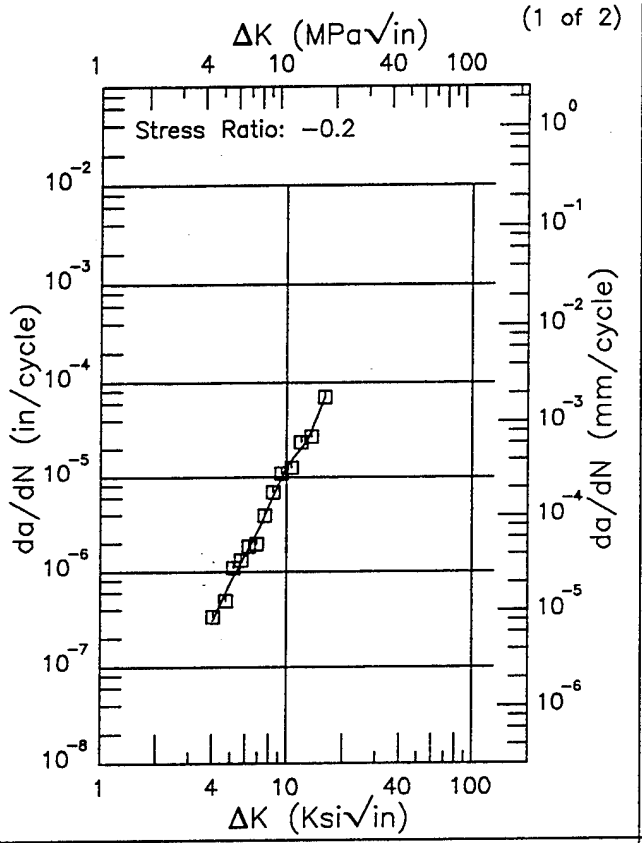
## 2024

R

Condition/Ht: T81
Form: 0.13 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 1 Hz
Environment: S.T.W.; RT

Yield Strength: 65.3 ksi
Ult. Strength: 70.9 ksi
Specimen Thk: 0.125 in.
Specimen Width: 6 in.
Ref: GD004

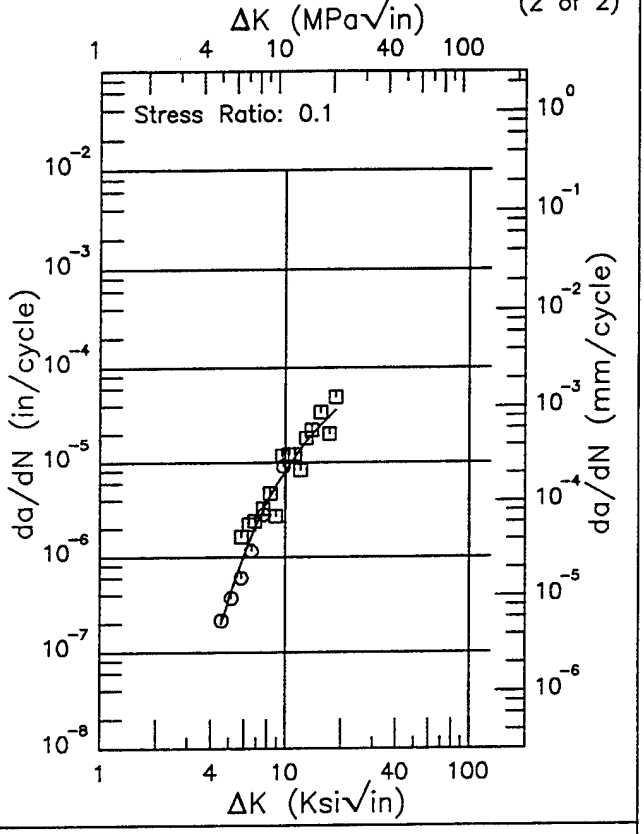
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.03 (min) | 0.308 |
| 5. | 0.767 |
| 6. | 1.48 |
| 7. | 2.68 |
| 8. | 4.89 |
| 9. | 8.35 |
| 10. | 12.7 |
| 13. | 25.2 |
| 15.95 (max) | 70.0 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 14.16 | 0. .5 .8 1.25 2. |

(2 of 2)



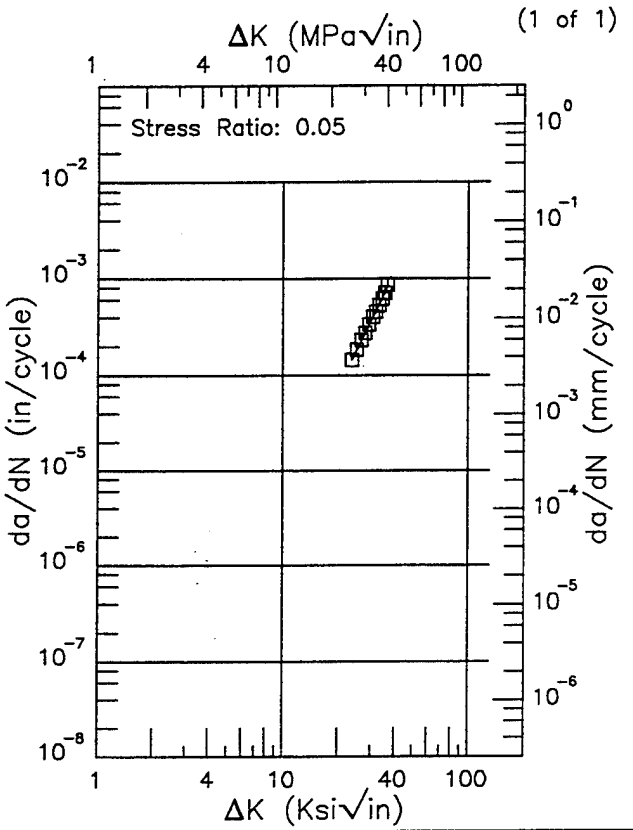

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.55 (min) | 0.196 |
| 5. | 0.365 |
| 6. | 1.04 |
| 7. | 2.19 |
| 8. | 3.82 |
| 9. | 5.86 |
| 10. | 8.25 |
| 13. | 16.7 |
| 16. | 26.4 |
| 18.76 (max) | 36.2 |

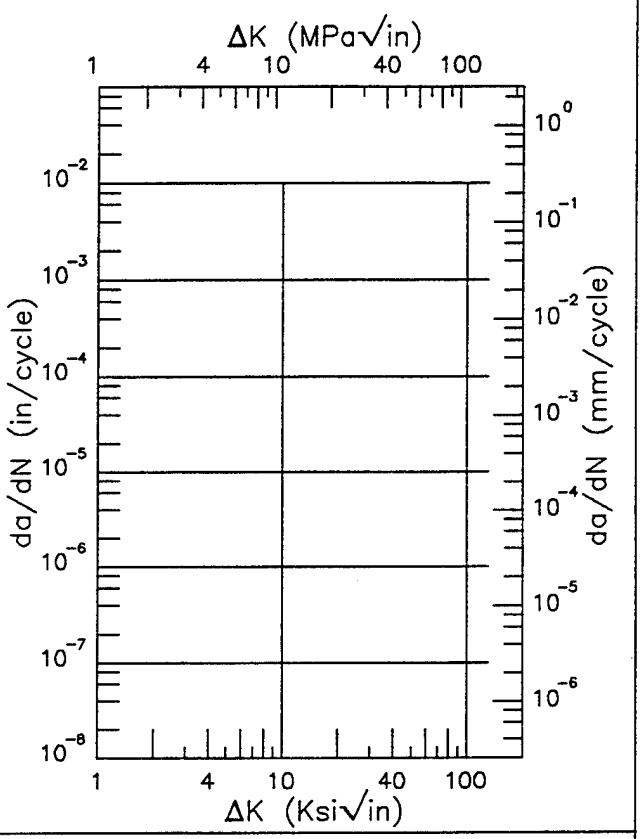
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 35.93 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.75**

Condition/Ht: T81
Form: 0.04 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 2 Hz
Environment: LAB AIR; RT

Yield Strength: 64.4 ksi
Ult. Strength: 70.5 ksi
Specimen Thk: 0.04 in.
Specimen Width: 6.45 in.
Ref: 86734




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 23.63 (min) | 144. |
| 25. | 183. |
| 30. | 369. |
| 35. | 666. |
| 36.74 (max) | 863. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 0.76 | 0. .5 .8 1.25 2. |

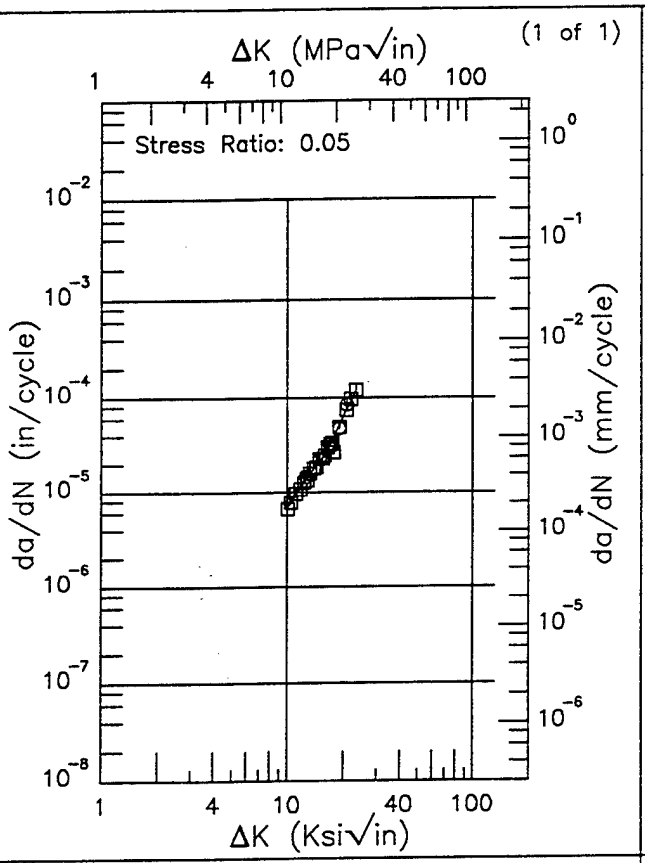
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

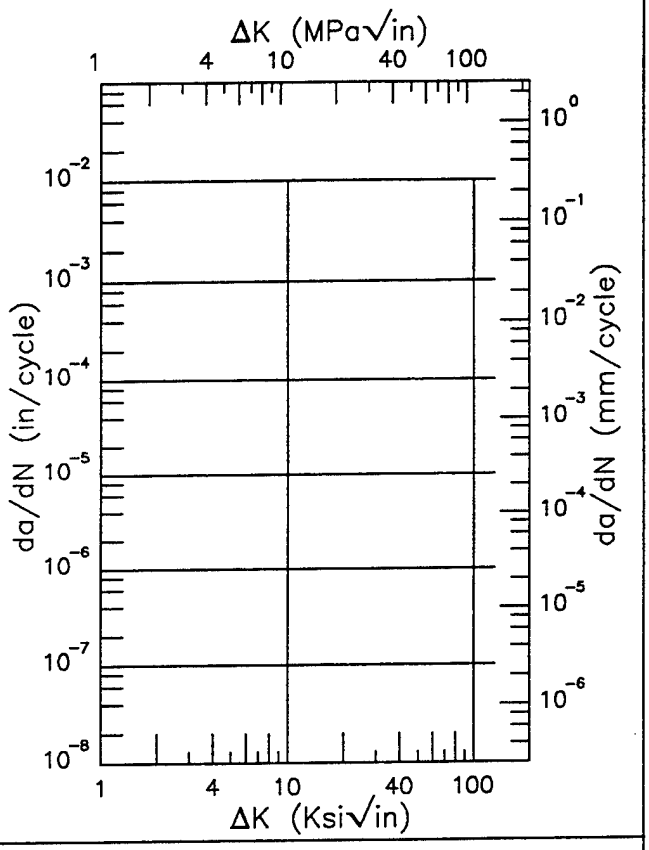
**Figure 7.5.3.1.76**

R 2024

Condition/Ht: T81
Form: 0.04 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 2 Hz
Environment: LAB AIR; RT

Yield Strength: 64.4 ksi
Ult. Strength: 70.5 ksi
Specimen Thk: 0.04 in.
Specimen Width: 9.7 in.
Ref: 86734




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 10.00 (min) | 6.93 |
| 13. | 14.9 |
| 16. | 25.4 |
| 20. | 63.6 |
| 23.11 (max) | 116. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

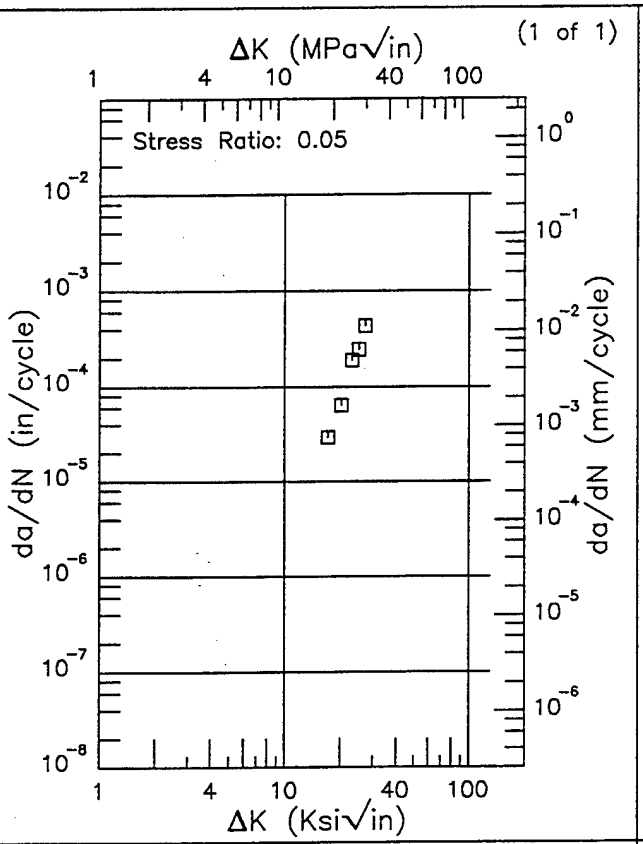
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 7.82 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

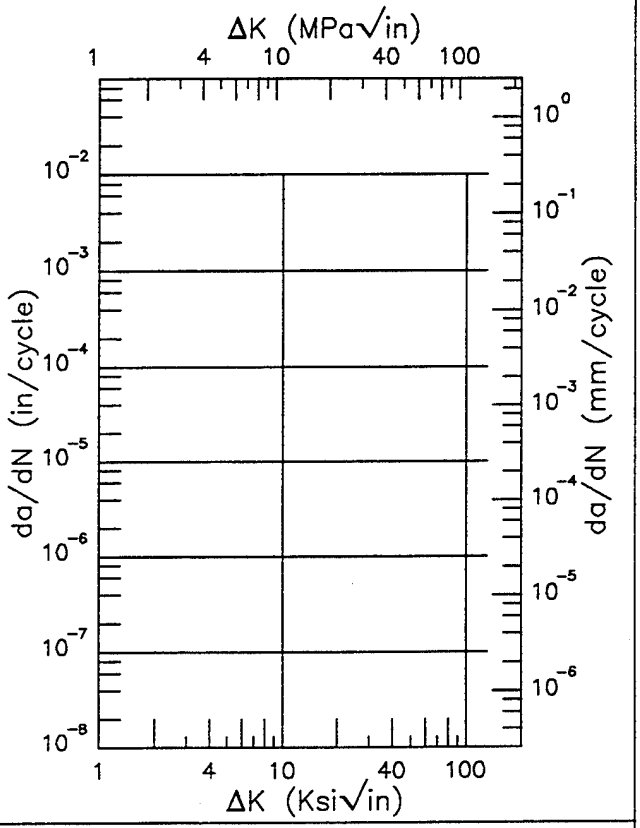
**Figure 7.5.3.1.77**

Condition/Ht: T81
Form: 0.03 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 2 Hz
Environment: LAB AIR; RT

Yield Strength: 64.4 ksi
Ult. Strength: 70.5 ksi
Specimen Thk: 0.032 in.
Specimen Width: 6 in.
Ref: 86734




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

| RMS % Error | Life Prediction Ratio Summary | RMS % Error | Life Prediction Ratio Summary |
|---|---|---|---|
| | 0. .5 .8 1.25 2. | | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.78**

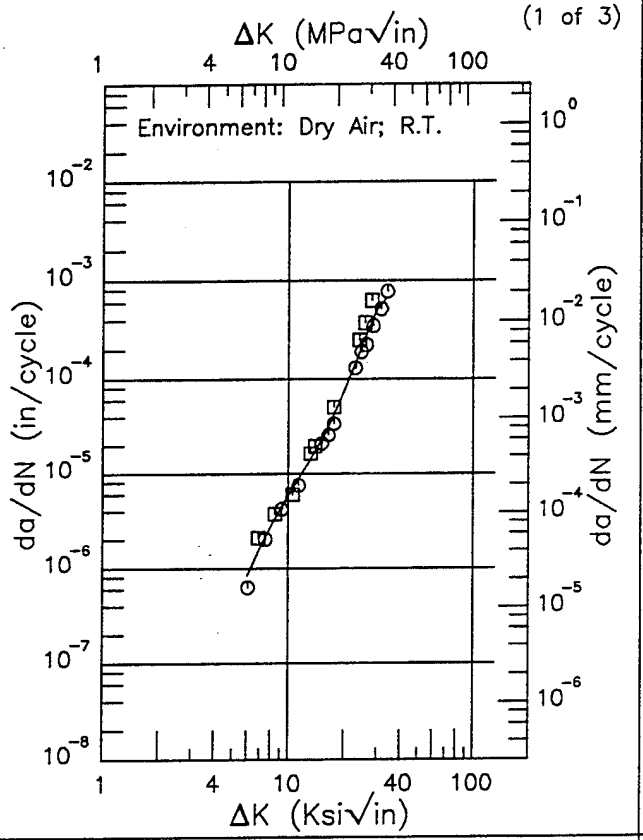
## 2024

E

Condition/Ht: T81
Form: 0.1 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Stress Ratio: 0.08
Frequency: 1 Hz

Yield Strength:
Ult. Strength:
Specimen Thk: 0.099 – 0.101 in.
Specimen Width: 23.8 – 23.82 in.
Ref: 86575

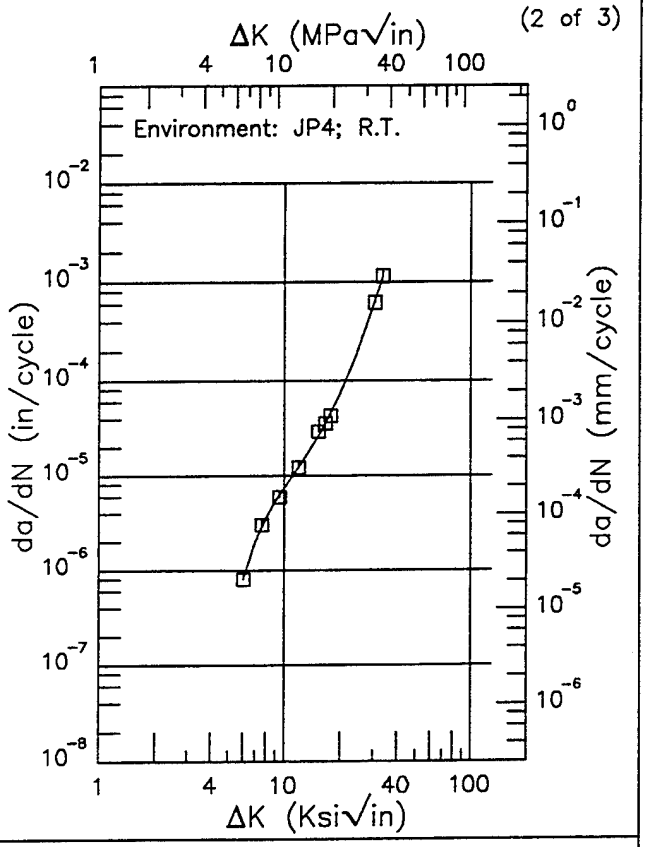
(1 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.04 (min) | 0.847 |
| 7. | 1.65 |
| 8. | 2.77 |
| 9. | 4.18 |
| 10. | 5.91 |
| 13. | 13.7 |
| 16. | 28.5 |
| 20. | 74.4 |
| 25. | 232. |
| 30. | 505. |
| 34.01 (max) | 677. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 23.66 | 0. .5 .8 1.25 2. |

(2 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.04 (min) | 0.836 |
| 7. | 1.95 |
| 8. | 3.53 |
| 9. | 5.42 |
| 10. | 7.52 |
| 13. | 15.7 |
| 16. | 30.4 |
| 20. | 75.1 |
| 25. | 216. |
| 30. | 572. |
| 33.51 (max) | 1132. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 5.62 | 0. .5 .8 1.25 2. |

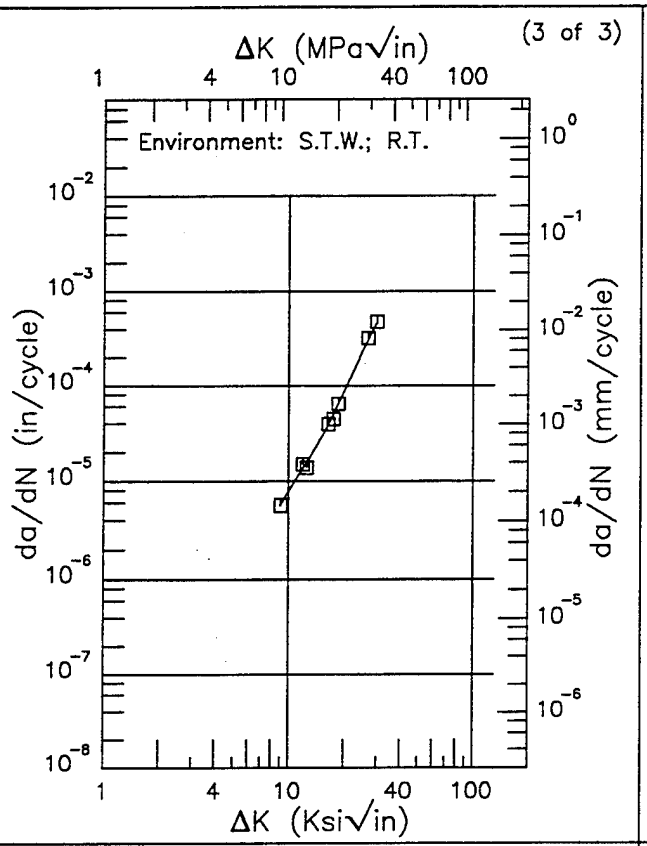
**Figure 7.5.3.1.79**

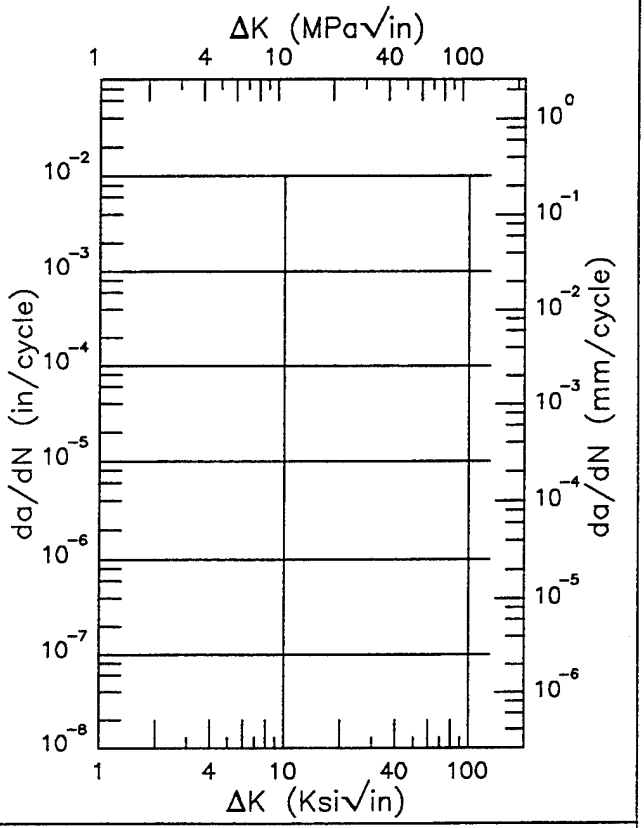
2024 E

Condition/Ht: T81
Form: 0.1 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Stress Ratio: 0.08
Frequency: 1 Hz

Yield Strength:
Ult. Strength:
Specimen Thk: 0.099 – 0.101 in.
Specimen Width: 23.8 – 23.82 in.
Ref: 86575

(3 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 9.01 (min) | 5.65 |
| 10. | 7.92 |
| 13. | 17.5 |
| 16. | 35.1 |
| 20. | 87.7 |
| 25. | 238. |
| 29.88 (max) | 475. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 6.65 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

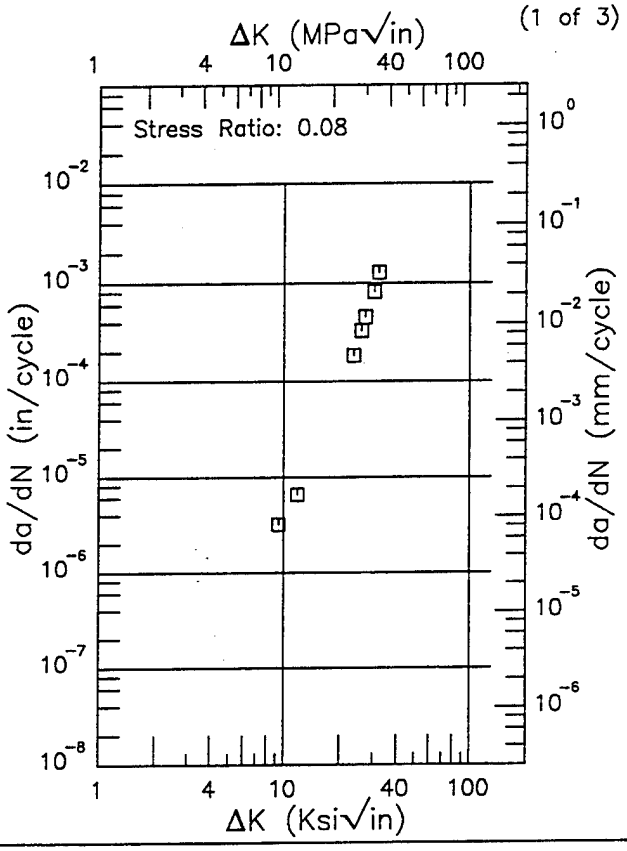
**Figure 7.5.3.1.79 (Concluded)**

R | 2024 |

Condition/Ht: T81
Form: 0.1 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 6 Hz
Environment: DRY AIR; RT

Yield Strength:
Ult. Strength:
Specimen Thk: 0.097 – 0.1 in.
Specimen Width: 23.66 – 23.68 in.
Ref: 86575

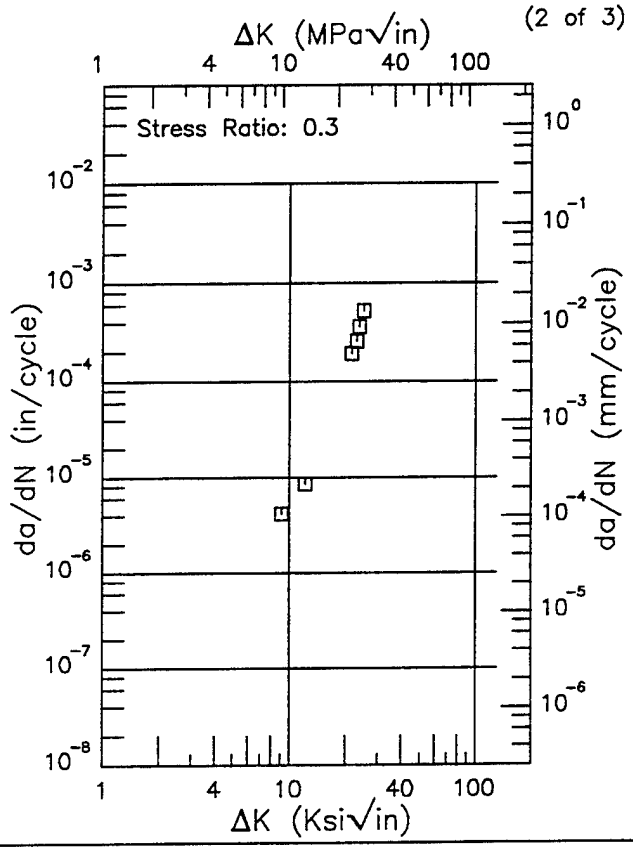
(1 of 3)




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

(2 of 3)




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

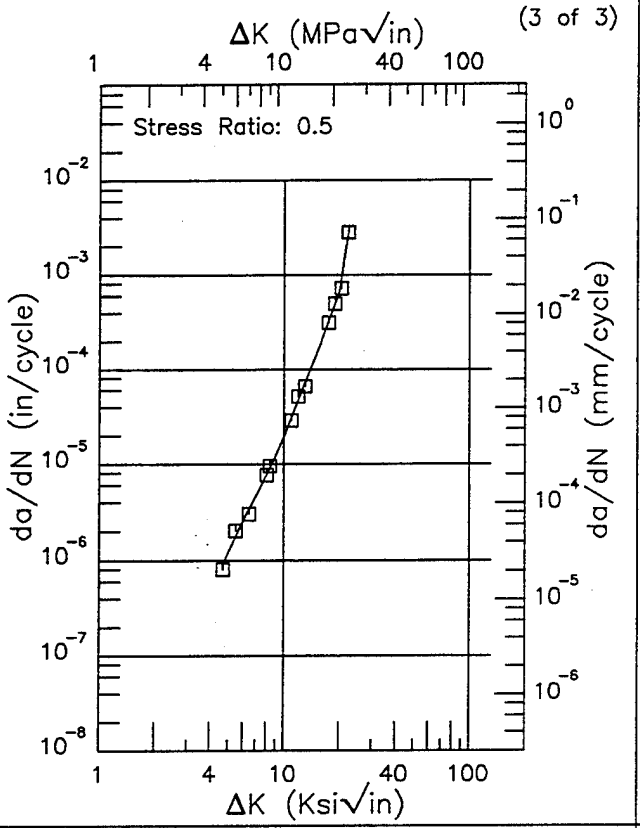
**Figure 7.5.3.1.80**

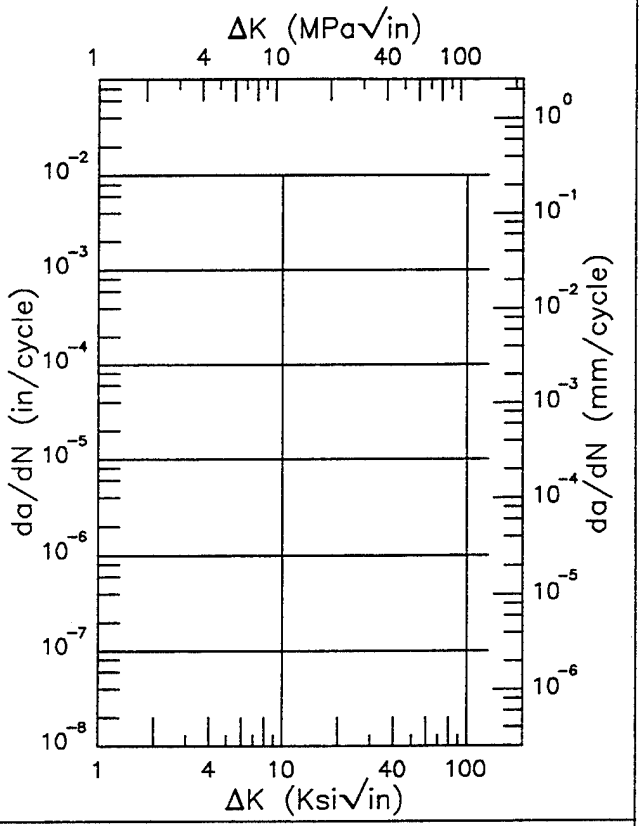
2024 R

Condition/Ht: T81
Form: 0.1 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 6 Hz
Environment: DRY AIR; RT

Yield Strength:
Ult. Strength:
Specimen Thk: 0.097 – 0.1 in.
Specimen Width: 23.66 – 23.68 in.
Ref: 86575

(3 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.66 (min) | 0.867 |
| 5. | 1.20 |
| 6. | 2.54 |
| 7. | 4.56 |
| 8. | 7.59 |
| 9. | 12.2 |
| 10. | 19.3 |
| 13. | 69.8 |
| 16. | 210. |
| 20. | 679. |
| 22.07 (max) | 2658. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 8.38 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

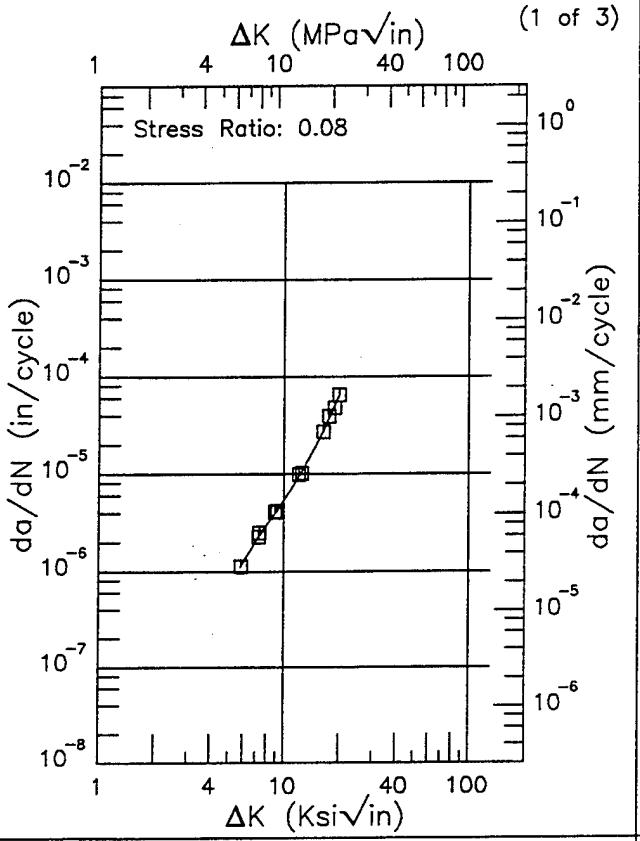
**Figure 7.5.3.1.80 (Concluded)**

R | 2024 |

Condition/Ht: T81
Form: 0.1 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 6 Hz
Environment: DRY AIR; RT

Yield Strength:
Ult. Strength:
Specimen Thk: 0.1 – 0.101 in.
Specimen Width: 23.8 – 23.82 in.
Ref: 86575

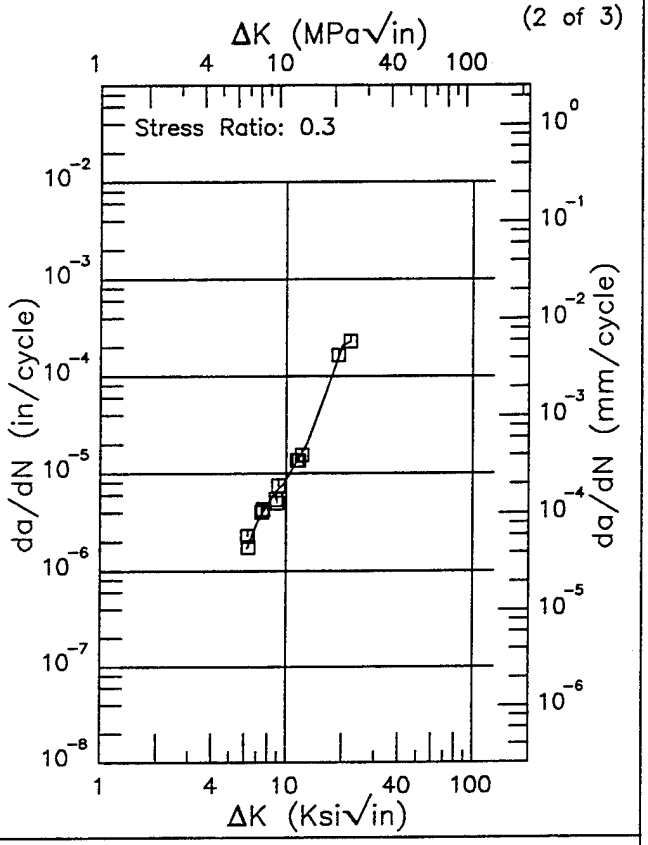
(1 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.82 (min) | 1.11 |
| 6. | 1.25 |
| 7. | 2.07 |
| 8. | 3.02 |
| 9. | 4.12 |
| 10. | 5.45 |
| 13. | 11.9 |
| 16. | 25.2 |
| 19.89 (max) | 64.9 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 3.47 | 0. .5 .8 1.25 2. |

(2 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.20 (min) | 1.72 |
| 7. | 3.08 |
| 8. | 4.87 |
| 9. | 6.66 |
| 10. | 8.65 |
| 13. | 20.4 |
| 16. | 58.5 |
| 20. | 206. |
| 21.95 (max) | 226. |

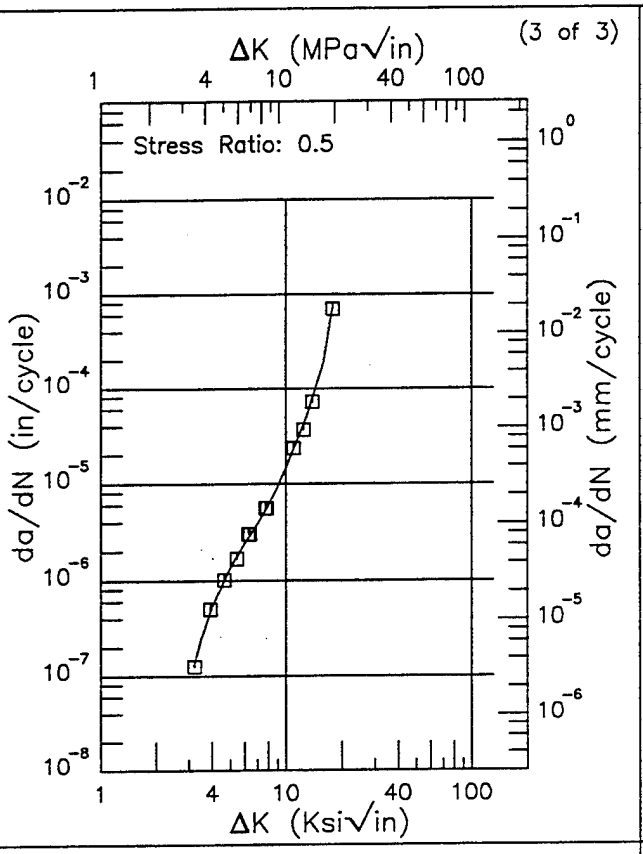
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 12.93 | 0. .5 .8 1.25 2. |

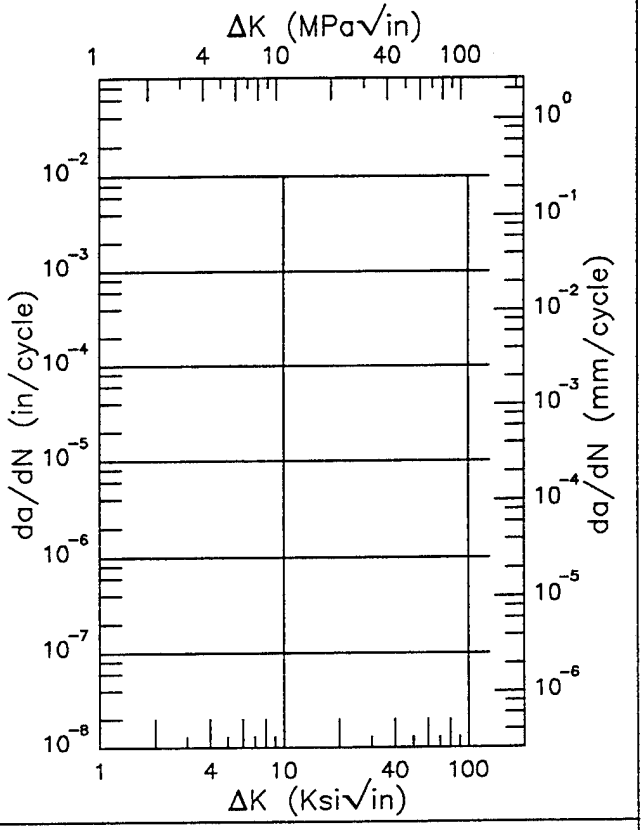
**Figure 7.5.3.1.81**

Condition/Ht: T81
Form: 0.1 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 6 Hz
Environment: DRY AIR; RT

Yield Strength:
Ult. Strength:
Specimen Thk: 0.1 – 0.101 in.
Specimen Width: 23.8 – 23.82 in.
Ref: 86575

(3 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 3.21 (min) | 0.130 |
| 3.5 | 0.242 |
| 4. | 0.528 |
| 5. | 1.36 |
| 6. | 2.45 |
| 7. | 3.88 |
| 8. | 6.01 |
| 9. | 9.44 |
| 10. | 14.8 |
| 13. | 51.6 |
| 16. | 199. |
| 17.77 (max) | 692. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 5.53 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.81 (Concluded)**

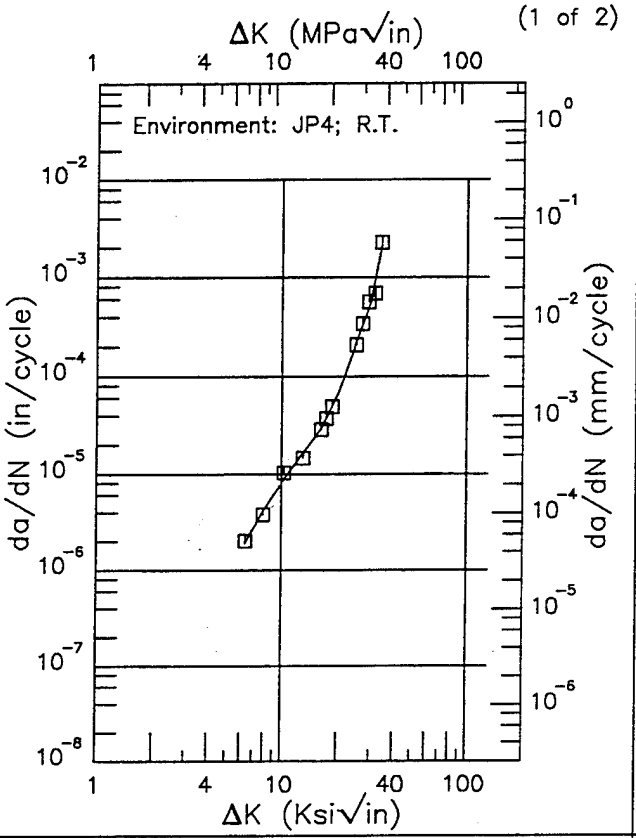
## 2024

E

Condition/Ht: T81
Form: 0.1 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Stress Ratio: 0.08
Frequency: 1 Hz

Yield Strength:
Ult. Strength:
Specimen Thk: 0.098 – 0.099 in.
Specimen Width: 23.66 – 23.67 in.
Ref: 86575

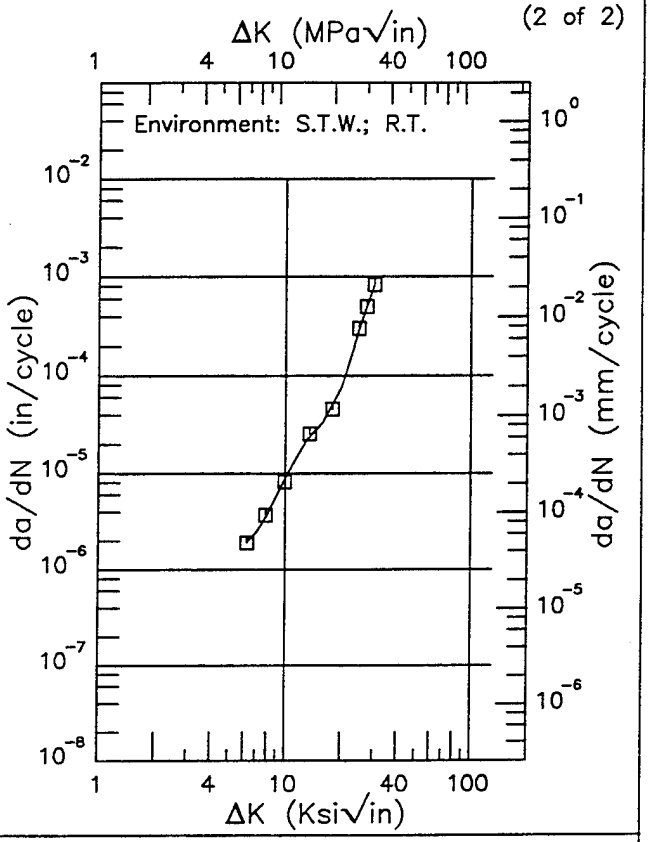
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.33 (min) | 1.90 |
| 7. | 2.71 |
| 8. | 4.20 |
| 9. | 6.01 |
| 10. | 8.11 |
| 13. | 16.3 |
| 16. | 28.5 |
| 20. | 66.3 |
| 25. | 227. |
| 30. | 557. |
| 34.23 (max) | 2144. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 10.58 | 0. .5 .8 1.25 2. |

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.24 (min) | 1.97 |
| 7. | 2.42 |
| 8. | 3.70 |
| 9. | 5.91 |
| 10. | 9.17 |
| 13. | 21.9 |
| 16. | 33.9 |
| 20. | 75.7 |
| 25. | 296. |
| 29.89 (max) | 806. |

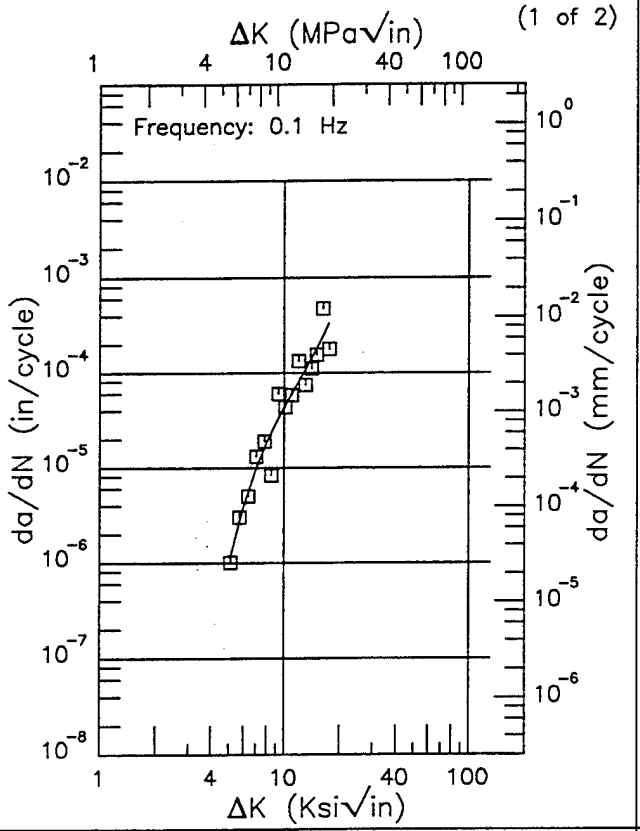
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 6.25 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.82**

Condition/Ht: T81
Form: 0.13 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Stress Ratio: 0.1
Environment: H.H.A.; RT

Yield Strength: 65.3 ksi
Ult. Strength: 70.9 ksi
Specimen Thk: 0.125 in.
Specimen Width: 6 in.
Ref: GD004

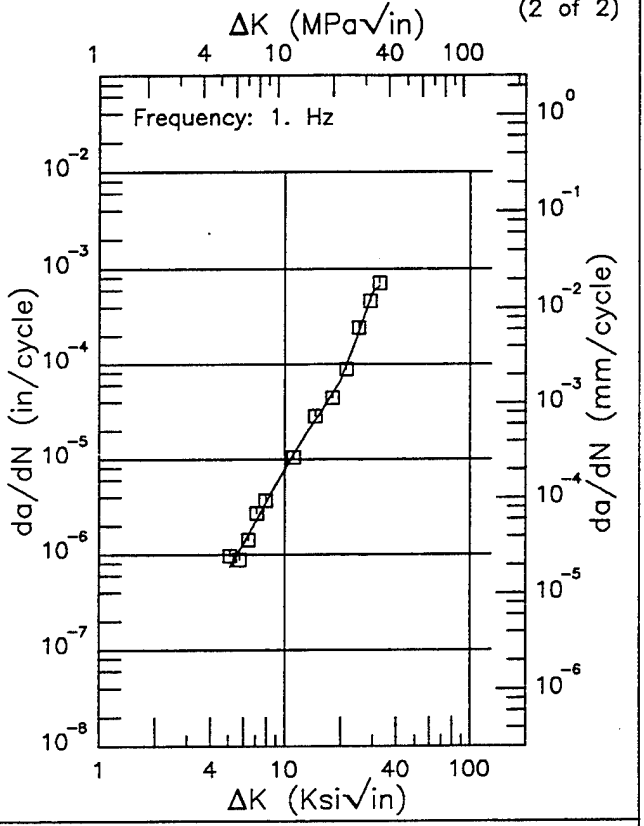
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 5.09 (min) | 1.14 |
| 6. | 3.88 |
| 7. | 9.64 |
| 8. | 18.3 |
| 9. | 29.8 |
| 10. | 43.9 |
| 13. | 107. |
| 16. | 232. |
| 17.46 (max) | 339. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 44.38 | 0. .5 .8 1.25 2. |

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 5.09 (min) | 0.750 |
| 6. | 1.29 |
| 7. | 2.20 |
| 8. | 3.55 |
| 9. | 5.40 |
| 10. | 7.82 |
| 13. | 18.5 |
| 16. | 33.3 |
| 20. | 68.1 |
| 25. | 217. |
| 30. | 579. |
| 32.48 (max) | 672. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 13.30 | 0. .5 .8 1.25 2. |

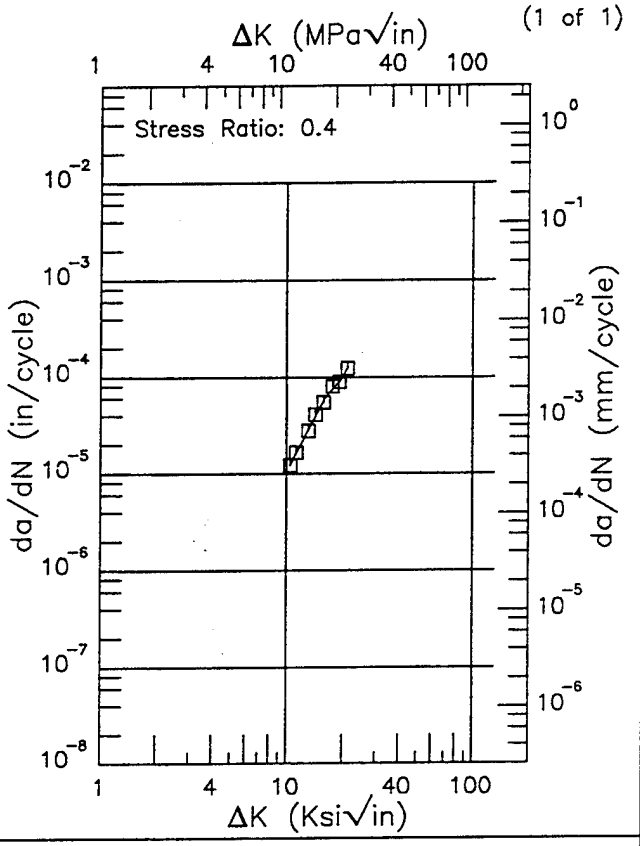
**Figure 7.5.3.1.83**

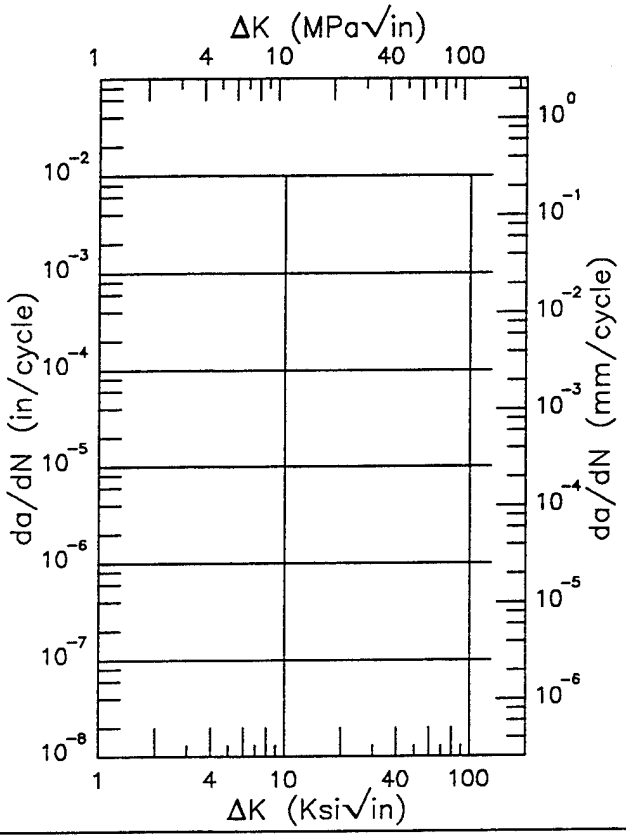
R 2024

Condition/Ht: T81
Form: 0.07 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 2 Hz
Environment: LAB AIR; RT

Yield Strength: 64.4 ksi
Ult. Strength: 70.5 ksi
Specimen Thk: 0.065 in.
Specimen Width: 4 in.
Ref: 86734

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 10.39 (min) | 12.1 |
| 13. | 28.2 |
| 16. | 60.9 |
| 20. | 100. |
| 21.09 (max) | 122. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 3.30 | 0. .5 .8 1.25 2. |

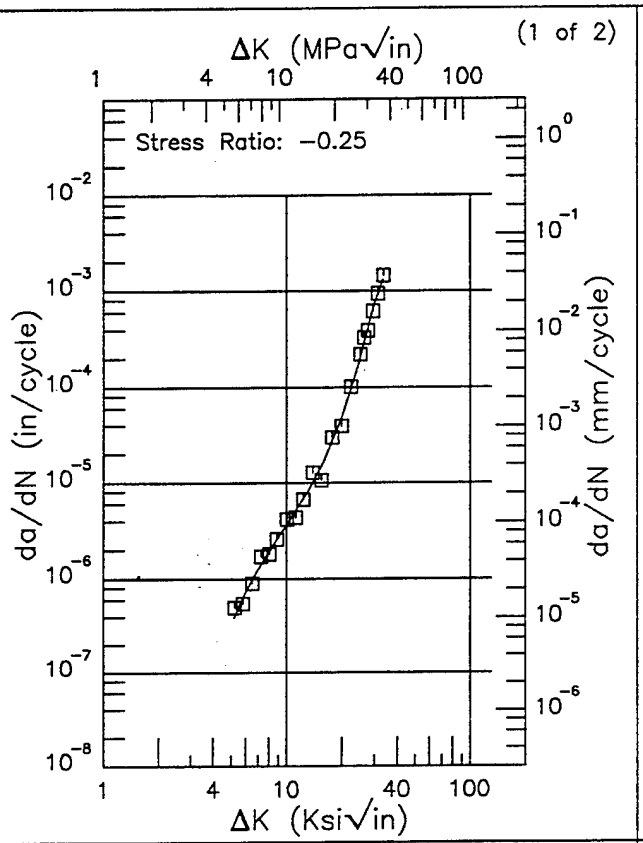
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.84**

Condition/Ht: T81
Form: 0.13 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 6 Hz
Environment: DRY AIR; RT

Yield Strength: 65.8 ksi
Ult. Strength: 73.1 ksi
Specimen Thk: 0.125 in.
Specimen Width: 6 in.
Ref: GD004

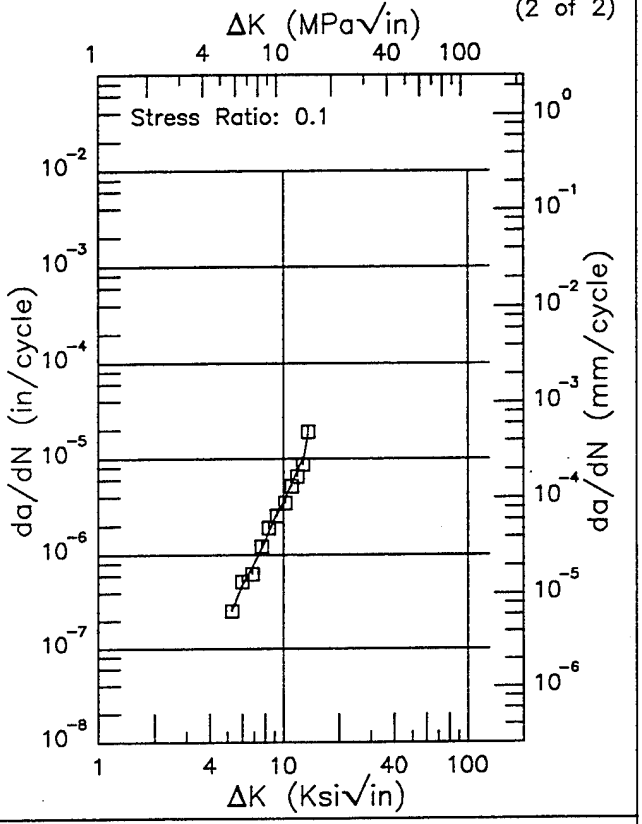
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.21 (min) | 0.395 |
| 6. | 0.722 |
| 7. | 1.26 |
| 8. | 1.91 |
| 9. | 2.70 |
| 10. | 3.63 |
| 13. | 7.93 |
| 16. | 16.8 |
| 20. | 48.2 |
| 25. | 201. |
| 30. | 742. |
| 33.50 (max) | 1319. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 14.33 | 0. .5 .8 1.25 2. |

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.26 (min) | 0.263 |
| 6. | 0.483 |
| 7. | 0.804 |
| 8. | 1.40 |
| 9. | 2.41 |
| 10. | 3.53 |
| 13. | 11.0 |
| 13.58 (max) | 18.2 |

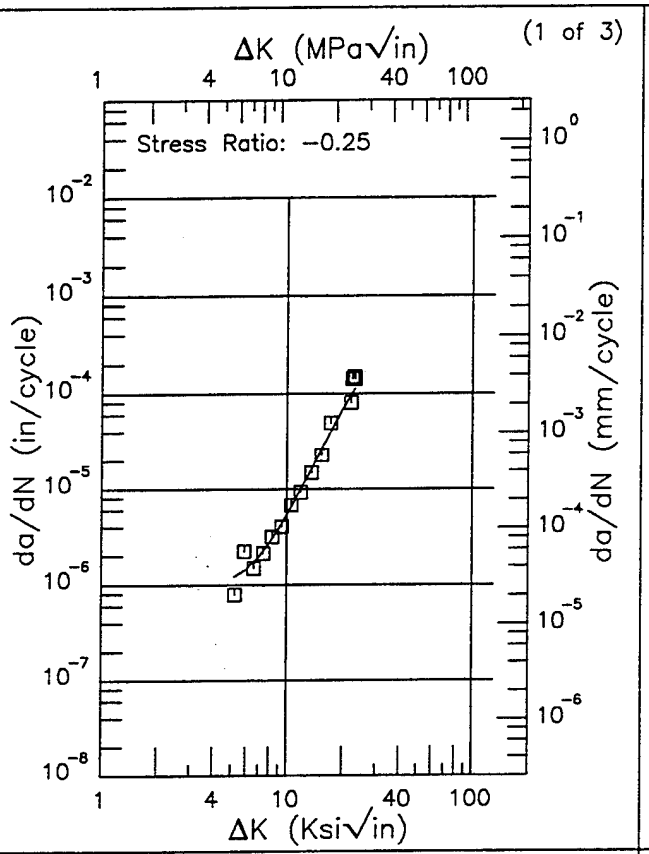
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 9.72 | 0. .5 .8 1.25 2. |

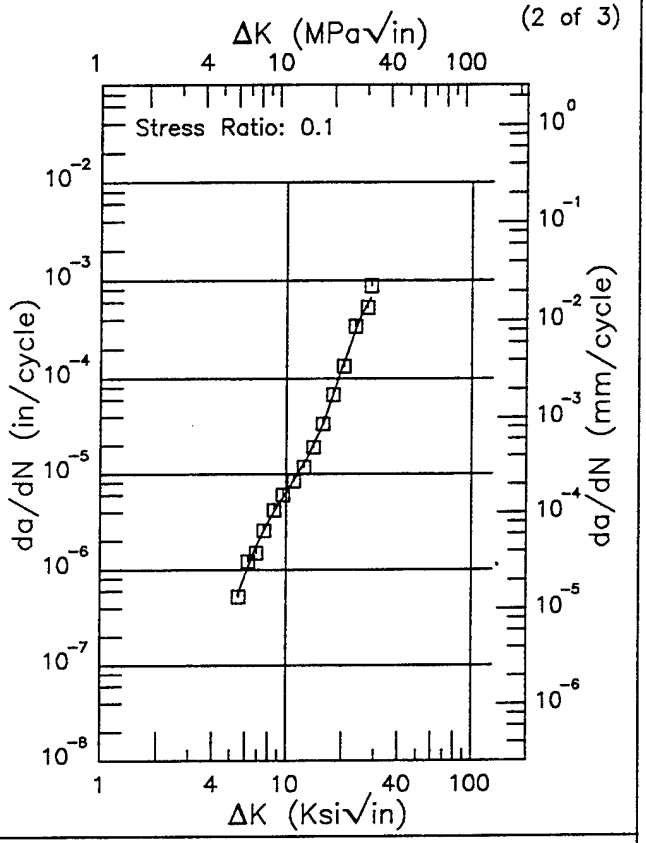
**Figure 7.5.3.1.85**

R | 2024

Condition/Ht: T81
Form: 0.13 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 1 Hz
Environment: H.H.A.; RT

Yield Strength: 65.8 ksi
Ult. Strength: 73.1 ksi
Specimen Thk: 0.125 in.
Specimen Width: 6 in.
Ref: GD004




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.22 (min) | 1.23 |
| 6. | 1.44 |
| 7. | 1.94 |
| 8. | 2.71 |
| 9. | 3.83 |
| 10. | 5.40 |
| 13. | 13.9 |
| 16. | 30.5 |
| 20. | 69.5 |
| 23.07 (max) | 113. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.53 (min) | 0.548 |
| 6. | 0.881 |
| 7. | 1.85 |
| 8. | 3.11 |
| 9. | 4.62 |
| 10. | 6.41 |
| 13. | 14.6 |
| 16. | 34.9 |
| 20. | 131. |
| 25. | 415. |
| 28.46 (max) | 675. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 24.89 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 11.36 | 0. .5 .8 1.25 2. |

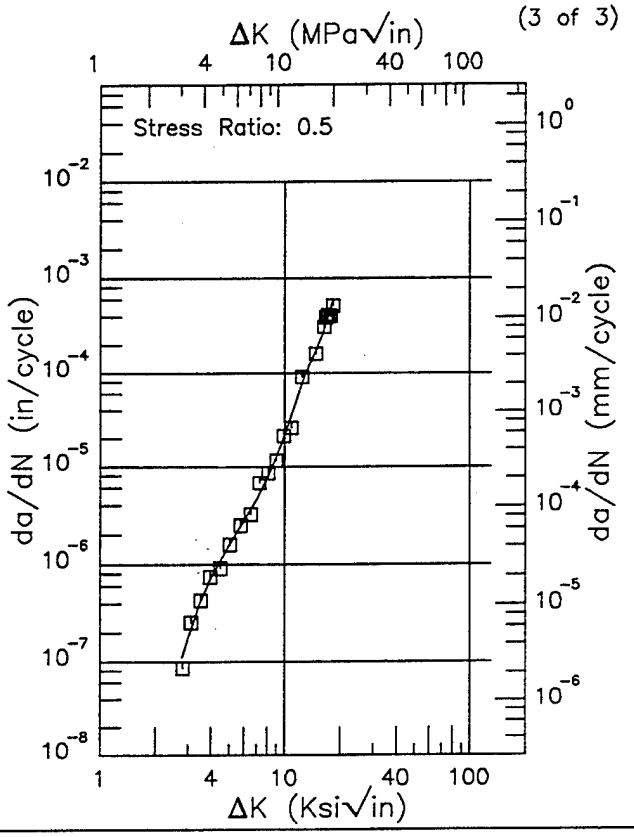
**Figure 7.5.3.1.86**

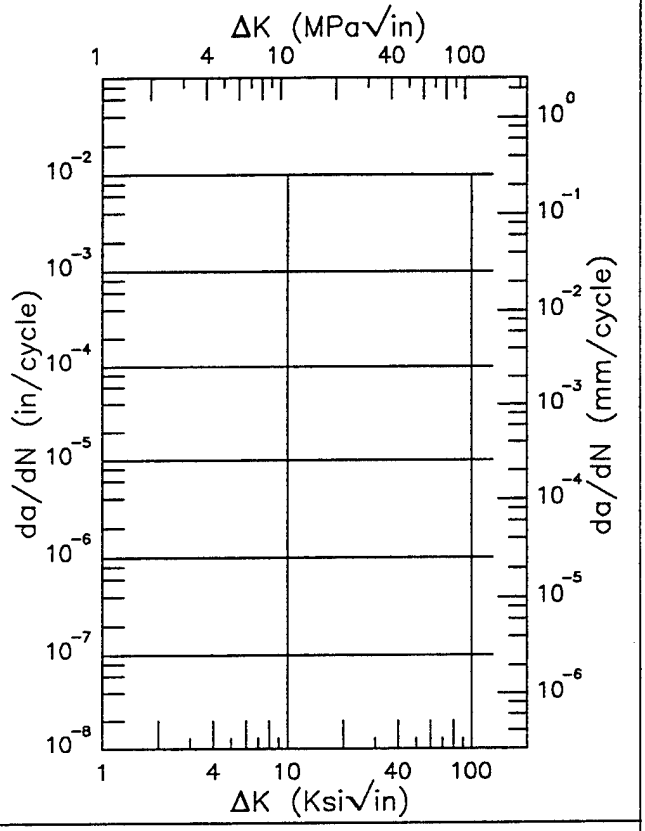
2024 R

Condition/Ht: T81
Form: 0.13 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 1 Hz
Environment: H.H.A.; RT

Yield Strength: 65.8 ksi
Ult. Strength: 73.1 ksi
Specimen Thk: 0.125 in.
Specimen Width: 6 in.
Ref: GD004

(3 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.80 (min) | 0.111 |
| 3. | 0.176 |
| 3.5 | 0.410 |
| 4. | 0.733 |
| 5. | 1.58 |
| 6. | 2.76 |
| 7. | 4.58 |
| 8. | 7.62 |
| 9. | 12.8 |
| 10. | 21.7 |
| 13. | 99.3 |
| 16. | 257. |
| 18.14 (max) | 564. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 14.41 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.86 (Concluded)**

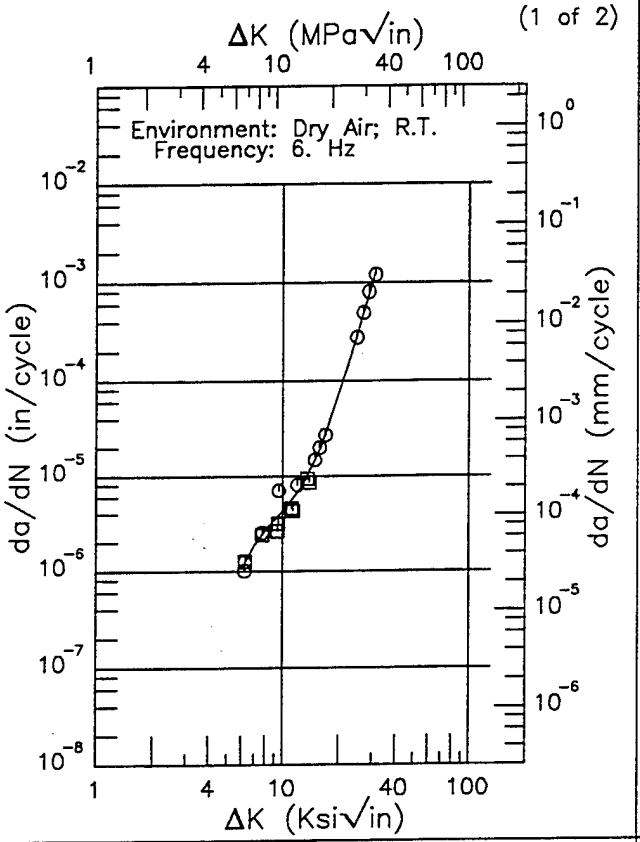
## 2024

EF

Condition/Ht: T81
Form: 0.1 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T–L
Stress Ratio: 0.08

Yield Strength: 67 ksi
Ult. Strength: 73 ksi
Specimen Thk: 0.099 – 0.1 in.
Specimen Width: 23.81 – 23.91 in.
Ref: 86575

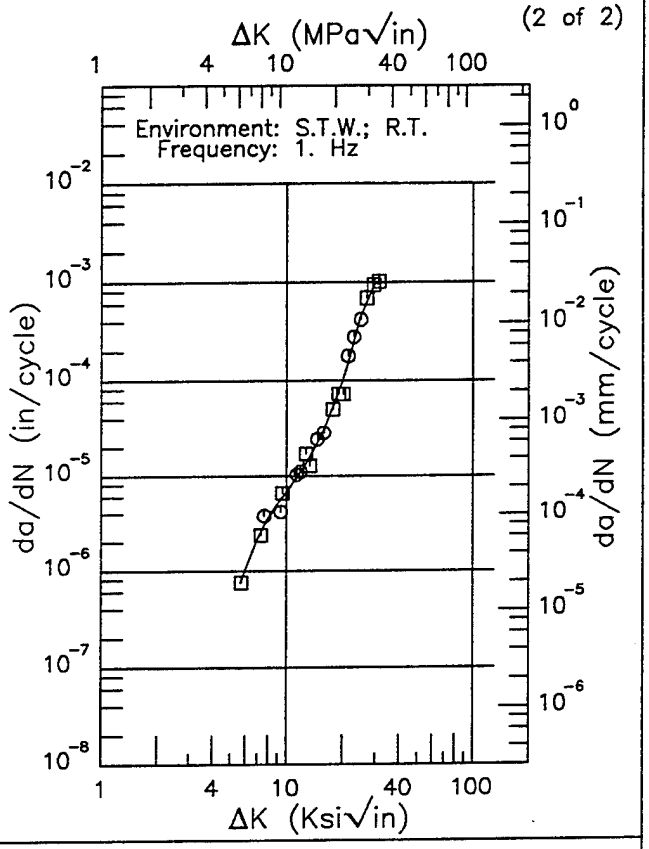
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.20 (min) | 1.19 |
| 7. | 1.85 |
| 8. | 2.67 |
| 9. | 3.46 |
| 10. | 4.30 |
| 13. | 8.41 |
| 16. | 20.3 |
| 20. | 74.5 |
| 25. | 306. |
| 30. | 988. |
| 31.13 (max) | 1267. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 22.92 | 0. .5 .8 1.25 2. |

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.70 (min) | 0.761 |
| 6. | 1.03 |
| 7. | 2.16 |
| 8. | 3.55 |
| 9. | 5.11 |
| 10. | 6.85 |
| 13. | 14.3 |
| 16. | 31.0 |
| 20. | 98.0 |
| 25. | 451. |
| 30. | 990. |
| 31.22 (max) | 957. |

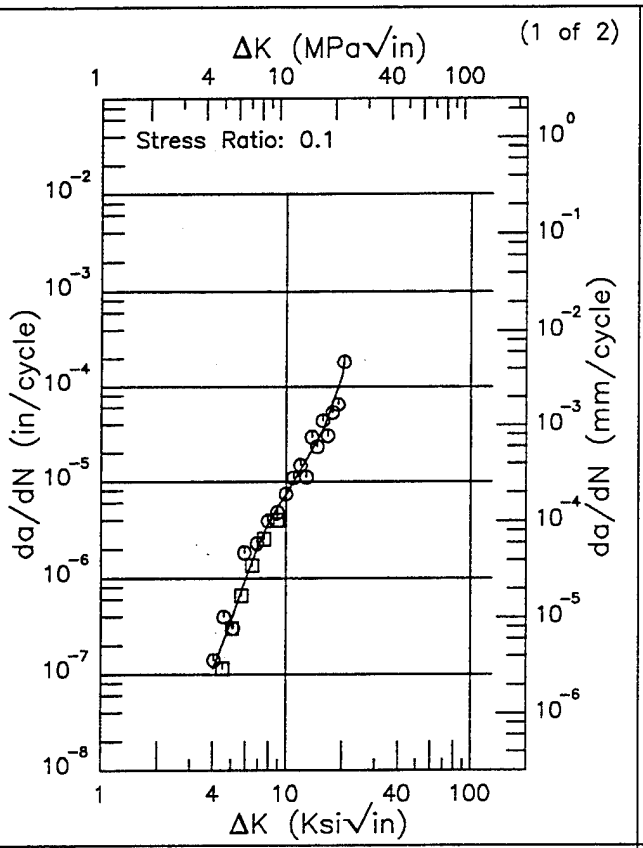
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 15.19 | 0. .5 .8 1.25 2. |

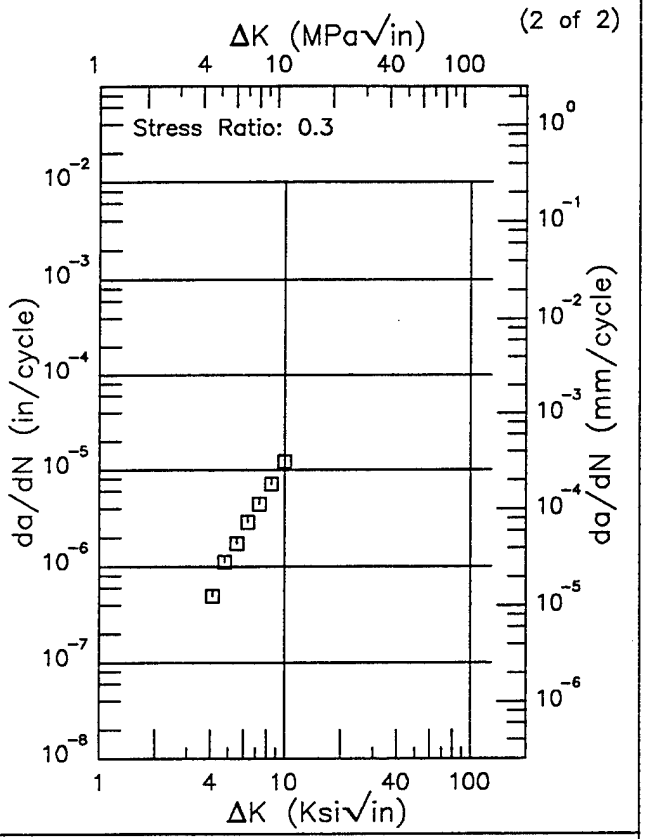
**Figure 7.5.3.1.87**

2024 R

Condition/Ht: T81
Form: 0.13 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 1 Hz
Environment: S.T.W.; RT

Yield Strength: 65.8 ksi
Ult. Strength: 73.1 ksi
Specimen Thk: 0.125 in.
Specimen Width: 6 in.
Ref: GD004




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.03 (min) | 0.115 |
| 5. | 0.358 |
| 6. | 0.971 |
| 7. | 2.11 |
| 8. | 3.73 |
| 9. | 5.50 |
| 10. | 7.39 |
| 13. | 17.4 |
| 16. | 36.6 |
| 20. | 131. |
| 20.39 (max) | 183. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 34.42 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.88**

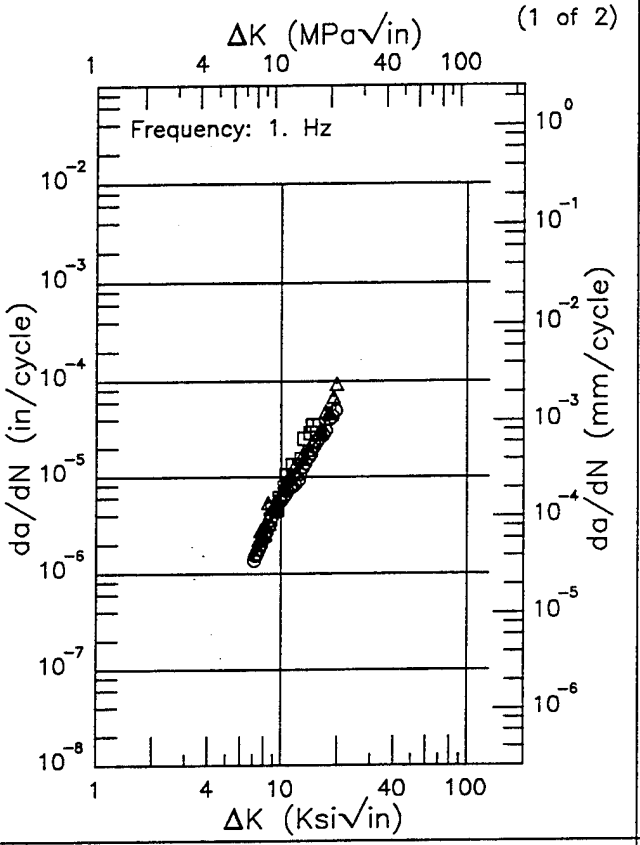
## 2024

F

Condition/Ht: T851
Form: 3 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.08
Environment: DRY AIR; RT

Yield Strength: 51 – 66 ksi
Ult. Strength: 71 – 74 ksi
Specimen Thk: 0.494 – 1 in.
Specimen Width: 5.99 – 6.01 in.
Ref: 88579;85837

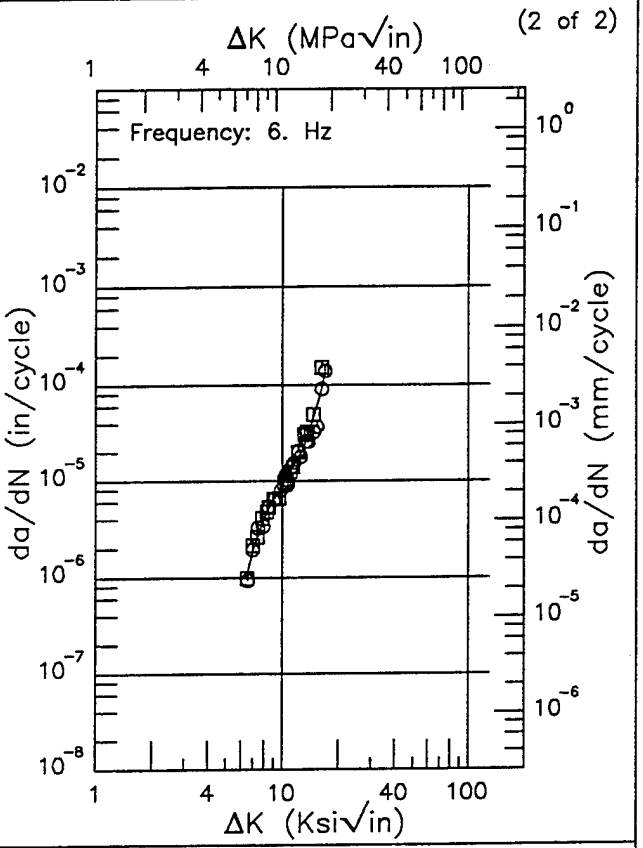
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 7.09 (min) | 1.40 |
| 8. | 2.65 |
| 9. | 4.36 |
| 10. | 6.36 |
| 13. | 14.6 |
| 16. | 27.9 |
| 19.69 (max) | 66.3 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 21.01 | 0. .5 .8 1.25 2. |

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.45 (min) | 1.02 |
| 7. | 1.90 |
| 8. | 4.06 |
| 9. | 6.55 |
| 10. | 9.20 |
| 13. | 21.5 |
| 16. | 77.7 |
| 16.92 (max) | 134. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 17.88 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.89**

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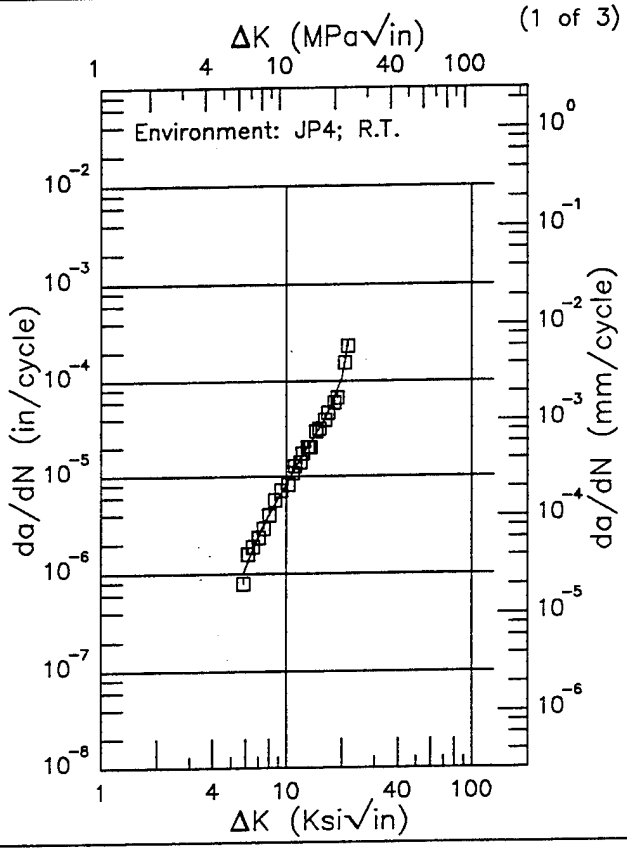
2024

E

Condition/Ht: T851
Form: 3 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.08
Frequency: 1 Hz

Yield Strength: 59 – 66 ksi
Ult. Strength: 71 – 74 ksi
Specimen Thk: 0.99 – 1 in.
Specimen Width: 5.99 – 6 in.
Ref: 88579

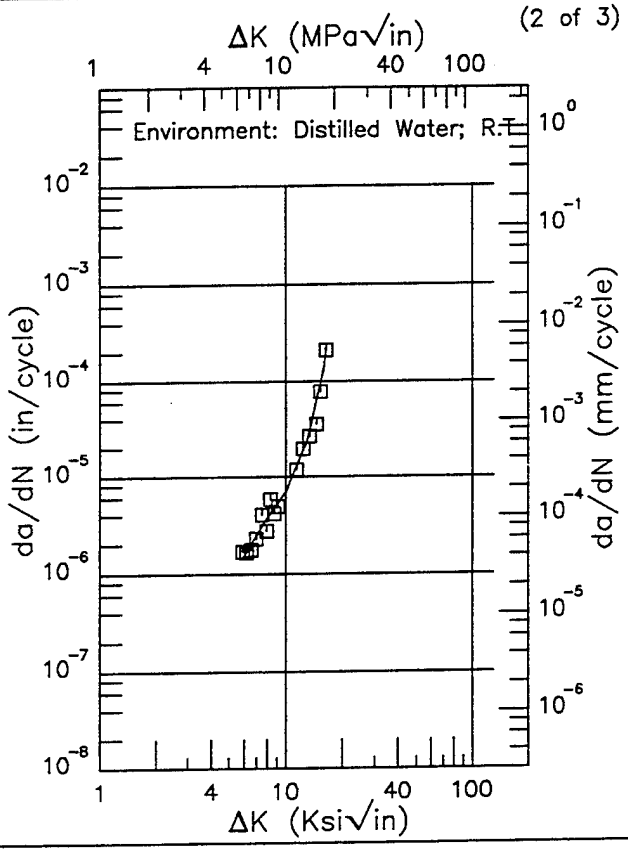
(1 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.85 (min) | 1.00 |
| 6. | 1.15 |
| 7. | 2.39 |
| 8. | 3.98 |
| 9. | 5.95 |
| 10. | 8.43 |
| 13. | 20.1 |
| 16. | 39.0 |
| 20. | 108. |
| 21.48 (max) | 256. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 9.32 | 0. .5 .8 1.25 2. |

(2 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.87 (min) | 1.45 |
| 6. | 1.54 |
| 7. | 2.47 |
| 8. | 3.72 |
| 9. | 5.18 |
| 10. | 7.03 |
| 13. | 23.6 |
| 16. | 136. |
| 16.35 (max) | 224. |

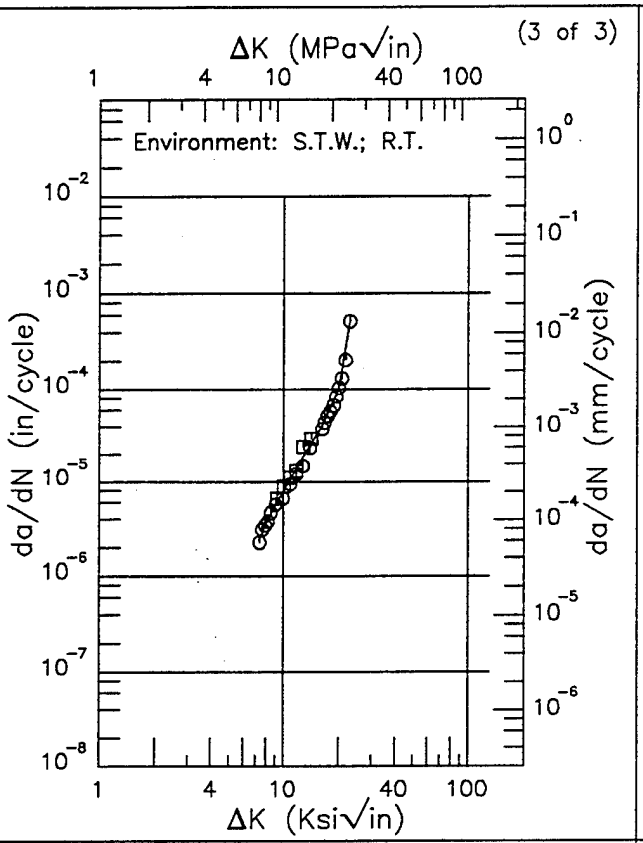
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 20.57 | 0. .5 .8 1.25 2. |

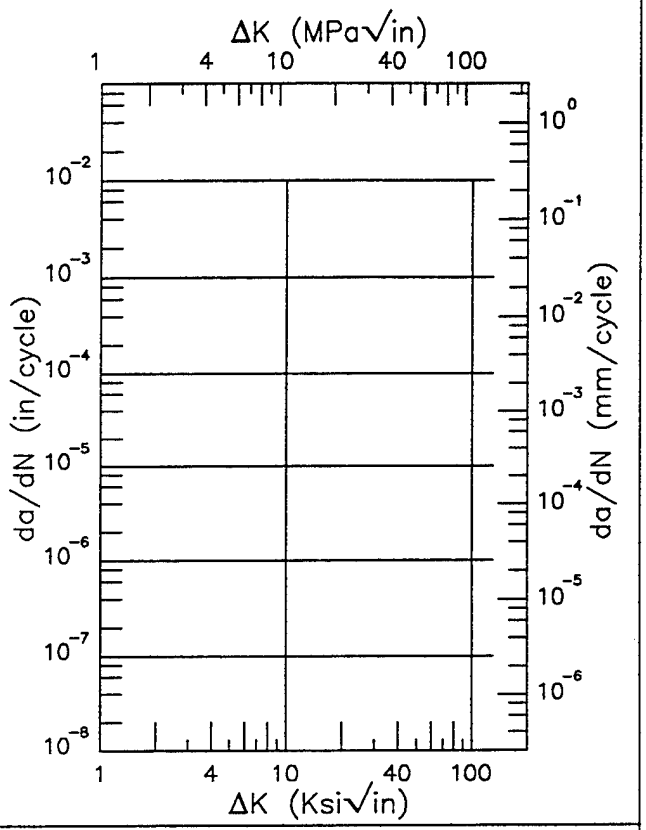
**Figure 7.5.3.1.90**

2024 E

Condition/Ht: T851
Form: 3 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.08
Frequency: 1 Hz

Yield Strength: 59 – 66 ksi
Ult. Strength: 71 – 74 ksi
Specimen Thk: 0.99 – 1 in.
Specimen Width: 5.99 – 6 in.
Ref: 88579




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 7.37 (min) | 2.40 |
| 8. | 3.61 |
| 9. | 5.65 |
| 10. | 7.87 |
| 13. | 19.3 |
| 16. | 38.9 |
| 20. | 102. |
| 22.77 (max) | 502. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 10.75 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.90 (Concluded)**

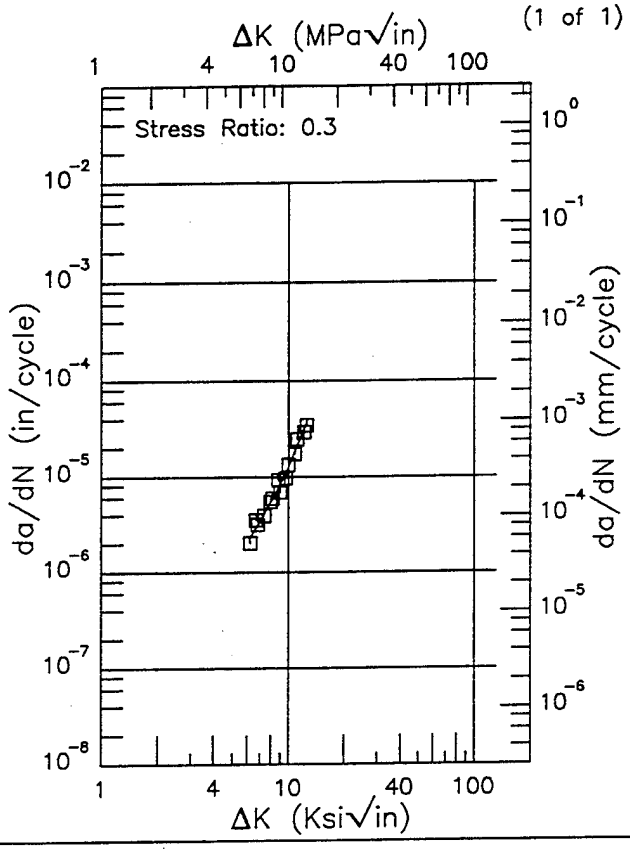
2024

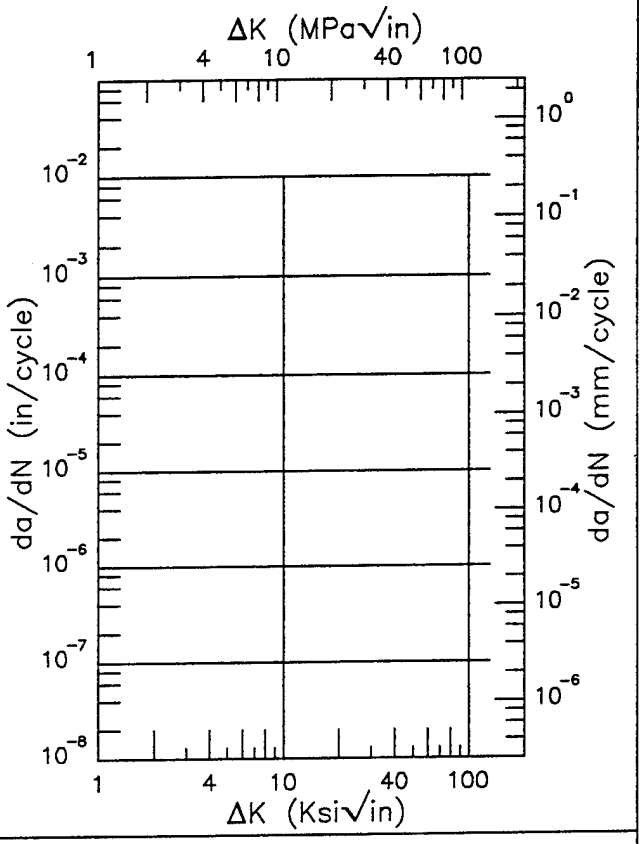
R

Condition/Ht: T851
Form: 3 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 1 Hz
Environment: DRY AIR; RT

Yield Strength: 66 ksi
Ult. Strength: 71 ksi
Specimen Thk: 1 in.
Specimen Width: 6 in.
Ref: 88579

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.19 (min) | 2.25 |
| 7. | 3.42 |
| 8. | 5.46 |
| 9. | 8.45 |
| 10. | 12.9 |
| 12.46 (max) | 36.2 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 11.53 | 0. .5 .8 1.25 2. |

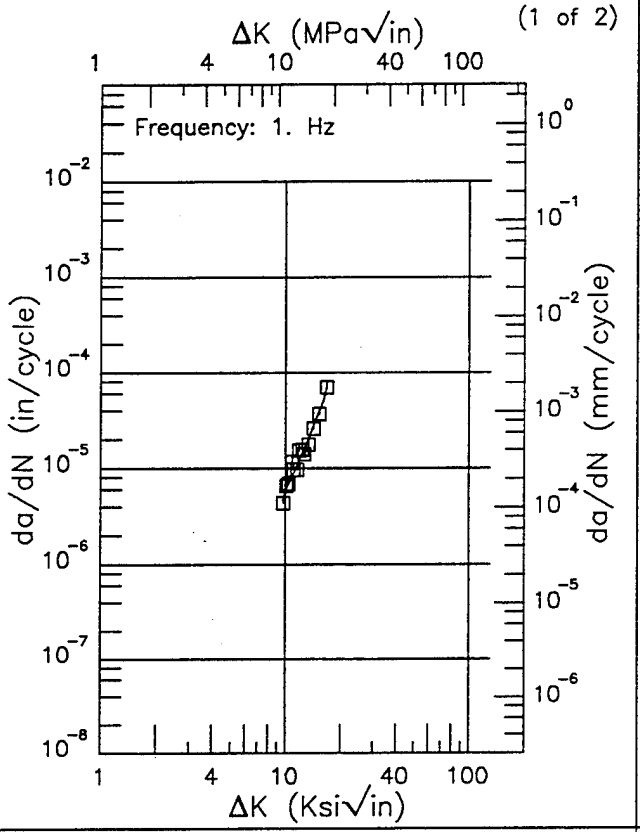
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.91**

2024 F

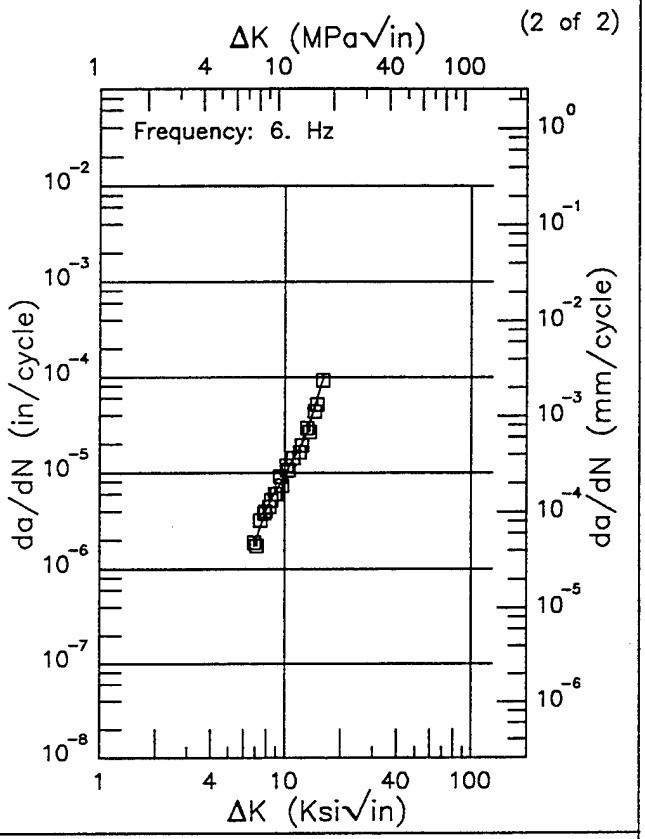
Condition/Ht: T851
Form: 3 in. Plate
Specimen Type: CT
Orientation: T-L
Stress Ratio: 0.08
Environment: DRY AIR; RT

Yield Strength: 65 ksi
Ult. Strength: 71 ksi
Specimen Thk: 1 in.
Specimen Width: 5.99 - 6 in.
Ref: 88579




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 9.67 (min) | 4.65 |
| 10. | 5.90 |
| 13. | 17.6 |
| 16. | 50.2 |
| 16.70 (max) | 72.4 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 15.44 | 0. .5 .8 1.25 2. |




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.86 (min) | 1.71 |
| 7. | 1.95 |
| 8. | 4.07 |
| 9. | 6.63 |
| 10. | 9.54 |
| 13. | 24.2 |
| 15.93 (max) | 90.8 |

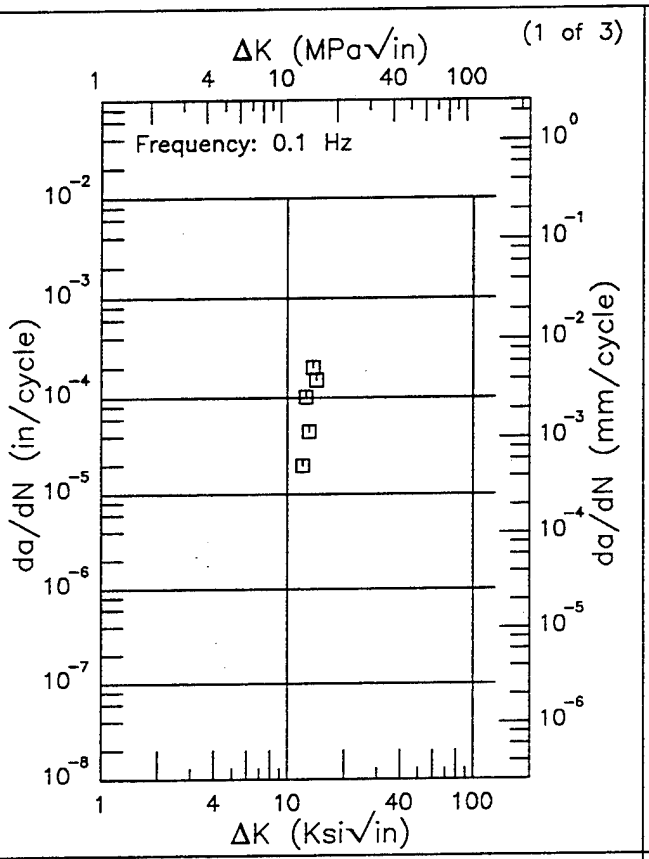
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 10.82 | 0. .5 .8 1.25 2. |

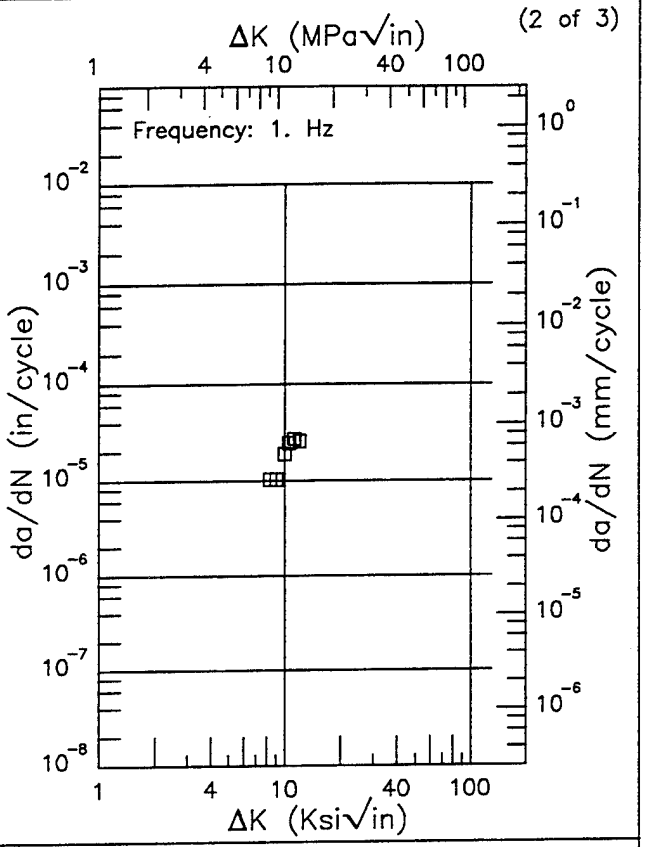
**Figure 7.5.3.1.92**

F | 2024

Condition/Ht: T851
Form: 4 in. Plate
Specimen Type: CT
Orientation: T–L
Stress Ratio: 0.1
Environment: 3.5% NACL; RT

Yield Strength: 64.6 ksi
Ult. Strength: 71.3 ksi
Specimen Thk: 1 in.
Specimen Width: 2.55 in.
Ref: 90981




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

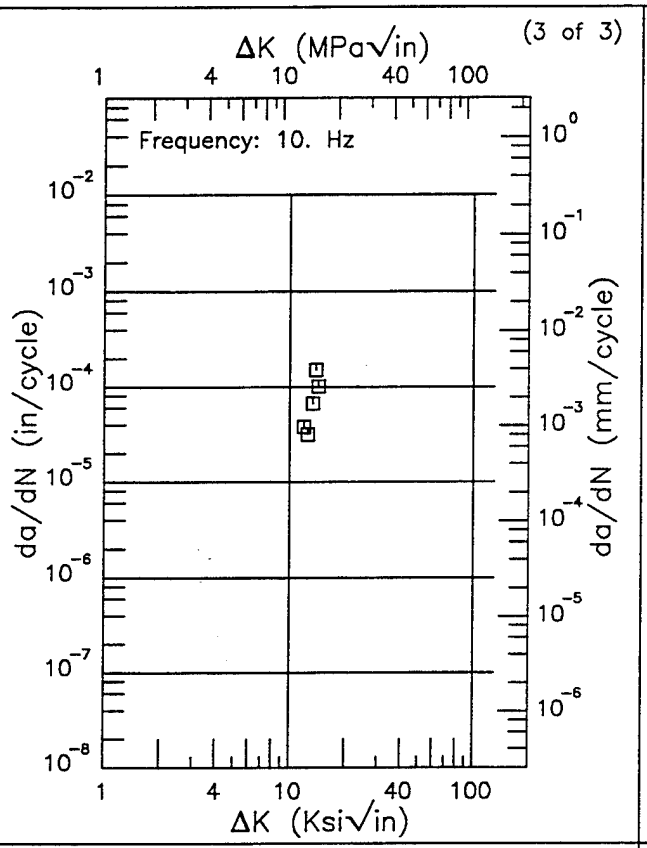
| RMS % Error | Life Prediction Ratio Summary | RMS % Error | Life Prediction Ratio Summary |
|---|---|---|---|
| | 0. .5 .8 1.25 2. | | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.93**

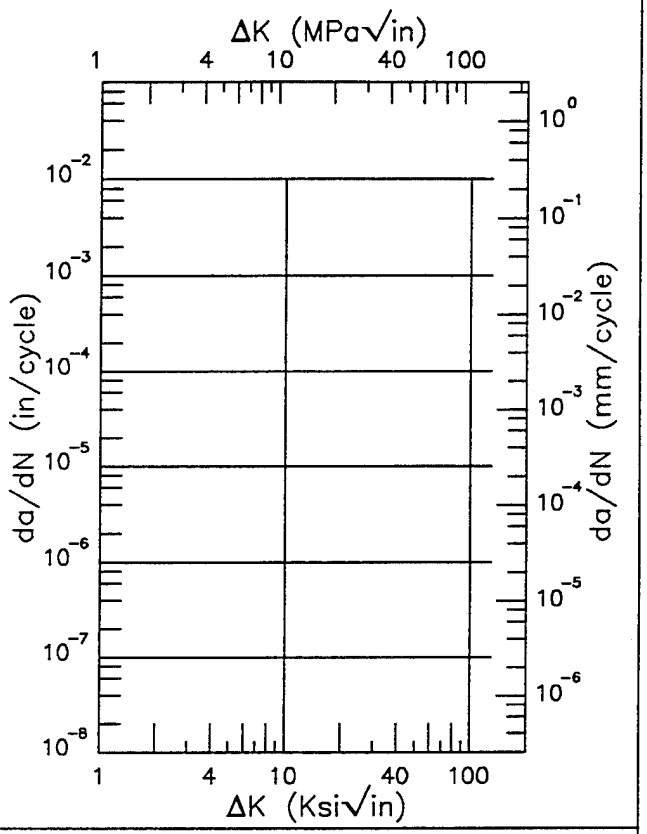
2024 F

Condition/Ht: T851
Form: 4 in. Plate
Specimen Type: CT
Orientation: T–L
Stress Ratio: 0.1
Environment: 3.5% NACL; RT

Yield Strength: 64.6 ksi
Ult. Strength: 71.3 ksi
Specimen Thk: 1 in.
Specimen Width: 2.55 in.
Ref: 90981




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

| RMS % Error | Life Prediction Ratio Summary | RMS % Error | Life Prediction Ratio Summary |
|---|---|---|---|
| | 0. .5 .8 1.25 2. | | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.93 (Concluded)**

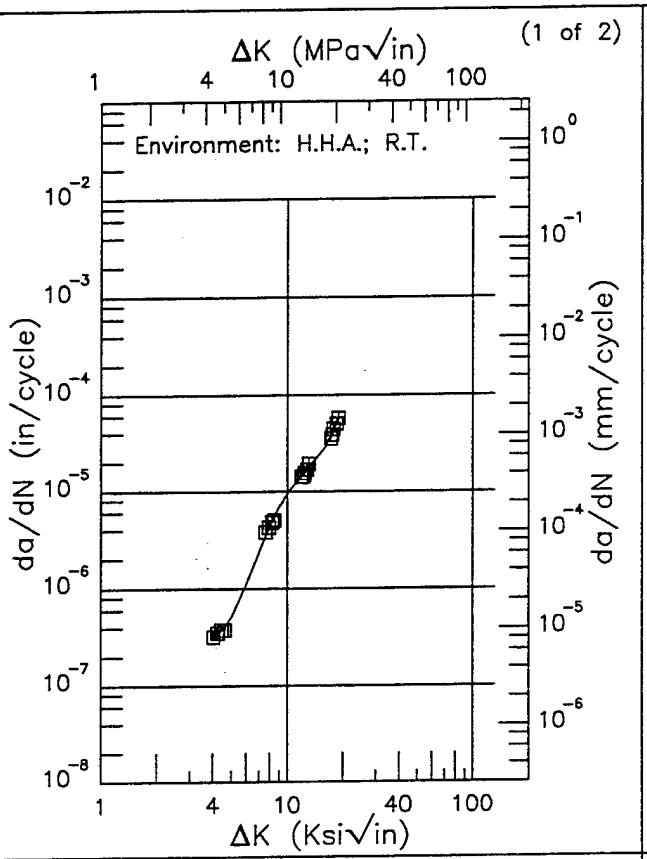
## 2024

E

Condition/Ht: T851
Form: 0.75 in. Plate
Specimen Type: CCP (max load specified)
Orientation: T–L
Stress Ratio: 0.1
Frequency: 20 Hz

Yield Strength: 68.6 ksi
Ult. Strength: 73 ksi
Specimen Thk: 0.76 – 0.761 in.
Specimen Width: 5 in.
Ref: 90981

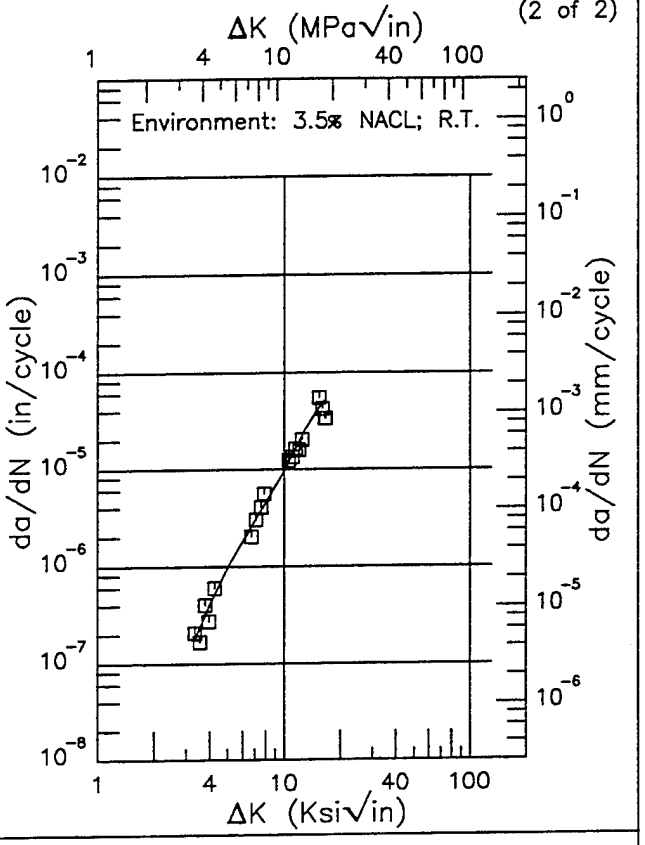
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.01 (min) | 0.300 |
| 5. | 0.507 |
| 6. | 1.10 |
| 7. | 2.33 |
| 8. | 4.37 |
| 9. | 7.01 |
| 10. | 9.76 |
| 13. | 17.7 |
| 16. | 29.0 |
| 18.82 (max) | 56.4 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 5.53 | 0. .5 .8 1.25 2. |

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 3.33 (min) | 0.175 |
| 3.5 | 0.224 |
| 4. | 0.407 |
| 5. | 0.962 |
| 6. | 1.78 |
| 7. | 2.92 |
| 8. | 4.49 |
| 9. | 6.67 |
| 10. | 9.70 |
| 13. | 25.9 |
| 16. | 48.4 |
| 16.68 (max) | 52.8 |

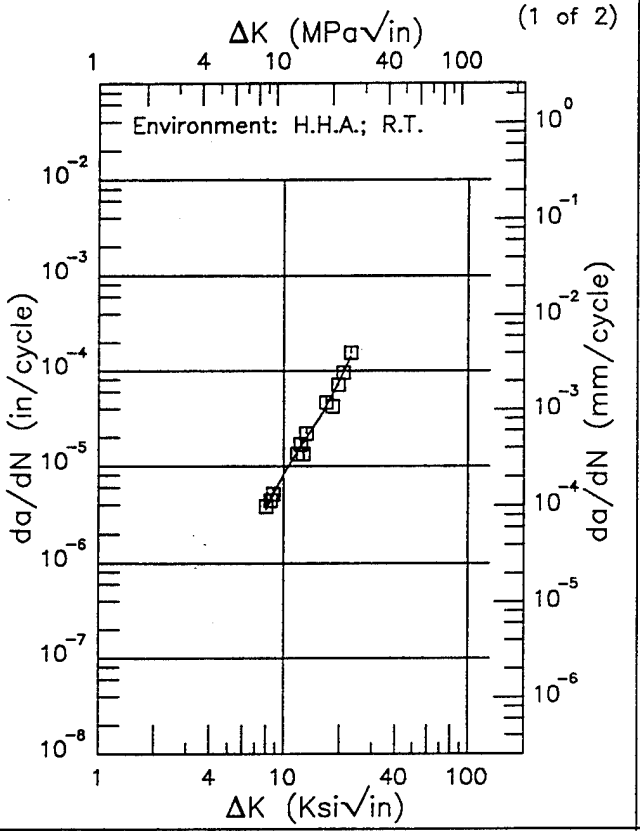
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 22.04 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.94**

Condition/Ht: T851
Form: 0.38 in. Plate
Specimen Type: CCP (max load specified)
Orientation: T–L
Stress Ratio: 0.1
Frequency: 20 Hz

Yield Strength: 66.6 ksi
Ult. Strength: 72 ksi
Specimen Thk: 0.375 in.
Specimen Width: 5 in.
Ref: 90981

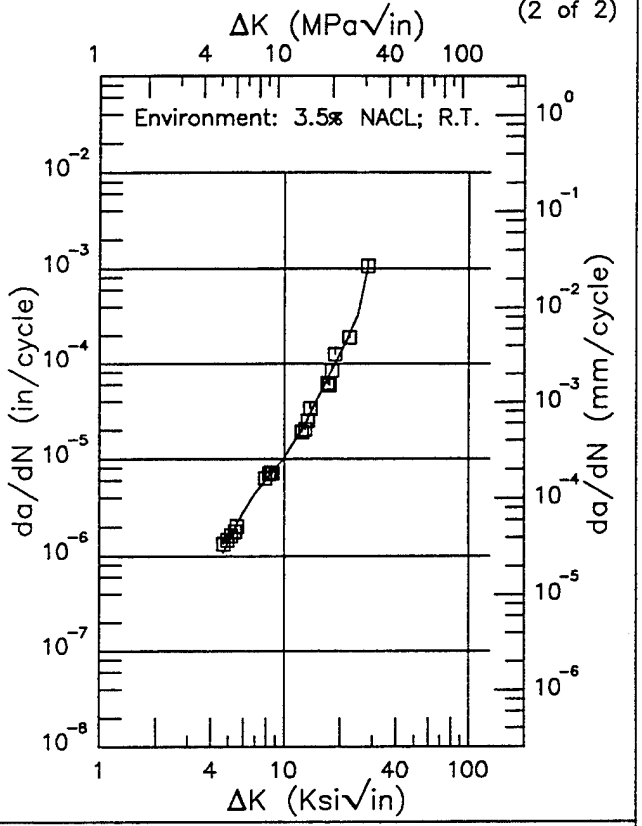
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 8.03 (min) | 3.57 |
| 9. | 5.68 |
| 10. | 8.28 |
| 13. | 18.6 |
| 16. | 35.1 |
| 20. | 79.2 |
| 22.79 (max) | 143. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 11.78 | 0. .5 .8 1.25 2. |

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.70 (min) | 1.08 |
| 5. | 1.43 |
| 6. | 2.83 |
| 7. | 4.40 |
| 8. | 6.09 |
| 9. | 8.02 |
| 10. | 10.4 |
| 13. | 23.2 |
| 16. | 53.8 |
| 20. | 130. |
| 25. | 330. |
| 28.22 (max) | 1049. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 11.62 | 0. .5 .8 1.25 2. |

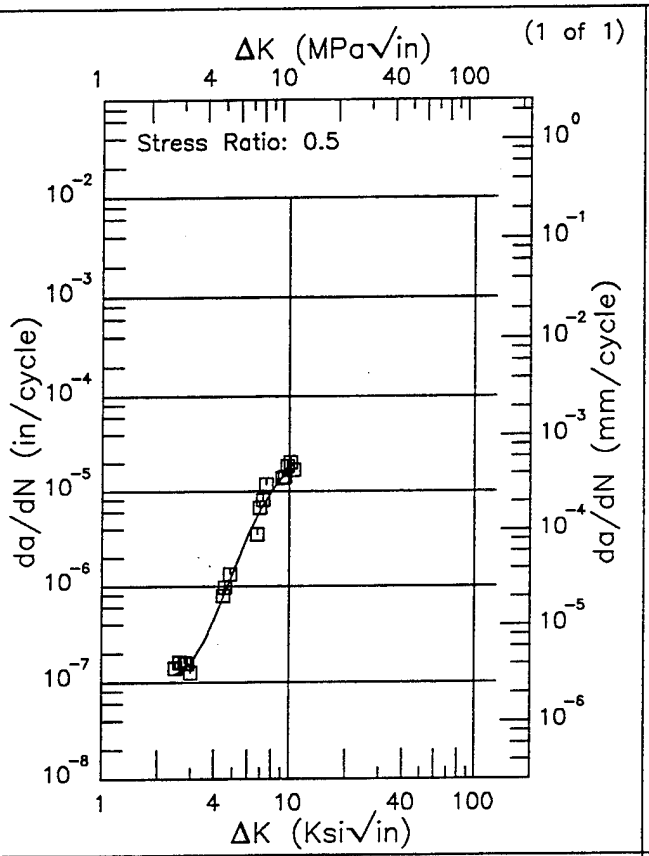
**Figure 7.5.3.1.95**

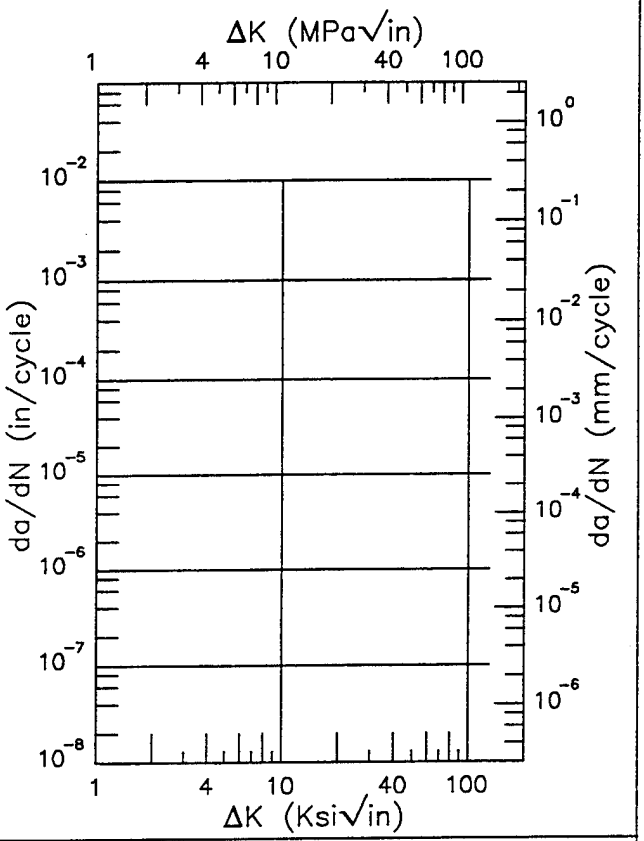
2024

R

Condition/Ht: T851
Form: 0.38 in. Plate
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 20 Hz
Environment: H.H.A.; RT

Yield Strength: 66.6 ksi
Ult. Strength: 72 ksi
Specimen Thk: 0.375 in.
Specimen Width: 5 in.
Ref: 90981




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.48 (min) | 0.122 |
| 2.5 | 0.122 |
| 3. | 0.156 |
| 3.5 | 0.255 |
| 4. | 0.454 |
| 5. | 1.38 |
| 6. | 3.37 |
| 7. | 6.37 |
| 8. | 9.90 |
| 9. | 13.7 |
| 10. | 17.7 |
| 10.53 (max) | 20.0 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 18.47 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

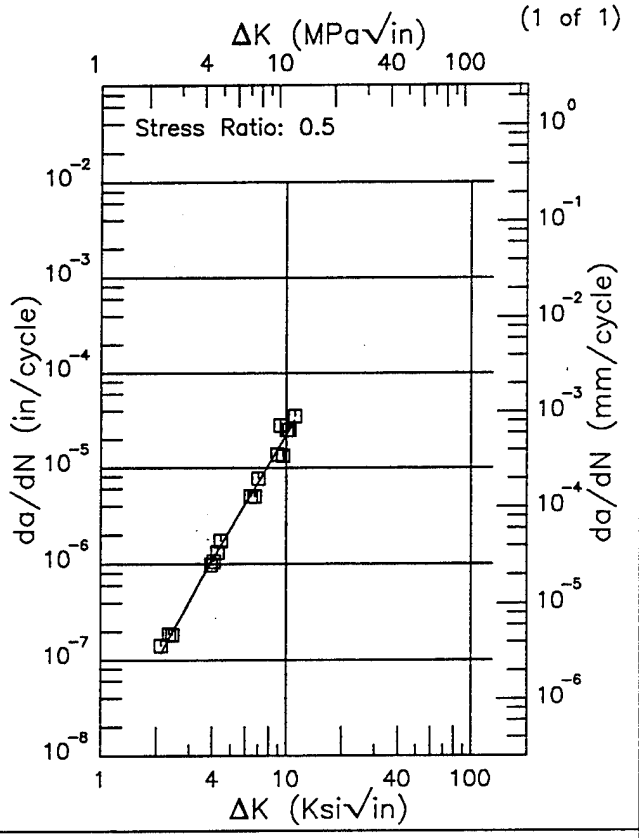
**Figure 7.5.3.1.96**

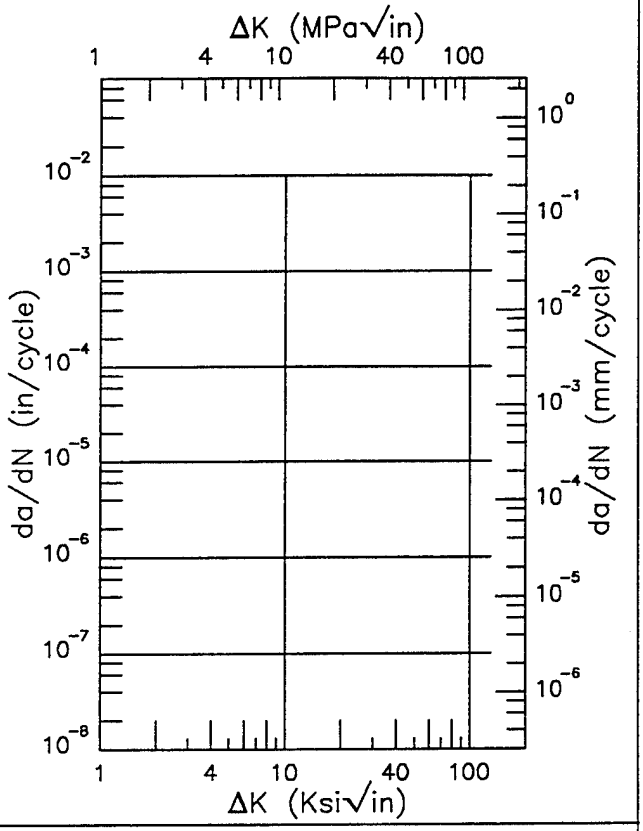
2024 R

Condition/Ht: T851
Form: 0.75 in. Plate
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 20 Hz
Environment: 3.5% NACL; RT

Yield Strength: 68.6 ksi
Ult. Strength: 73 ksi
Specimen Thk: 0.76 in.
Specimen Width: 5 in.
Ref: 90981

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.12 (min) | 0.119 |
| 2.5 | 0.215 |
| 3. | 0.406 |
| 3.5 | 0.689 |
| 4. | 1.08 |
| 5. | 2.28 |
| 6. | 4.17 |
| 7. | 6.93 |
| 8. | 10.7 |
| 9. | 15.8 |
| 10. | 22.4 |
| 11.10 (max) | 31.7 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 19.11 | 0. .5 .8 1.25 2. |

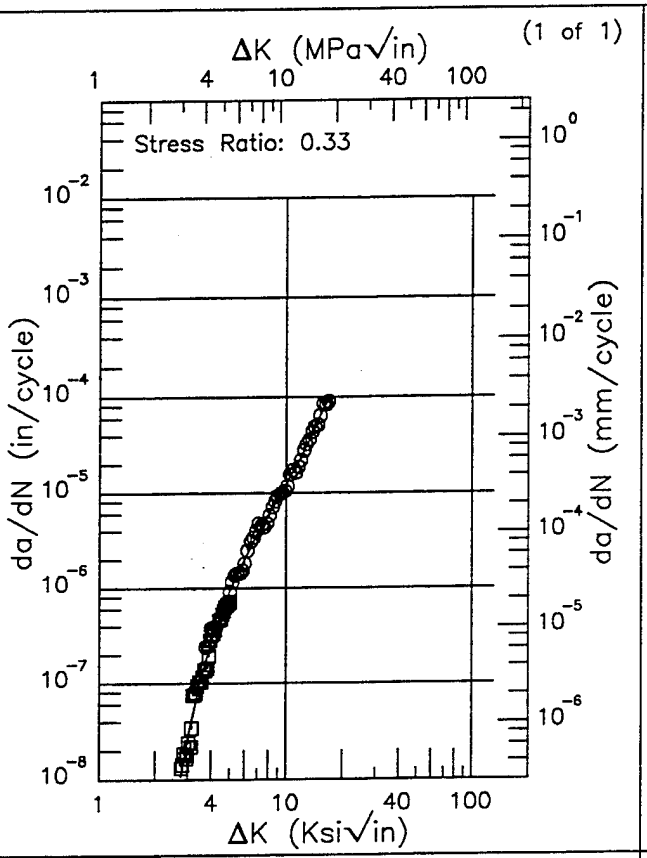
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

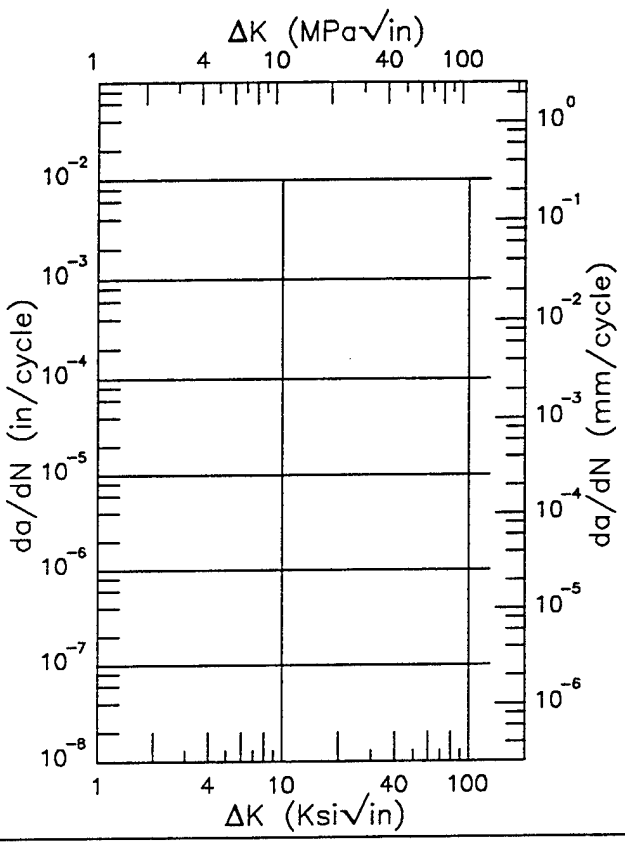
**Figure 7.5.3.1.97**

R | 2024 |

Condition/Ht: T851
Form: 0.75 in. Plate
Specimen Type: WOL
Orientation: L–T
Frequency: 25 Hz
Environment: H.H.A.; RT

Yield Strength: 67 ksi
Ult. Strength: 71 ksi
Specimen Thk: 0.25 in.
Specimen Width: 2.55 in.
Ref: NC003




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.75 (min) | 0.0107 |
| 3. | 0.0265 |
| 3.5 | 0.103 |
| 4. | 0.267 |
| 5. | 0.919 |
| 6. | 2.03 |
| 7. | 3.66 |
| 8. | 5.90 |
| 9. | 8.78 |
| 10. | 12.4 |
| 13. | 32.4 |
| 16. | 82.6 |
| 16.67 (max) | 90.9 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 17.77 | 0. .5 .8 1.25 2. |

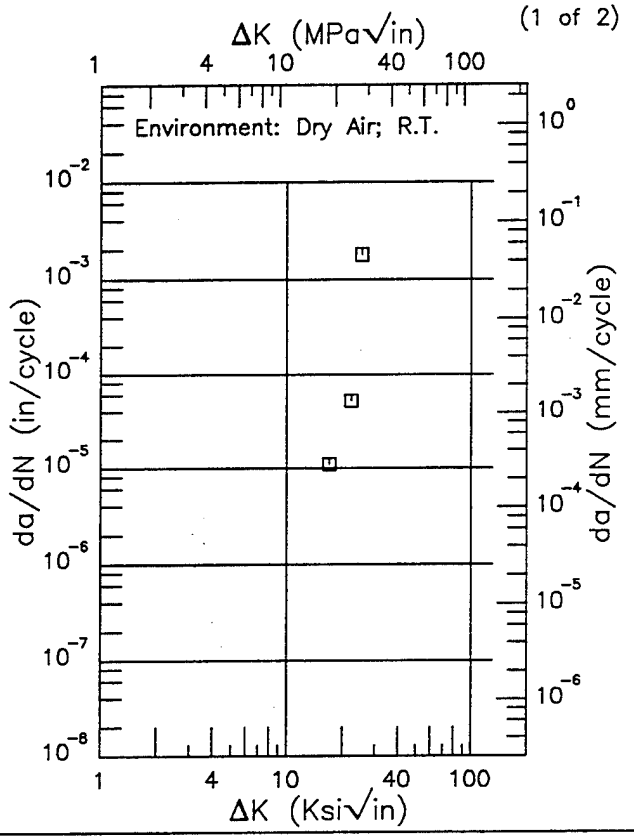
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.98**

Condition/Ht: T851
Form: 2 in. Plate
Specimen Type: DCB
Orientation: L–T
Stress Ratio: 0.02
Frequency: 1 Hz

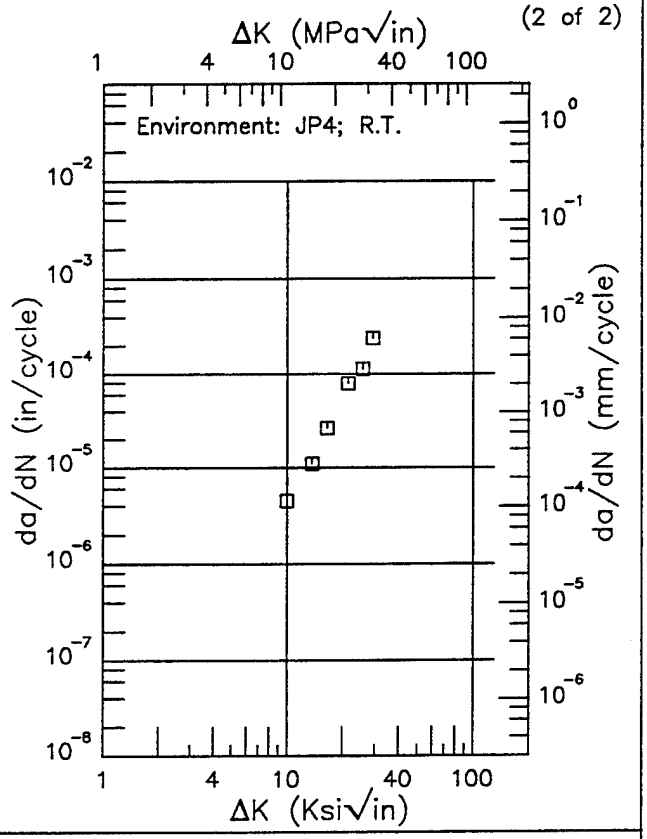
Yield Strength: 64 ksi
Ult. Strength: 69 – 71 ksi
Specimen Thk: 0.75 in.
Specimen Width: 5.5 in.
Ref: 84360

(1 of 2)




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

(2 of 2)




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

| RMS % Error | Life Prediction Ratio Summary | RMS % Error | Life Prediction Ratio Summary |
|---|---|---|---|
| | 0. .5 .8 1.25 2. | | 0. .5 .8 1.25 2. |

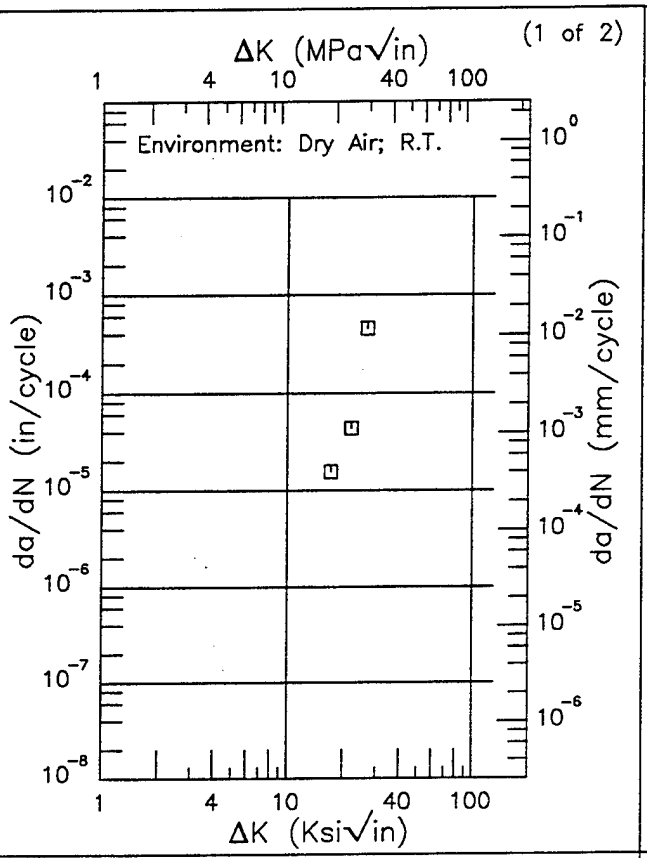
**Figure 7.5.3.1.99**

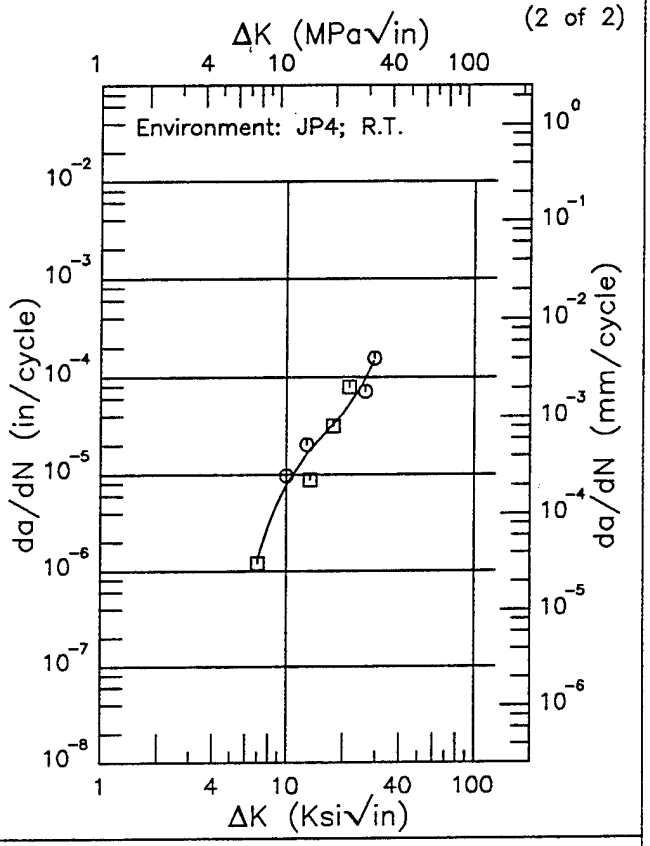
2024

E

Condition/Ht: T851
Form: 2 in. Plate
Specimen Type: DCB
Orientation: L–T
Stress Ratio: 0.02
Frequency: 10 Hz

Yield Strength: 64 ksi
Ult. Strength: 69 – 71 ksi
Specimen Thk: 0.75 in.
Specimen Width: 5.5 in.
Ref: 84360




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 7.00 (min) | 1.31 |
| 8. | 2.93 |
| 9. | 5.18 |
| 10. | 7.85 |
| 13. | 16.8 |
| 16. | 26.3 |
| 20. | 42.5 |
| 25. | 79.6 |
| 29.26 (max) | 147. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 29.66 | 0. .5 .8 1.25 2. |

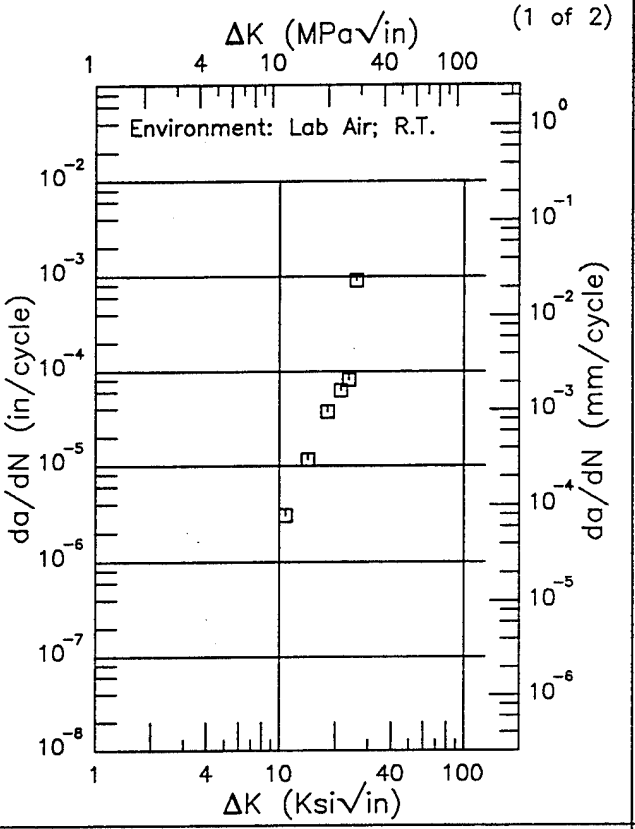
**Figure 7.5.3.1.100**

2024 E

Condition/Ht: T851
Form: 3 in. Plate
Specimen Type: DCB
Orientation: L–T
Stress Ratio: 0.02
Frequency: 1 Hz

Yield Strength: 59 ksi
Ult. Strength: 66 ksi
Specimen Thk: 1 in.
Specimen Width: 5.5 in.
Ref: 84360

(1 of 2)



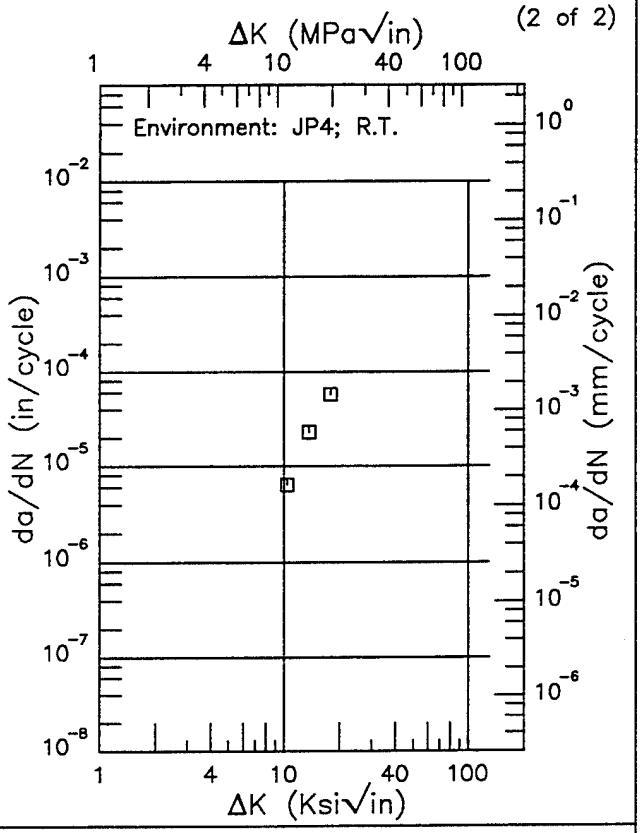

ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

RMS % Error

Life Prediction Ratio Summary

0. .5 .8 1.25 2.

(2 of 2)




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

RMS % Error

Life Prediction Ratio Summary

0. .5 .8 1.25 2.

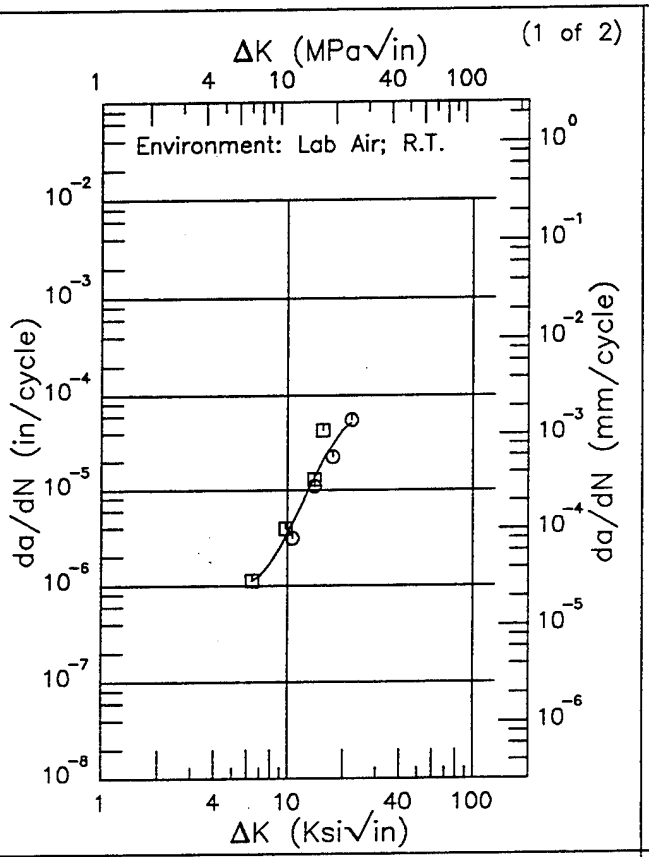
**Figure 7.5.3.1.101**

## 2024

E

Condition/Ht: T851
Form: 2 – 3 in. Plate
Specimen Type: DCB
Orientation: L–T
Stress Ratio: 0.02
Frequency: 10 Hz

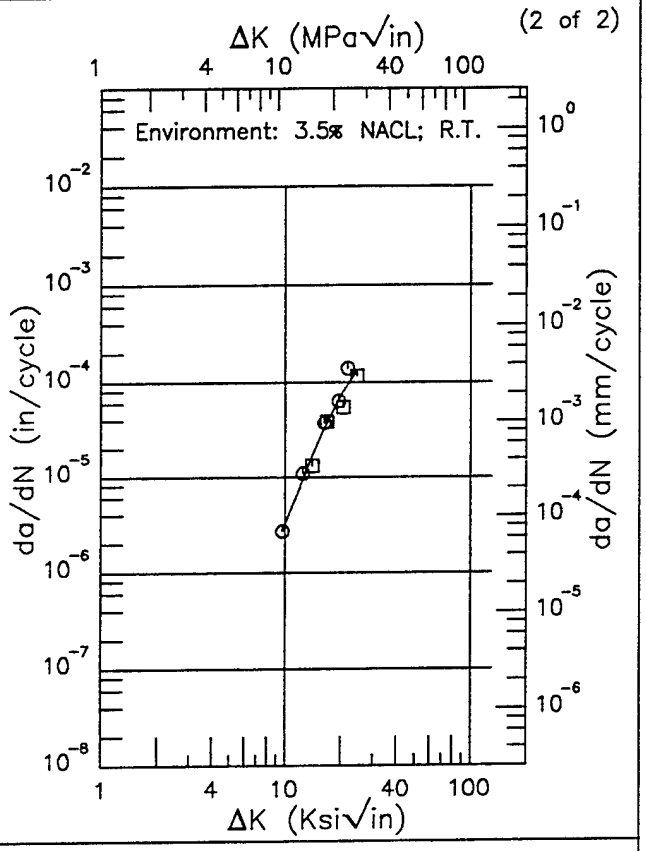
Yield Strength: 59 – 64 ksi
Ult. Strength: 66 – 71 ksi
Specimen Thk: 0.875 in.
Specimen Width: 5.5 in.
Ref: 84360




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.40 (min) | 1.13 |
| 7. | 1.27 |
| 8. | 1.70 |
| 9. | 2.45 |
| 10. | 3.59 |
| 13. | 10.4 |
| 16. | 23.1 |
| 20. | 43.7 |
| 22.11 (max) | 51.5 |

RMS % Error
43.42

Life Prediction Ratio Summary
0. .5 .8 1.25 2.




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 9.67 (min) | 2.74 |
| 10. | 3.23 |
| 13. | 11.6 |
| 16. | 30.2 |
| 20. | 73.3 |
| 24.49 (max) | 135. |

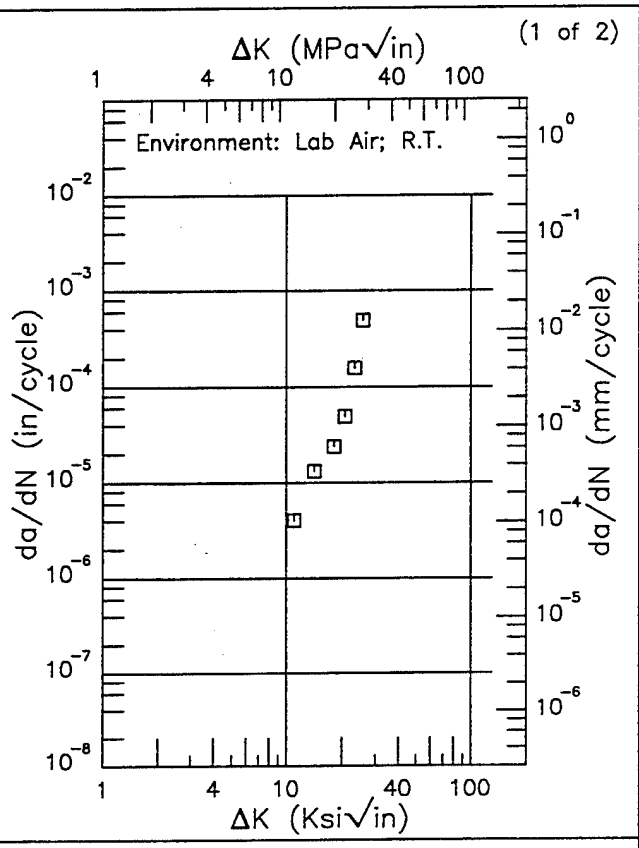
RMS % Error
21.67

Life Prediction Ratio Summary
0. .5 .8 1.25 2.

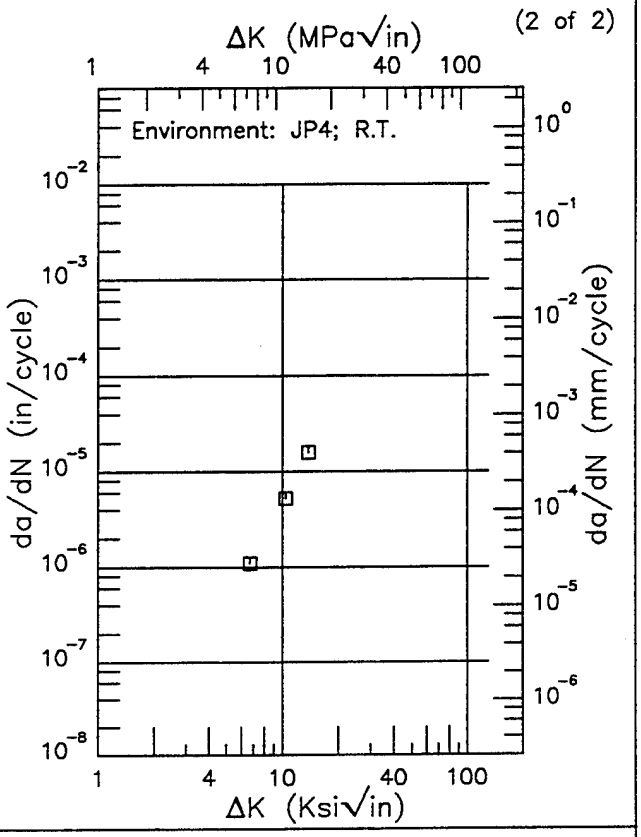
**Figure 7.5.3.1.102**

Condition/Ht: T851
Form: 3 in. Plate
Specimen Type: DCB
Orientation: L–T
Stress Ratio: 0.02
Frequency: 10 Hz

Yield Strength: 59 ksi
Ult. Strength: 66 ksi
Specimen Thk: 1 in.
Specimen Width: 5.5 in.
Ref: 84360




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

| RMS % Error | Life Prediction Ratio Summary | RMS % Error | Life Prediction Ratio Summary |
|---|---|---|---|
| | 0. .5 .8 1.25 2. | | 0. .5 .8 1.25 2. |

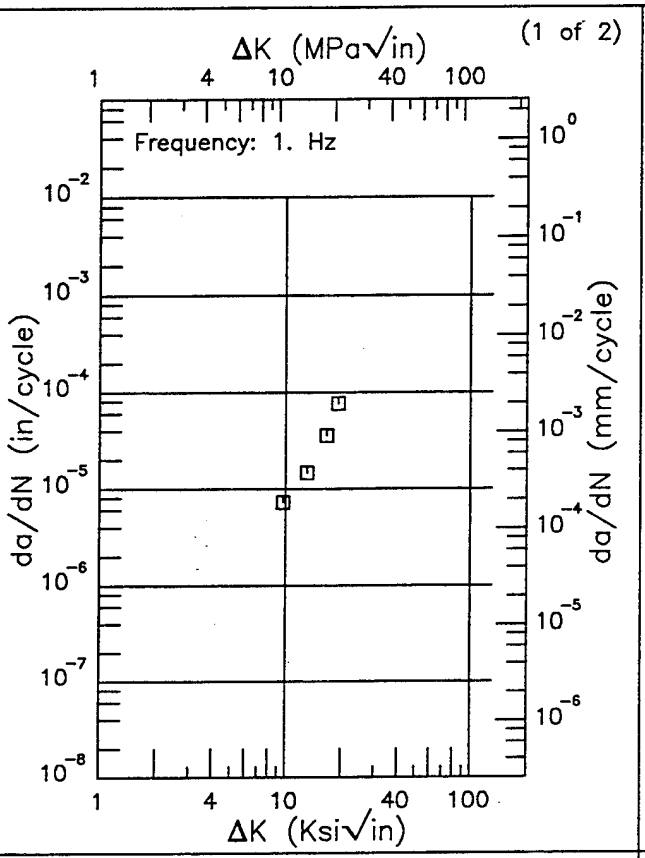
**Figure 7.5.3.1.103**

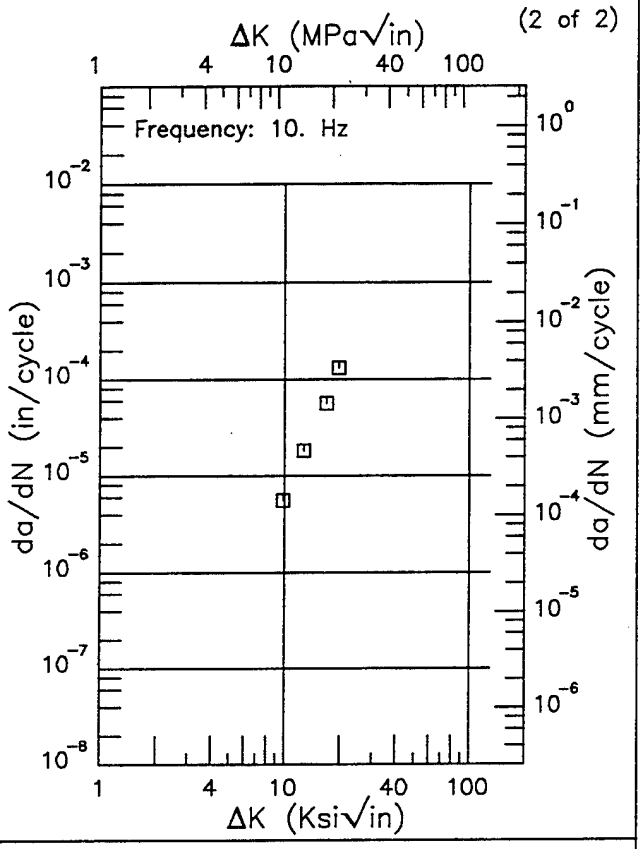
2024

F

Condition/Ht: T851
Form: 3 in. Plate
Specimen Type: DCB
Orientation: L–T
Stress Ratio: 0.02
Environment: SIMULATED FUEL; RT

Yield Strength: 59 ksi
Ult. Strength: 66 ksi
Specimen Thk: 0.625 in.
Specimen Width: 5.5 in.
Ref: 84360




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

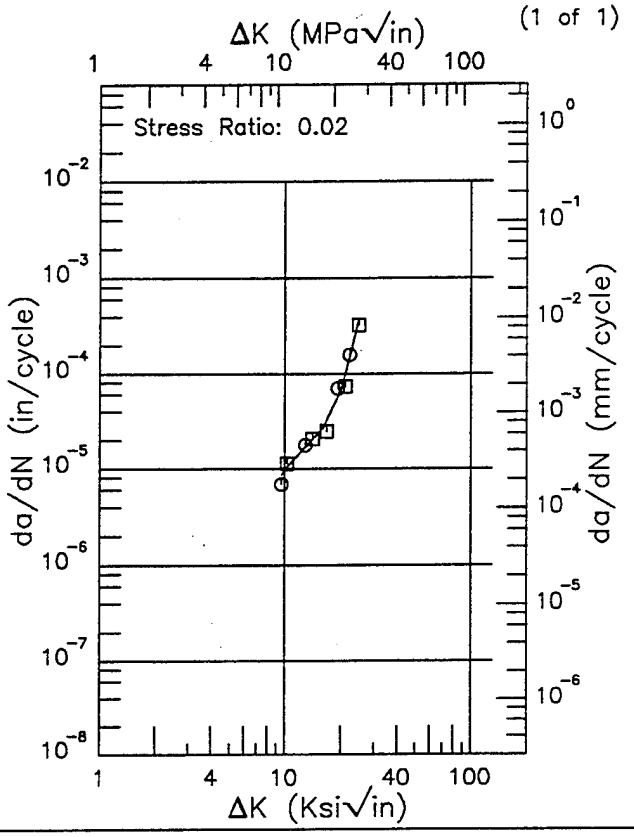
| RMS % Error | Life Prediction Ratio Summary | RMS % Error | Life Prediction Ratio Summary |
|---|---|---|---|
| | 0. .5 .8 1.25 2. | | 0. .5 .8 1.25 2. |

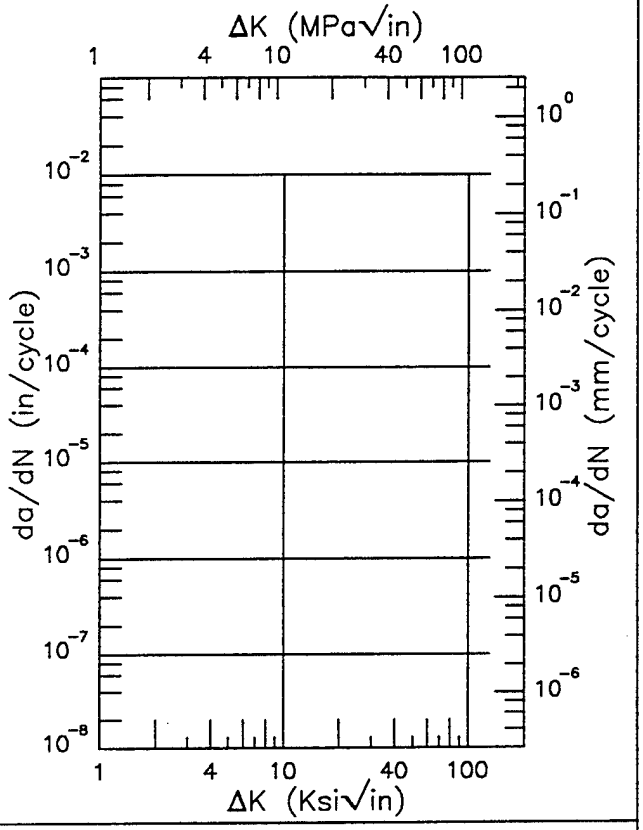
**Figure 7.5.3.1.104**

Condition/Ht: T851
Form: 2 – 3 in. Plate
Specimen Type: DCB
Orientation: L–T
Frequency: 1 Hz
Environment: 3.5% NACL; RT

Yield Strength: 59 – 64 ksi
Ult. Strength: 66 – 71 ksi
Specimen Thk: 0.875 in.
Specimen Width: 5.5 in.
Ref: 84360

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 9.58 (min) | 8.53 |
| 10. | 9.77 |
| 13. | 17.2 |
| 16. | 26.9 |
| 20. | 67.6 |
| 24.72 (max) | 363. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 16.58 | 0. .5 .8 1.25 2. |

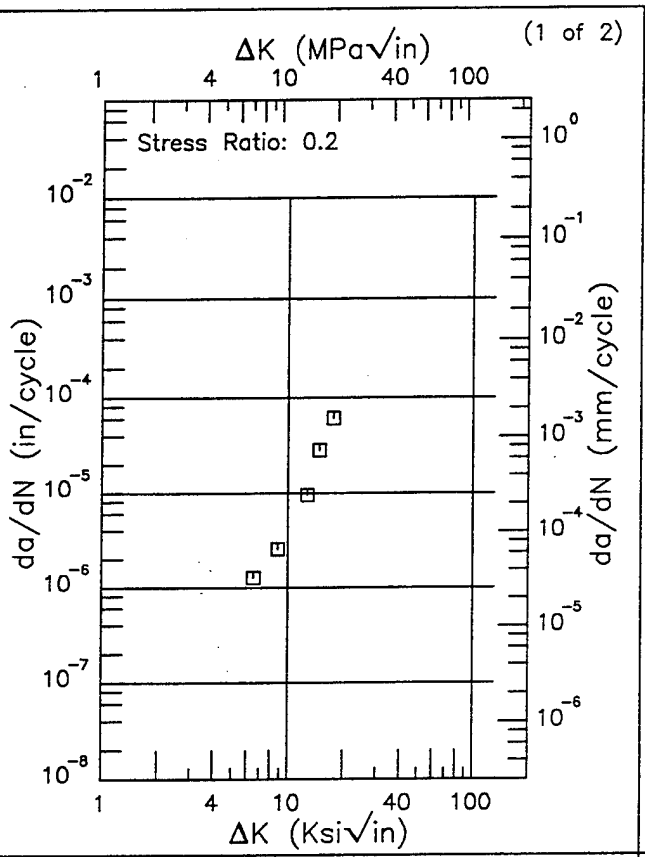
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

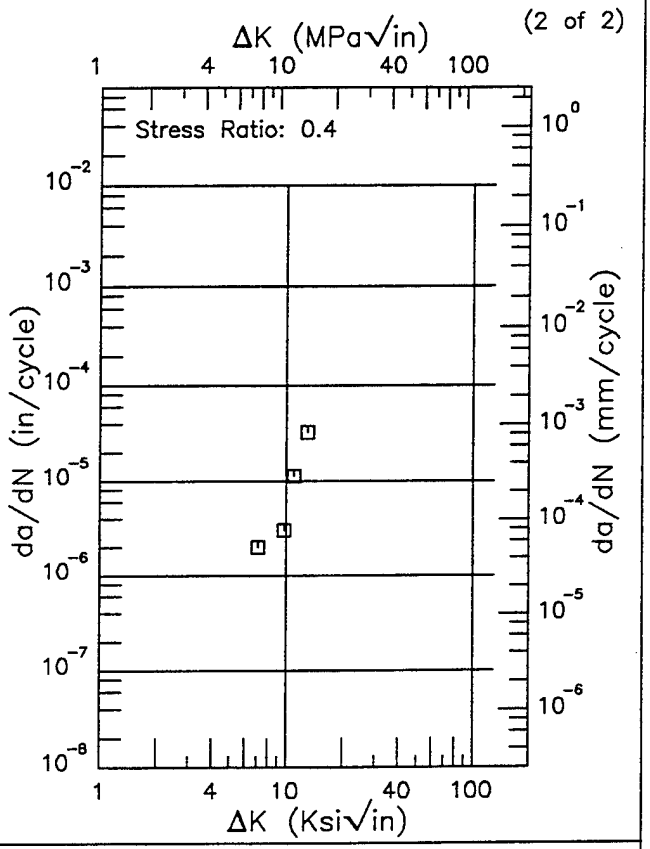
**Figure 7.5.3.1.105**

R 2024

Condition/Ht: T851
Form: 2 in. Plate
Specimen Type: DCB
Orientation: L–T
Frequency: 10 Hz
Environment: DRY AIR; RT

Yield Strength: 64 ksi
Ult. Strength: 71 ksi
Specimen Thk: 0.75 in.
Specimen Width: 5.5 in.
Ref: 84360




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

| RMS % Error | Life Prediction Ratio Summary | RMS % Error | Life Prediction Ratio Summary |
|---|---|---|---|
| | 0. .5 .8 1.25 2. | | 0. .5 .8 1.25 2. |

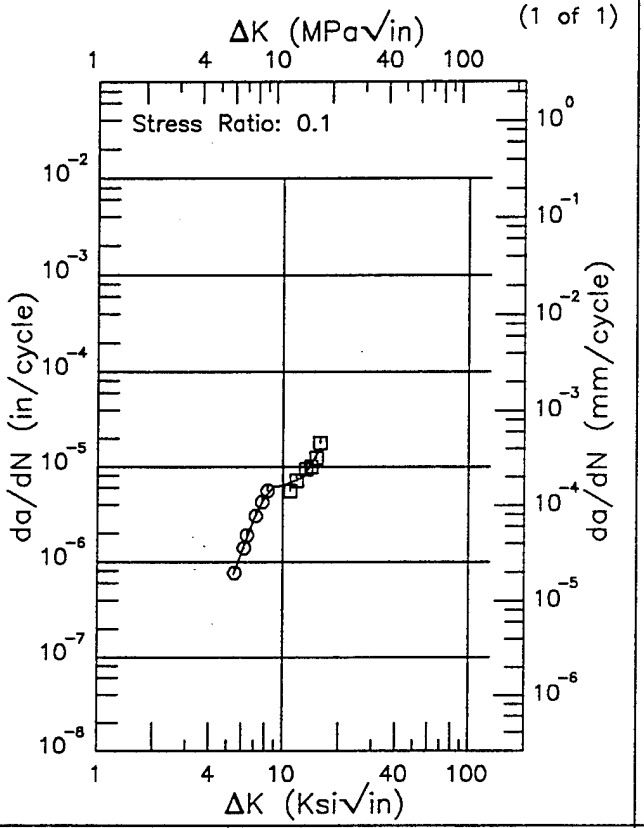
**Figure 7.5.3.1.106**

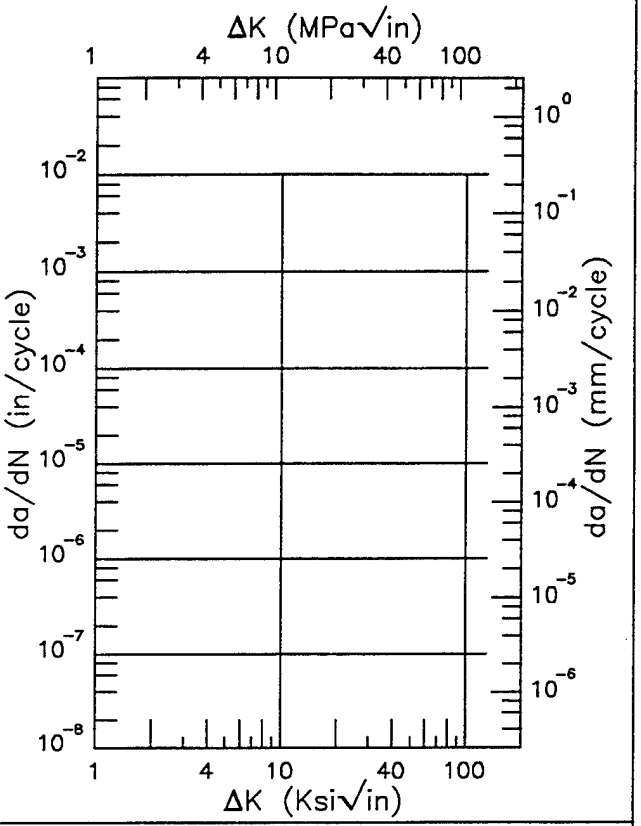
2024 R

Condition/Ht: T851
Form: 0.38 in. Plate
Specimen Type: PTSF (max stress specified)
Orientation: L–S
Frequency: 20 Hz
Environment: H.H.A.; RT

Yield Strength: 70.1 ksi
Ult. Strength: 73.5 ksi
Specimen Thk: 0.374 – 0.377 in.
Specimen Width: 5.004 – 5.006 in.
Ref: 90981

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 5.47 (min) | 0.751 |
| 6. | 1.27 |
| 7. | 2.86 |
| 8. | 4.86 |
| 9. | 6.18 |
| 10. | 6.28 |
| 13. | 7.82 |
| 15.84 (max) | 15.6 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 8.30 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.107**

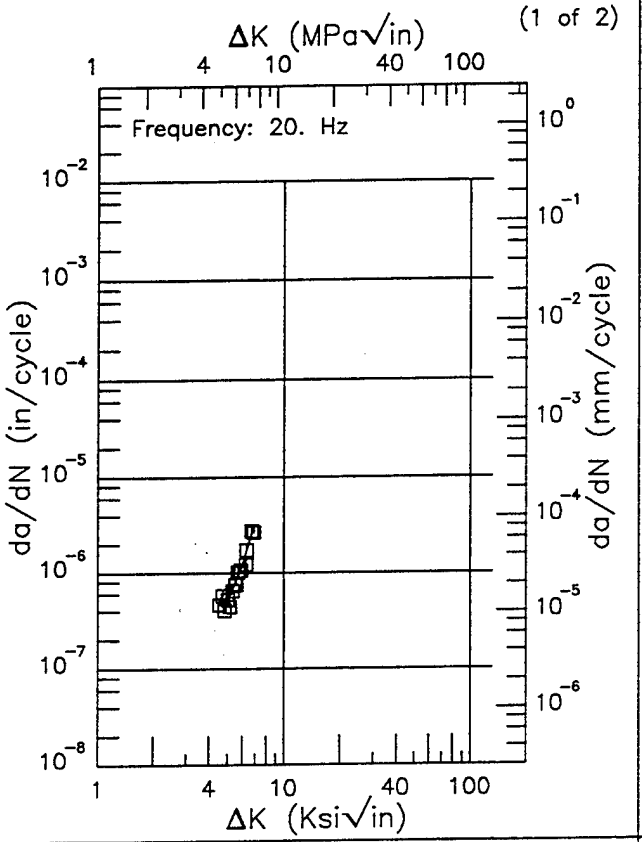
## 2024

F

Condition/Ht: T851
Form: 0.75 in. Plate
Specimen Type: PTSF (max stress specified)
Orientation: L–S
Stress Ratio: 0.1
Environment: H.H.A.; RT

Yield Strength: 70.1 ksi
Ult. Strength: 73.5 ksi
Specimen Thk: 0.759 – 0.76 in.
Specimen Width: 5.003 in.
Ref: 90981

(1 of 2)



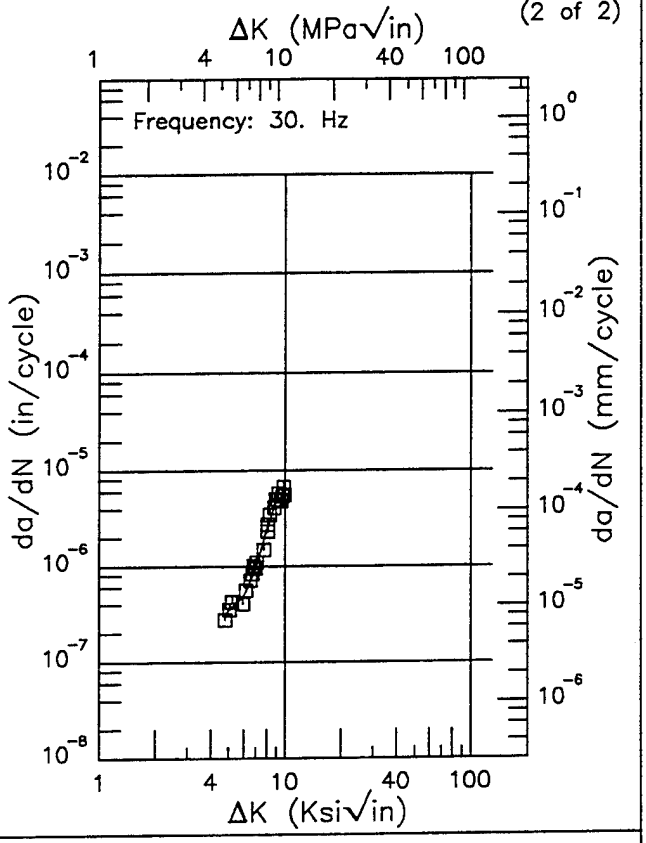

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.52 (min) | 0.487 |
| 5. | 0.501 |
| 6. | 1.18 |
| 6.88 (max) | 2.95 |

| RMS % Error |
|---|
| 11.76 |

Life Prediction Ratio Summary

0. .5 .8 1.25 2.

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.77 (min) | 0.302 |
| 5. | 0.348 |
| 6. | 0.487 |
| 7. | 0.947 |
| 8. | 2.41 |
| 9. | 4.88 |
| 9.90 (max) | 5.45 |

| RMS % Error |
|---|
| 11.27 |

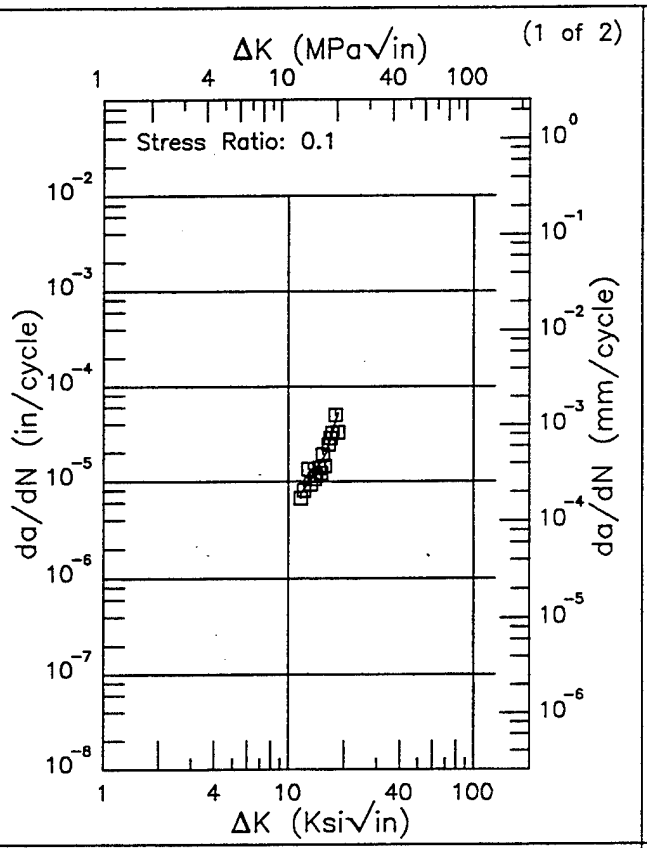
Life Prediction Ratio Summary

0. .5 .8 1.25 2.

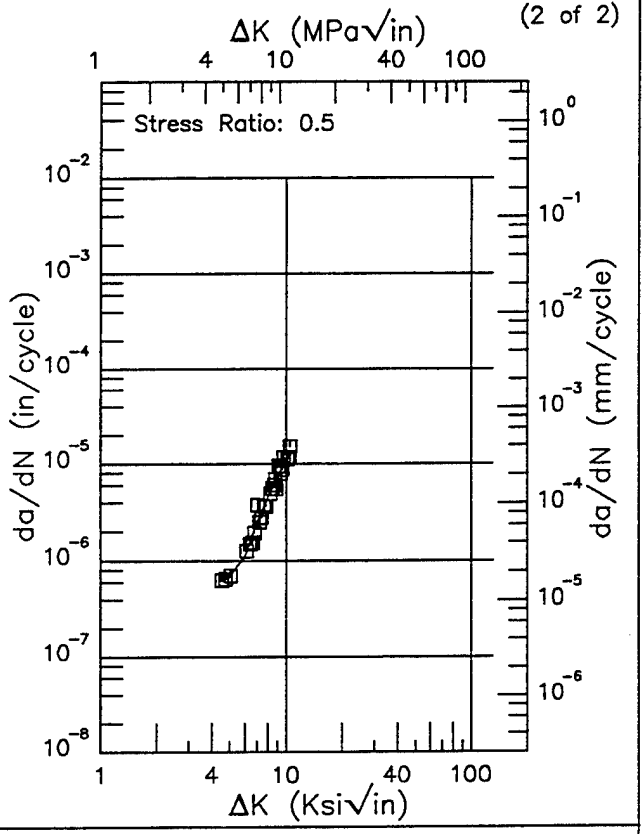
**Figure 7.5.3.1.108**

Condition/Ht: T851
Form: 0.75 in. Plate
Specimen Type: PTSF (max stress specified)
Orientation: T–S
Frequency: 2 Hz
Environment: H.H.A.; RT

Yield Strength: 70.1 ksi
Ult. Strength: 73.5 ksi
Specimen Thk: 0.759 in.
Specimen Width: 5.004 – 5.006 in.
Ref: 90981




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 11.66 (min) | 7.64 |
| 13. | 9.86 |
| 16. | 19.7 |
| 18.52 (max) | 52.3 |




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.50 (min) | 0.616 |
| 5. | 0.690 |
| 6. | 1.12 |
| 7. | 2.45 |
| 8. | 4.50 |
| 9. | 7.35 |
| 10. | 11.7 |
| 10.47 (max) | 11.8 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 18.68 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 14.20 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.109**

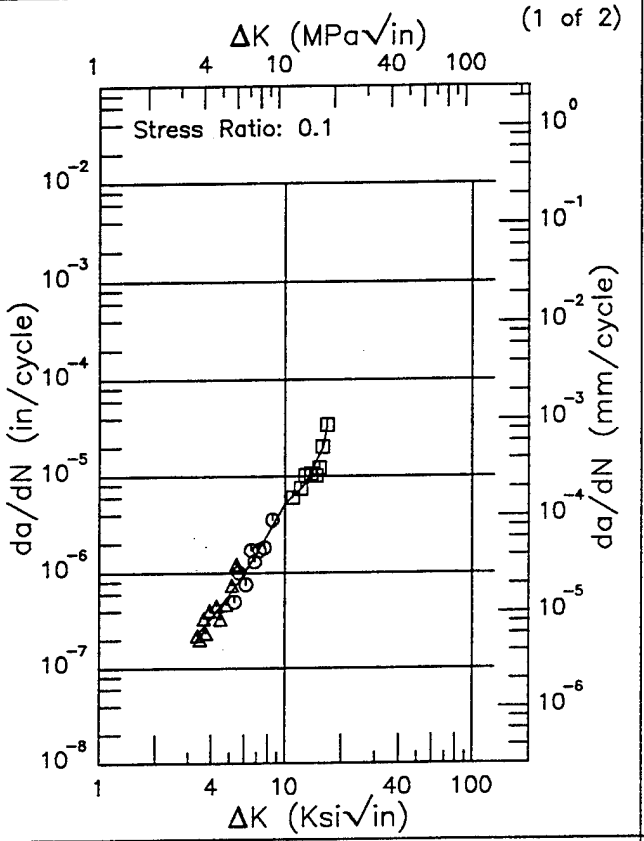
2024

R

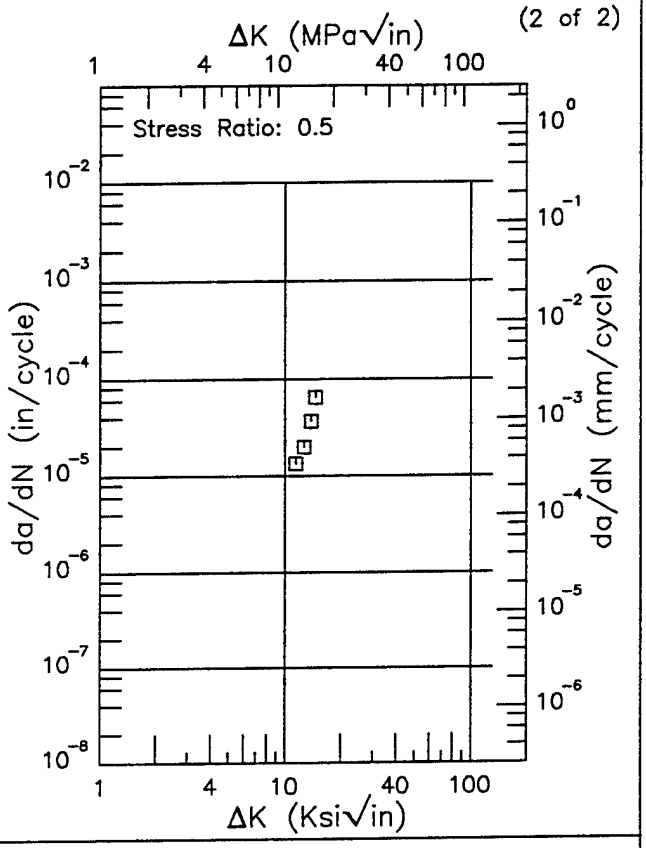
Condition/Ht: T851
Form: 0.38 in. Plate
Specimen Type: PTSF (max stress specified)
Orientation: T–S
Frequency: 20 Hz
Environment: H.H.A.; RT

Yield Strength: 70.1 ksi
Ult. Strength: 73.5 ksi
Specimen Thk: 0.376 – 0.38 in.
Specimen Width: 5.003 – 5.006 in.
Ref: 90981

(1 of 2)




(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.37 (min) | 0.230 |
| 3.5 | 0.249 |
| 4. | 0.335 |
| 5. | 0.590 |
| 6. | 0.992 |
| 7. | 1.60 |
| 8. | 2.49 |
| 9. | 3.70 |
| 10. | 5.14 |
| 13. | 8.64 |
| 16. | 20.4 |
| 16.73 (max) | 33.3 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 22.17 | 0. .5 .8 1.25 2. |

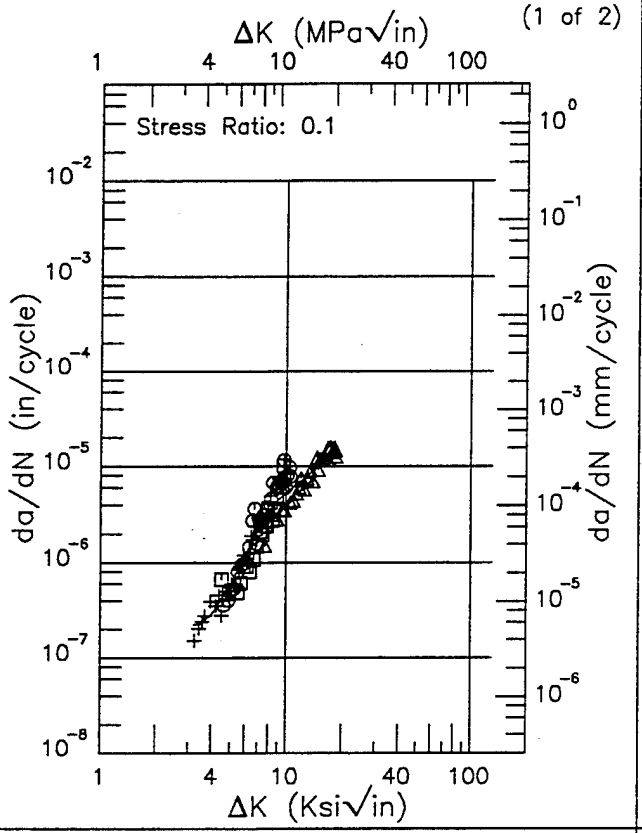
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

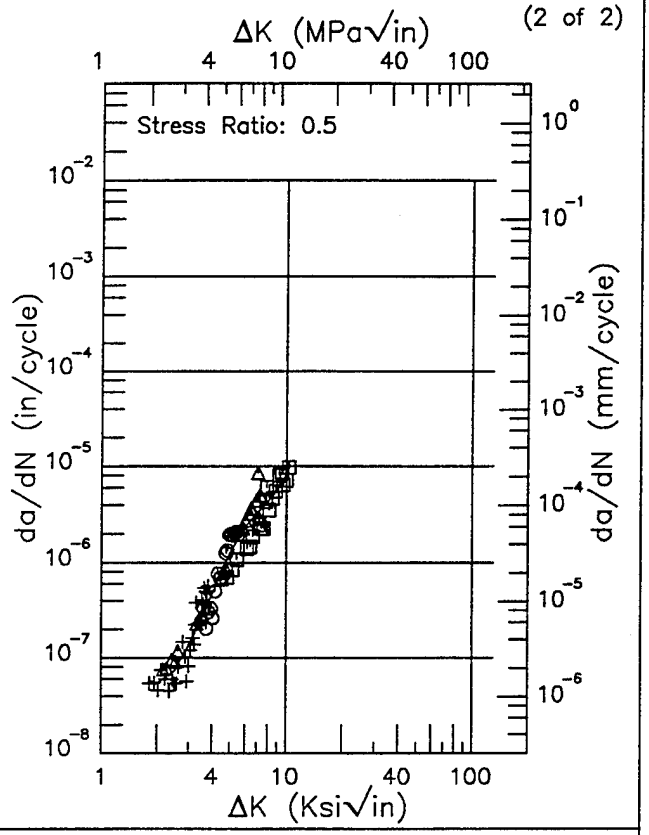
**Figure 7.5.3.1.110**

2024 R

Condition/Ht: T851
Form: 0.75 in. Plate
Specimen Type: PTSF (max stress specified)
Orientation: T–S
Frequency: 20 Hz
Environment: H.H.A.; RT

Yield Strength: 70.1 ksi
Ult. Strength: 73.5 ksi
Specimen Thk: 0.758 – 0.764 in.
Specimen Width: 5 – 5.005 in.
Ref: 90981




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.22 (min) | 0.223 |
| 3.5 | 0.229 |
| 4. | 0.284 |
| 5. | 0.572 |
| 6. | 1.18 |
| 7. | 2.15 |
| 8. | 3.34 |
| 9. | 4.42 |
| 10. | 5.29 |
| 13. | 7.80 |
| 16. | 12.3 |
| 18.47 (max) | 15.6 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 1.82 (min) | 0.0577 |
| 2. | 0.0540 |
| 2.5 | 0.0729 |
| 3. | 0.133 |
| 3.5 | 0.256 |
| 4. | 0.472 |
| 5. | 1.26 |
| 6. | 2.36 |
| 7. | 3.31 |
| 8. | 4.26 |
| 9. | 5.71 |
| 10. | 8.43 |
| 10.31 (max) | 9.73 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 32.81 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 35.81 | 0. .5 .8 1.25 2. |

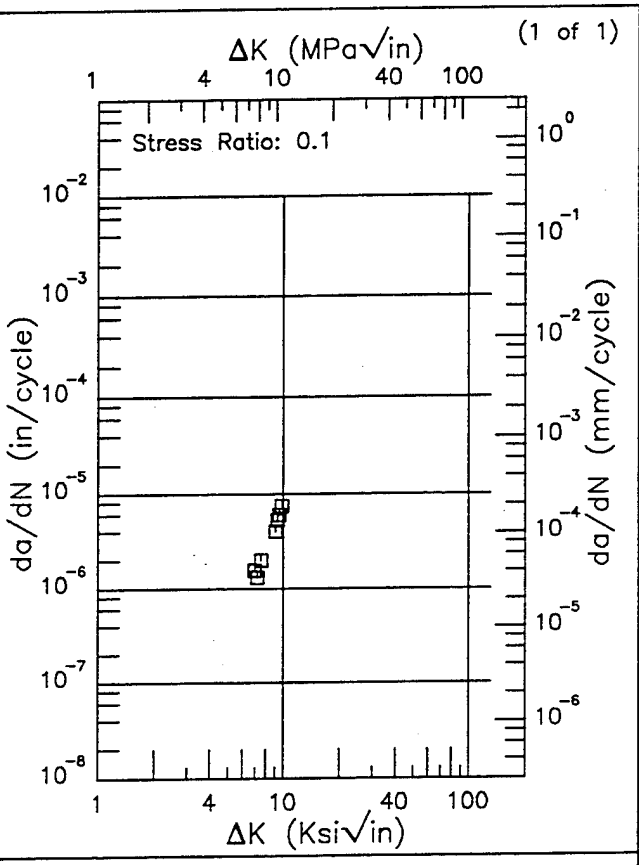
**Figure 7.5.3.1.111**

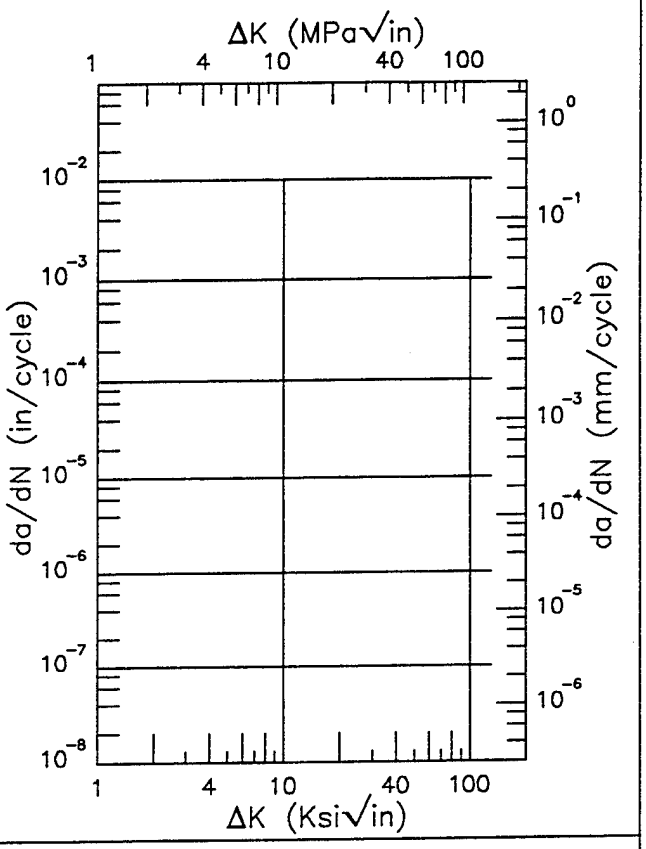
R 2024

Condition/Ht: T851
Form: 0.75 in. Plate
Specimen Type: PTSF (max stress specified)
Orientation: T-S
Frequency: 2 Hz
Environment: 3.5% NACL; RT

Yield Strength: 70.1 ksi
Ult. Strength: 73.5 ksi
Specimen Thk: 0.763 in.
Specimen Width: 5.003 in.
Ref: 90981

(1 of 1)




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

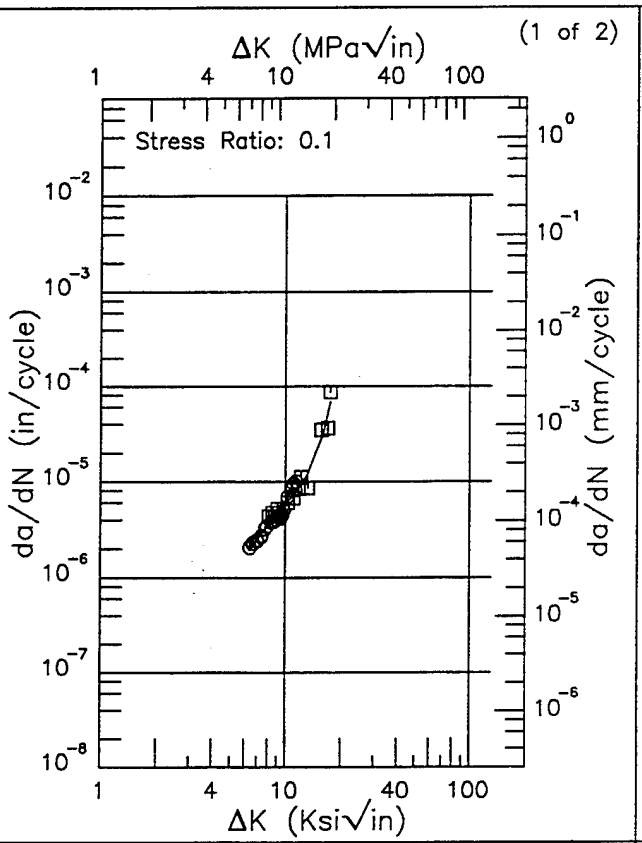
| RMS % Error | Life Prediction Ratio Summary | RMS % Error | Life Prediction Ratio Summary |
|---|---|---|---|
| | 0. .5 .8 1.25 2. | | 0. .5 .8 1.25 2. |

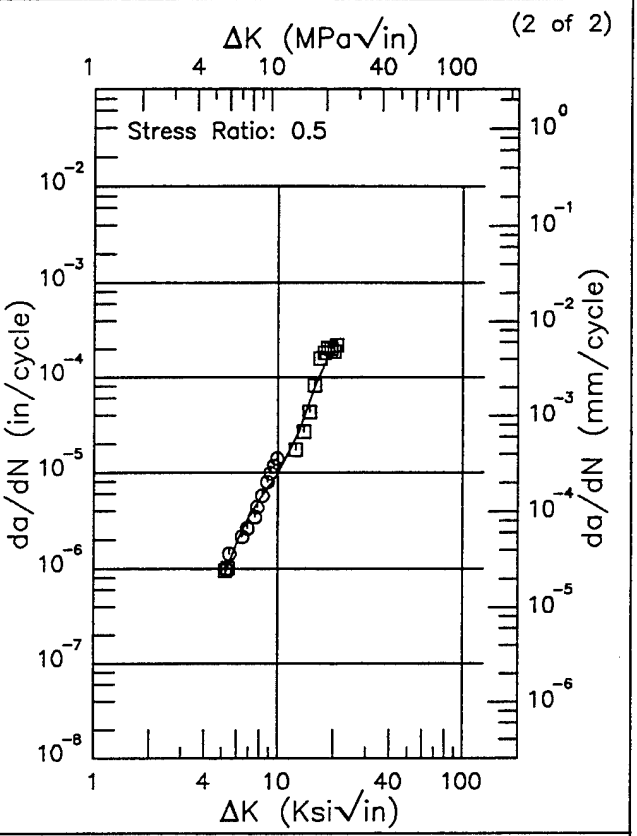
**Figure 7.5.3.1.112**

2024 R

Condition/Ht: T851
Form: 0.75 – 0.76 in. Plate
Specimen Type: PTSF (max stress specified)
Orientation: T–S
Frequency: 20 Hz
Environment: 3.5% NACL; RT

Yield Strength: 70.1 ksi
Ult. Strength: 73.5 ksi
Specimen Thk: 0.759 – 0.763 in.
Specimen Width: 5 – 5.005 in.
Ref: 90981




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.40 (min) | 1.94 |
| 7. | 2.50 |
| 8. | 3.47 |
| 9. | 4.52 |
| 10. | 5.71 |
| 13. | 11.2 |
| 16. | 32.4 |
| 17.38 (max) | 68.8 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.20 (min) | 0.854 |
| 6. | 1.85 |
| 7. | 3.43 |
| 8. | 5.21 |
| 9. | 7.28 |
| 10. | 9.89 |
| 13. | 26.8 |
| 16. | 82.6 |
| 20. | 229. |
| 20.76 (max) | 254. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 16.38 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 23.66 | 0. .5 .8 1.25 2. |

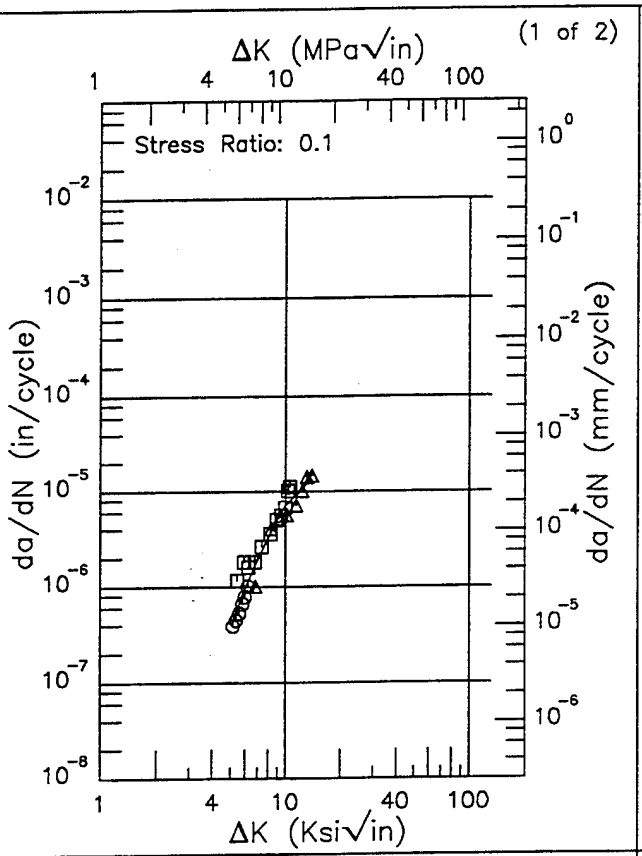
**Figure 7.5.3.1.113**

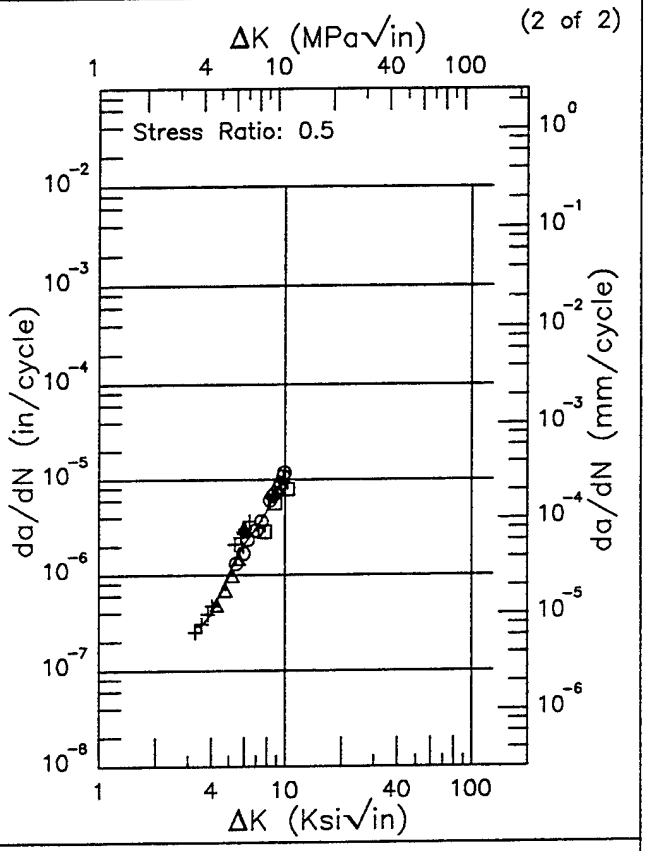
## 2024

R

Condition/Ht: T851
Form: 0.38 in. Plate
Specimen Type: PTSF (max stress specified)
Orientation: T–S
Frequency: 20 Hz
Environment: 3.5% NACL; RT

Yield Strength: 70.1 ksi
Ult. Strength: 73.5 ksi
Specimen Thk: 0.377 – 0.38 in.
Specimen Width: 5.002 – 5.005 in.
Ref: 90981




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.15 (min) | 0.430 |
| 6. | 0.953 |
| 7. | 1.90 |
| 8. | 3.27 |
| 9. | 5.10 |
| 10. | 7.07 |
| 13. | 11.8 |
| 13.84 (max) | 16.5 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.28 (min) | 0.295 |
| 3.5 | 0.288 |
| 4. | 0.384 |
| 5. | 1.03 |
| 6. | 2.09 |
| 7. | 3.08 |
| 8. | 4.62 |
| 9. | 7.48 |
| 10. | 9.80 |
| 10.28 (max) | 9.88 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 35.20 | 0. .5 .8 1.25 2. |

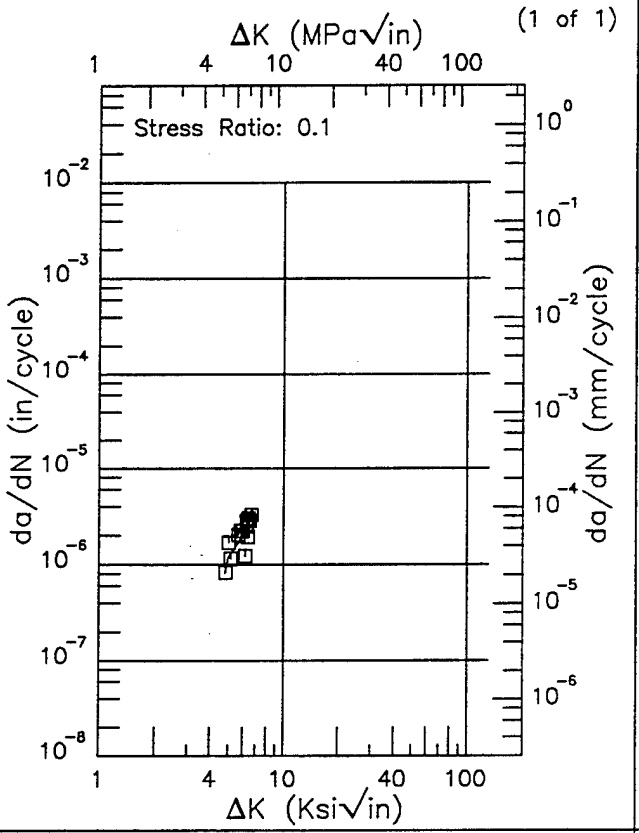
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 23.49 | 0. .5 .8 1.25 2. |

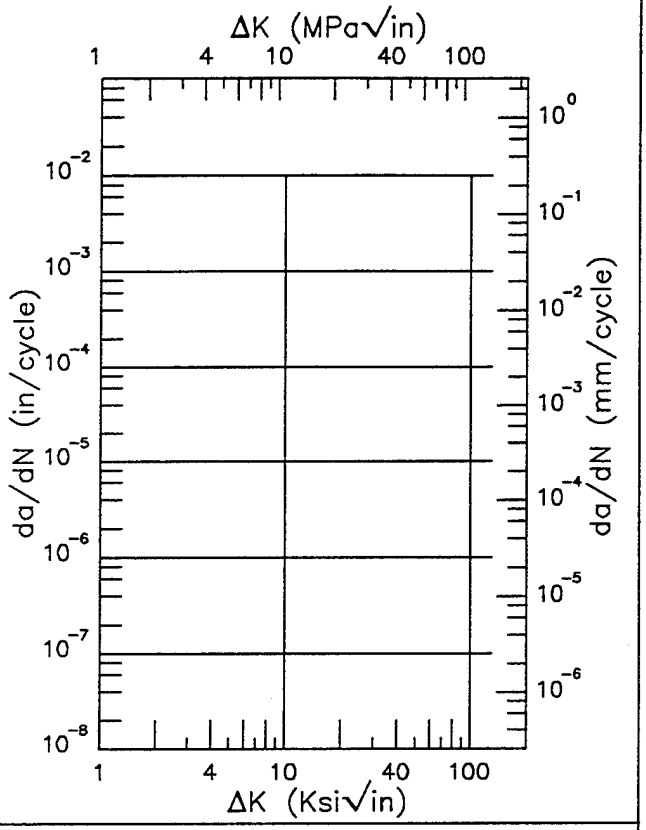
**Figure 7.5.3.1.114**

2024 R

Condition/Ht: T851
Form: 0.75 in. Plate
Specimen Type: PTSF (max stress specified)
Orientation: T–S
Frequency: 20 Hz
Environment: 3.5% NACL; RT

Yield Strength: 70.1 ksi
Ult. Strength: 73.5 ksi
Specimen Thk: 0.75 in.
Specimen Width: 5 in.
Ref: 90981




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.82 (min) | 0.817 |
| 5. | 1.19 |
| 6. | 1.97 |
| 6.67 (max) | 3.11 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 21.26 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

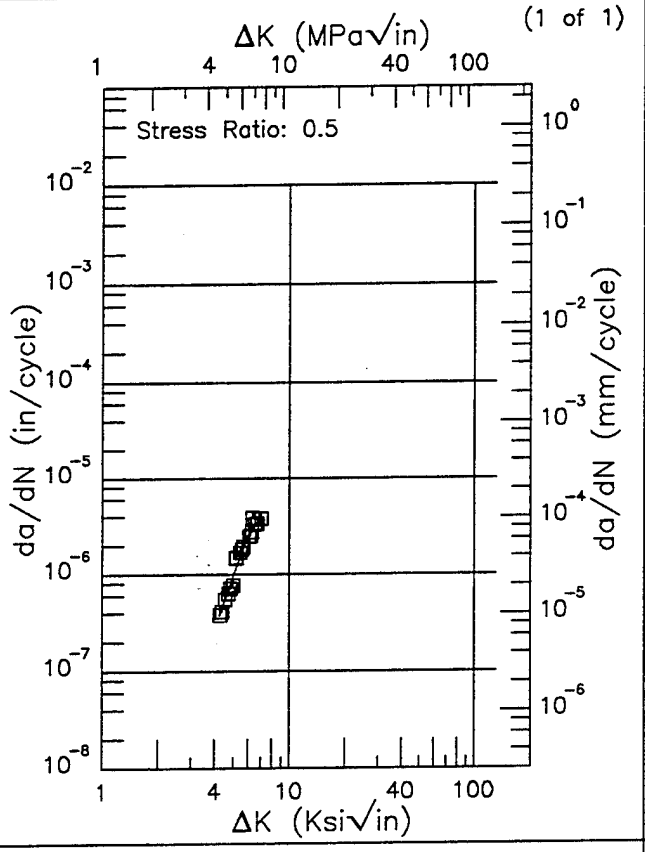
**Figure 7.5.3.1.115**

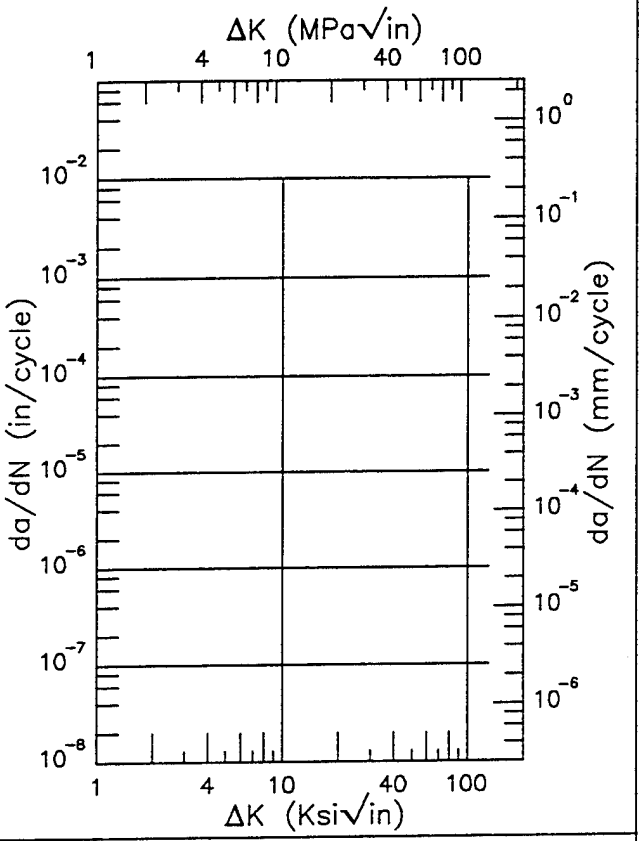
## 2024

R

Condition/Ht: T851
Form: 0.75 in. Plate
Specimen Type: PTSF (max stress specified)
Orientation: T–S
Frequency: 2 Hz
Environment: H.H.A.; RT

Yield Strength: 70.1 ksi
Ult. Strength: 73.5 ksi
Specimen Thk: 0.763 in.
Specimen Width: 5.004 in.
Ref: 90981




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.25 (min) | 0.374 |
| 5. | 0.955 |
| 6. | 2.54 |
| 7. | 3.78 |
| 7.02 (max) | 3.81 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 14.73 | 0. .5 .8 1.25 2. |

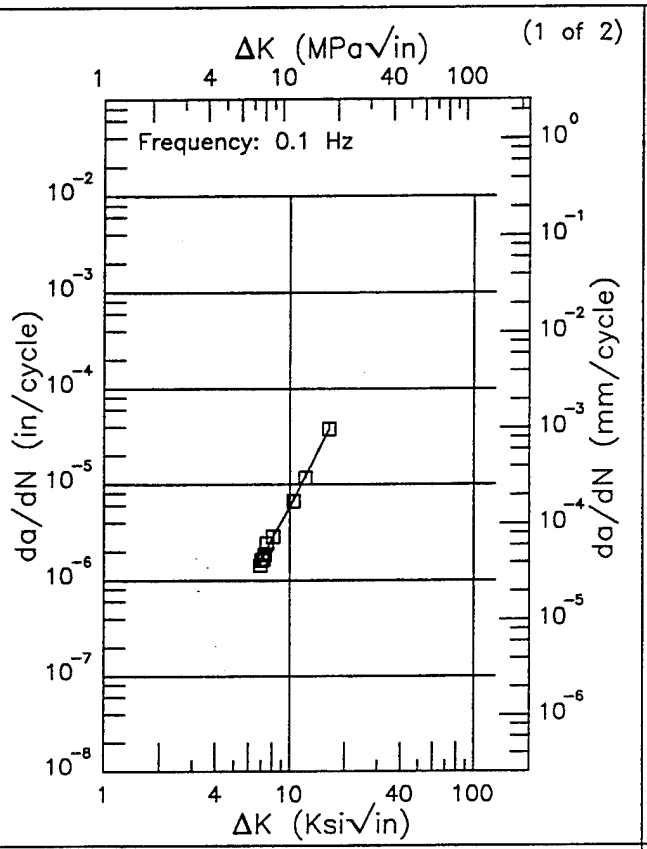
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

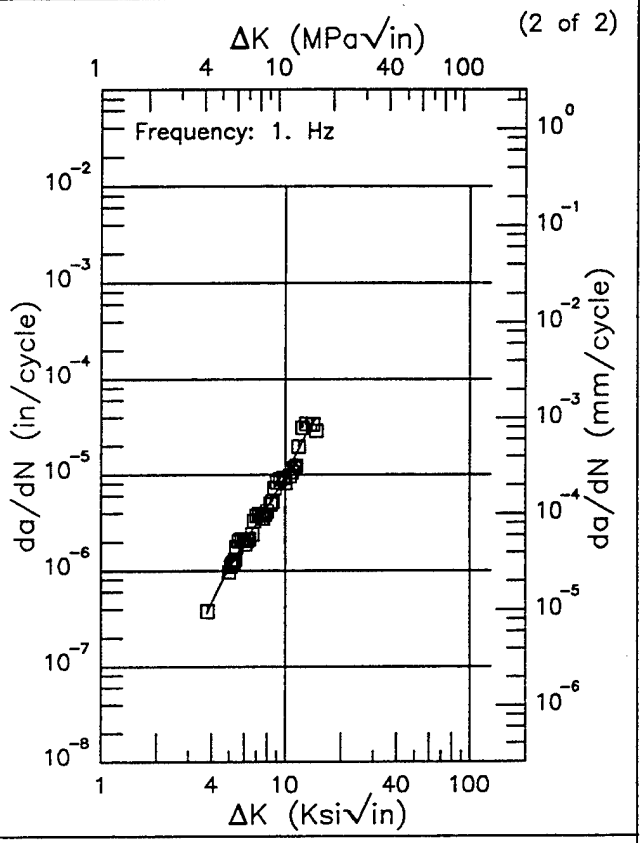
**Figure 7.5.3.1.116**

2024 F

Condition/Ht: T852
Form: 3 in. Forging
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.08
Environment: DRY AIR; RT

Yield Strength: 53 ksi
Ult. Strength: 70 ksi
Specimen Thk: 1 – 1.002 in.
Specimen Width: 7.4 in.
Ref: 85837




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.91 (min) | 1.52 |
| 7. | 1.61 |
| 8. | 2.77 |
| 9. | 4.13 |
| 10. | 5.80 |
| 13. | 15.4 |
| 16. | 35.1 |
| 16.31 (max) | 37.5 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.80 (min) | 0.365 |
| 4. | 0.463 |
| 5. | 1.10 |
| 6. | 1.95 |
| 7. | 3.05 |
| 8. | 4.56 |
| 9. | 6.73 |
| 10. | 9.91 |
| 13. | 27.0 |
| 14.60 (max) | 39.2 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 5.83 | 0. .5 .8 1.25 2. |

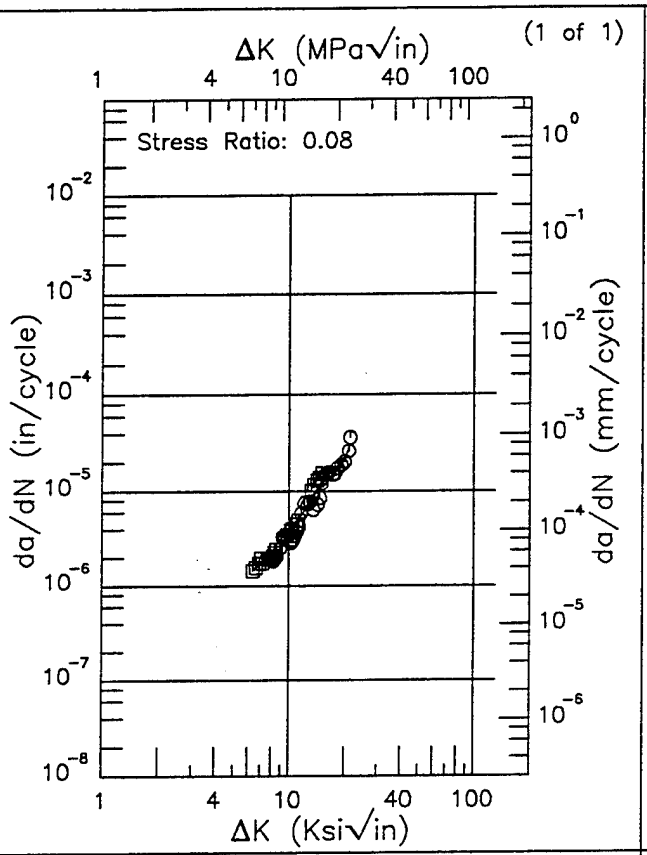
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 16.65 | 0. .5 .8 1.25 2. |

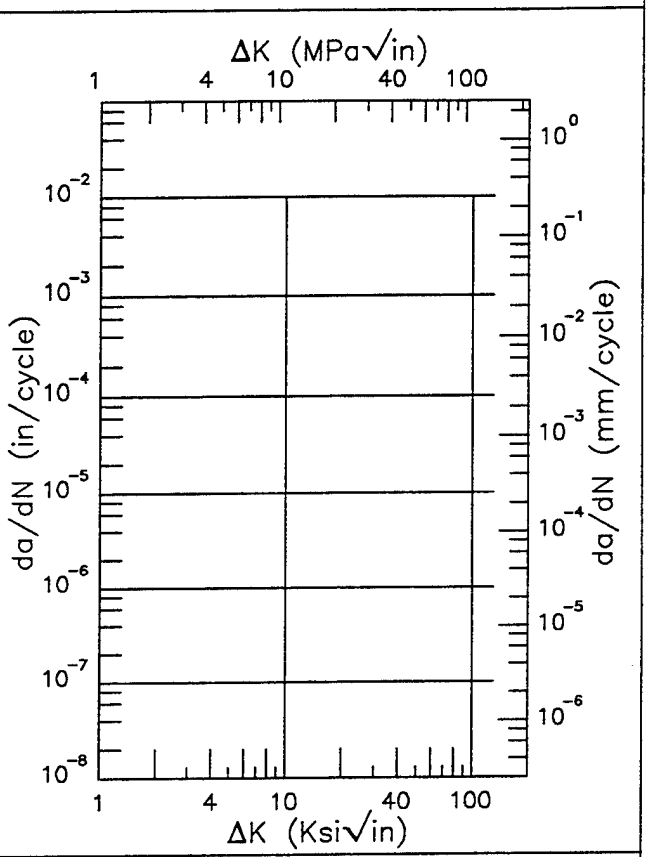
**Figure 7.5.3.1.117**

R 2024

Condition/Ht: T852
Form: 3 in. Forging
Specimen Type: CT
Orientation: L–T
Frequency: 6 Hz
Environment: DRY AIR; RT

Yield Strength: 53 ksi
Ult. Strength: 68 – 70 ksi
Specimen Thk: 0.5 – 0.502 in.
Specimen Width: 7.4 in.
Ref: 88579;85837




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.36 (min) | 1.52 |
| 7. | 1.68 |
| 8. | 2.03 |
| 9. | 2.56 |
| 10. | 3.34 |
| 13. | 8.18 |
| 16. | 14.7 |
| 20. | 21.2 |
| 21.25 (max) | 30.9 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

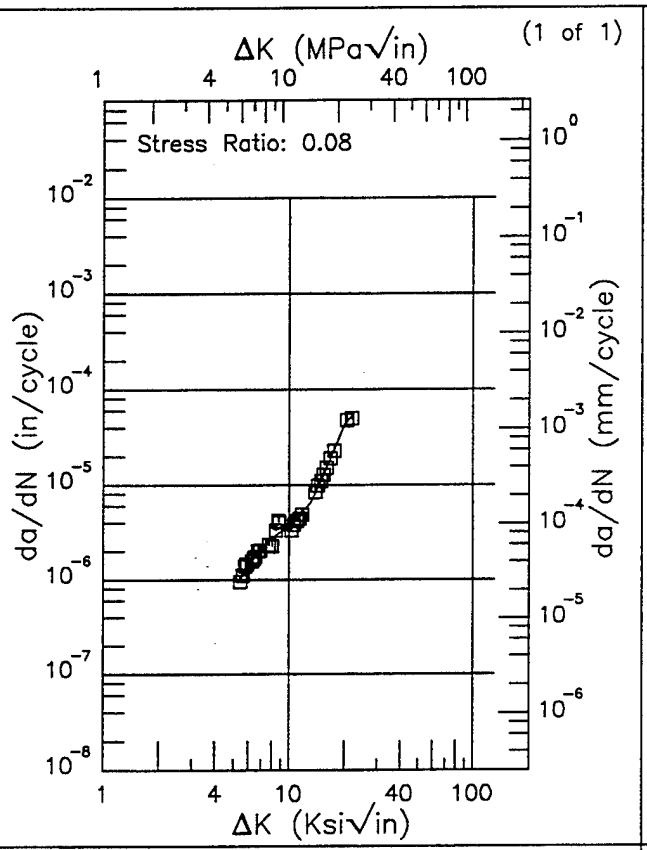
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 14.08 | 0. .5 .8 1.25 2. |

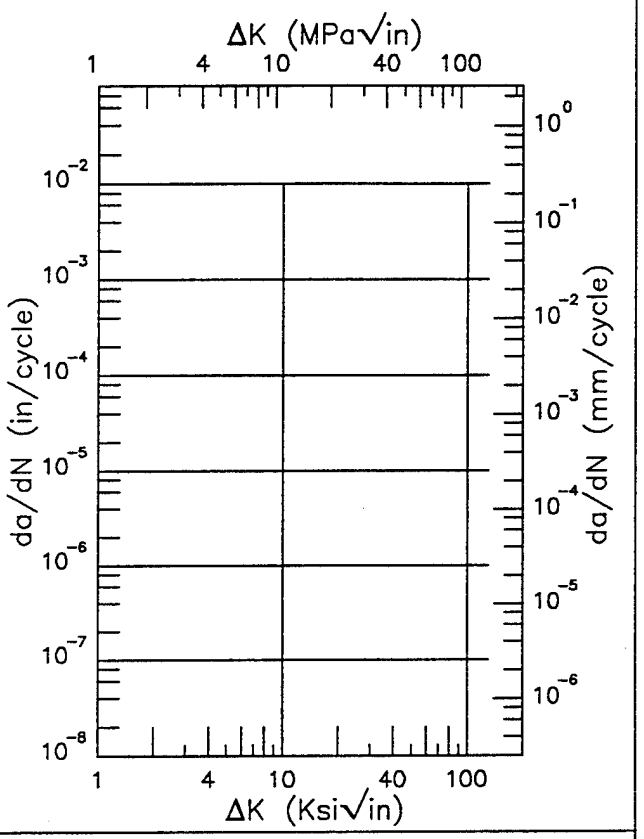
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.118**

Condition/Ht: T852
Form: 3 in. Forging
Specimen Type: CT
Orientation: L–T
Frequency: 6 Hz
Environment: DRY AIR; RT

Yield Strength: 53 ksi
Ult. Strength: 68 ksi
Specimen Thk: 0.25 in.
Specimen Width: 7.4 in.
Ref: 88579




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.43 (min) | 0.999 |
| 6. | 1.40 |
| 7. | 2.09 |
| 8. | 2.69 |
| 9. | 3.23 |
| 10. | 3.73 |
| 13. | 6.33 |
| 16. | 15.4 |
| 20. | 43.1 |
| 21.81 (max) | 51.4 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 11.16 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

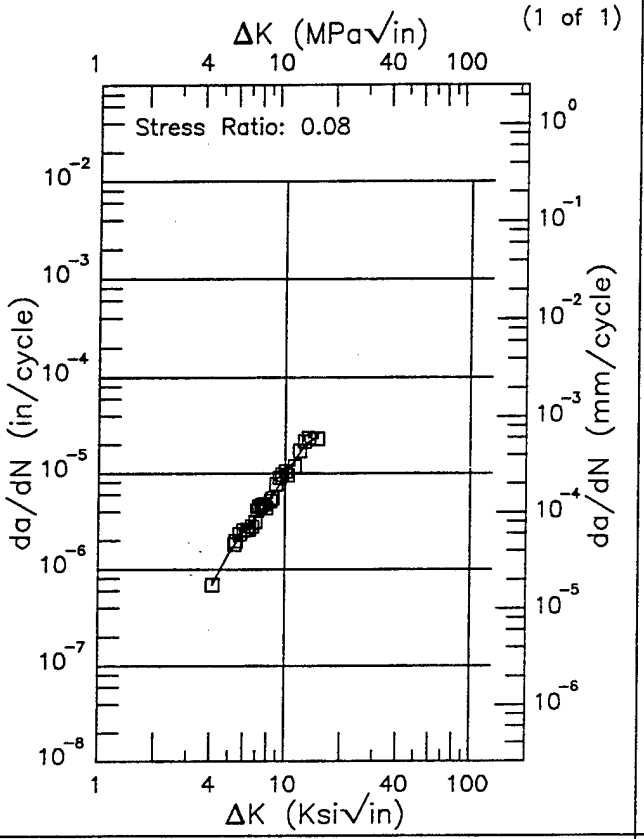
**Figure 7.5.3.1.119**

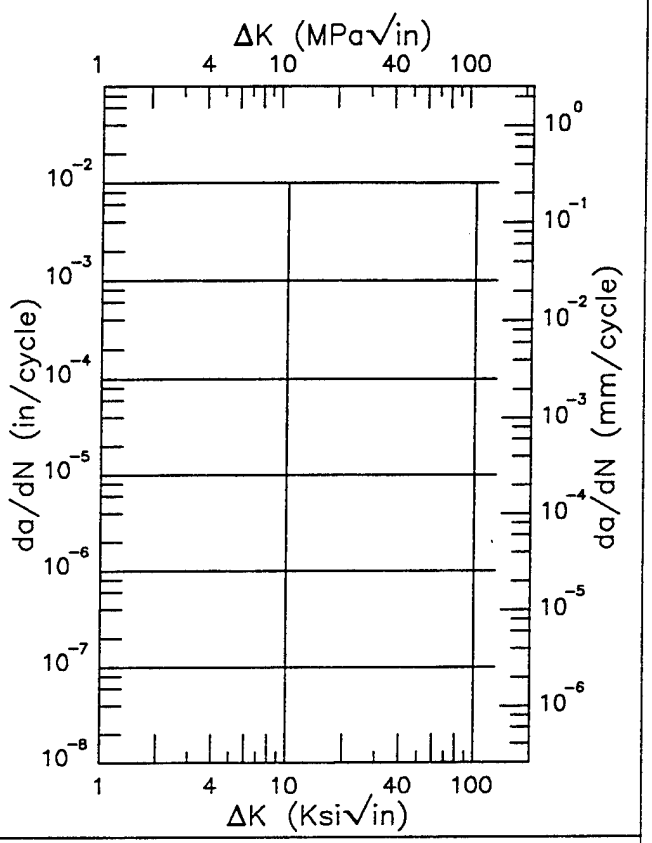
2024

R

Condition/Ht: T852
Form: 3 in. Forging
Specimen Type: CT
Orientation: L–T
Frequency: 1 Hz
Environment: S.C.S.; RT

Yield Strength: 53 ksi
Ult. Strength: 70 ksi
Specimen Thk: 1.004 in.
Specimen Width: 7.4 in.
Ref: 85837




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.09 (min) | 0.690 |
| 5. | 1.47 |
| 6. | 2.47 |
| 7. | 3.62 |
| 8. | 5.04 |
| 9. | 6.95 |
| 10. | 9.64 |
| 13. | 20.7 |
| 14.86 (max) | 23.9 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 9.50 | 0. .5 .8 1.25 2. |

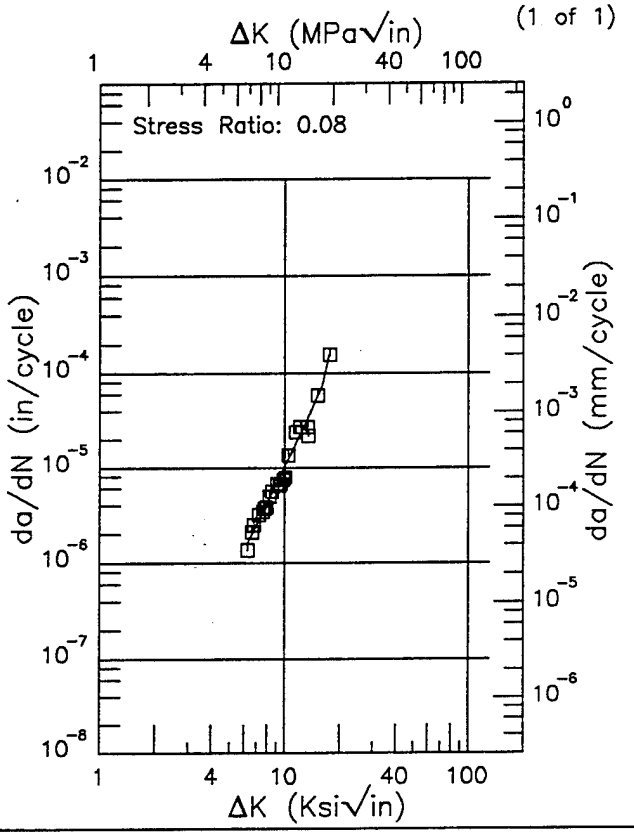
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

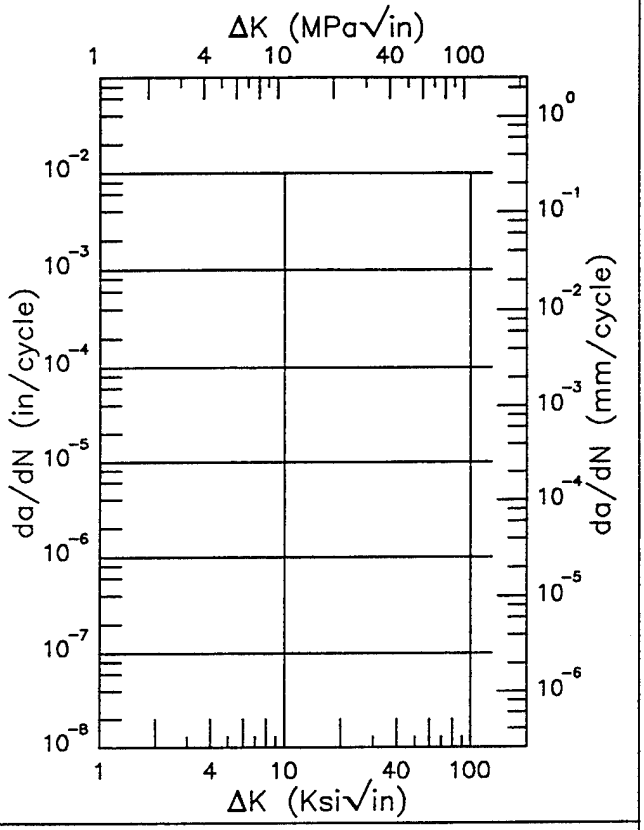
**Figure 7.5.3.1.120**

Condition/Ht: T852
Form: 3 in. Forging
Specimen Type: CT
Orientation: T–L
Frequency: 6 Hz
Environment: DRY AIR;265°F

Yield Strength: 54 ksi
Ult. Strength: 68 ksi
Specimen Thk: 0.999 in.
Specimen Width: 7.4 in.
Ref: 85837

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.27 (min) | 1.61 |
| 7. | 2.50 |
| 8. | 4.24 |
| 9. | 6.75 |
| 10. | 10.3 |
| 13. | 29.3 |
| 16. | 75.1 |
| 17.44 (max) | 156. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 16.32 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

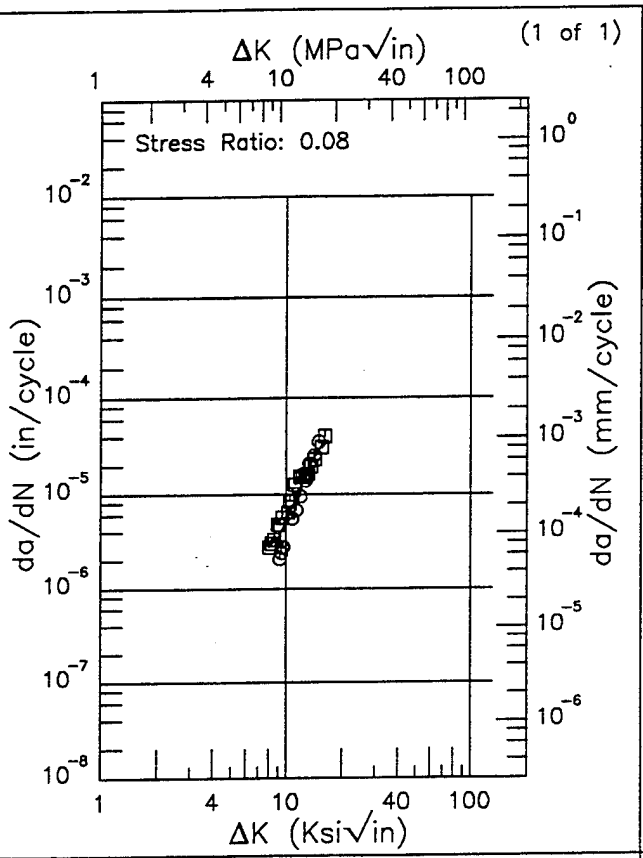
**Figure 7.5.3.1.121**

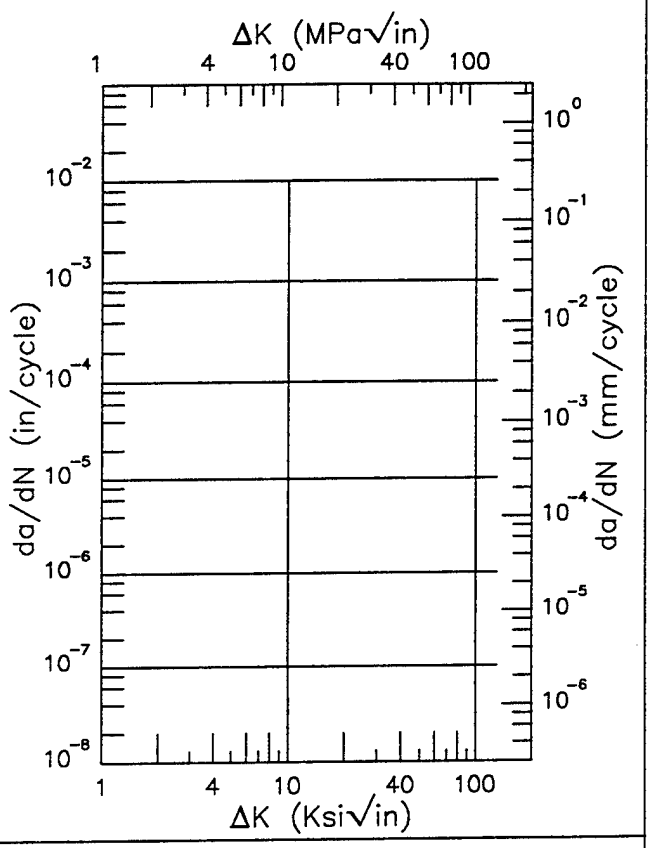
2024

R

Condition/Ht: T852
Form: 3 in. Forging
Specimen Type: CT
Orientation: T–L
Frequency: 1 Hz
Environment: S.T.W.; RT

Yield Strength: 54 ksi
Ult. Strength: 68 ksi
Specimen Thk: 0.998 – 0.999 in.
Specimen Width: 7.4 in.
Ref: 85837




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 8.03 (min) | 2.81 |
| 9. | 3.50 |
| 10. | 5.19 |
| 13. | 18.5 |
| 15.99 (max) | 36.5 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 23.79 | 0. .5 .8 1.25 2. |

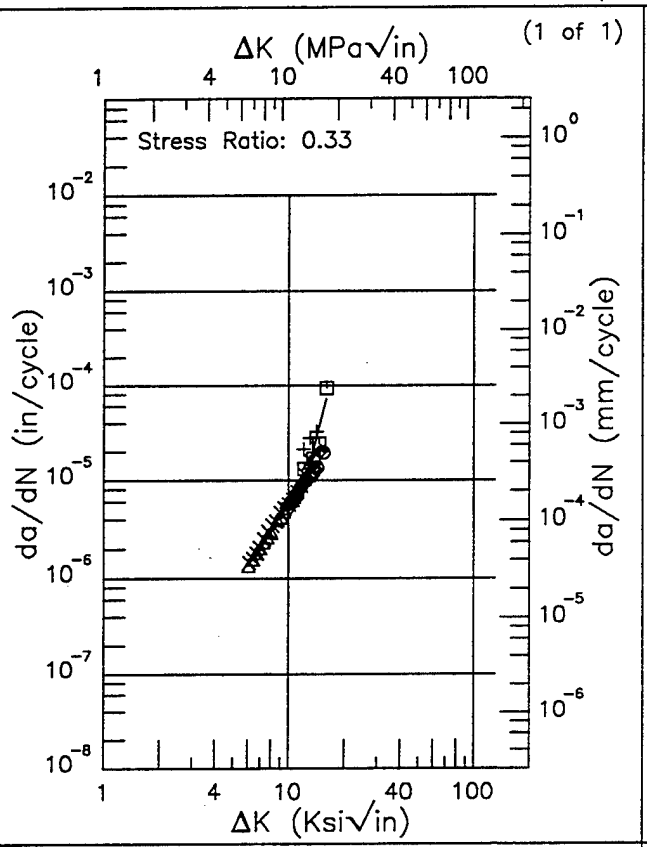
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

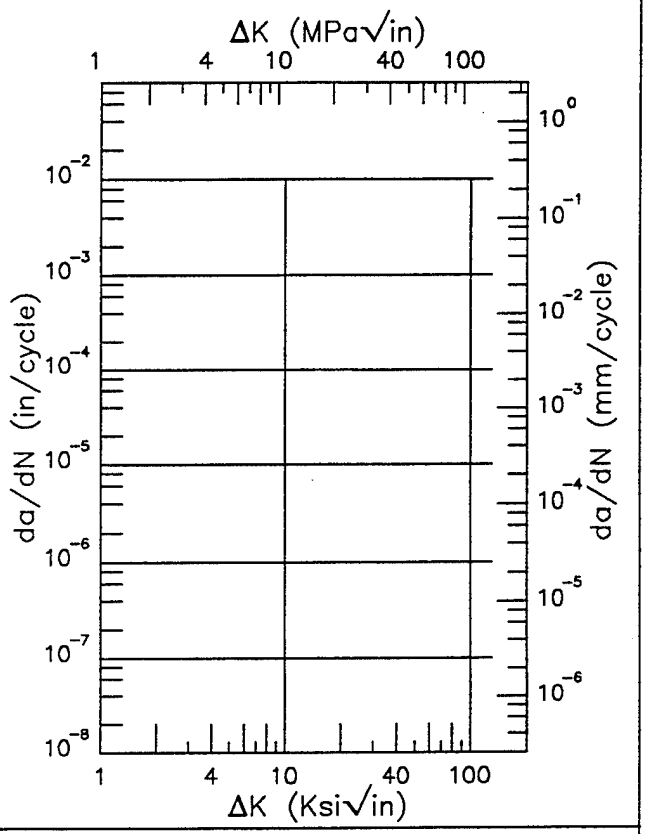
**Figure 7.5.3.1.122**

2024 R

Condition/Ht: T852
Form: 6 in. Forging
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 5.2 Hz
Environment: LAB AIR; RT

Yield Strength:
Ult. Strength:
Specimen Thk: 0.75 in.
Specimen Width: 3 in.
Ref: 77720




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.07 (min) | 1.42 |
| 7. | 2.03 |
| 8. | 3.13 |
| 9. | 4.32 |
| 10. | 5.53 |
| 13. | 14.4 |
| 15.89 (max) | 72.7 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 25.53 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

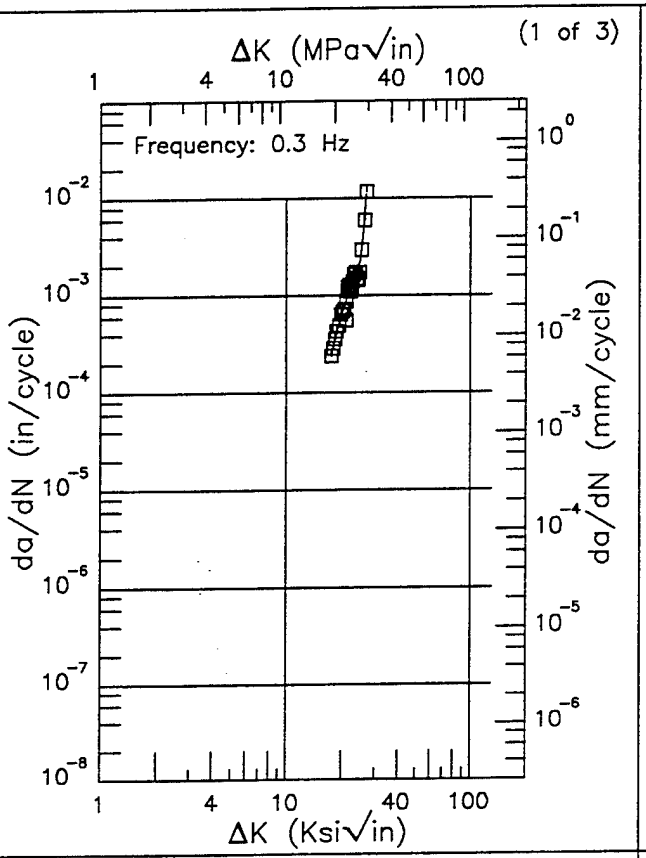
**Figure 7.5.3.1.123**

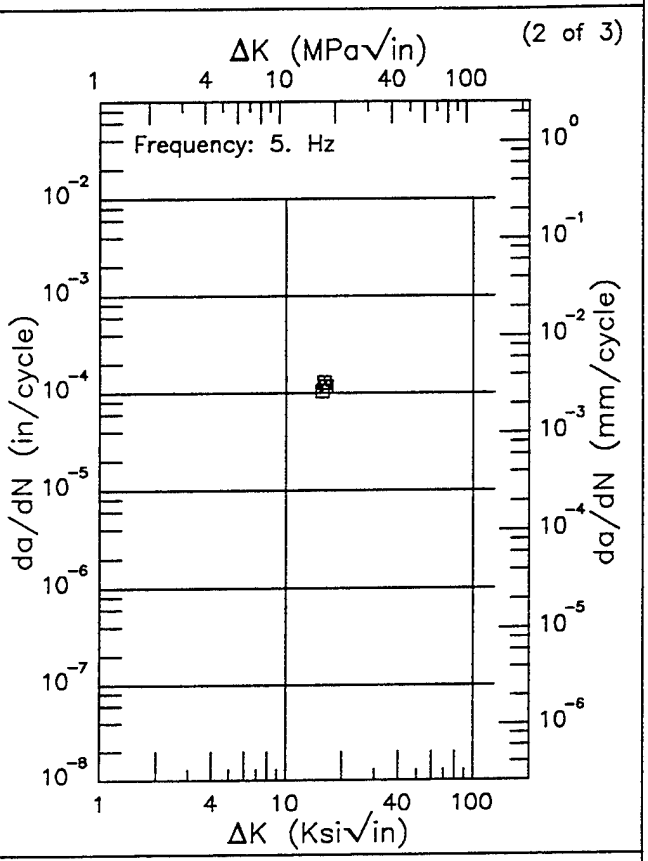
2024

F

Condition/Ht: T861
Form: 0.09 in. Sheet
Specimen Type: CT
Orientation: T–L
Stress Ratio: 0.08
Environment: LAB AIR; RT

Yield Strength: 73 ksi
Ult. Strength: 76.6 ksi
Specimen Thk: 0.09 in.
Specimen Width: 5 in.
Ref: 88578




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 17.51 (min) | 253. |
| 20. | 667. |
| 25. | 2299. |
| 26.94 (max) | 11018. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 14.22 | 0. .5 .8 1.25 2. |

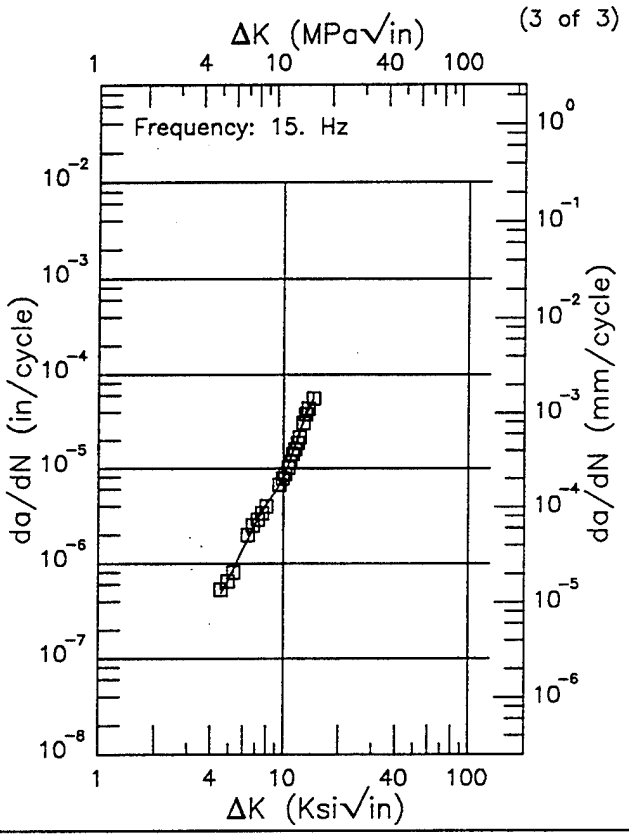
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

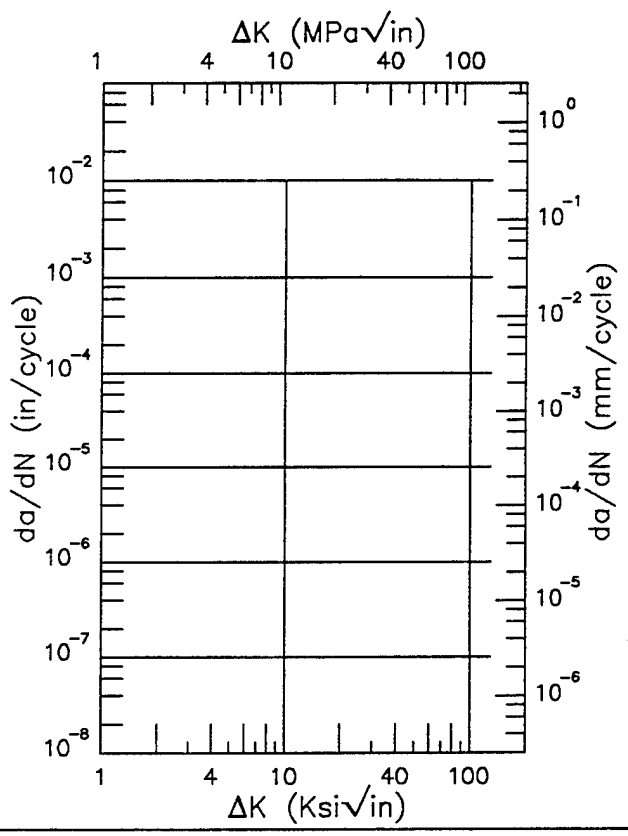
**Figure 7.5.3.1.124**

2024 F

Condition/Ht: T861
Form: 0.09 in. Sheet
Specimen Type: CT
Orientation: T–L
Stress Ratio: 0.08
Environment: LAB AIR; RT

Yield Strength: 73 ksi
Ult. Strength: 76.6 ksi
Specimen Thk: 0.09 in.
Specimen Width: 5 in.
Ref: 88578




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.55 (min) | 0.485 |
| 5. | 0.681 |
| 6. | 1.42 |
| 7. | 2.63 |
| 8. | 4.12 |
| 9. | 5.71 |
| 10. | 7.97 |
| 13. | 33.8 |
| 14.51 (max) | 55.5 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 6.13 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

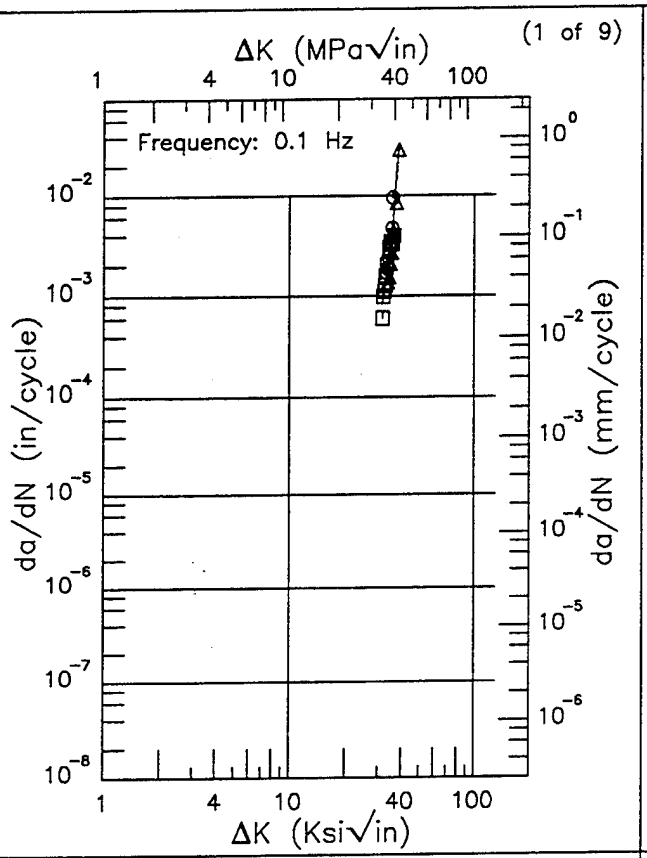
**Figure 7.5.3.1.124 (Concluded)**

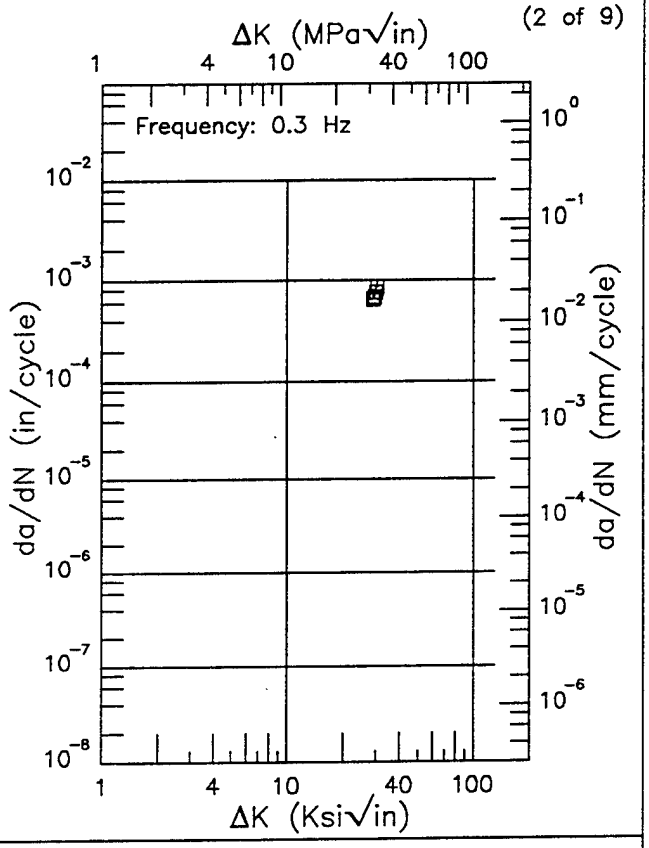
## 2024

F

Condition/Ht: T861
Form: 0.02 in. Sheet
Specimen Type: CT
Orientation: T–L
Stress Ratio: 0.1
Environment: LAB AIR; RT

Yield Strength: 65.7 ksi
Ult. Strength: 70.8 ksi
Specimen Thk: 0.02 in.
Specimen Width: 5 in.
Ref: 88578




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 31.64 (min) | 867. |
| 35. | 3074. |
| 38.64 (max) | 28689. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

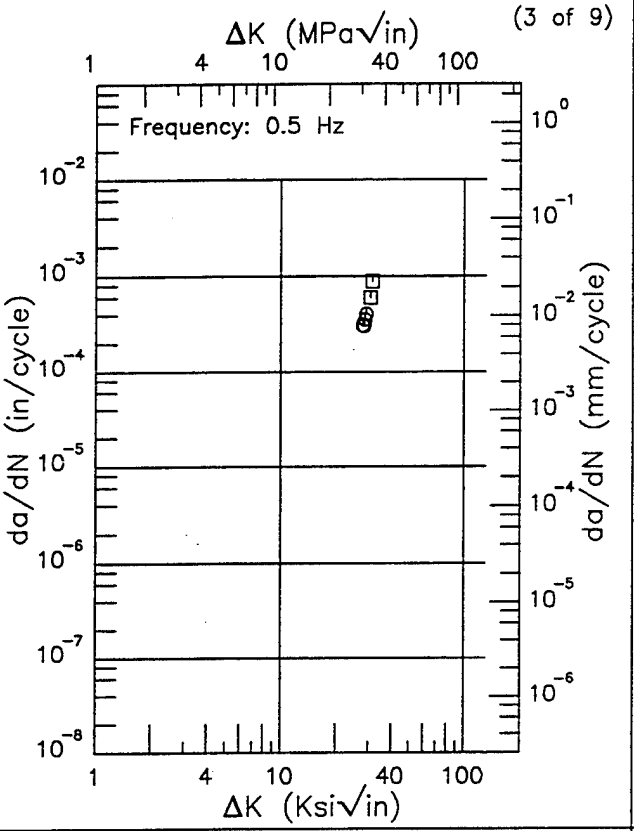
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 27.73 | 0. .5 .8 1.25 2. |

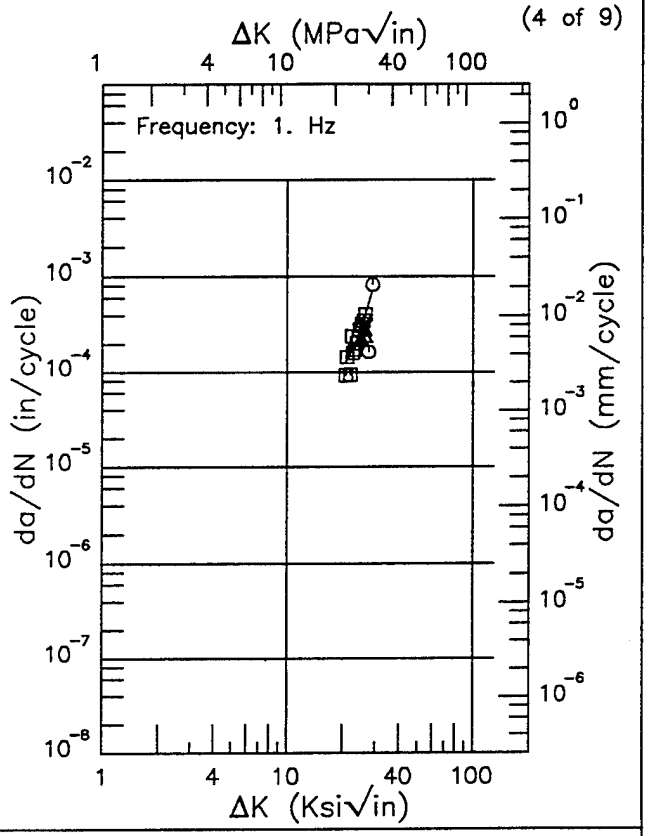
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.125**

Condition/Ht: T861
Form: 0.02 in. Sheet
Specimen Type: CT
Orientation: T–L
Stress Ratio: 0.1
Environment: LAB AIR; RT

Yield Strength: 65.7 ksi
Ult. Strength: 70.8 ksi
Specimen Thk: 0.02 in.
Specimen Width: 5 in.
Ref: 88578




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 20.67 (min) | 126. |
| 25. | 275. |
| 28.78 (max) | 709. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 27.83 | ⊙ △ 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.125 (Continued)**

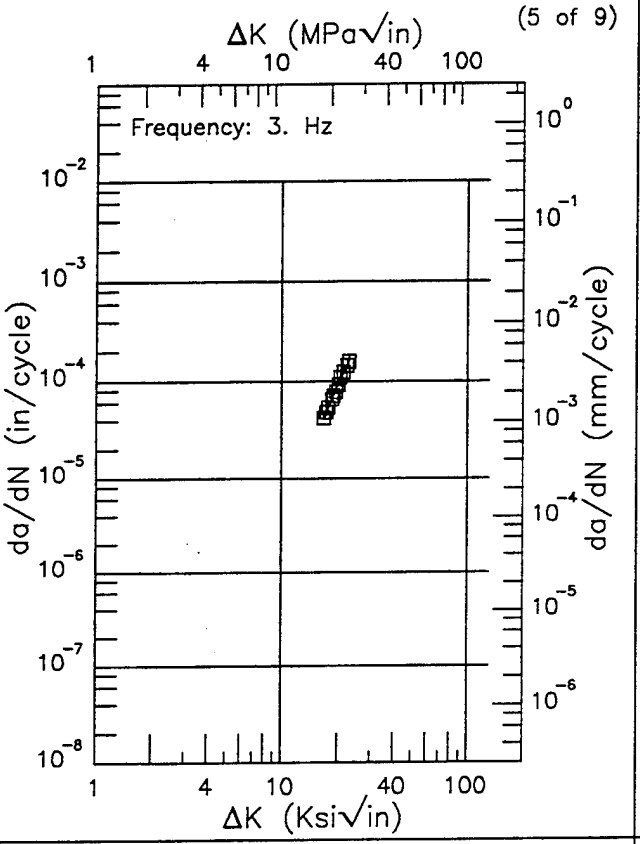
2024

F

Condition/Ht: T861
Form: 0.02 in. Sheet
Specimen Type: CT
Orientation: T–L
Stress Ratio: 0.1
Environment: LAB AIR; RT

Yield Strength: 65.7 ksi
Ult. Strength: 70.8 ksi
Specimen Thk: 0.02 in.
Specimen Width: 5 in.
Ref: 88578

(5 of 9)



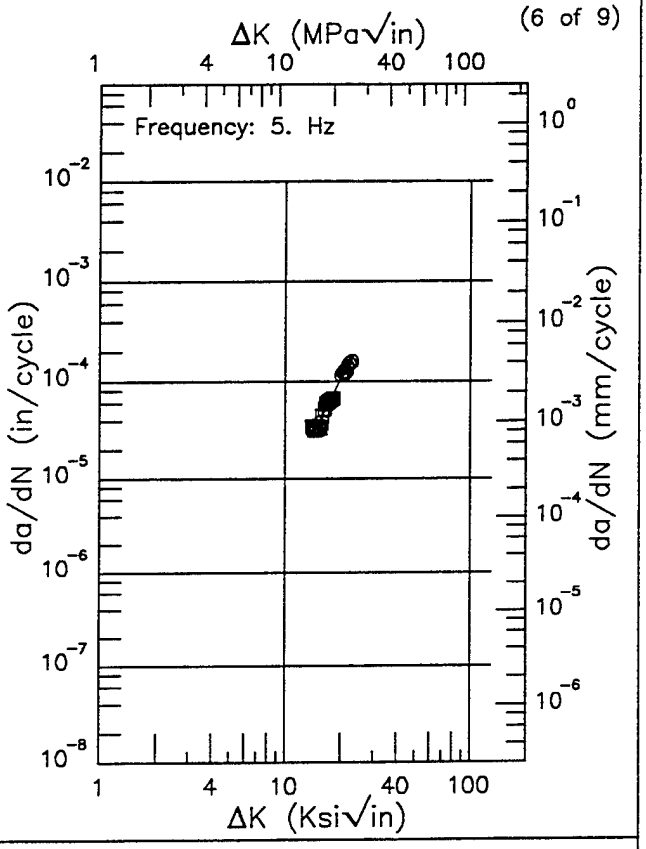

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 16.70 (min) | 41.7 |
| 20. | 92.7 |
| 22.77 (max) | 157. |

| RMS % Error |
|---|
| 2.43 |

Life Prediction Ratio Summary

0. .5 .8 1.25 2.

(6 of 9)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 13.95 (min) | 30.2 |
| 16. | 43.4 |
| 20. | 109. |
| 22.81 (max) | 155. |

| RMS % Error |
|---|
| 8.73 |

Life Prediction Ratio Summary

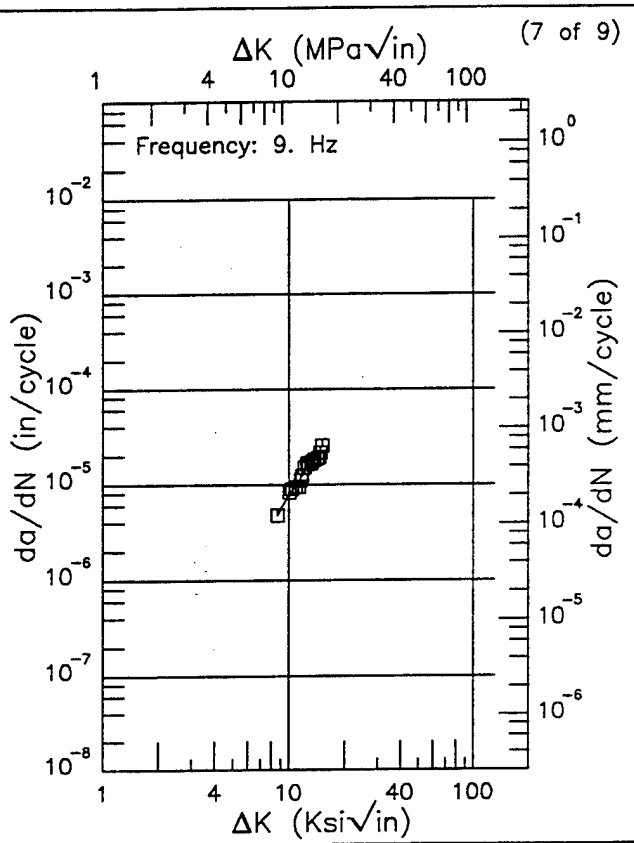
0. .5 .8 1.25 2.

**Figure 7.5.3.1.125 (Continued)**

Condition/Ht: T861
Form: 0.02 in. Sheet
Specimen Type: CT
Orientation: T–L
Stress Ratio: 0.1
Environment: LAB AIR; RT

Yield Strength: 65.7 ksi
Ult. Strength: 70.8 ksi
Specimen Thk: 0.02 in.
Specimen Width: 5 in.
Ref: 88578

(7 of 9)



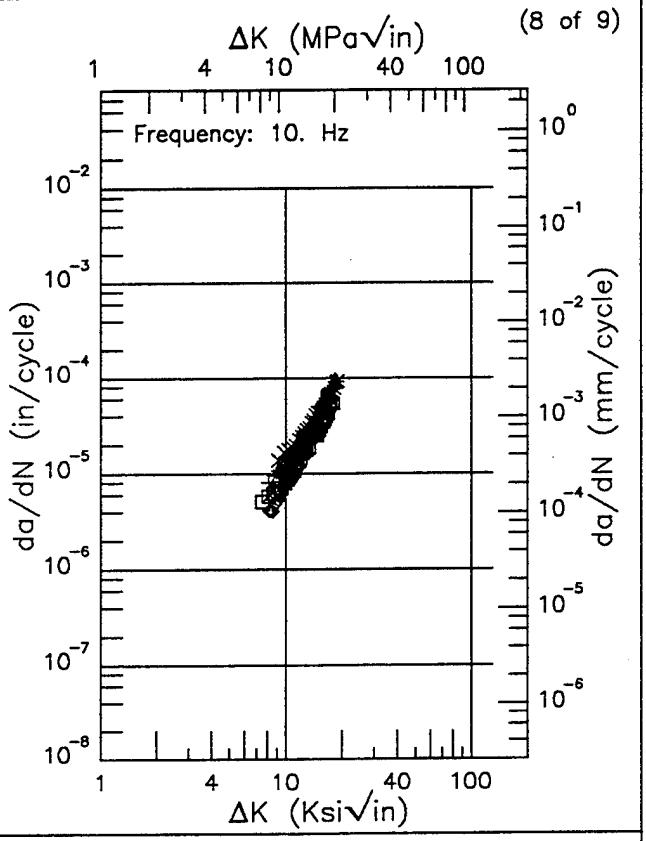

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 8.65 (min) | 4.80 |
| 9. | 5.54 |
| 10. | 7.84 |
| 13. | 16.0 |
| 15.07 (max) | 22.5 |

| RMS % Error |
|---|
| 7.34 |

Life Prediction Ratio Summary

0. .5 .8 1.25 2.

(8 of 9)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 7.47 (min) | 4.95 |
| 8. | 5.67 |
| 9. | 7.47 |
| 10. | 9.92 |
| 13. | 22.9 |
| 16. | 48.8 |
| 18.90 (max) | 93.2 |

| RMS % Error |
|---|
| 21.91 |

Life Prediction Ratio Summary

◇ ◀ × +

0. .5 .8 1.25 2.

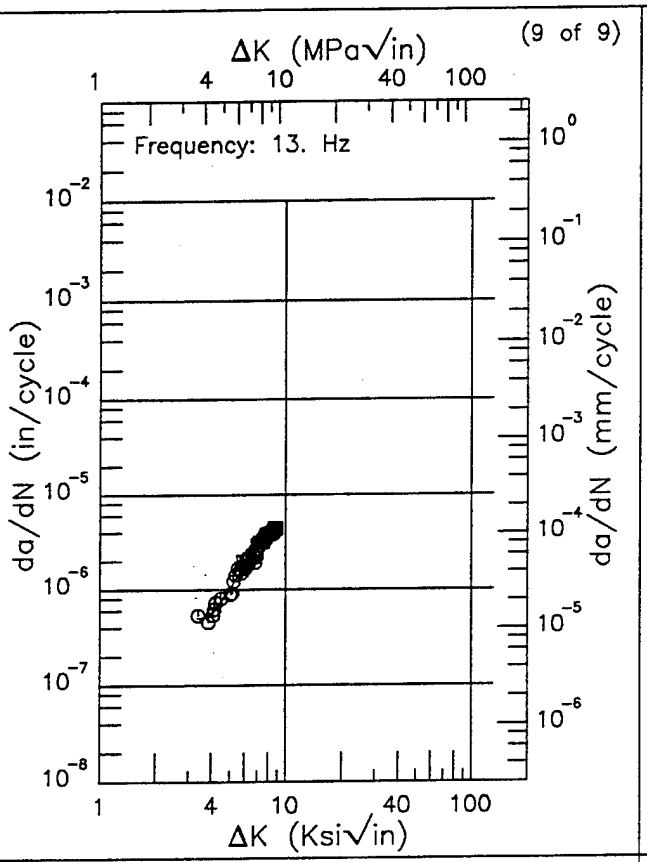
**Figure 7.5.3.1.125 (Continued)**

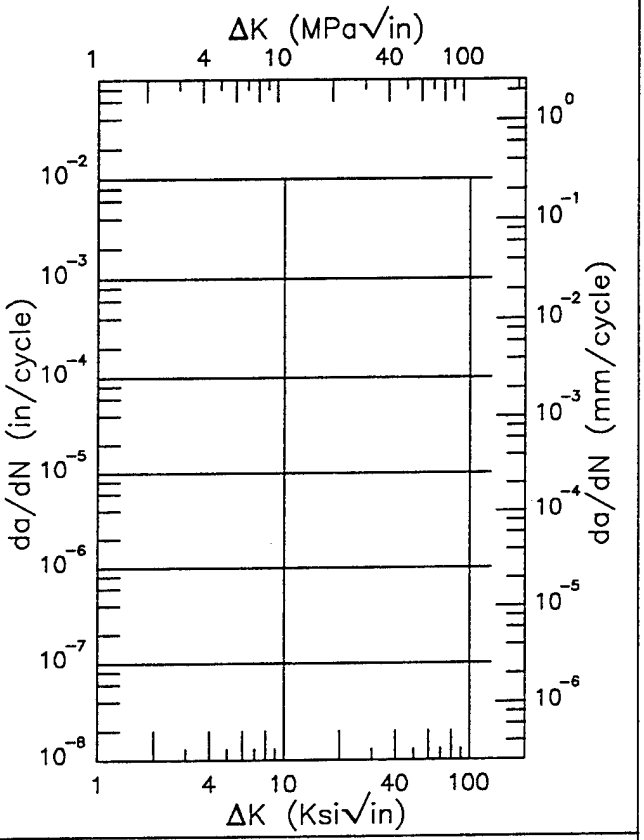
2024

F

Condition/Ht: T861
Form: 0.02 in. Sheet
Specimen Type: CT
Orientation: T–L
Stress Ratio: 0.1
Environment: LAB AIR; RT

Yield Strength: 65.7 ksi
Ult. Strength: 70.8 ksi
Specimen Thk: 0.02 in.
Specimen Width: 5 in.
Ref: 88578




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 3.38 (min) | 0.499 |
| 3.5 | 0.491 |
| 4. | 0.550 |
| 5. | 0.996 |
| 6. | 1.79 |
| 7. | 2.68 |
| 8. | 3.61 |
| 8.85 (max) | 4.57 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 9.09 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.125 (Concluded)**

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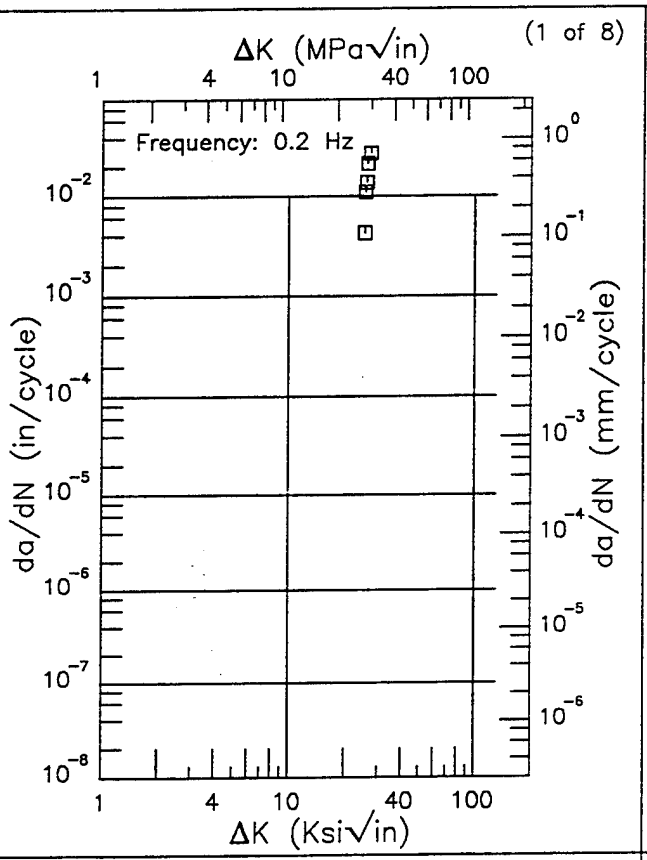
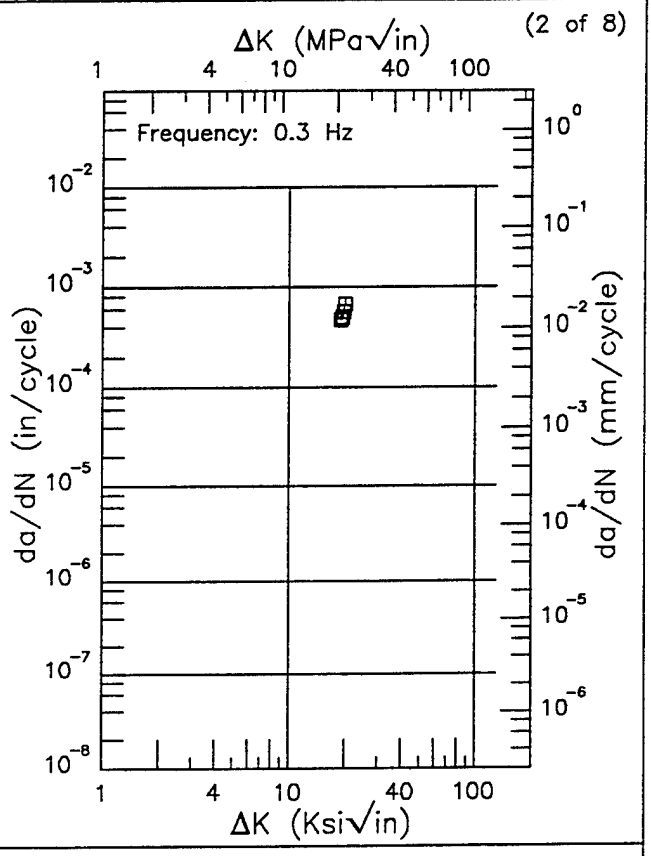
2024

F

Condition/Ht: T861
Form: 0.09 in. Sheet
Specimen Type: CT
Orientation: T–L
Stress Ratio: 0.1
Environment: LAB AIR; RT

Yield Strength: 73 ksi
Ult. Strength: 76.6 ksi
Specimen Thk: 0.09 in.
Specimen Width: 5 in.
Ref: 88578




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

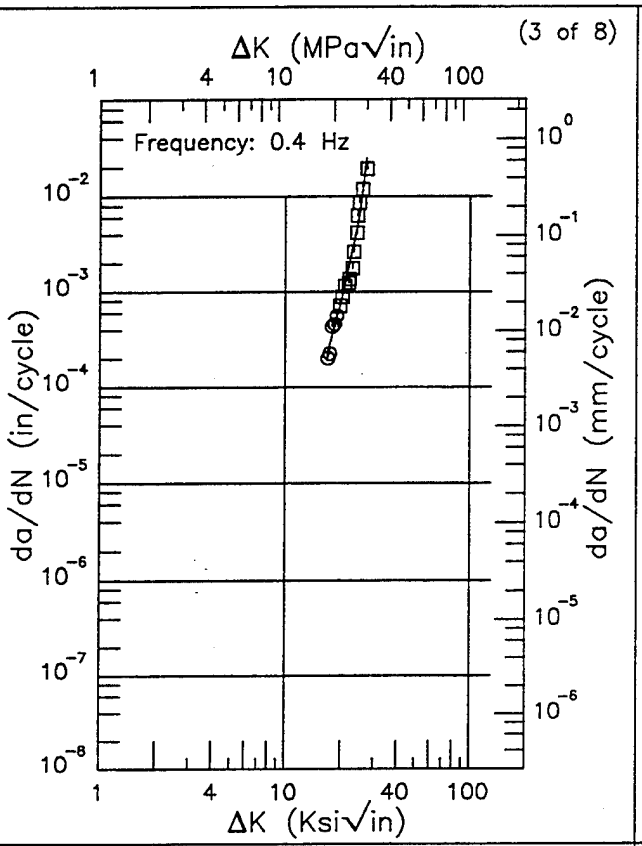
ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

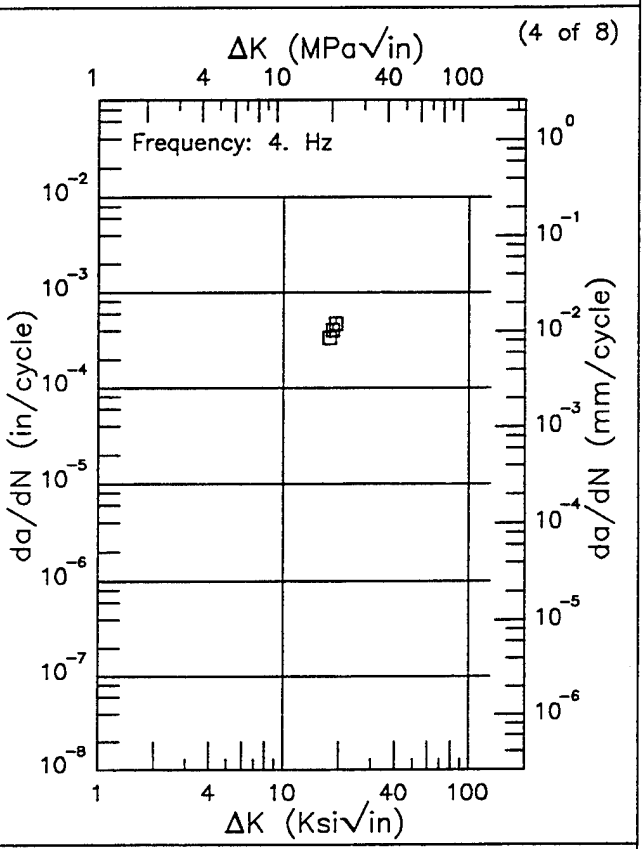
| RMS % Error | Life Prediction Ratio Summary | RMS % Error | Life Prediction Ratio Summary |
|---|---|---|---|
| | 0. .5 .8 1.25 2. | | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.126**

Condition/Ht: T861
Form: 0.09 in. Sheet
Specimen Type: CT
Orientation: T–L
Stress Ratio: 0.1
Environment: LAB AIR; RT

Yield Strength: 73 ksi
Ult. Strength: 76.6 ksi
Specimen Thk: 0.09 in.
Specimen Width: 5 in.
Ref: 88578




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 16.87 (min) | 235. |
| 20. | 793. |
| 25. | 6512. |
| 27.35 (max) | 24733. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 20.73 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

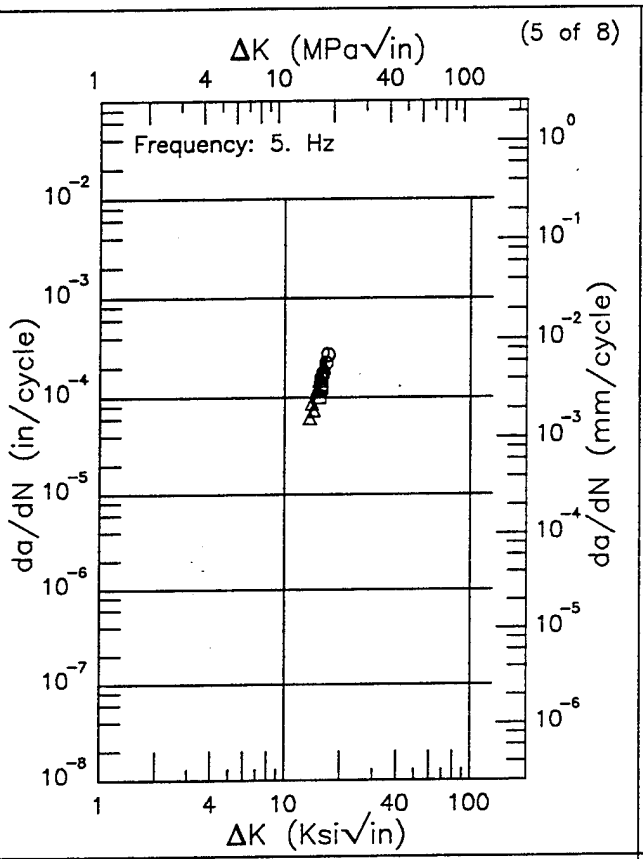
**Figure 7.5.3.1.126 (Continued)**

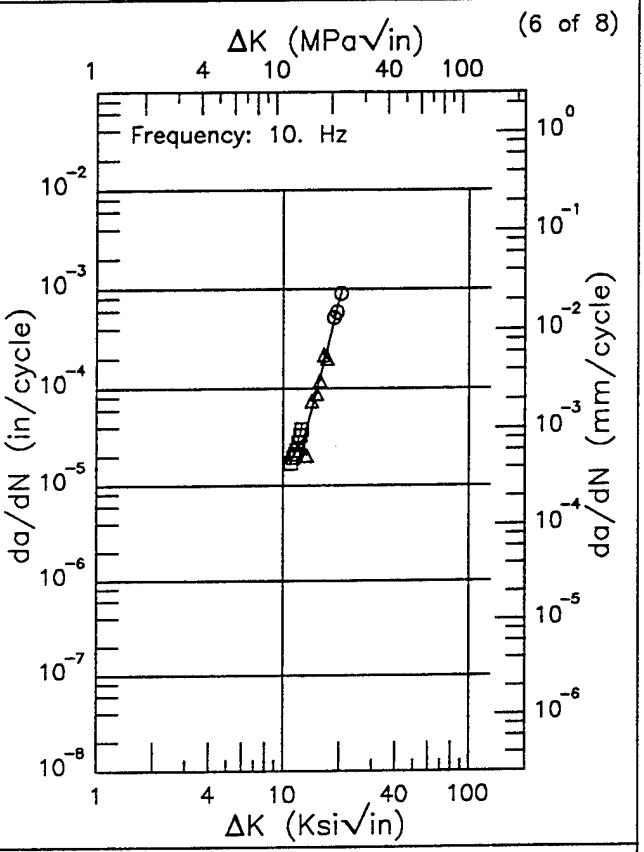
2024

F

Condition/Ht: T861
Form: 0.09 in. Sheet
Specimen Type: CT
Orientation: T–L
Stress Ratio: 0.1
Environment: LAB AIR; RT

Yield Strength: 73 ksi
Ult. Strength: 76.6 ksi
Specimen Thk: 0.09 in.
Specimen Width: 5 in.
Ref: 88578




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 13.66 (min) | 66.2 |
| 16. | 175. |
| 17.03 (max) | 267. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 10.99 (min) | 18.5 |
| 13. | 31.7 |
| 16. | 139. |
| 20. | 790. |
| 20.30 (max) | 902. |

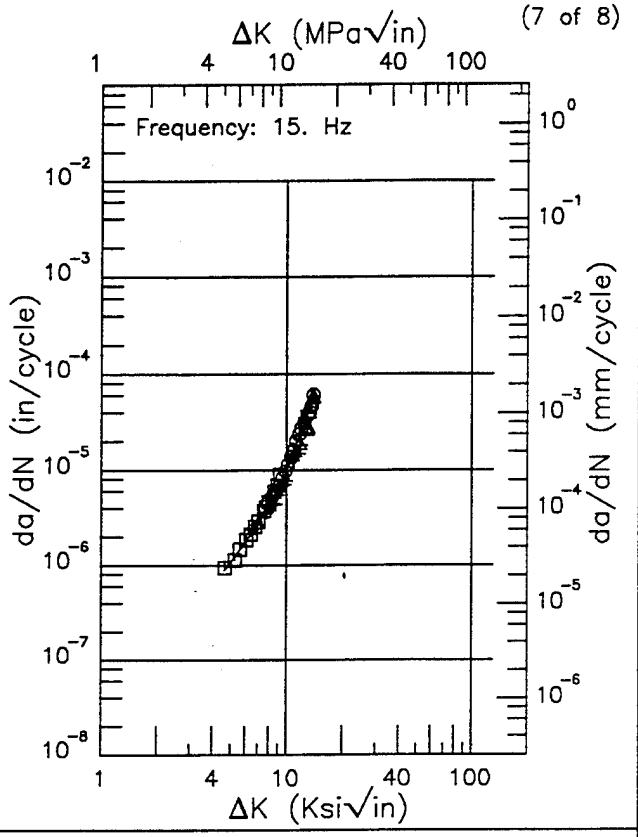
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 11.79 | 0. .5 .8 1.25 2. |

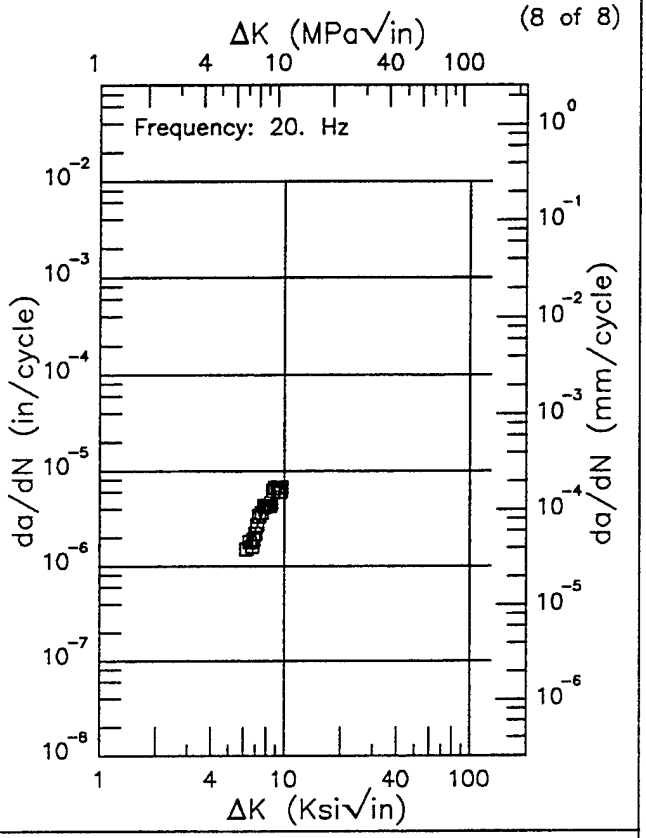
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 18.39 | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.126 (Continued)**

Condition/Ht: T861
Form: 0.09 in. Sheet
Specimen Type: CT
Orientation: T–L
Stress Ratio: 0.1
Environment: LAB AIR; RT

Yield Strength: 73 ksi
Ult. Strength: 76.6 ksi
Specimen Thk: 0.09 in.
Specimen Width: 5 in.
Ref: 88578




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.64 (min) | 0.879 |
| 5. | 1.07 |
| 6. | 1.74 |
| 7. | 2.73 |
| 8. | 4.21 |
| 9. | 6.43 |
| 10. | 9.82 |
| 13. | 38.7 |
| 13.99 (max) | 64.1 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 6.21 (min) | 1.42 |
| 7. | 2.41 |
| 8. | 4.39 |
| 9. | 6.09 |
| 9.60 (max) | 6.26 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 12.83 | Δ ⊙ 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 9.92 | ⊡ 0. .5 .8 1.25 2. |

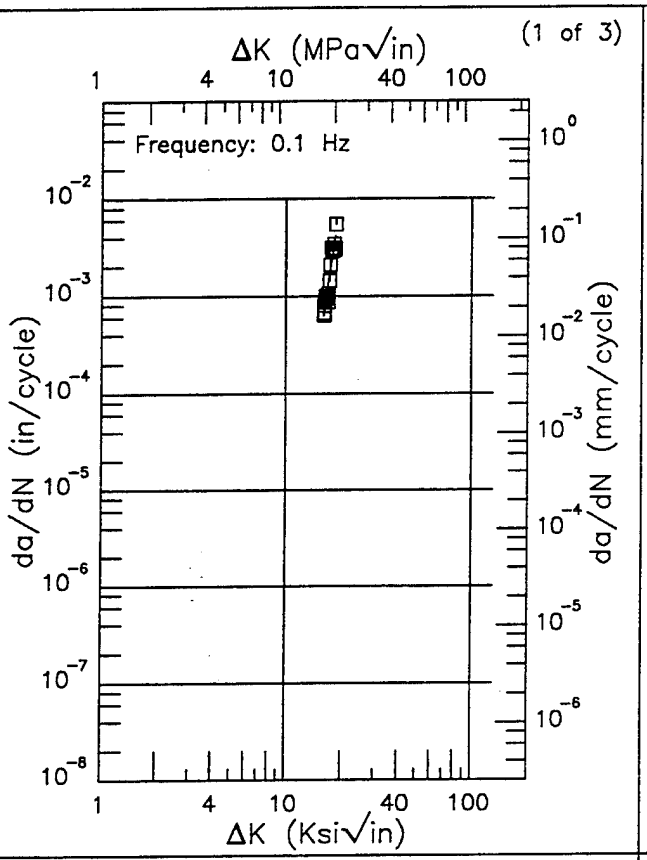
**Figure 7.5.3.1.126 (Concluded)**

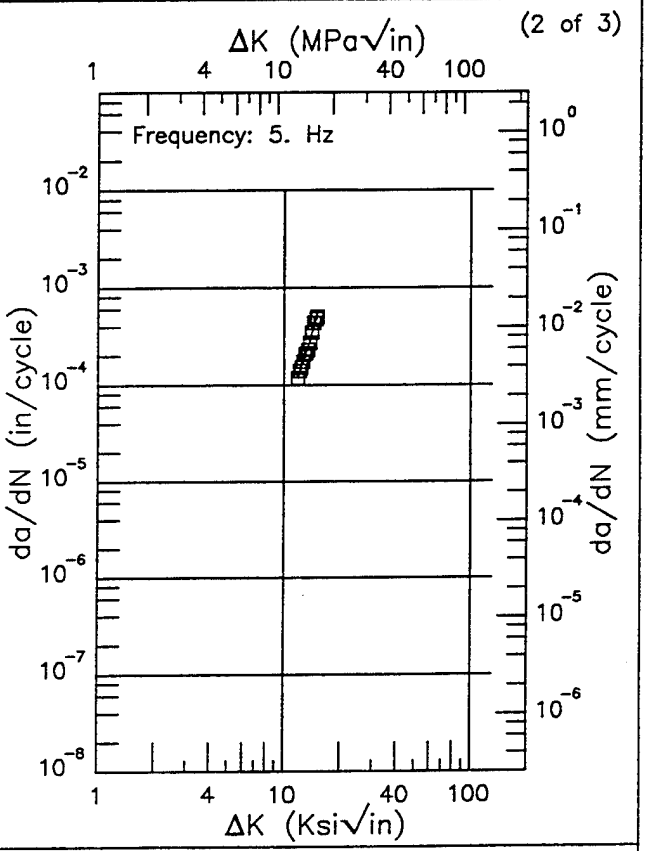
2024

F

Condition/Ht: T861
Form: 0.09 in. Sheet
Specimen Type: CT
Orientation: T–L
Stress Ratio: 0.4
Environment: LAB AIR; RT

Yield Strength: 73 ksi
Ult. Strength: 76.6 ksi
Specimen Thk: 0.09 in.
Specimen Width: 5 in.
Ref: 88578




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 15.86 (min) | 633. |
| 16. | 723. |
| 18.41 (max) | 4157. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 11.86 (min) | 121. |
| 13. | 198. |
| 15.02 (max) | 536. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 19.06 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 6.10 | 0. .5 .8 1.25 2. |

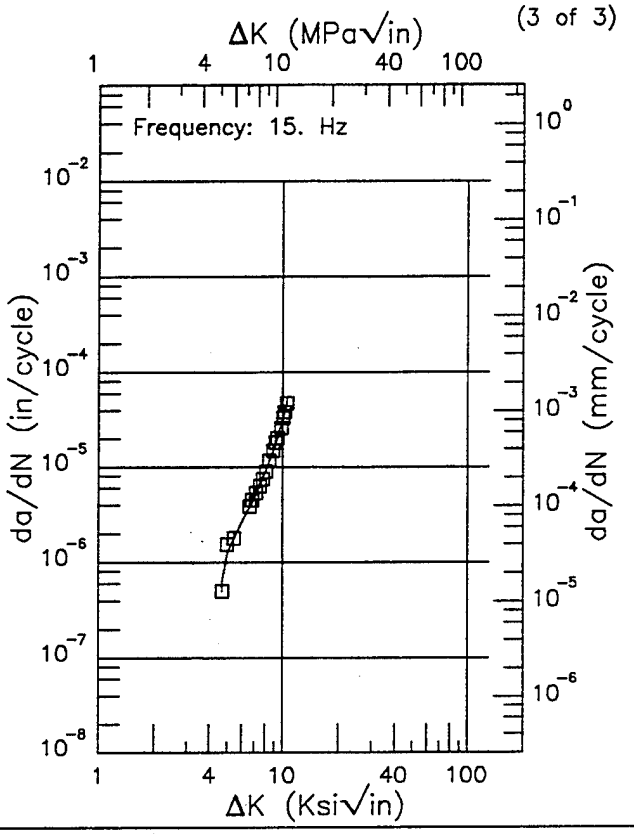
**Figure 7.5.3.1.127**

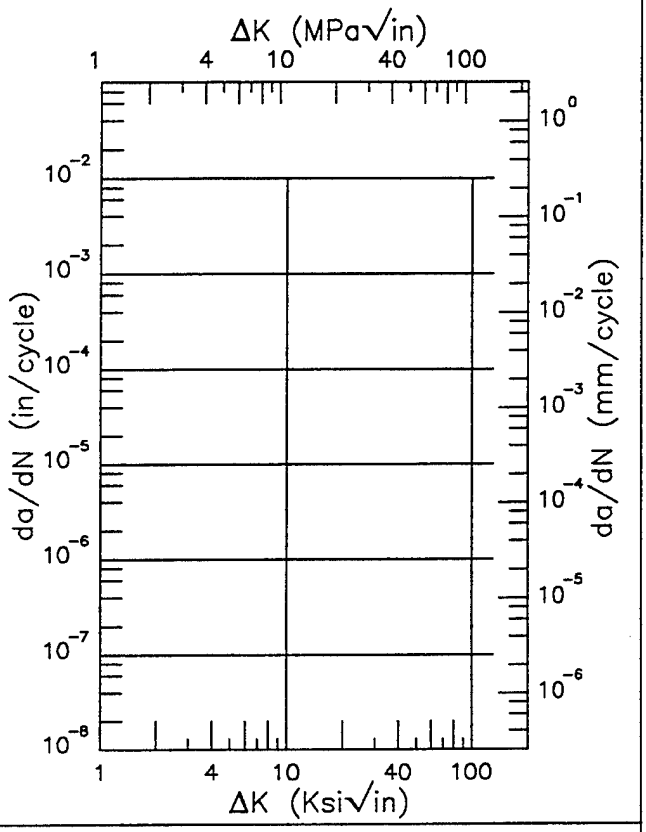
2024 F

Condition/Ht: T861
Form: 0.09 in. Sheet
Specimen Type: CT
Orientation: T–L
Stress Ratio: 0.4
Environment: LAB AIR; RT

Yield Strength: 73 ksi
Ult. Strength: 76.6 ksi
Specimen Thk: 0.09 in.
Specimen Width: 5 in.
Ref: 88578

(3 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.66 (min) | 0.570 |
| 5. | 1.26 |
| 6. | 2.63 |
| 7. | 4.75 |
| 8. | 8.84 |
| 9. | 15.8 |
| 10. | 31.8 |
| 10.48 (max) | 46.6 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 7.43 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.127 (Concluded)**

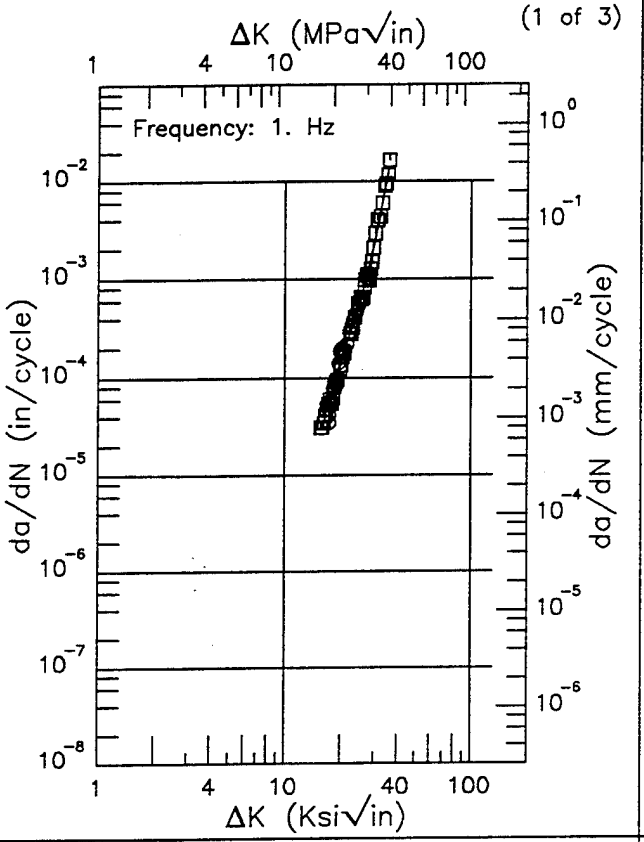
## 2024

F

Condition/Ht: T861
Form: 0.25 in. Plate
Specimen Type: CT
Orientation: T-L
Stress Ratio: 0.1
Environment: LAB AIR; RT

Yield Strength: 70.6 ksi
Ult. Strength: 74.9 ksi
Specimen Thk: 0.25 in.
Specimen Width: 5 in.
Ref: 88578

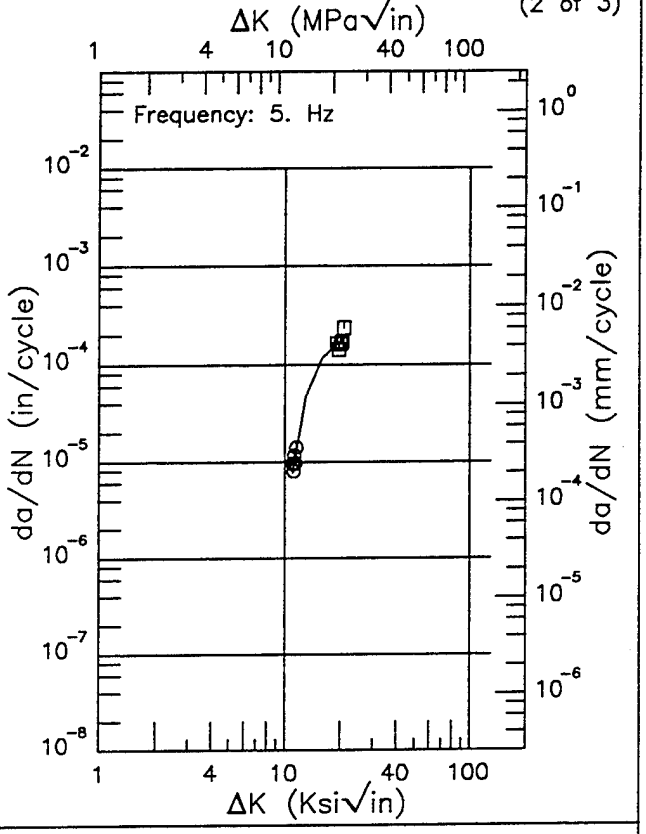
(1 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 15.55 (min) | 30.5 |
| 16. | 34.1 |
| 20. | 154. |
| 25. | 542. |
| 30. | 2247. |
| 35. | 10814. |
| 36.01 (max) | 13922. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 12.94 | 0. .5 .8 1.25 2. |

(2 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 11.03 (min) | 7.63 |
| 13. | 47.1 |
| 16. | 116. |
| 20. | 173. |
| 20.92 (max) | 197. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 14.64 | 0. .5 .8 1.25 2. |

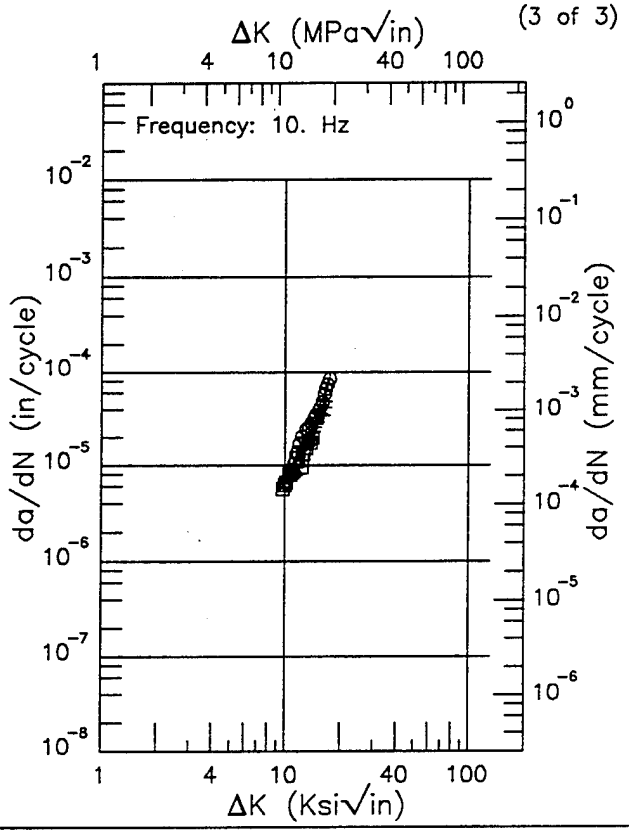
**Figure 7.5.3.1.128**

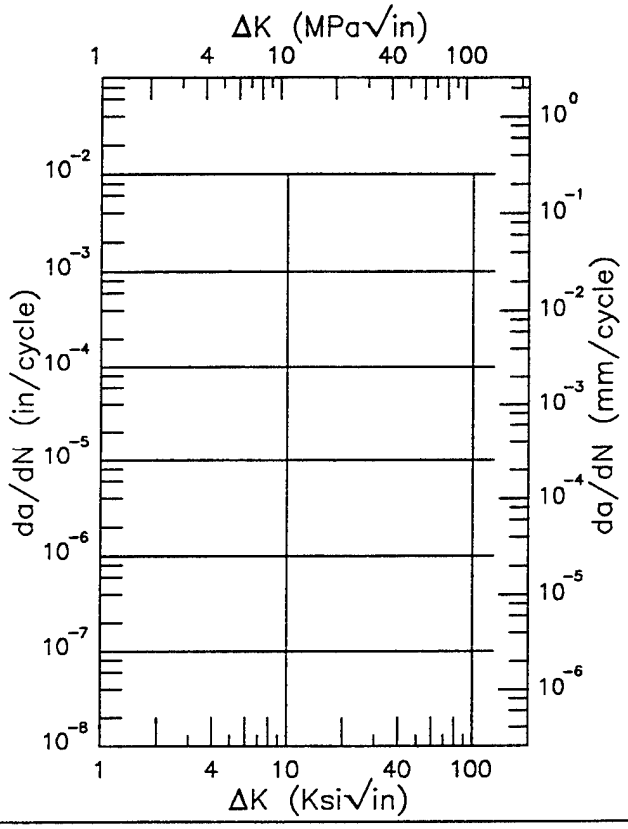
2024 F

Condition/Ht: T861
Form: 0.25 in. Plate
Specimen Type: CT
Orientation: T-L
Stress Ratio: 0.1
Environment: LAB AIR; RT

Yield Strength: 70.6 ksi
Ult. Strength: 74.9 ksi
Specimen Thk: 0.25 in.
Specimen Width: 5 in.
Ref: 88578

(3 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 9.69 (min) | 6.36 |
| 10. | 6.94 |
| 13. | 16.7 |
| 16. | 43.9 |
| 17.41 (max) | 88.6 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 15.29 | 0. .5 .8 1.25 2. |

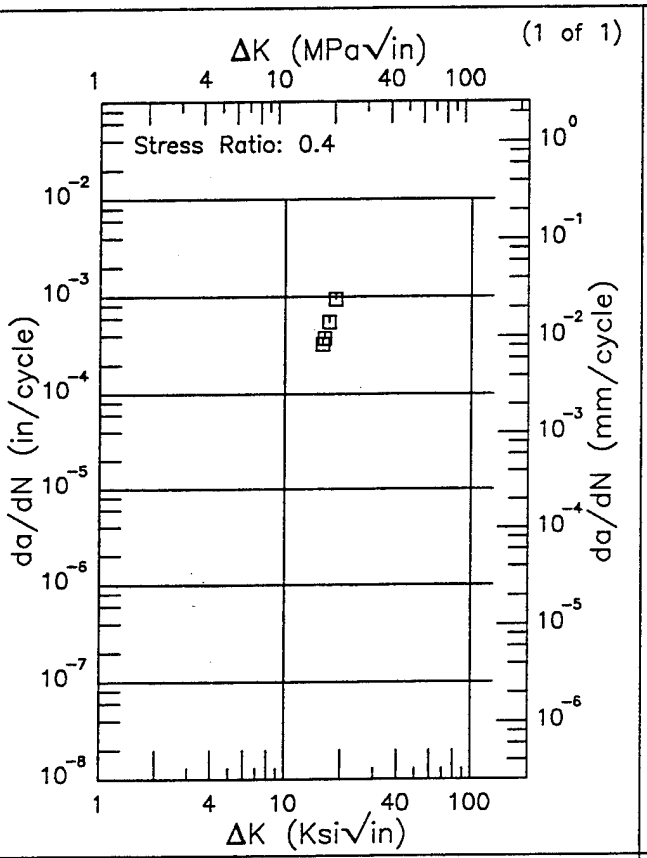
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

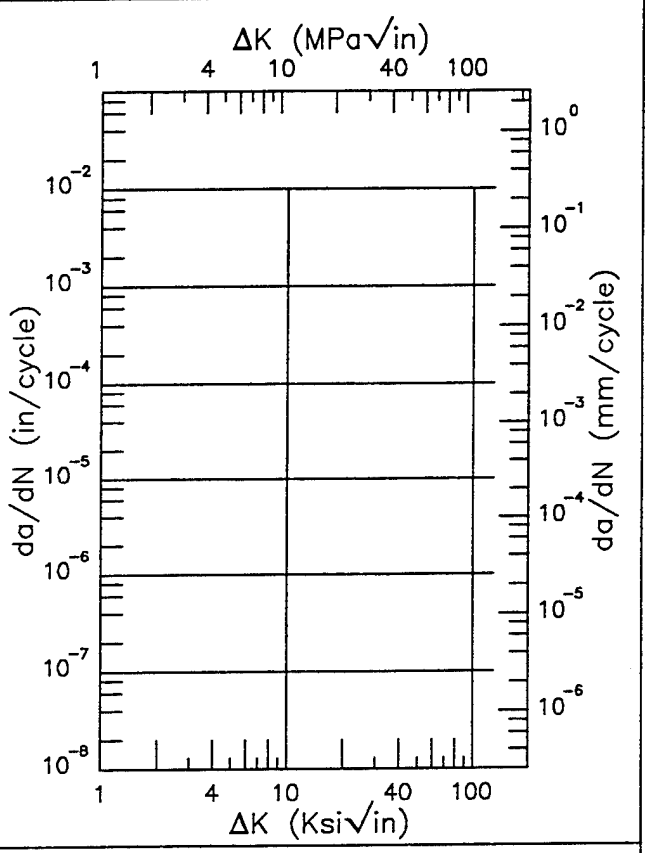
**Figure 7.5.3.1.128 (Concluded)**

R 2024

Condition/Ht: T861
Form: 0.25 in. Plate
Specimen Type: CT
Orientation: T-L
Frequency: 2 - 5 Hz
Environment: LAB AIR; RT

Yield Strength: 70.6 ksi
Ult. Strength: 74.9 ksi
Specimen Thk: 0.25 in.
Specimen Width: 5 in.
Ref: 88578




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

| RMS % Error | Life Prediction Ratio Summary | RMS % Error | Life Prediction Ratio Summary |
|---|---|---|---|
| | 0. .5 .8 1.25 2. | | 0. .5 .8 1.25 2. |

**Figure 7.5.3.1.129**

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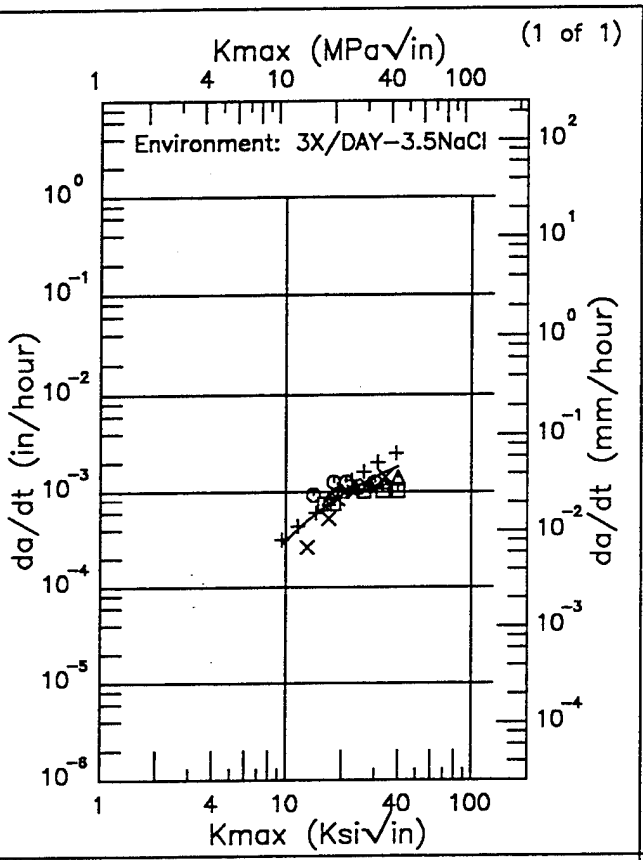
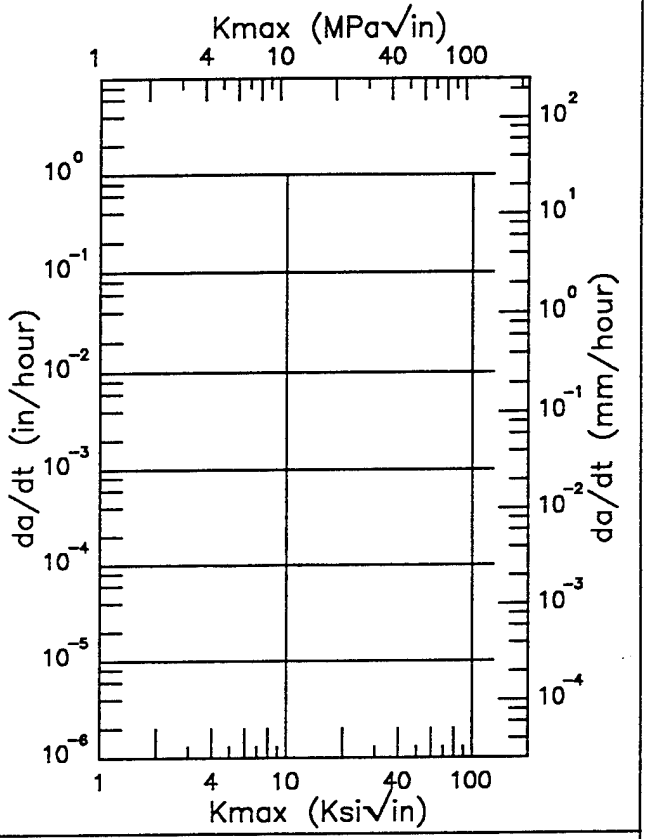
## 2024

Condition/Ht: T351
Form: 1 – 2 in. Plate
Specimen Type: DCB
Orientation: S–L
Yield Strength:
Ult. Strength:

Specimen Thk: 1 in.
Specimen Width: 5 in.
Ao:
$K_{Iscc}$:
Ref: 78313;84284




| Kmax (Ksi√in) | da/dt ($10^{-3}$in/hour) |
|---|---|
| 9.50 (min) | 0.284 |
| 10. | 0.313 |
| 13. | 0.496 |
| 16. | 0.682 |
| 20. | 0.920 |
| 25. | 1.19 |
| 30. | 1.43 |
| 35. | 1.64 |
| 40.00 (max) | 1.82 |

| Kmax (Ksi√in) | da/dt ($10^{-3}$in/hour) |
|---|---|

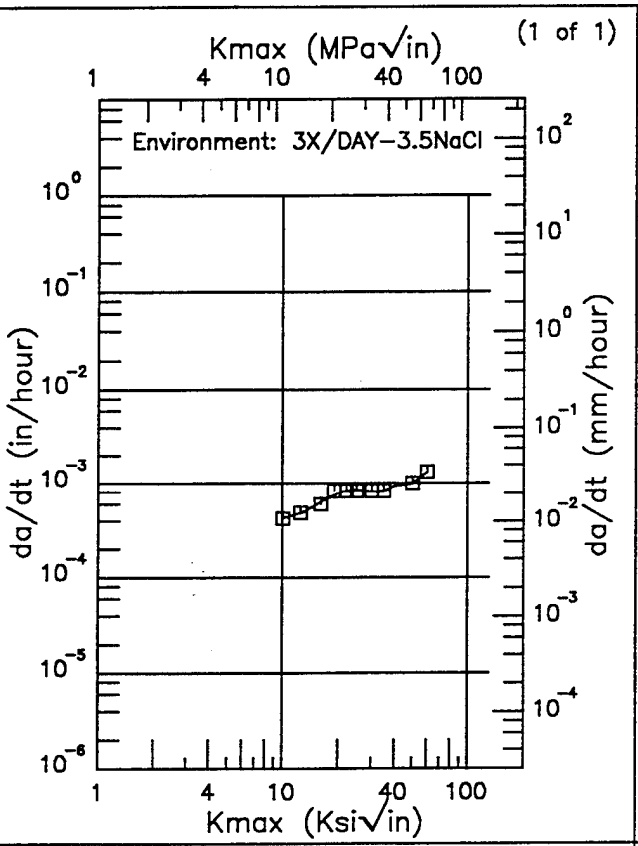
| RMS % Error | |
|---|---|
| 27.59 | |

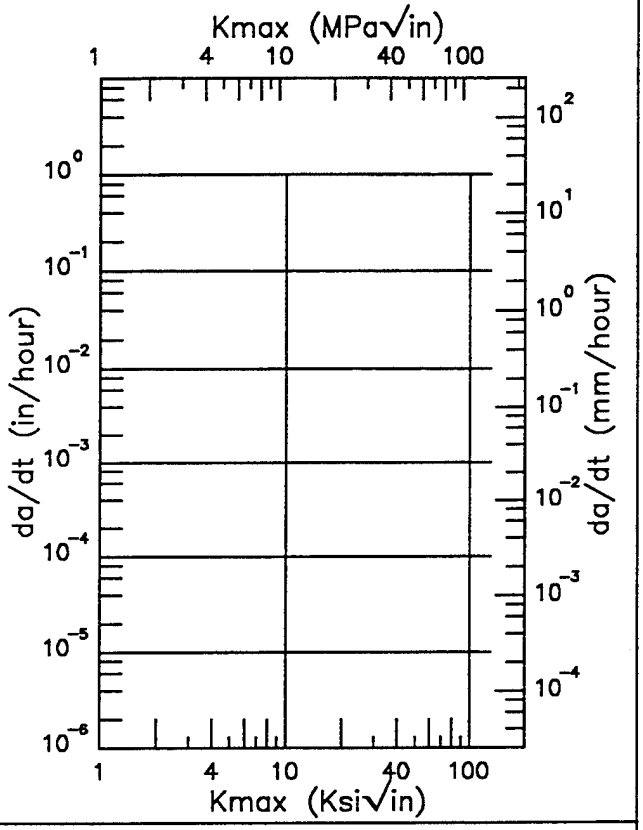
| RMS % Error | |
|---|---|
| | |

**Figure 7.5.3.2.1**

Condition/Ht: T4
Form: Forging
Specimen Type: DCB
Orientation: S–L
Yield Strength:
Ult. Strength:

Specimen Thk: 1 in.
Specimen Width: 5 in.
$A_o$:
$K_{Iscc}$:
Ref: 78313




| Kmax (Ksi√in) | da/dt ($10^{-3}$in/hour) |
|---|---|
| 10.00 (min) | 0.423 |
| 13. | 0.492 |
| 16. | 0.629 |
| 20. | 0.795 |
| 25. | 0.843 |
| 30. | 0.805 |
| 35. | 0.823 |
| 40. | 0.919 |
| 50. | 0.980 |
| 60.00 (max) | 1.30 |

| Kmax (Ksi√in) | da/dt ($10^{-3}$in/hour) |
|---|---|

| RMS % Error | |
|---|---|
| 3.35 | |

| RMS % Error | |
|---|---|
| | |

**Figure 7.5.3.2.2**

## TABLE 7.5.3.3



## $K_{Iscc}$ SUMMARY FOR ALUMINUM ALLOY 2024

| Condition/ Heat Treat | Prod Form | Test Temp (°F) | Spec Or. | Yield Str (Ksi) | Environment | Specimen | | | Prod Thk (in) | Crack (in) | $K_Q$ (Ksi√in) | $K_{Iscc}$ (Ksi√in) | Test Time (min) | Test Date | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Thick (in) | Design | Width (in) | | | | | | | |
| T351 | P | R.T. | S-L | 47 | 3.5% NaCl | 1 | DCB | 5 | 1 | --- | 50 | 10 | --- | 1969 | 78313 |
| | | | | 42.4 | Industrial Atm | 1 | CT | 2 | 2.5 | --- | 21.2 | 10 | --- | 1973 | 86688 |
| | | | | | Salt-Dichromate-Acetate | 1 | CT | 2 | 2.5 | --- | 21.2 | 9 | --- | 1973 | 86688 |
| | | | | | Seacoast Atm | 1 | CT | 2 | 2.5 | --- | 21.2 | 10 | --- | 1973 | 86688 |
| T352 | F | R.T. | S-L | 43.3 | Seawater | 0.7 | DCB | 1.4 | 6 | --- | 27.6 | 23* | --- | 1972 | 82675 |
| T851 | P | R.T. | L-T | 59.3 | 3.5% NaCl | 1.25 | TDCB | 5 | 3.2 | --- | 18.6 | 21.5 | --- | 1971 | 84360 |
| | | | | | Air 78% RH | 1.25 | TDCB | 5 | 3.2 | --- | 18.6 | 22.7 | --- | 1971 | 84360 |
| | | | | | Dist Water | 1.25 | TDCB | 5 | 3.2 | --- | 18.6 | 22 | --- | 1971 | 84360 |
| | | | | | JP-4 Fuel | 1.25 | TDCB | 5 | 3.2 | --- | 18.6 | 21.6 | --- | 1971 | 84360 |
| | | | S-L | 61.8 | Industrial Atm | 1 | CT | 2 | 2.5 | --- | 16.7 | 16 | --- | 1973 | 86688 |
| | | | | | Salt-Dichromate-Acetate | 1 | CT | 2 | 2.5 | --- | 16.7 | 15 | --- | 1973 | 86688 |
| | | | | | Seacoast Atm | 1 | CT | 2 | 2.5 | --- | 16.7 | 16 | --- | 1973 | 86688 |
| T852 | F | R.T. | L-T | 53 | S.C.S. | 1 | DCB | 5.5 | 3 | --- | 34 | 22.1 | 64920 | 1976 | RI006 |
| | | | | | | 1 | DCB | 5.5 | 3 | --- | 34 | 34* | 61680 | 1976 | RI006 |
| | | | | 58 | S.T.W. | 1 | DCB | 5.5 | 3 | --- | 37 | 22.5 | 76140 | 1976 | RI006 |
| | | | | | | 1 | DCB | 5.5 | 3 | --- | 37 | >23.5 | 76140 | 1976 | RI006 |
| | | | | | | 1 | DCB | 5.5 | 3 | --- | 37 | 22.5 | 76140 | 1976 | RI006 |

## TABLE 7.5.3.3 (CONCLUDED)



## $K_{Iscc}$ SUMMARY FOR ALUMINUM ALLOY 2024

| Condition/ Heat Treat | Prod Form | Test Temp (°F) | Spec Or. | Yield Str (Ksi) | Environment | Specimen | | | Prod Thk (in) | Crack (in) | $K_Q$ (Ksi$\sqrt{in}$) | $K_{Iscc}$ (Ksi$\sqrt{in}$) | Test Time (min) | Test Date | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Thick (in) | Design | Width (in) | | | | | | | |
| T852 (cont'd) | F (cont'd) | R.T. (cont'd) | T-L | 54 | S.T.W. | 1 | DCB | 5.5 | 3 | --- | 34 | 19.8 | 133680 | 1976 | RI006 |
| | | | | | | 1 | DCB | 5.5 | 3 | --- | 34 | >21 | 133680 | 1976 | RI006 |
| | | | | | | 1 | DCB | 5.5 | 3 | --- | 34 | >21 | 133680 | 1976 | RI006 |
| | | | | | | 1 | DCB | 5.5 | 3 | --- | 34 | 20.5 | 133680 | 1976 | RI006 |
| | | | S-L | --- | S.T.W. | 1 | DCB | 5.5 | 3 | --- | 37 | 20 | 133680 | 1976 | RI006 |
| | | | | | | 1 | DCB | 5.5 | 3 | --- | 37 | >13.5 | 133680 | 1976 | RI006 |
| | | | | 53.9 | Seawater | 0.7 | CANT | 1.4 | 6 | --- | 17.6 | 14 | --- | 1972 | 82675 |

* specimen thickness does not meet minimum requirements of $2.5 \left(\frac{K_{Iscc}}{\sigma_{ys}}\right)^2$

TABLE 7.6.1.2



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK
## 2024 (ALCLAD) AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T3 | SHEET | 0. | 13.3 | | | 3.52 | 21.01 | | |
| | | 0.33 | 13.3 | | | 7.14 | 62.46 | | |

# TABLE 7.6.2.2



## ALUMINUM 2024 (ALCLAD) $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_Q$ (Ksi$\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 | Sheet | 0.08 | R.T. | L-T | 50.1 | 5.900 | 0.079 | 1.580 | 1.890 | 31.90 | 37.30 | 61.50* | --- | --- | 68.66* | --- | --- | 1966 | 84366 |
| | | 0.08 | | | 50.1 | 5.900 | 0.079 | 1.580 | 1.890 | 32.60 | 37.30 | 61.50* | | | 68.66* | | | 1966 | 84366 |
| | | 0.08 | | | 50.1 | 5.900 | 0.079 | 1.180 | --- | --- | 41.20 | 57.52* | | | --- | | | 1966 | 84366 |
| | | 0.08 | | | 50.1 | 5.900 | 0.079 | 0.790 | 1.020 | 43.00 | 46.00 | 51.82* | | | 59.32* | | | 1966 | 84366 |
| | | 0.08 | | | 50.1 | 5.900 | 0.079 | 0.790 | --- | 42.30 | 46.10 | 51.93* | | | --- | | | 1966 | 84366 |
| | | 0.08 | | | 50.1 | 5.900 | 0.079 | 3.150 | 3.540 | 19.40 | 22.50 | 61.21* | | | 69.20* | | | 1966 | 84366 |
| | | 0.08 | | | 50.1 | 5.900 | 0.079 | 3.150 | 3.460 | 17.60 | 22.10 | 60.13* | | | 66.25* | | | 1966 | 84366 |
| | | 0.08 | | | 50.1 | 5.900 | 0.079 | 1.180 | 1.380 | 35.60 | 41.20 | 57.52* | | | 62.79* | | | 1966 | 84366 |
| | | 0.08 | | | 50.1 | 5.900 | 0.079 | 0.790 | 0.980 | 42.70 | 45.90 | 51.70* | | | 57.94* | | | 1966 | 84366 |
| | | 0.08 | | | 50.1 | 5.900 | 0.079 | 1.580 | 2.120 | --- | 37.30 | 61.50* | | | 74.05* | | | 1966 | 84366 |
| | | 0.08 | | | 50.4 | 5.900 | 0.079 | 0.790 | 1.140 | --- | 43.70 | 49.23* | | | 59.86* | | | 1966 | 84366 |
| | | 0.08 | | | 50.4 | 5.900 | 0.079 | 1.580 | 2.120 | --- | 36.00 | 59.36* | | | 71.47* | | | 1966 | 84366 |
| | | 0.08 | | | 50.4 | 5.900 | 0.079 | 0.790 | 1.220 | 40.30 | 43.90 | 49.45* | | | 62.43* | | | 1966 | 84366 |
| | | 0.08 | | | 50.4 | 5.900 | 0.079 | 1.580 | 2.010 | 33.30 | 36.20 | 59.69* | | | 69.35* | | | 1966 | 84366 |
| | | 0.08 | | | 50.4 | 5.900 | 0.079 | 3.150 | 3.540 | 15.90 | 21.40 | 58.22* | | | 65.82* | | | 1966 | 84366 |
| | | 0.08 | | | 50.4 | 5.900 | 0.079 | 3.150 | 3.540 | 17.20 | 21.40 | 58.22* | | | 65.82* | | | 1966 | 84366 |
| | | 0.08 | | | 50.4 | 5.900 | 0.079 | 1.180 | 1.610 | 36.70 | 40.30 | 56.26* | | | 67.20* | | | 1966 | 84366 |
| | | 0.08 | | | 50.4 | 5.900 | 0.079 | 1.180 | 1.500 | 36.60 | 40.10 | 55.98* | | | 64.13* | | | 1966 | 84366 |
| | | 0.08 | | | 50.4 | 5.900 | 0.079 | 1.180 | 1.610 | 35.20 | 39.80 | 55.56* | | | 66.37* | | | 1966 | 84366 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.6.2.2 (CONTINUED)



## ALUMINUM 2024 (ALCLAD) $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($Ksi\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($Ksi\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 Cont'd | Sheet Cont'd | 0.08 | R.T. Cont'd | L-T Cont'd | 50.4 | 5.900 | 0.079 | 1.580 | 2.120 | 30.80 | 35.90 | 59.20* | Cont'd | Cont'd | 71.27* | Cont'd | Cont'd | 1966 | 84366 |
| | | 0.08 | | | 50.4 | 5.900 | 0.079 | 0.790 | 1.180 | 39.30 | 43.10 | 48.55* | | | 60.17* | | | 1966 | 84366 |
| | | 0.08 | | | 51.8 | 5.900 | 0.079 | 3.150 | 3.580 | 20.60 | 21.30 | 57.95* | | | 66.37* | | | 1966 | 84366 |
| | | 0.08 | | | 51.8 | 5.900 | 0.079 | 1.180 | 1.580 | 34.60 | 40.90 | 57.10* | | | 67.44* | | | 1966 | 84366 |
| | | 0.08 | | | 51.8 | 5.900 | 0.079 | 0.790 | 1.220 | 45.30 | 46.20 | 52.04* | | | 65.70* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 5.900 | 0.079 | 0.790 | 1.140 | 43.10 | 44.00 | 49.56* | | | 60.27* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 5.900 | 0.079 | 3.150 | 3.500 | 19.60 | 20.50 | 55.77* | | | 62.24* | | | 1966 | 84366 |
| | | 0.08 | | | 51.8 | 5.900 | 0.079 | 1.180 | 1.530 | 33.60 | 41.10 | 57.38* | | | 66.49* | | | 1966 | 84366 |
| | | 0.08 | | | 51.8 | 5.900 | 0.079 | 0.390 | 0.630 | 49.50 | 50.00 | 39.24* | | | 50.09* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 5.900 | 0.079 | 0.790 | 1.140 | 43.10 | 44.00 | 49.56* | | | 60.27* | | | 1966 | 84366 |
| | | 0.08 | | | 51.8 | 5.900 | 0.079 | 3.150 | 3.500 | 19.60 | 20.50 | 55.77* | | | 62.24* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 5.900 | 0.079 | 1.580 | 2.160 | 31.20 | 36.60 | 60.35* | | | 73.59* | | | 1966 | 84366 |
| | | 0.08 | | | 51.8 | 5.900 | 0.079 | 1.580 | 2.050 | 29.60 | 37.00 | 61.01* | | | 71.82* | | | 1966 | 84366 |
| | | 0.08 | | | 51.8 | 5.900 | 0.079 | 1.580 | 2.160 | 31.20 | 36.60 | 60.35* | | | 73.59* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 5.900 | 0.079 | 0.790 | 1.220 | 45.30 | 46.20 | 52.04* | | | 65.70* | | | 1966 | 84366 |
| | | 0.08 | | | 51.8 | 5.900 | 0.079 | 1.580 | 2.050 | 29.60 | 37.00 | 61.01* | | | 71.82* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 5.900 | 0.079 | 3.150 | 3.500 | 20.20 | 21.20 | 57.68* | | | 64.37* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 5.900 | 0.079 | 3.150 | 3.580 | 20.60 | 21.30 | 57.95* | | | 66.37* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 5.900 | 0.079 | 0.790 | 1.140 | 46.30 | 46.90 | 52.83* | | | 64.25* | | | 1966 | 84366 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.6.2.2 (CONTINUED)



## ALUMINUM 2024 (ALCLAD) $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_C$ (Ksi$\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 Cont'd | Sheet Cont'd | 0.08 | R.T. Cont'd | L-T Cont'd | 51.8 | 5.900 | 0.079 | 0.790 | 1.140 | 46.20 | 46.80 | 52.72* | Cont'd | Cont'd | 64.11* | Cont'd | Cont'd | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 5.900 | 0.079 | 1.180 | 1.500 | 36.10 | 41.10 | 57.38* | | | 65.73* | | | 1966 | 84366 |
| | | 0.08 | | | 51.8 | 5.900 | 0.079 | 1.580 | 2.090 | 33.40 | 36.60 | 60.35* | | | 71.97* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 5.900 | 0.079 | 3.150 | 3.500 | 20.20 | 21.20 | 57.68* | | | 64.37* | | | 1966 | 84366 |
| | | 0.08 | | | 51.8 | 5.900 | 0.079 | 0.390 | 0.670 | 49.10 | 49.40 | 38.77* | | | 51.09* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 5.900 | 0.079 | 1.580 | 2.080 | 33.40 | 36.60 | 60.35* | | | 71.73* | | | 1966 | 84366 |
| | | 0.08 | | | 53.0 | 5.900 | 0.079 | 1.180 | 1.650 | 37.20 | 40.70 | 56.82* | | | 68.87* | | | 1966 | 84366 |
| | | 0.08 | | | 53.0 | 5.900 | 0.079 | 1.180 | 1.580 | 36.40 | 40.90 | 57.10* | | | 67.44* | | | 1966 | 84366 |
| | | 0.08 | | | 53.0 | 5.900 | 0.079 | 0.790 | 1.140 | --- | 45.00 | 50.69* | | | 61.64* | | | 1966 | 84366 |
| | | 0.08 | | | 53.0 | 5.900 | 0.079 | 1.180 | 1.610 | 36.60 | 40.00 | 55.84* | | | 66.70* | | | 1966 | 84366 |
| | | 0.08 | | | 53.0 | 5.900 | 0.079 | 0.790 | --- | --- | 45.00 | 50.69* | | | --- | | | 1966 | 84366 |
| | | 0.08 | | | 53.0 | 5.900 | 0.079 | 3.150 | 3.620 | --- | 21.80 | 59.31* | | | 68.83* | | | 1966 | 84366 |
| | | 0.08 | | | 53.0 | 5.900 | 0.079 | 0.790 | --- | --- | 44.90 | 50.58* | | | --- | | | 1966 | 84366 |
| | | 0.08 | | | 53.0 | 5.900 | 0.079 | 1.580 | 2.050 | --- | 37.70 | 62.16* | | | 73.18* | | | 1966 | 84366 |
| | | 0.08 | | | 53.0 | 5.900 | 0.079 | 3.150 | 3.580 | --- | 21.10 | 57.41* | | | 65.75* | | | 1966 | 84366 |
| | | 0.08 | | | 53.0 | 5.900 | 0.079 | 1.580 | 1.970 | 29.00 | 36.20 | 59.69* | | | 68.45* | | | 1966 | 84366 |
| | | 0.08 | | | 53.0 | 5.900 | 0.079 | 1.580 | 2.120 | 30.70 | 35.20 | 58.04* | | | 69.88* | | | 1966 | 84366 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.6.2.2 (CONTINUED)



## ALUMINUM 2024 (ALCLAD) $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_C$ (Ksi$\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 | Sheet | 0.09 | R.T. | L-T | 56.0 | 5.900 | 0.095 | 1.580 | 2.240 | 25.80 | 38.20 | 62.99* | --- | --- | 78.78* | --- | --- | 1966 | 84366 |
| | | 0.09 | | | 56.0 | 5.900 | 0.095 | 1.580 | 2.400 | 31.80 | 38.20 | 62.99* | | | 82.78* | | | 1966 | 84366 |
| | | 0.09 | | | 56.0 | 5.900 | 0.095 | 3.150 | 3.500 | 20.30 | 23.80 | 64.75* | | | 72.26* | | | 1966 | 84366 |
| | | 0.09 | | | 56.0 | 5.900 | 0.095 | 3.150 | 3.740 | 21.60 | 23.60 | 64.21* | | | 77.56* | | | 1966 | 84366 |
| | | 0.09 | | | 56.0 | 5.900 | 0.095 | 0.790 | 1.100 | 46.40 | 47.50 | 53.51* | | | 63.81* | | | 1966 | 84366 |
| | | 0.09 | | | 56.0 | 5.900 | 0.095 | 1.180 | 1.540 | 39.80 | 43.00 | 60.03* | | | 69.84* | | | 1966 | 84366 |
| | | 0.09 | | | 56.0 | 5.900 | 0.095 | 0.790 | 1.060 | 46.40 | 47.60 | 53.62* | | | 62.67* | | | 1966 | 84366 |
| T3 | Sheet | 0.04 | R.T. | L-T | 45.0 | 11.800 | 0.039 | 4.720 | 6.170 | 17.20 | 23.90 | 72.35* | --- | --- | 90.15* | --- | --- | 1966 | 70519 |
| | | 0.04 | | | 45.0 | 11.800 | 0.039 | 3.540 | 5.240 | 20.40 | 29.20 | 72.95* | | | 95.69* | | | 1966 | 70519 |
| | | 0.04 | | | 45.0 | 11.800 | 0.039 | 1.770 | 2.600 | 25.60 | 36.00 | 60.87* | | | 75.01* | | | 1966 | 70519 |
| | | 0.04 | | | 45.0 | 11.800 | 0.039 | 1.770 | 2.400 | 30.50 | 36.20 | 61.21* | | | 72.14* | | | 1966 | 70519 |
| | | 0.04 | | | 45.0 | 11.800 | 0.039 | 1.770 | 2.950 | 29.80 | 36.20 | 61.21* | | | 81.07* | | | 1966 | 70519 |
| | | 0.04 | | | 45.0 | 11.800 | 0.039 | 1.180 | 1.930 | 33.80 | 40.10 | 54.93* | | | 71.00* | | | 1966 | 70519 |
| | | 0.04 | | | 45.0 | 11.800 | 0.039 | 1.180 | 1.610 | 35.20 | 39.80 | 54.52* | | | 64.03* | | | 1966 | 70519 |
| | | 0.04 | | | 45.0 | 11.800 | 0.039 | 4.720 | 6.530 | 18.10 | 24.20 | 73.26* | | | 96.48* | | | 1966 | 70519 |
| | | 0.04 | | | 45.0 | 11.800 | 0.039 | 3.540 | 5.150 | 20.60 | 29.50 | 73.70* | | | 95.37* | | | 1966 | 70519 |
| T3 | Sheet | 0.08 | R.T. | L-T | 51.8 | 11.800 | 0.079 | 4.720 | 5.710 | 17.20 | 28.30 | 85.67* | --- | --- | 99.56* | --- | --- | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 11.800 | 0.079 | 1.770 | 2.480 | 32.30 | 42.10 | 71.19* | | | 85.43* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 11.800 | 0.079 | 1.180 | 2.240 | 32.00 | 45.50 | 62.33* | | | 87.30* | | | 1965 | 70485 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.6.2.2 (CONTINUED)

## ALUMINUM 2024 (ALCLAD) $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_C$ (Ksi$\sqrt{in}$) | $K_C$ $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 Cont'd | Sheet Cont'd | 0.08 | R.T. Cont'd | L-T Cont'd | 51.8 | 11.800 | 0.079 | 1.770 | 2.280 | 28.50 | 42.10 | 71.19* | Cont'd | Cont'd | 81.56* | Cont'd | Cont'd | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 11.800 | 0.079 | 4.720 | 5.830 | 17.40 | 28.50 | 86.28* | | | 102.09* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 11.800 | 0.079 | 3.540 | 4.540 | 24.90 | 34.00 | 84.94* | | | 100.09* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 11.800 | 0.079 | 3.540 | 4.610 | 25.80 | 33.80 | 84.44* | | | 100.59* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 11.800 | 0.079 | 1.770 | 2.480 | 30.50 | 41.90 | 70.85* | | | 85.03* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 11.800 | 0.079 | 1.180 | 1.610 | 33.40 | 45.80 | 62.74* | | | 73.68* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 11.800 | 0.079 | 1.180 | 1.580 | 31.00 | 45.10 | 61.78* | | | 71.85* | | | 1965 | 70485 |
| T3 | Sheet | 0.11 | R.T. | L-T | 53.2 | 11.800 | 0.118 | 1.180 | 1.810 | 37.80 | 44.30 | 60.69* | --- | --- | 75.80* | --- | --- | 1966 | 70519 |
| | | 0.11 | | | 53.2 | 11.800 | 0.118 | 4.720 | 5.400 | 20.40 | 25.60 | 77.50* | | | 85.95* | | | 1966 | 70519 |
| | | 0.11 | | | 53.2 | 11.800 | 0.118 | 4.720 | 5.550 | 20.60 | 25.20 | 76.29 | | | 86.54* | | | 1966 | 70519 |
| | | 0.11 | | | 53.2 | 11.800 | 0.118 | 1.180 | 1.730 | 38.70 | 45.00 | 61.65* | | | 75.18* | | | 1966 | 70519 |
| | | 0.11 | | | 53.2 | 11.800 | 0.118 | 3.540 | 4.560 | 25.20 | 32.20 | 80.44* | | | 95.09* | | | 1966 | 70519 |
| | | 0.11 | | | 53.2 | 11.800 | 0.118 | 3.540 | 4.690 | 23.30 | 32.20 | 80.44* | | | 97.03* | | | 1966 | 70519 |
| | | 0.11 | | | 53.2 | 11.800 | 0.118 | 1.770 | 2.520 | 34.00 | 41.50 | 70.17* | | | 84.97* | | | 1966 | 70519 |
| | | 0.11 | | | 53.2 | 11.800 | 0.118 | 1.770 | 2.720 | 31.90 | 41.60 | 70.34* | | | 88.92* | | | 1966 | 70519 |
| | | 0.11 | | | 53.2 | 11.800 | 0.118 | 1.770 | 2.480 | 35.70 | 41.90 | 70.85* | | | 85.03* | | | 1966 | 70519 |
| T3 | Sheet | 0.16 | R.T. | L-T | 52.0 | 11.800 | 0.158 | 1.180 | 1.610 | 38.10 | 44.30 | 60.69* | --- | --- | 71.27* | --- | --- | 1966 | 70519 |
| | | 0.16 | | | 52.0 | 11.800 | 0.158 | 3.540 | 4.610 | 26.30 | 32.50 | 81.19* | | | 96.72* | | | 1966 | 70519 |
| | | 0.16 | | | 52.0 | 11.800 | 0.158 | 4.720 | 6.060 | 19.80 | 26.90 | 81.43* | | | 99.78* | | | 1966 | 70519 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.6.2.2 (CONTINUED)



## ALUMINUM 2024 (ALCLAD) $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_C$ (Ksi$\sqrt{in}$) | $K_C$ $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 Cont'd | Sheet Cont'd | 0.16 | R.T. Cont'd | L-T Cont'd | 52.0 | 11.800 | 0.158 | 1.180 | 1.610 | 38.40 | 44.40 | 60.82* | Cont'd | Cont'd | 71.43* | Cont'd | Cont'd | 1966 | 70519 |
| | | 0.16 | | | 52.0 | 11.800 | 0.158 | 1.770 | 2.440 | 33.80 | 41.60 | 70.34* | | | 83.66* | | | 1966 | 70519 |
| | | 0.16 | | | 52.0 | 11.800 | 0.158 | 1.770 | 2.990 | 34.80 | 41.10 | 69.50* | | | 92.77* | | | 1966 | 70519 |
| | | 0.16 | | | 52.0 | 11.800 | 0.158 | 3.540 | 4.210 | 23.30 | 32.20 | 80.44* | | | 89.97* | | | 1966 | 70519 |
| | | 0.16 | | | 52.0 | 11.800 | 0.158 | 4.720 | 5.640 | 20.90 | 26.50 | 80.22* | | | 92.24* | | | 1966 | 70519 |
| | | 0.16 | | | 52.0 | 11.800 | 0.158 | 1.770 | 2.520 | 34.00 | 41.30 | 69.84* | | | 84.56* | | | 1966 | 70519 |
| T3 | Sheet | 0.01 | R.T. | L-T | 51.8 | 15.000 | 0.009 | 7.500 | 8.890 | --- | 21.20 | 86.53* | --- | --- | 102.53* | --- | --- | 1966 | 86734 |
| | | 0.01 | | | 51.8 | 15.000 | 0.010 | 7.500 | 8.840 | --- | 21.40 | 87.35* | | | 102.84* | | | 1966 | 86734 |
| T3 | Sheet | 0.02 | R.T. | L-T | 42.3 | 15.000 | 0.019 | 7.500 | 9.900 | --- | 21.90 | 89.39* | --- | --- | 121.04* | --- | --- | 1966 | 86734 |
| T3 | Sheet | 0.03 | R.T. | L-T | 53.0 | 15.000 | 0.030 | 7.500 | 9.330 | --- | 22.80 | 93.06* | --- | --- | 116.69* | --- | --- | 1966 | 86734 |
| | | 0.03 | | | 53.0 | 15.000 | 0.030 | 7.500 | 9.600 | --- | 22.30 | 91.02* | | | 118.30* | | | 1966 | 86734 |
| T3 | Sheet | 0.08 | R.T. | L-T | 51.8 | 23.600 | 0.079 | 1.970 | 3.190 | 32.60 | 45.10 | 79.68* | 89.9 | 10.5 | 102.11* | --- | --- | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 23.600 | 0.079 | 11.80 | 12.520 | 12.70 | 20.20 | 103.42 | | | 109.24* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 23.600 | 0.079 | 4.720 | 6.300 | 23.60 | 31.30 | 87.39 | | | 103.03* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 23.600 | 0.079 | 0.790 | --- | --- | 49.80 | 55.51* | | | --- | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 23.600 | 0.079 | 6.300 | 9.050 | 15.90 | 31.90 | 105.00* | | | 132.50* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 23.600 | 0.079 | 0.790 | 1.690 | 46.20 | 50.40 | 56.18* | | | 82.38* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 23.600 | 0.079 | 4.720 | 7.400 | 23.90 | 37.80 | 105.54* | | | 137.29* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 23.600 | 0.079 | 1.180 | 2.620 | 37.80 | 49.20 | 67.09* | | | 100.58* | | | 1965 | 70485 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.6.2.2 (CONTINUED)



## ALUMINUM 2024 (ALCLAD) $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($K_{app}$ (Ksi$\sqrt{in}$)) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($K_C$ (Ksi$\sqrt{in}$)) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 Cont'd | Sheet Cont'd | 0.08 | R.T. Cont'd | L-T Cont'd | 51.8 | 23.600 | 0.079 | 3.150 | 4.450 | 25.60 | 35.40 | 79.62 | Cont'd | Cont'd | 95.70* | Cont'd | Cont'd | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 23.600 | 0.079 | 1.580 | --- | --- | 46.30 | 73.14* | | | --- | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 23.600 | 0.079 | 1.580 | 2.520 | 40.70 | 48.60 | 76.78* | | | 97.38* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 23.600 | 0.079 | 4.720 | 5.750 | 22.20 | 29.80 | 83.20 | | | 92.99 | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 23.600 | 0.079 | 6.300 | 9.450 | 18.00 | 30.90 | 101.71* | | | 132.39* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 23.600 | 0.079 | 8.660 | 11.720 | 13.20 | 25.20 | 101.50 | | | 128.24* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 23.600 | 0.079 | 15.75 | --- | --- | 13.70 | 96.46 | | | --- | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 23.600 | 0.079 | 1.580 | 2.440 | 40.71 | 47.00 | 74.25* | | | 92.62* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 23.600 | 0.079 | 3.150 | 4.490 | 25.30 | 37.00 | 83.22* | | | 100.51* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 23.600 | 0.079 | 1.180 | 1.850 | 41.90 | 48.50 | 66.13* | | | 82.99* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 23.600 | 0.079 | 3.150 | 4.600 | 28.00 | 34.60 | 77.82 | | | 95.25* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 23.600 | 0.079 | 1.180 | 2.090 | 41.70 | 50.00 | 68.18* | | | 91.04* | | | 1965 | 70485 |
| | | 0.08 | | | 51.8 | 23.600 | 0.079 | 0.790 | 1.420 | 28.90 | 52.40 | 58.41* | | | 78.43* | | | 1965 | 70485 |
| T3 | Sheet | 0.06 | R.T. | L-T | 52.8 | 48.000 | 0.060 | 24.00 | 29.850 | --- | 19.10 | 139.46 | 141.3 | 2.6 | 174.83* | --- | --- | 1966 | 86734 |
| | | 0.06 | | | 52.8 | 48.000 | 0.061 | 24.00 | 28.250 | --- | 19.60 | 143.11 | | | 168.24* | | | 1966 | 86734 |
| T3 | Sheet | 0.01 | R.T. | T-L | 46.0 | 14.990 | 0.009 | 7.500 | 9.510 | --- | 20.80 | 84.92* | --- | --- | 109.08* | --- | --- | 1962 | 62308 |
| | | 0.01 | | | 46.0 | 14.990 | 0.010 | 7.500 | 9.060 | --- | 21.20 | 86.56* | | | 104.82* | | | 1962 | 62308 |
| T3 | Sheet | 0.02 | R.T. | T-L | 46.5 | 15.000 | 0.020 | 7.500 | 8.680 | --- | 20.40 | 83.27* | --- | --- | 96.09* | --- | --- | 1966 | 86734 |
| T3 | Sheet | 0.06 | R.T. | T-L | 44.9 | 48.000 | 0.061 | 24.00 | 28.650 | --- | 17.10 | 124.86 | --- | --- | 149.12* | --- | --- | 1966 | 86734 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.6.2.2 (CONTINUED)



## ALUMINUM 2024 (ALCLAD) $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($K_{app}$ (Ksi$\sqrt{in}$)) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($K_C$ (Ksi$\sqrt{in}$)) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BUCKLING OF CRACK EDGES RESTRAINED** | | | | | | | | | | | | | | | | | | | |
| T3 | Sheet | 0.08 | R.T. | T-L | 43.0 | 47.980 | 0.079 | 24.00 | 27.150 | --- | 18.80 | 137.29* | --- | --- | 154.64* | --- | --- | 1966 | 86734 |
| | | 0.08 | | | 43.0 | 47.980 | 0.080 | 24.00 | 27.810 | --- | 18.90 | 138.02* | | | 159.50* | | | 1966 | 86734 |
| **BUCKLING OF CRACK EDGES NOT RESTRAINED** | | | | | | | | | | | | | | | | | | | |
| T3 | Sheet | 0.06 | 60 | L-T | 47.0 | 12.000 | 0.061 | 3.000 | --- | --- | 31.60 | 71.37* | --- | --- | --- | --- | --- | 1966 | 86734 |
| | | 0.06 | | | 47.0 | 12.000 | 0.061 | 3.910 | --- | --- | 26.82 | 71.18* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 47.0 | 12.000 | 0.061 | 3.000 | --- | --- | 32.10 | 72.50* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 47.0 | 12.000 | 0.061 | 3.000 | --- | --- | 31.60 | 71.37* | | | --- | | | 1966 | 86734 |
| T3 | Sheet | 0.06 | R.T. | L-T | 53.2 | 2.000 | 0.064 | 0.622 | 1.020 | 33.30 | 36.20 | 38.08* | --- | --- | 54.93* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 53.2 | 2.000 | 0.064 | 0.621 | 0.980 | 31.60 | 36.20 | 38.00* | | | 53.00* | | | 1973 | 86213 |
| T3 | Sheet | 0.04 | R.T. | L-T | 44.3 | 7.500 | 0.040 | 3.000 | --- | --- | 21.30 | 51.41* | 50.5 | 4.4 | --- | --- | --- | 1966 | 86734 |
| | | 0.04 | | | 44.4 | 7.500 | 0.040 | 3.000 | --- | --- | 21.90 | 52.85* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 46.1 | 7.500 | 0.040 | 0.550 | --- | --- | 41.30 | 38.52* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 46.1 | 7.500 | 0.040 | 1.050 | --- | --- | 37.20 | 48.36* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 46.1 | 7.500 | 0.040 | 4.700 | --- | --- | 12.14 | 44.34 | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 46.1 | 7.500 | 0.040 | 4.700 | --- | --- | 12.14 | 44.34 | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 46.1 | 7.500 | 0.040 | 2.100 | --- | --- | 28.70 | 54.80* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 46.1 | 7.500 | 0.040 | 1.100 | --- | --- | 39.60 | 52.76* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 46.1 | 7.500 | 0.040 | 3.900 | --- | --- | 16.73 | 50.05 | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 46.1 | 7.500 | 0.040 | 1.050 | --- | --- | 37.10 | 48.23* | | | --- | | | 1966 | 86734 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.6.2.2 (CONTINUED)

## ALUMINUM 2024 (ALCLAD) $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_C$ (Ksi$\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 Cont'd | Sheet Cont'd | 0.04 | R.T. Cont'd | L-T Cont'd | 46.1 | 7.500 | 0.040 | 0.500 | --- | --- | 42.10 | 37.41* | Cont'd | Cont'd | --- | Cont'd | Cont'd | 1966 | 86734 |
| | | 0.04 | | | 46.1 | 7.500 | 0.040 | 0.550 | --- | --- | 41.60 | 38.79* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 46.1 | 7.500 | 0.040 | 2.000 | --- | --- | 29.90 | 55.45* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 46.1 | 7.500 | 0.040 | 4.150 | --- | --- | 15.27 | 48.53 | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 47.4 | 7.500 | 0.040 | 4.200 | --- | --- | 15.80 | 50.83 | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 47.4 | 7.500 | 0.040 | 4.700 | --- | --- | 13.00 | 47.48 | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 47.4 | 7.500 | 0.040 | 1.050 | --- | --- | 41.90 | 54.47* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 47.4 | 7.500 | 0.040 | 0.500 | --- | --- | 44.90 | 39.90* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 47.4 | 7.500 | 0.040 | 2.200 | --- | --- | 30.70 | 60.30* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 47.4 | 7.500 | 0.040 | 4.100 | --- | --- | 16.20 | 50.86 | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 47.4 | 7.500 | 0.040 | 0.950 | --- | --- | 42.40 | 52.31* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 47.4 | 7.500 | 0.040 | 2.000 | --- | --- | 32.90 | 61.01* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 47.4 | 7.500 | 0.040 | 4.000 | --- | --- | 17.33 | 53.10 | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 47.4 | 7.500 | 0.040 | 0.500 | --- | --- | 45.40 | 40.35* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 47.4 | 7.500 | 0.040 | 0.750 | --- | --- | 43.40 | 47.40* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 51.0 | 7.500 | 0.040 | 4.120 | --- | --- | 17.00 | 53.63 | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 51.0 | 7.500 | 0.040 | 1.150 | --- | --- | 44.10 | 60.15* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 51.0 | 7.500 | 0.040 | 5.900 | --- | --- | 12.14 | 64.45* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 51.0 | 7.500 | 0.040 | 1.150 | --- | --- | 43.90 | 59.87* | | | --- | | | 1966 | 86734 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.6.2.2 (CONTINUED)



## ALUMINUM 2024 (ALCLAD) $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($Ksi\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($Ksi\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 Cont'd | Sheet Cont'd | 0.04 | R.T. Cont'd | L-T Cont'd | 51.0 | 7.500 | 0.040 | 0.810 | --- | --- | 48.70 | 55.33* | Cont'd | Cont'd | --- | Cont'd | Cont'd | 1966 | 86734 |
| | | 0.04 | | | 51.0 | 7.500 | 0.040 | 1.950 | --- | --- | 31.40 | 57.36* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 51.0 | 7.500 | 0.040 | 0.500 | --- | --- | 51.30 | 45.59* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 51.0 | 7.500 | 0.040 | 4.870 | --- | --- | 12.14 | 46.41 | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 51.0 | 7.500 | 0.040 | 0.500 | --- | --- | 51.70 | 45.94* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 51.0 | 7.500 | 0.040 | 4.280 | --- | --- | 14.80 | 48.56 | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 51.0 | 7.500 | 0.040 | 0.650 | --- | --- | 50.70 | 51.47* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 51.2 | 7.500 | 0.040 | 3.000 | --- | --- | 22.00 | 53.10 | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 51.5 | 7.500 | 0.040 | 3.000 | --- | --- | 24.70 | 59.61 | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 51.5 | 7.500 | 0.040 | 3.000 | --- | --- | 23.30 | 56.23 | | | --- | | | 1966 | 86734 |
| T3 | Sheet | 0.06 | R.T. | L-T | 44.2 | 7.500 | 0.064 | 0.500 | --- | --- | 45.20 | 40.17* | --- | --- | --- | --- | --- | 1966 | 86734 |
| | | 0.06 | | | 44.2 | 7.500 | 0.064 | 1.080 | --- | --- | 41.80 | 55.15* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 44.2 | 7.500 | 0.064 | 1.940 | --- | --- | 34.30 | 62.47* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 44.2 | 7.500 | 0.064 | 0.500 | --- | --- | 44.80 | 39.81* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 44.2 | 7.500 | 0.064 | 3.910 | --- | --- | 18.83 | 56.47* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 44.2 | 7.500 | 0.064 | 4.900 | --- | --- | 12.13 | 46.76 | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 44.2 | 7.500 | 0.064 | 5.450 | --- | --- | 12.13 | 55.01* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 44.2 | 7.500 | 0.064 | 1.930 | --- | --- | 34.10 | 61.92* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 44.2 | 7.500 | 0.064 | 0.500 | --- | --- | 46.10 | 40.97* | | | --- | | | 1966 | 86734 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.6.2.2 (CONTINUED)



## ALUMINUM 2024 (ALCLAD) $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($K_{si}\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($K_{si}\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 Cont'd | Sheet Cont'd | 0.06 | R.T. Cont'd | L-T Cont'd | 44.2 | 7.500 | 0.064 | 0.500 | --- | --- | 46.00 | 40.88* | Cont'd | Cont'd | --- | Cont'd | Cont'd | 1966 | 86734 |
| | | 0.06 | | | 44.2 | 7.500 | 0.064 | 3.760 | --- | --- | 19.75 | 57.14* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 44.2 | 7.500 | 0.064 | 0.960 | --- | --- | 45.80 | 56.82* | | | --- | | | 1966 | 86734 |
| T3 | Sheet | 0.03 | R.T. | L-T | 51.0 | 9.000 | 0.032 | 2.560 | 2.800 | --- | 31.90 | 67.36* | --- | --- | 71.20* | --- | --- | 1965 | 62311 |
| T3 | Sheet | 0.04 | R.T. | L-T | 51.0 | 9.000 | 0.040 | 4.480 | 4.980 | 18.20 | 20.70 | 65.19* | 53.2 | 9.4 | 72.06* | --- | --- | 1965 | 62311 |
| | | 0.04 | | | 51.0 | 9.000 | 0.040 | 2.490 | 2.800 | 28.30 | 31.90 | 66.24* | | | 71.20* | | | 1965 | 62311 |
| | | 0.04 | | | 51.0 | 9.000 | 0.040 | 4.420 | 4.880 | 18.10 | 20.50 | 63.80 | | | 69.93* | | | 1965 | 62311 |
| | | 0.04 | | | 51.0 | 9.000 | 0.040 | 6.280 | 6.500 | 9.60 | 9.90 | 45.99 | | | 48.66 | | | 1965 | 62311 |
| | | 0.04 | | | 51.0 | 9.000 | 0.040 | 6.220 | 6.620 | 9.20 | 10.90 | 49.89 | | | 55.33* | | | 1965 | 62311 |
| T3 | Sheet | 0.09 | R.T. | L-T | 51.0 | 9.000 | 0.091 | 4.480 | 5.060 | 20.10 | 23.10 | 72.75* | --- | --- | 81.74* | --- | --- | 1965 | 62311 |
| | | 0.09 | | | 51.0 | 9.000 | 0.091 | 2.560 | 2.920 | 28.10 | 35.70 | 75.38* | | | 81.83* | | | 1965 | 62311 |
| | | 0.09 | | | 51.0 | 9.000 | 0.091 | 6.230 | 6.520 | 10.90 | 14.00 | 64.24* | | | 69.18* | | | 1965 | 62311 |
| | | 0.09 | | | 51.0 | 9.000 | 0.091 | 6.190 | 6.650 | 11.00 | 13.60 | 61.79* | | | 69.61* | | | 1965 | 62311 |
| | | 0.09 | | | 51.0 | 9.000 | 0.091 | 4.480 | 4.860 | 20.10 | 23.20 | 73.06* | | | 78.82* | | | 1965 | 62311 |
| | | 0.09 | | | 51.0 | 9.000 | 0.091 | 2.500 | 3.040 | 28.10 | 34.90 | 72.65* | | | 82.12* | | | 1965 | 62311 |
| T3 | Sheet | 0.10 | R.T. | L-T | 51.0 | 9.000 | 0.102 | 2.100 | 2.340 | 32.10 | 36.10 | 67.86* | --- | --- | 72.25* | --- | --- | 1965 | 62311 |
| | | 0.10 | | | 51.0 | 9.000 | 0.102 | --- | 1.700 | --- | 39.20 | --- | | | 65.50* | | | 1965 | 62311 |
| T3 | Sheet | 0.06 | R.T. | L-T | 52.7 | 15.820 | 0.062 | 4.000 | --- | --- | 30.90 | 80.66 | 78.9 | 2.6 | --- | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 52.7 | 15.820 | 0.063 | 1.020 | 1.500 | --- | 47.10 | 59.77* | | | 72.70* | --- | --- | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.6.2.2 (CONTINUED)



## ALUMINUM 2024 (ALCLAD) $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($Ksi\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($Ksi\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 Cont'd | Sheet Cont'd | 0.06 | R.T. Cont'd | L-T Cont'd | 52.7 | 15.810 | 0.064 | 6.010 | 7.310 | --- | 22.80 | 77.04 | Cont'd | Cont'd | 89.35* | Cont'd | Cont'd | 1973 | 86213 |
| | | 0.06 | | | 52.7 | 15.810 | 0.065 | 3.000 | 4.370 | --- | 36.10 | 80.15* | | | 99.30* | | | 1973 | 86213 |
| T3 | Sheet | 0.04 | R.T. | L-T | 51.0 | 20.000 | 0.040 | 2.260 | 4.900 | 27.50 | 40.10 | 76.15* | --- | --- | 115.56* | --- | --- | 1965 | 62311 |
| | | 0.04 | | | 51.0 | 20.000 | 0.040 | 2.260 | 7.370 | 27.00 | 40.10 | 76.15* | | | 149.12* | | | 1965 | 62311 |
| T3 | Sheet | 0.04 | R.T. | L-T | 50.6 | 30.000 | 0.040 | 15.00 | 19.700 | --- | 17.70 | 102.17 | 90.4 | 10.8 | 137.40* | --- | --- | 1966 | 86734 |
| | | 0.04 | | | 50.6 | 30.000 | 0.040 | 15.00 | 17.700 | --- | 18.30 | 105.64 | | | 124.53* | | | 1966 | 86734 |
| | | 0.04 | | | 50.9 | 30.000 | 0.040 | 6.000 | --- | --- | 27.80 | 87.51 | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 51.3 | 30.000 | 0.040 | 12.00 | --- | --- | 17.50 | 84.47 | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 51.6 | 30.000 | 0.040 | 12.00 | --- | --- | 17.41 | 84.04 | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 52.1 | 30.000 | 0.040 | 3.000 | --- | --- | 36.10 | 78.85 | | | --- | | | 1966 | 86734 |
| T3 | Sheet | 0.10 | R.T. | L-T | 52.7 | 35.000 | 0.102 | 4.950 | --- | --- | 37.40 | 105.59* | 103.5 | 17.6 | --- | --- | --- | 1956 | 84367 |
| | | 0.10 | | | 52.7 | 35.000 | 0.102 | 17.90 | --- | --- | 19.10 | 121.55 | | | --- | | | 1956 | 84367 |
| | | 0.10 | | | 52.7 | 35.000 | 0.102 | 17.85 | --- | --- | 13.60 | 86.33 | | | --- | | | 1956 | 84367 |
| | | 0.10 | | | 52.7 | 35.000 | 0.102 | 1.480 | --- | --- | 48.10 | 73.42* | | | --- | | | 1956 | 84367 |
| | | 0.10 | | | 52.7 | 35.000 | 0.102 | 1.070 | --- | --- | 49.60 | 64.34* | | | --- | | | 1956 | 84367 |
| | | 0.10 | | | 52.7 | 35.000 | 0.102 | 10.70 | --- | --- | 23.60 | 102.74 | | | --- | | | 1956 | 84367 |
| T3 | Sheet | 0.08 | R.T. | L-T | 49.4 | 47.990 | 0.079 | 24.00 | 27.300 | --- | 19.60 | 143.12 | 143.1 | 0.0 | 162.14* | --- | --- | 1966 | 86734 |
| | | 0.08 | | | 49.4 | 47.990 | 0.080 | 24.00 | 27.450 | --- | 19.60 | 143.12 | | | 163.08* | | | 1966 | 86734 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.6.2.2 (CONTINUED)



## ALUMINUM 2024 (ALCLAD) $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_C$ (Ksi$\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 | Sheet | 0.09 | 82 | L-T | 52.5 | 3.000 | 0.090 | 1.270 | 2.182 | --- | 29.70 | 47.29* | --- | --- | 85.32* | --- | --- | 1973 | 86213 |
| | | 0.09 | | | 52.5 | 3.000 | 0.090 | 1.320 | 2.240 | --- | 28.60 | 46.92* | | | 86.18* | | | 1973 | 86213 |
| | | 0.09 | | | 52.0 | 3.000 | 0.091 | 1.200 | 2.067 | --- | 30.50 | 46.56* | | | 80.16* | | | 1973 | 86213 |
| | | 0.09 | | | 52.0 | 3.000 | 0.091 | 1.280 | 2.135 | --- | 29.60 | 47.41* | | | 81.88* | | | 1973 | 86213 |
| | | 0.09 | | | 52.5 | 3.000 | 0.091 | 1.140 | 2.067 | --- | 32.30 | 47.53* | | | 84.89* | | | 1973 | 86213 |
| | | 0.09 | | | 51.2 | 3.000 | 0.092 | 1.230 | 2.229 | --- | 30.10 | 46.79* | | | 89.79* | | | 1973 | 86213 |
| | | 0.09 | | | 51.2 | 3.000 | 0.092 | 1.240 | 2.103 | --- | 30.00 | 46.91* | | | 80.99* | | | 1973 | 86213 |
| | | 0.09 | | | 51.2 | 3.000 | 0.092 | 1.180 | 2.149 | --- | 31.00 | 46.75* | | | 86.69* | | | 1973 | 86213 |
| | | 0.09 | | | 52.0 | 3.000 | 0.092 | 1.270 | 2.164 | --- | 29.30 | 46.65* | | | 82.97* | | | 1973 | 86213 |
| T3 | Sheet | 0.06 | R.T. | T-L | 46.2 | 2.000 | 0.064 | 0.622 | 1.100 | 32.00 | 33.50 | 35.24* | --- | --- | 54.64* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 46.2 | 2.000 | 0.064 | 0.623 | 1.120 | 32.30 | 33.50 | 35.24* | | | 55.65* | | | 1973 | 86213 |
| T3 | Sheet | 0.06 | R.T. | T-L | 43.4 | 6.000 | 0.060 | 2.000 | 2.200 | --- | 29.30 | 55.81* | --- | --- | 59.48* | --- | --- | 1966 | 86734 |
| T3 | Sheet | 0.04 | R.T. | T-L | 59.5 | 7.500 | 0.040 | 0.500 | --- | --- | 46.00 | 40.88* | 48.9 | 6.1 | --- | --- | --- | 1966 | 86734 |
| | | 0.04 | | | 59.5 | 7.500 | 0.040 | 1.300 | --- | --- | 36.80 | 53.58 | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 59.5 | 7.500 | 0.040 | 4.060 | --- | --- | 15.07 | 46.85 | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 59.5 | 7.500 | 0.040 | 2.000 | --- | --- | 30.10 | 55.82 | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 59.5 | 7.500 | 0.040 | 0.750 | --- | --- | 44.70 | 48.82* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 59.5 | 7.500 | 0.040 | 0.550 | --- | --- | 45.00 | 41.97* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 59.5 | 7.500 | 0.040 | 4.200 | --- | --- | 12.14 | 39.06 | | | --- | | | 1966 | 86734 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.6.2.2 (CONTINUED)



## ALUMINUM 2024 (ALCLAD) $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($Ksi\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($Ksi\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 Cont'd | Sheet Cont'd | 0.04 | R.T. Cont'd | T-L Cont'd | 59.5 | 7.500 | 0.040 | 2.060 | --- | --- | 29.30 | 55.30 | Cont'd | Cont'd | --- | Cont'd | Cont'd | 1966 | 86734 |
| | | 0.04 | | | 59.5 | 7.500 | 0.040 | 0.500 | --- | --- | 45.70 | 40.61* | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 59.5 | 7.500 | 0.040 | 4.710 | --- | --- | 11.53 | 42.22 | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 59.5 | 7.500 | 0.040 | 4.000 | --- | --- | 15.76 | 48.29 | | | --- | | | 1966 | 86734 |
| | | 0.04 | | | 59.5 | 7.500 | 0.040 | 0.970 | --- | --- | 40.10 | 50.02 | | | --- | | | 1966 | 86734 |
| T3 | Sheet | 0.06 | R.T. | T-L | 50.7 | 7.500 | 0.064 | 2.000 | --- | --- | 30.50 | 56.56* | 48.1 | 6.0 | --- | --- | --- | 1966 | 86734 |
| | | 0.06 | | | 50.7 | 7.500 | 0.064 | 0.500 | --- | --- | 41.50 | 36.88* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 50.7 | 7.500 | 0.064 | 4.160 | --- | --- | 15.92 | 50.72 | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 50.7 | 7.500 | 0.064 | 0.660 | --- | --- | 40.00 | 40.92* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 50.7 | 7.500 | 0.064 | 4.090 | --- | --- | 16.15 | 50.58 | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 50.7 | 7.500 | 0.064 | 0.500 | --- | --- | 42.00 | 37.32* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 50.7 | 7.500 | 0.064 | 4.400 | --- | --- | 14.63 | 49.46 | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 50.7 | 7.500 | 0.064 | 4.500 | --- | --- | 12.14 | 42.10 | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 50.7 | 7.500 | 0.064 | 0.500 | --- | --- | 42.00 | 37.32* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 50.7 | 7.500 | 0.064 | 1.000 | --- | --- | 37.60 | 47.65* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 50.7 | 7.500 | 0.064 | 1.950 | --- | --- | 30.30 | 55.36* | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 62.6 | 7.500 | 0.064 | 0.750 | --- | --- | 42.30 | 46.20 | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 62.6 | 7.500 | 0.064 | 0.500 | --- | --- | 42.90 | 38.12 | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 62.6 | 7.500 | 0.064 | 2.170 | --- | --- | 30.00 | 58.43 | | | --- | | | 1966 | 86734 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.6.2.2 (CONTINUED)



| ALUMINUM 2024 (ALCLAD) $K_C$ | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONDITION HEAT TREAT | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | CRACK LENGTH | | GROSS STRESS | | $K_{app}$ | | | $K_C$ | | | DATE | REFER |
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | INIT (in.) $2a_o$ | FINAL (in.) $2a_f$ | ONSET (Ksi) $\sigma_o$ | MAX (Ksi) $\sigma_{net}$ | $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ MEAN | STAN DEV | $K_C$ (Ksi$\sqrt{in}$) | $K_C$ MEAN | STAN DEV | | |
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 Cont'd | Sheet Cont'd | 0.06 | R.T. Cont'd | T-L Cont'd | 62.6 | 7.500 | 0.064 | 0.500 | --- | --- | 44.40 | 39.46 | Cont'd | Cont'd | --- | Cont'd | Cont'd | 1966 | 86734 |
| | | 0.06 | | | 62.6 | 7.500 | 0.064 | 2.300 | --- | --- | 27.10 | 54.72 | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 62.6 | 7.500 | 0.064 | 1.000 | --- | --- | 40.30 | 51.07 | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 62.6 | 7.500 | 0.064 | 0.750 | --- | --- | 41.70 | 45.54 | | | --- | | | 1966 | 86734 |
| | | 0.06 | | | 62.6 | 7.500 | 0.064 | 1.110 | --- | --- | 37.50 | 50.20 | | | --- | | | 1966 | 86734 |
| T3 | Sheet | 0.06 | R.T. | T-L | 43.4 | 9.000 | 0.060 | 3.000 | 3.600 | --- | 28.60 | 66.71* | --- | --- | 75.61* | --- | --- | 1966 | 86734 |
| T3 | Sheet | 0.02 | R.T. | T-L | 46.5 | 15.000 | 0.020 | 7.500 | 9.350 | --- | 19.80 | 80.82* | --- | --- | 101.60* | --- | --- | 1966 | 86734 |
| T3 | Sheet | 0.03 | R.T. | T-L | 44.4 | 15.010 | 0.031 | 7.500 | 9.560 | --- | 20.40 | 83.25* | --- | --- | 107.59* | --- | --- | 1962 | 62308 |
| | | 0.03 | | | 44.4 | 15.010 | 0.031 | 7.500 | 9.380 | --- | 20.40 | 83.25* | | | 105.05* | | | 1962 | 62308 |
| T3 | Sheet | 0.06 | R.T. | T-L | 43.4 | 15.000 | 0.060 | 5.000 | 5.900 | --- | 23.70 | 71.37* | --- | --- | 79.91* | --- | --- | 1966 | 86734 |
| | | 0.06 | | | 43.4 | 15.000 | 0.060 | 5.000 | 5.800 | --- | 24.00 | 72.28* | | | 79.94* | | | 1966 | 86734 |
| T3 | Sheet | 0.06 | R.T. | T-L | 46.6 | 15.810 | 0.064 | 4.000 | --- | --- | 28.40 | 74.14* | --- | --- | --- | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 46.6 | 15.810 | 0.064 | 3.000 | --- | --- | 32.10 | 71.27* | | | --- | | | 1973 | 86213 |
| | | 0.06 | | | 46.6 | 15.820 | 0.064 | 1.010 | 1.920 | --- | 46.40 | 58.59* | | | 81.32* | | | 1973 | 86213 |
| | | 0.06 | | | 46.6 | 15.810 | 0.065 | 6.010 | 7.140 | --- | 21.20 | 71.63 | | | 81.51* | | | 1973 | 86213 |
| T3 | Sheet | 0.06 | R.T. | T-L | 43.4 | 18.000 | 0.060 | 6.000 | 7.000 | --- | 22.10 | 72.91 | 73.2 | 0.5 | 80.97* | --- | --- | 1966 | 86734 |
| | | 0.06 | | | 43.4 | 18.000 | 0.061 | 6.000 | 6.900 | --- | 22.30 | 73.57 | | | 80.87* | | | 1966 | 86734 |
| T3 | Sheet | 0.06 | R.T. | T-L | 43.4 | 21.000 | 0.060 | 7.000 | 8.400 | --- | 20.70 | 73.76 | 74.4 | 0.9 | 83.60 | --- | --- | 1966 | 86734 |
| | | 0.06 | | | 43.4 | 21.000 | 0.060 | 7.000 | 8.600 | --- | 21.05 | 75.01 | | | 86.49* | | | --- | 86734 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.6.2.2 (CONCLUDED)



## ALUMINUM 2024 (ALCLAD) $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($Ksi\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($Ksi\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T3 | Sheet | 0.06 | R.T. | T-L | 43.4 | 24.000 | 0.060 | 8.000 | 9.500 | --- | 20.80 | 79.23 | 80.8 | 2.2 | 89.12 | --- | --- | 1966 | 86734 |
| | | 0.06 | | | 43.4 | 24.000 | 0.061 | 8.000 | 9.600 | --- | 21.60 | 82.28 | | | 93.25* | | | 1966 | 86734 |
| T3 | Sheet | 0.04 | R.T. | T-L | 43.3 | 30.020 | 0.040 | 15.00 | 16.200 | --- | 19.10 | 110.23* | --- | --- | 118.44* | --- | --- | 1962 | 62308 |
| | | 0.04 | | | 43.3 | 29.990 | 0.041 | 15.00 | 18.620 | --- | 17.20 | 99.30 | | | 124.20* | | | 1962 | 62308 |
| T3 | Sheet | 0.06 | R.T. | T-L | 44.9 | 47.000 | 0.061 | 24.00 | 25.050 | --- | 18.10 | 133.29* | --- | --- | 138.76* | --- | --- | 1966 | 86734 |
| T3 | Sheet | 0.09 | 82 | T-L | 44.3 | 3.000 | 0.091 | 1.220 | 2.442 | --- | 28.00 | 43.26* | --- | --- | 102.18* | --- | --- | 1973 | 86213 |
| | | 0.09 | | | 45.2 | 3.000 | 0.091 | 1.300 | 2.653 | --- | 26.30 | 42.63* | | | 126.10* | | | 1973 | 86213 |
| | | 0.09 | | | 44.3 | 3.000 | 0.092 | 1.230 | 2.473 | --- | 27.60 | 42.90* | | | 104.10* | | | 1973 | 86213 |
| | | 0.09 | | | 44.3 | 3.000 | 0.092 | 1.220 | 2.514 | --- | 28.00 | 43.26* | | | 110.90* | | | 1973 | 86213 |
| | | 0.09 | | | 45.2 | 3.000 | 0.092 | 1.200 | 2.480 | --- | 27.10 | 41.37* | | | 103.14* | | | 1973 | 86213 |
| | | 0.09 | | | 45.2 | 3.000 | 0.092 | 1.200 | 2.504 | --- | 27.70 | 42.28* | | | 108.41* | | | 1973 | 86213 |
| | | 0.09 | | | 45.4 | 3.000 | 0.092 | 1.250 | 2.539 | --- | 26.90 | 42.32* | | | 109.74* | | | 1973 | 86213 |
| | | 0.09 | | | 45.4 | 3.000 | 0.092 | 1.230 | 2.525 | --- | 27.10 | 42.12* | | | 108.65* | | | 1973 | 86213 |
| | | 0.09 | | | 45.4 | 3.000 | 0.092 | 1.220 | 2.381 | --- | 27.80 | 42.95* | | | 95.18* | | | 1973 | 86213 |
| T86 | Sheet | 0.06 | R.T. | L-T | 65.8 | 2.000 | 0.063 | 0.625 | 1.030 | --- | 34.70 | 36.57 | 35.6 | 1.3 | 53.13* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 65.8 | 2.000 | 0.063 | 0.625 | 0.940 | --- | 32.90 | 34.68 | | | 46.48* | | | 1973 | 86213 |
| T86 | Sheet | 0.06 | R.T. | T-L | 65.1 | 2.000 | 0.063 | 0.625 | 0.970 | --- | 30.90 | 32.57 | 32.3 | 0.4 | 44.84* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 65.1 | 2.000 | 0.063 | 0.625 | 0.860 | --- | 30.30 | 31.94 | | | 39.86* | | | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

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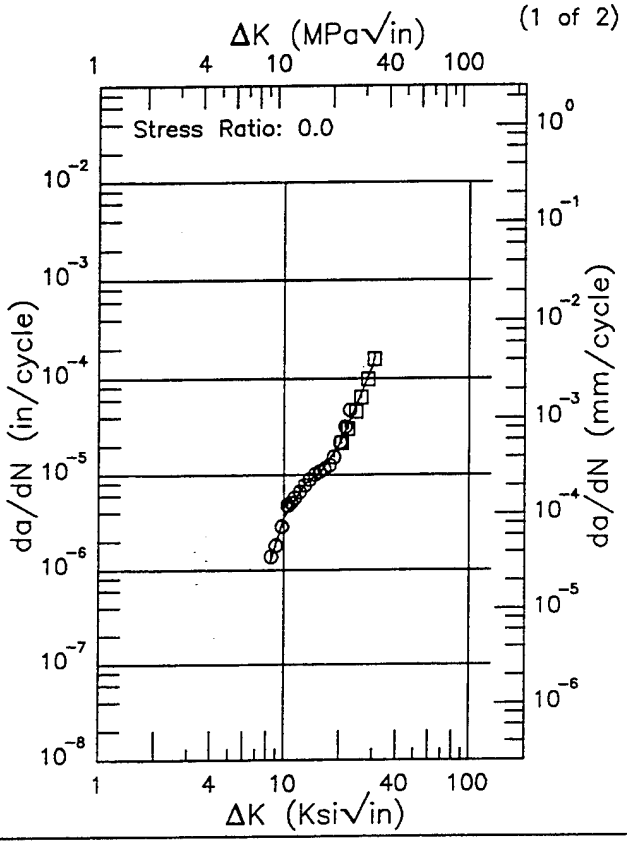
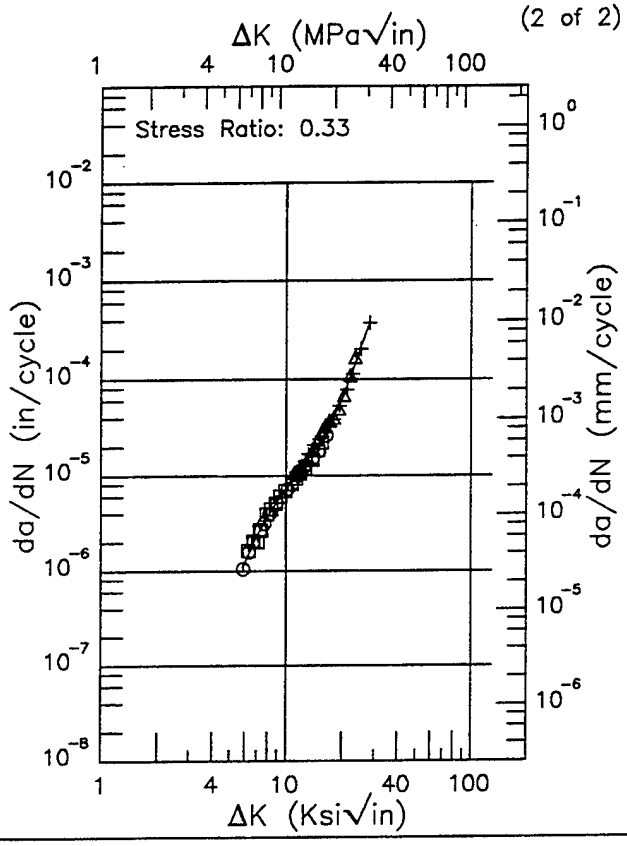
## 2024 (ALCLAD)

R

Condition/Ht: T3
Form: 0.09 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 13.3 Hz
Environment: LAB AIR; RT

Yield Strength: 45.8 ksi
Ult. Strength: 66.6 ksi
Specimen Thk: 0.09 in.
Specimen Width: 4 in.
Ref: 86213




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 8.49 (min) | 1.24 |
| 9. | 1.91 |
| 10. | 3.52 |
| 13. | 7.93 |
| 16. | 11.1 |
| 20. | 21.0 |
| 25. | 58.5 |
| 30. | 137. |
| 30.54 (max) | 161. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.87 (min) | 1.10 |
| 6. | 1.22 |
| 7. | 2.32 |
| 8. | 3.70 |
| 9. | 5.31 |
| 10. | 7.14 |
| 13. | 14.3 |
| 16. | 26.3 |
| 20. | 62.5 |
| 25. | 202. |
| 28.15 (max) | 363. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 9.97 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 8.68 | 0. .5 .8 1.25 2. |

**Figure 7.6.3.1**

# TABLE 7.7.1.1

## MEAN PLANE STRAIN FRACTURE TOUGHNESS FOR ALUMINUM 2000/6000 SERIES ALLOY 2048 AT ROOM TEMPERATURE

| Product Form | Condition/Heat Treatment | $K_{Ic}$ ($ksi\sqrt{in}$) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Specimen Orientation | | | | | | | | |
| | | L-T | | | T-L | | | S-L | | |
| | | Mean $K_{Ic}$ | Std Dev | n | Mean $K_{Ic}$ | Std Dev | n | Mean $K_{Ic}$ | Std Dev | n |
| Plate | T851 | 37.9 | 1.9 | 22 | 30.6 | 2.5 | 24 | 25.4 | 1.9 | 18 |

TABLE 7.7.1.2.1



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2048 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: Dry Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* ($Ksi\sqrt{in}$) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.33 | 2-20 | | | 3.28 | | | |
| | | 0.33 | 2-20 | | | 4.94 | 55.31 | | |

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK
## 2048 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: S.T.W.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level ($Ksi\sqrt{in}$) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.33 | 2-20 | | | 9.45 | | | |
| | | 0.33 | 2-20 | | | 8.85 | | | |

TABLE 7.7.1.2.3



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK
## 2048 ALLOYS AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: Dry Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level ($Ksi\sqrt{in}$) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.33 | 2-20 | | | 6.46 | | | |
| | | 0.33 | 10-30 | | | 3.71 | | | |

TABLE 7.7.1.2.4



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2048 AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: H.H.A.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* ($Ksi\sqrt{in}$) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.33 | 2-20 | | | 9.24 | | | |

TABLE 7.7.1.2.5



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2048 AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: S.T.W.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) ΔK *Level* (*Ksi√in*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.33 | 2-20 | | 1.05 | 10.88 | | | |
| | | 0.33 | 2-20 | | 0.5 | 11.23 | | | |
| | | 0.33 | 30 | 0.08 | 0.78 | | | | |
| | | 0.67 | 30 | | 1.52 | 24.61 | | | |

## TABLE 7.7.1.2.6

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2048 AT ROOM TEMPERATURE

**ORIENTATION: S-L** **ENVIRONMENT: H.H.A.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.33 | 2-20 | | | 11.48 | | | |

## TABLE 7.7.1.2.7



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2048 AT ROOM TEMPERATURE

**ORIENTATION: S-L** **ENVIRONMENT: S.T.W.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.33 | 2-20 | | 1.48 | 13.32 | | | |

# TABLE 7.7.2.1



## ALUMINUM 2048 $K_{Ic}$

| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 * ($K_c$/TYS)$^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_c$ (Ksi√in.) | $K_c$ MEAN | STAN DEV | | |
| T851 | Plate | 4.00 | R.T. | L-T | 59.1 | 4.000 | 2.000 | CT | 2.040 | 1.06 | 38.40 | 37.9 | 1.9 | 1977 | AL001 |
| | | 4.00 | | | 59.1 | 4.000 | 2.000 | CT | 2.020 | 1.00 | 37.40 | | | 1977 | AL001 |
| | | 4.00 | | | 59.1 | 4.000 | 2.000 | CT | 2.000 | 1.07 | 38.60 | | | 1977 | AL001 |
| | | 1.00 | | | 62.1 | 2.000 | 1.000 | CT | 1.030 | 0.97 | 38.70 | | | 1977 | AL001 |
| | | 2.00 | | | 63.7 | 4.000 | 1.980 | CT | 2.070 | 0.97 | 39.60 | | | 1977 | AL001 |
| | | 2.00 | | | 63.7 | 4.000 | 1.980 | CT | 2.050 | 1.05 | 41.20 | | | 1977 | AL001 |
| | | 2.00 | | | 63.7 | 4.000 | 1.980 | CT | 2.060 | 1.11 | 42.40 | | | 1977 | AL001 |
| | | 3.00 | | | 64.2 | 6.000 | 3.000 | CT | 3.120 | 0.80 | 36.40 | | | 1977 | AL001 |
| | | 3.00 | | | 64.2 | 6.000 | 3.000 | CT | 3.140 | 0.84 | 37.20 | | | 1977 | AL001 |
| | | 4.00 | | | 64.2 | 4.000 | 2.000 | CT | 2.020 | 0.79 | 36.20 | | | 1977 | AL001 |
| | | 3.00 | | | 64.2 | 6.000 | 3.000 | CT | 3.120 | 0.83 | 37.00 | | | 1977 | AL001 |
| | | 4.00 | | | 64.2 | 4.000 | 2.000 | CT | 2.010 | 0.75 | 35.20 | | | 1977 | AL001 |
| | | 4.00 | | | 64.2 | 4.000 | 2.000 | CT | 2.020 | 0.80 | 36.40 | | | 1977 | AL001 |
| | | 3.00 | | | 64.7 | 6.000 | 3.000 | CT | 3.060 | 0.89 | 38.50 | | | 1977 | AL001 |
| | | 3.00 | | | 64.7 | 6.000 | 3.000 | CT | 3.070 | 0.90 | 38.80 | | | 1977 | AL001 |
| | | 3.00 | | | 64.7 | 6.000 | 3.000 | CT | 3.060 | 0.84 | 37.60 | | | 1977 | AL001 |
| | | 2.00 | | | 65.4 | 4.000 | 1.980 | CT | 2.040 | 0.90 | 39.30 | | | 1977 | AL001 |
| | | 2.00 | | | 65.4 | 4.000 | 1.980 | CT | 2.040 | 0.91 | 39.40 | | | 1977 | AL001 |
| | | 2.00 | | | 65.4 | 4.000 | 1.980 | CT | 2.060 | 0.88 | 38.90 | | | 1977 | AL001 |
| | | 1.00 | | | 67.5 | 2.000 | 1.000 | CT | 1.040 | 0.70 | 35.70 | | | 1977 | AL001 |
| | | 1.00 | | | 67.5 | 2.000 | 1.000 | CT | 1.020 | 0.68 | 35.20 | | | 1977 | AL001 |
| | | 1.00 | | | 67.5 | 2.000 | 1.000 | CT | 1.040 | 0.70 | 35.70 | | | 1977 | AL001 |

# TABLE 7.7.2.1 (CONTINUED)



## ALUMINUM 2048 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 | Plate | 4.00 | R.T. | T-L | 57.3 | 4.000 | 2.000 | CT | 2.060 | 0.61 | 28.30 | 30.6 | 2.5 | 1977 | AL001 |
| | | 4.00 | | | 57.3 | 4.000 | 2.000 | CT | 2.020 | 0.61 | 28.40 | | | 1977 | AL001 |
| | | 4.00 | | | 57.3 | 4.000 | 2.000 | CT | 2.030 | 0.60 | 28.00 | | | 1977 | AL001 |
| | | 1.00 | | | 61.1 | 2.000 | 1.000 | CT | 1.030 | 0.67 | 31.70 | | | 1977 | AL001 |
| | | 1.00 | | | 61.1 | 2.000 | 1.000 | CT | 1.040 | 0.68 | 31.80 | | | 1977 | AL001 |
| | | 1.00 | | | 61.1 | 2.000 | 1.000 | CT | 1.030 | 0.67 | 31.70 | | | 1977 | AL001 |
| | | 4.00 | | | 61.9 | 4.000 | 2.000 | CT | 2.060 | 0.46 | 26.60 | | | 1977 | AL001 |
| | | 4.00 | | | 61.9 | 4.000 | 2.000 | CT | 2.040 | 0.48 | 27.00 | | | 1977 | AL001 |
| | | 4.00 | | | 61.9 | 4.000 | 2.000 | CT | 2.030 | 0.45 | 26.20 | | | 1977 | AL001 |
| | | 2.00 | | | 62.6 | 4.000 | 1.980 | CT | 2.050 | 0.57 | 30.00 | | | 1977 | AL001 |
| | | 2.00 | | | 62.6 | 4.000 | 1.980 | CT | 2.090 | 0.56 | 29.70 | | | 1977 | AL001 |
| | | 2.00 | | | 62.6 | 4.000 | 1.980 | CT | 2.060 | 0.55 | 29.40 | | | 1977 | AL001 |
| | | 3.00 | | | 62.9 | 6.000 | 3.000 | CT | 3.140 | 0.73 | 33.90 | | | 1977 | AL001 |
| | | 3.00 | | | 62.9 | 6.000 | 3.000 | CT | 3.100 | 0.70 | 33.30 | | | 1977 | AL001 |
| | | 3.00 | | | 62.9 | 6.000 | 3.000 | CT | 3.070 | 0.71 | 33.60 | | | 1977 | AL001 |
| | | 3.00 | | | 63.9 | 6.000 | 3.000 | CT | 3.240 | 0.70 | 33.70 | | | 1977 | AL001 |
| | | 3.00 | | | 63.9 | 6.000 | 3.000 | CT | 3.240 | 0.73 | 34.50 | | | 1977 | AL001 |
| | | 3.00 | | | 63.9 | 6.000 | 3.000 | CT | 3.280 | 0.72 | 34.30 | | | 1977 | AL001 |
| | | 2.00 | | | 64.9 | 4.000 | 1.980 | CT | 2.070 | 0.55 | 30.40 | | | 1977 | AL001 |
| | | 2.00 | | | 64.9 | 4.000 | 1.980 | CT | 2.050 | 0.53 | 29.90 | | | 1977 | AL001 |
| | | 2.00 | | | 64.9 | 4.000 | 1.980 | CT | 2.090 | 0.52 | 29.50 | | | 1977 | AL001 |
| | | 1.00 | | | 65.4 | 2.000 | 1.000 | CT | 1.060 | 0.56 | 30.90 | | | 1977 | AL001 |
| | | 1.00 | | | 65.4 | 2.000 | 1.000 | CT | 1.050 | 0.56 | 31.00 | | | 1977 | AL001 |
| | | 1.00 | | | 65.4 | 2.000 | 1.000 | CT | 1.050 | 0.55 | 30.70 | | | 1977 | AL001 |

# TABLE 7.7.2.1 (CONCLUDED)



## ALUMINUM 2048 $K_{Ic}$

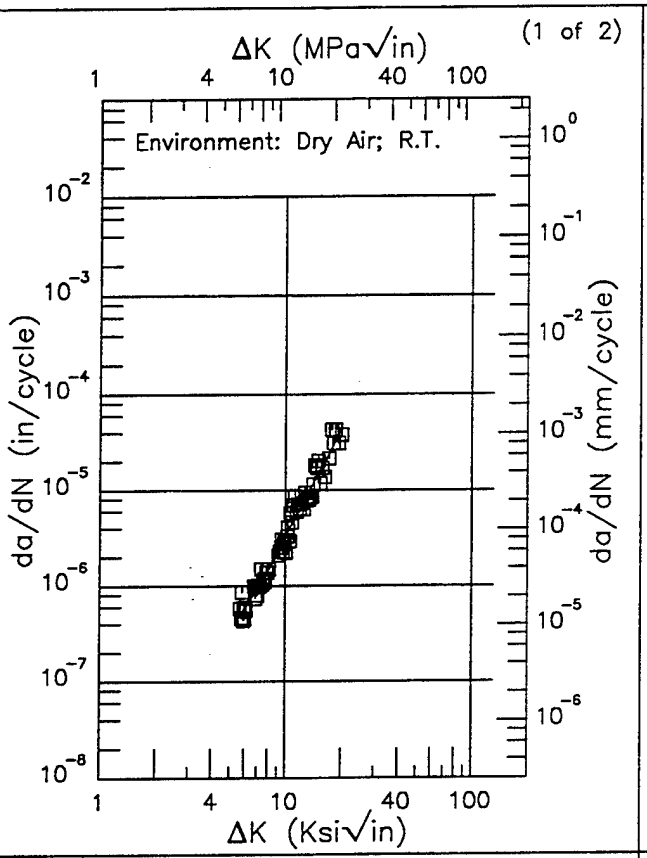
| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 | Plate | 4.00 | R.T. | S-L | 56.0 | 3.000 | 1.500 | CT | 1.530 | 0.48 | 24.60 | 25.4 | 1.9 | 1977 | AL001 |
| | | 4.00 | | | 56.0 | 3.000 | 1.500 | CT | 1.530 | 0.55 | 26.20 | | | 1977 | AL001 |
| | | 4.00 | | | 56.0 | 3.000 | 1.500 | CT | 1.530 | 0.52 | 25.60 | | | 1977 | AL001 |
| | | 3.00 | | | 58.5 | 2.500 | 1.250 | CT | 1.280 | 0.38 | 22.90 | | | 1977 | AL001 |
| | | 3.00 | | | 58.5 | 2.500 | 1.250 | CT | 1.280 | 0.38 | 22.80 | | | 1977 | AL001 |
| | | 3.00 | | | 58.5 | 2.500 | 1.250 | CT | 1.280 | 0.41 | 23.70 | | | 1977 | AL001 |
| | | 3.00 | | | 58.9 | 2.500 | 1.250 | CT | 1.290 | 0.60 | 28.80 | | | 1977 | AL001 |
| | | 3.00 | | | 58.9 | 2.500 | 1.250 | CT | 1.300 | 0.52 | 26.80 | | | 1977 | AL001 |
| | | 3.00 | | | 58.9 | 2.500 | 1.250 | CT | 1.290 | 0.65 | 30.00 | | | 1977 | AL001 |
| | | 2.00 | | | 59.3 | 1.500 | 0.750 | CT | 0.770 | 0.43 | 24.70 | | | 1977 | AL001 |
| | | 2.00 | | | 59.3 | 1.500 | 0.750 | CT | 0.780 | 0.46 | 25.30 | | | 1977 | AL001 |
| | | 2.00 | | | 59.3 | 1.500 | 0.750 | CT | 0.770 | 0.43 | 24.70 | | | 1977 | AL001 |
| | | 4.00 | | | 59.5 | 3.000 | 1.500 | CT | 1.520 | 0.42 | 24.30 | | | 1977 | AL001 |
| | | 4.00 | | | 59.5 | 3.000 | 1.500 | CT | 1.520 | 0.42 | 24.50 | | | 1977 | AL001 |
| | | 4.00 | | | 59.5 | 3.000 | 1.500 | CT | 1.520 | 0.40 | 23.90 | | | 1977 | AL001 |
| | | 2.00 | | | 59.9 | 1.500 | 0.750 | CT | 0.780 | 0.47 | 26.00 | | | 1977 | AL001 |
| | | 2.00 | | | 59.9 | 1.500 | 0.750 | CT | 0.780 | 0.48 | 26.20 | | | 1977 | AL001 |
| | | 2.00 | | | 59.9 | 1.500 | 0.750 | CT | 0.780 | 0.48 | 26.20 | | | 1977 | AL001 |

2048

E

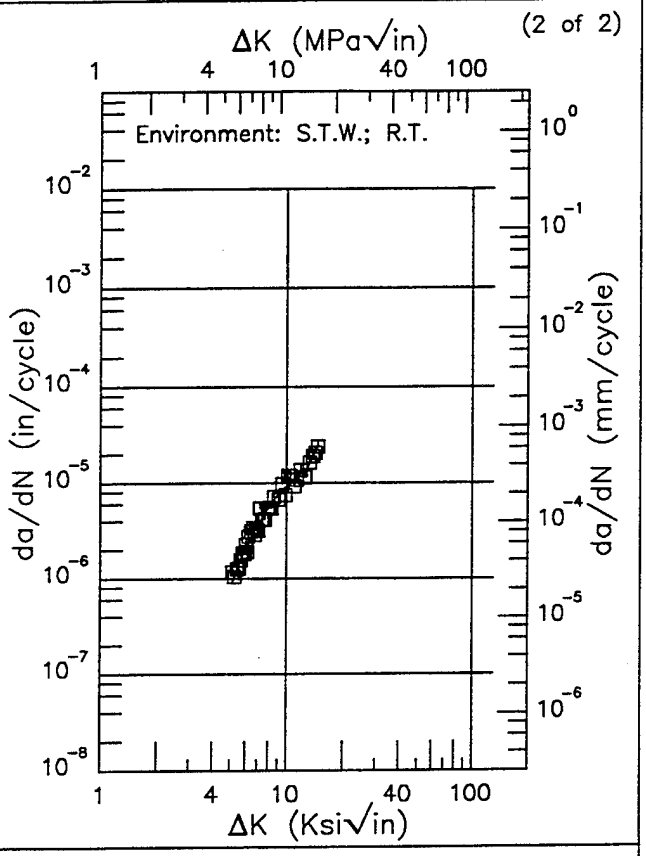
Condition/Ht: T851
Form: 1 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.33
Frequency: 2 – 20 Hz

Yield Strength: 67.5 ksi
Ult. Strength: 71.4 ksi
Specimen Thk: 1 in.
Specimen Width: 3.805 in.
Ref: AL001




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 5.67 (min) | 0.499 |
| 6. | 0.573 |
| 7. | 0.896 |
| 8. | 1.41 |
| 9. | 2.19 |
| 10. | 3.28 |
| 13. | 8.87 |
| 16. | 18.5 |
| 19.95 (max) | 42.9 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 22.63 | 0. .5 .8 1.25 2. |




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 5.12 (min) | 0.929 |
| 6. | 2.06 |
| 7. | 3.55 |
| 8. | 5.39 |
| 9. | 7.58 |
| 10. | 9.45 |
| 13. | 14.5 |
| 14.65 (max) | 24.4 |

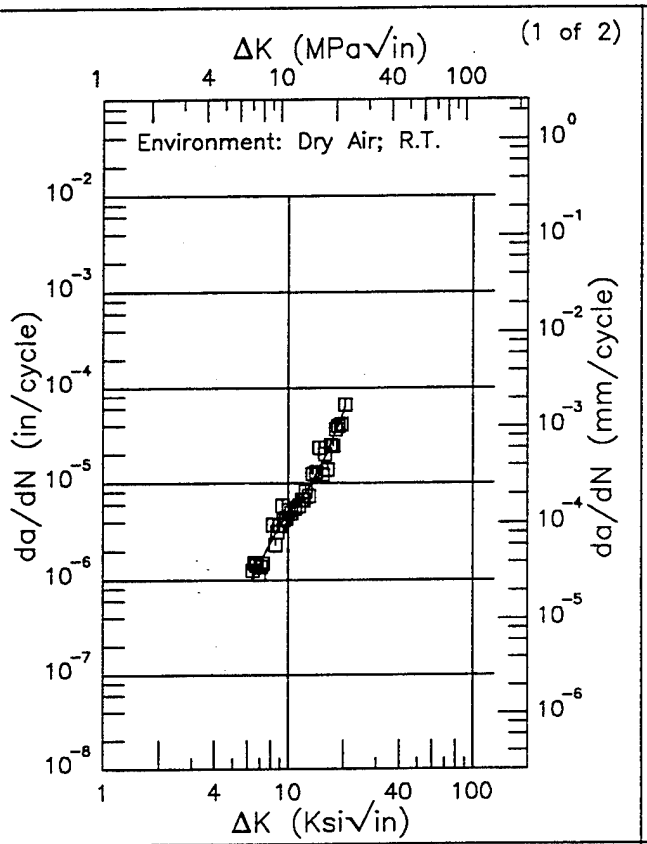
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 12.69 | 0. .5 .8 1.25 2. |

**Figure 7.7.3.1.1**

Condition/Ht: T851
Form: 4 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.33
Frequency: 2 – 20 Hz

Yield Strength: 59.1 ksi
Ult. Strength: 64.4 ksi
Specimen Thk: 1 in.
Specimen Width: 3.1 in.
Ref: AL001

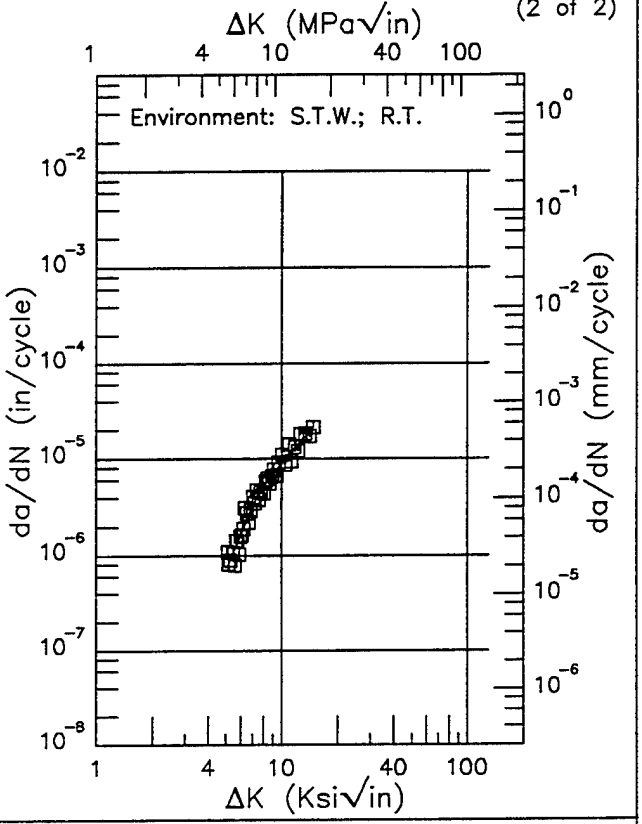
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.42 (min) | 1.07 |
| 7. | 1.50 |
| 8. | 2.49 |
| 9. | 3.69 |
| 10. | 4.94 |
| 13. | 8.99 |
| 16. | 19.4 |
| 20. | 55.3 |
| 20.35 (max) | 64.7 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 20.04 | 0. .5 .8 1.25 2. |

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.10 (min) | 0.763 |
| 6. | 1.61 |
| 7. | 3.27 |
| 8. | 5.24 |
| 9. | 7.02 |
| 10. | 8.85 |
| 13. | 16.3 |
| 14.76 (max) | 19.7 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 17.13 | 0. .5 .8 1.25 2. |

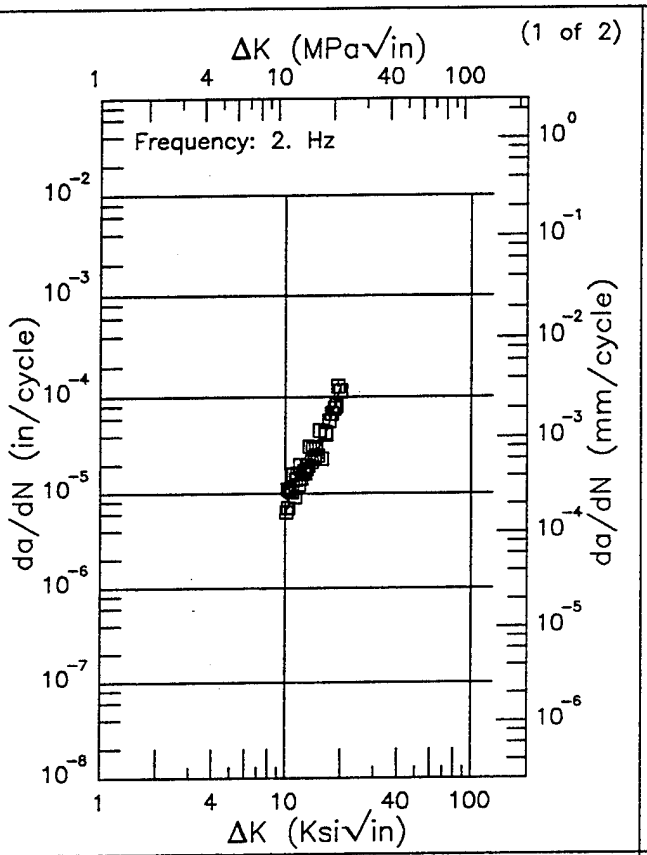
**Figure 7.7.3.1.2**

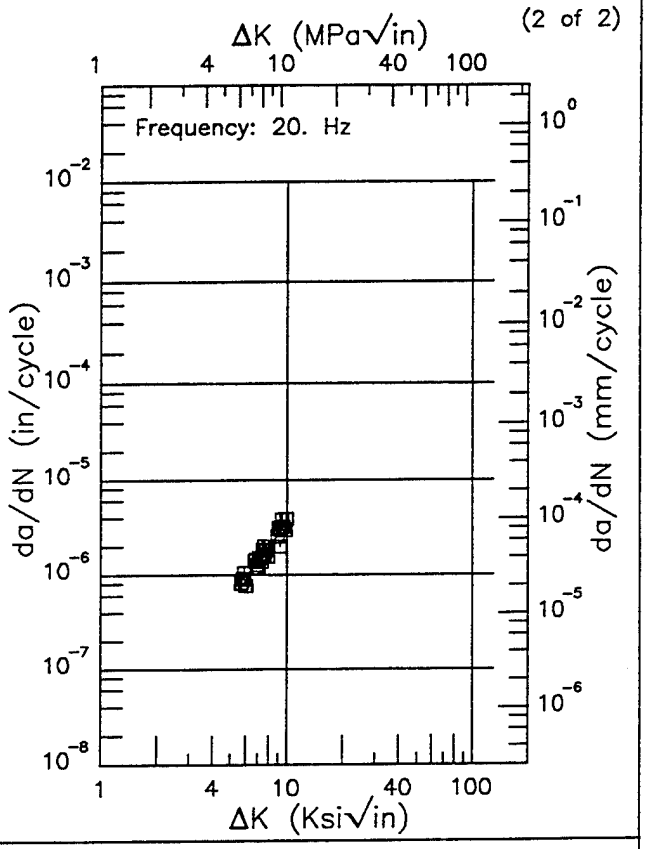
2048

F

Condition/Ht: T851
Form: 1 in. Plate
Specimen Type: CT
Orientation: T-L
Stress Ratio: 0.33
Environment: DRY AIR; RT

Yield Strength: 65.4 ksi
Ult. Strength: 70.5 ksi
Specimen Thk: 1 in.
Specimen Width: 3.805 in.
Ref: AL001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 10.08 (min) | 8.19 |
| 13. | 20.1 |
| 16. | 35.3 |
| 19.81 (max) | 123. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.67 (min) | 0.737 |
| 6. | 0.872 |
| 7. | 1.39 |
| 8. | 1.99 |
| 9. | 2.63 |
| 9.90 (max) | 3.62 |

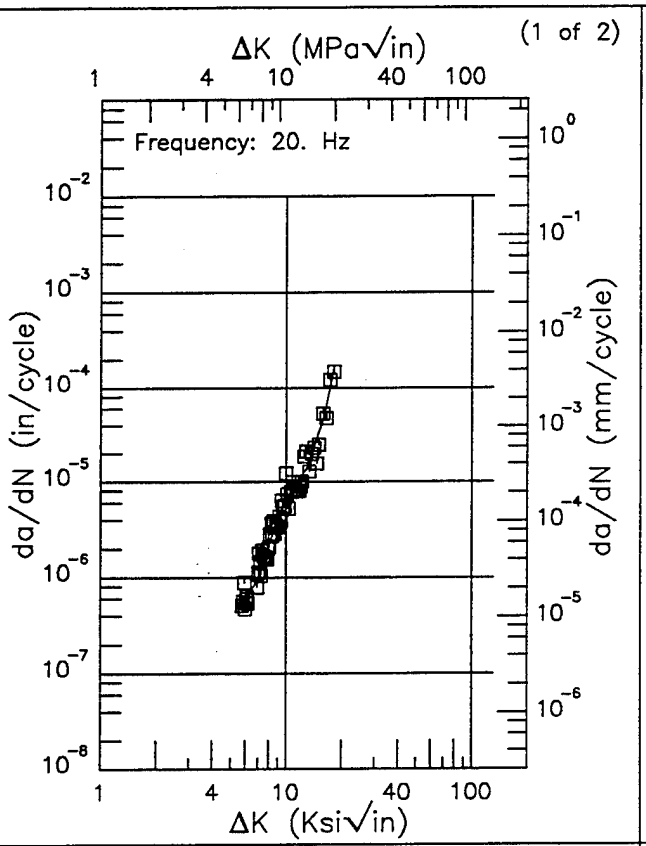
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 19.70 | 0. .5 .8 1.25 2. |

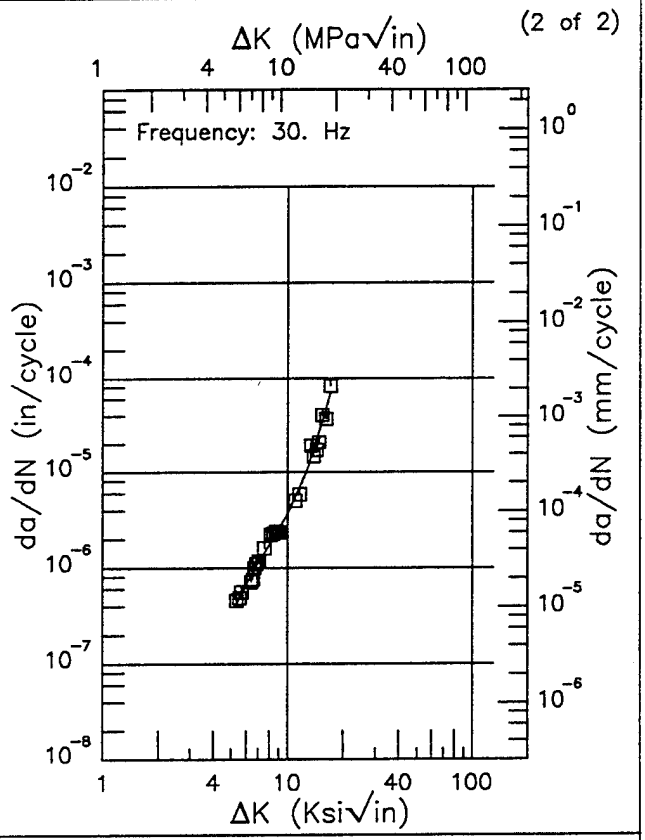
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 12.73 | 0. .5 .8 1.25 2. |

**Figure 7.7.3.1.3**

Condition/Ht: T851
Form: 4 in. Plate
Specimen Type: CT
Orientation: T–L
Stress Ratio: 0.33
Environment: DRY AIR; RT

Yield Strength: 57.3 ksi
Ult. Strength: 63.7 ksi
Specimen Thk: 0.25 in.
Specimen Width: 2.55 in.
Ref: AL001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.73 (min) | 0.546 |
| 6. | 0.560 |
| 7. | 0.980 |
| 8. | 2.16 |
| 9. | 4.18 |
| 10. | 6.46 |
| 13. | 13.8 |
| 16. | 49.1 |
| 18.10 (max) | 163. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.34 (min) | 0.419 |
| 6. | 0.667 |
| 7. | 1.14 |
| 8. | 1.75 |
| 9. | 2.56 |
| 10. | 3.71 |
| 13. | 11.7 |
| 16. | 42.9 |
| 17.07 (max) | 70.6 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 26.64 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 15.53 | 0. .5 .8 1.25 2. |

**Figure 7.7.3.1.4**

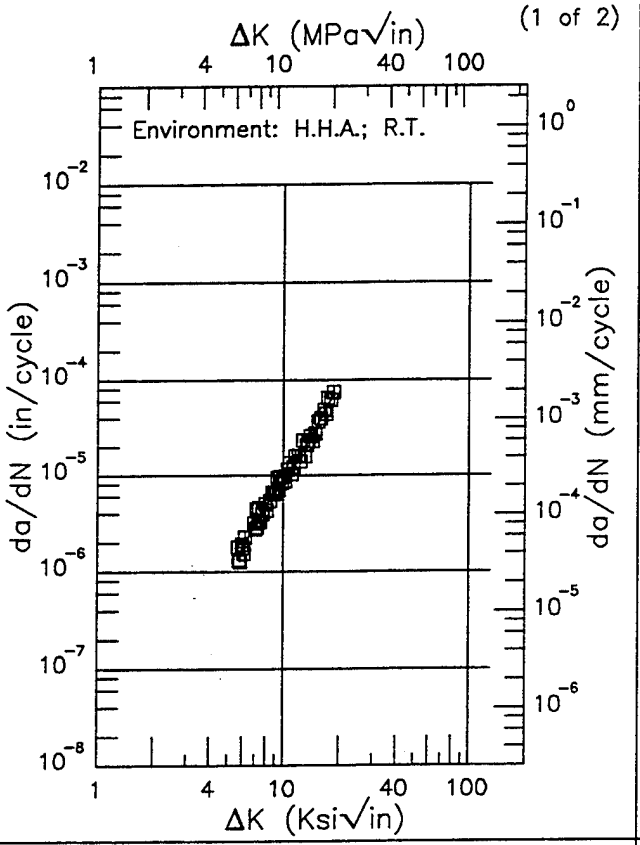
2048

E

Condition/Ht: T851
Form: 1 in. Plate
Specimen Type: CT
Orientation: T–L
Stress Ratio: 0.33
Frequency: 2 – 20 Hz

Yield Strength: 65.4 ksi
Ult. Strength: 70.5 ksi
Specimen Thk: 1 in.
Specimen Width: 3.805 in.
Ref: AL001

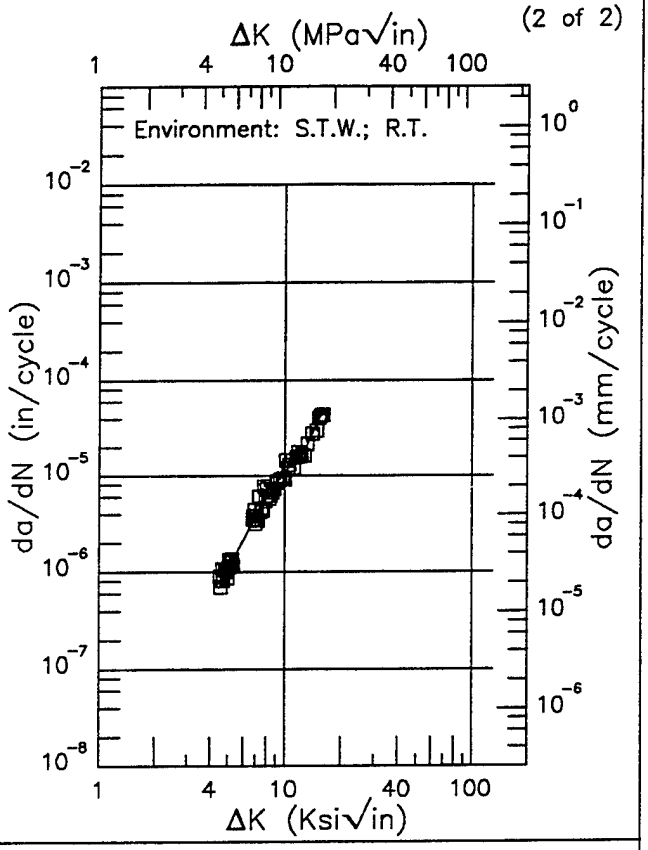
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.67 (min) | 1.40 |
| 6. | 1.74 |
| 7. | 3.05 |
| 8. | 4.76 |
| 9. | 6.83 |
| 10. | 9.24 |
| 13. | 19.4 |
| 16. | 41.1 |
| 18.55 (max) | 74.2 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 13.56 | 0. .5 .8 1.25 2. |

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.50 (min) | 0.697 |
| 5. | 1.05 |
| 6. | 2.12 |
| 7. | 3.74 |
| 8. | 5.86 |
| 9. | 8.32 |
| 10. | 10.9 |
| 13. | 19.6 |
| 15.99 (max) | 49.0 |

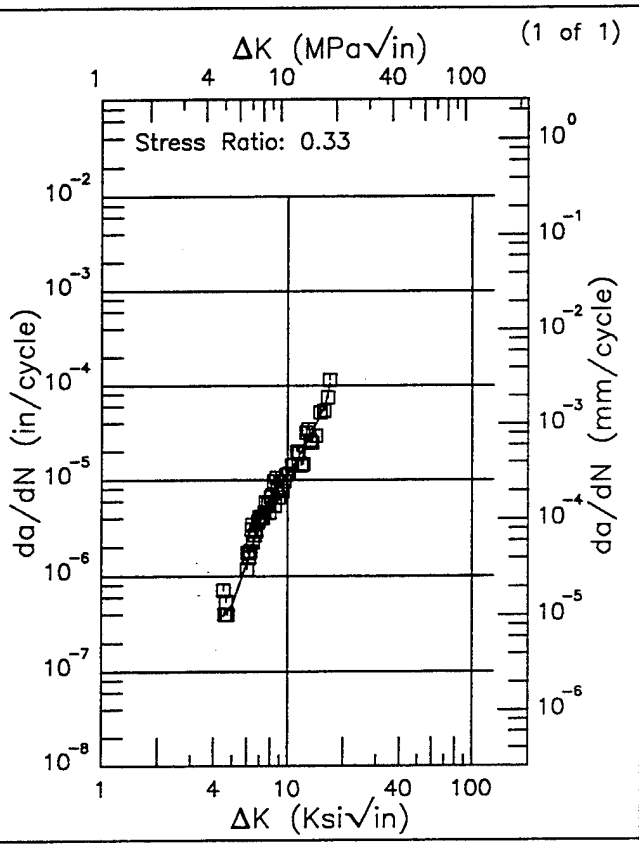
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 14.53 | 0. .5 .8 1.25 2. |

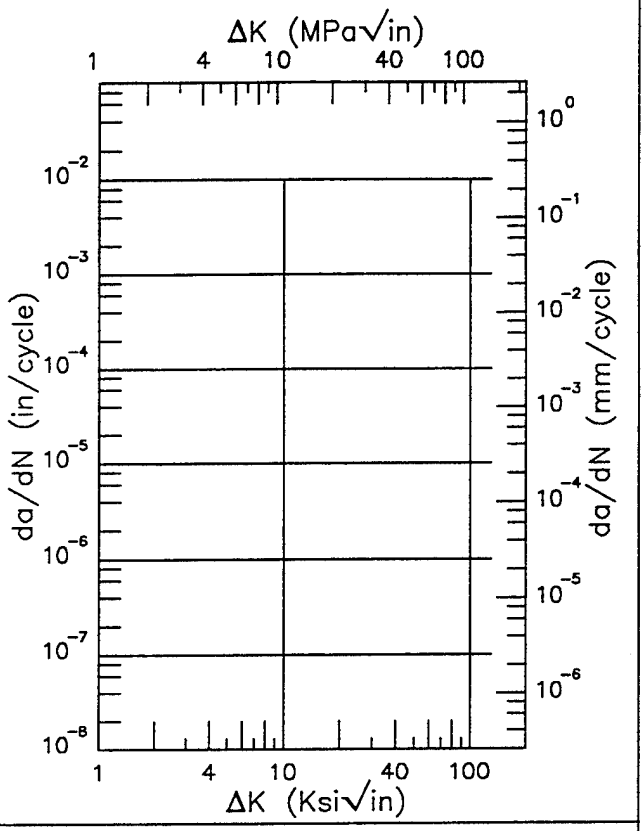
**Figure 7.7.3.1.5**

Condition/Ht: T851
Form: 4 in. Plate
Specimen Type: CT
Orientation: T–L
Frequency: 2 – 20 Hz
Environment: S.T.W.; RT

Yield Strength: 57.3 ksi
Ult. Strength: 63.7 ksi
Specimen Thk: 1 in.
Specimen Width: 2.55 in.
Ref: AL001

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.51 (min) | 0.388 |
| 5. | 0.502 |
| 6. | 1.33 |
| 7. | 3.46 |
| 8. | 6.44 |
| 9. | 8.91 |
| 10. | 11.2 |
| 13. | 26.3 |
| 16. | 63.0 |
| 16.89 (max) | 106. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 24.64 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.7.3.1.6**

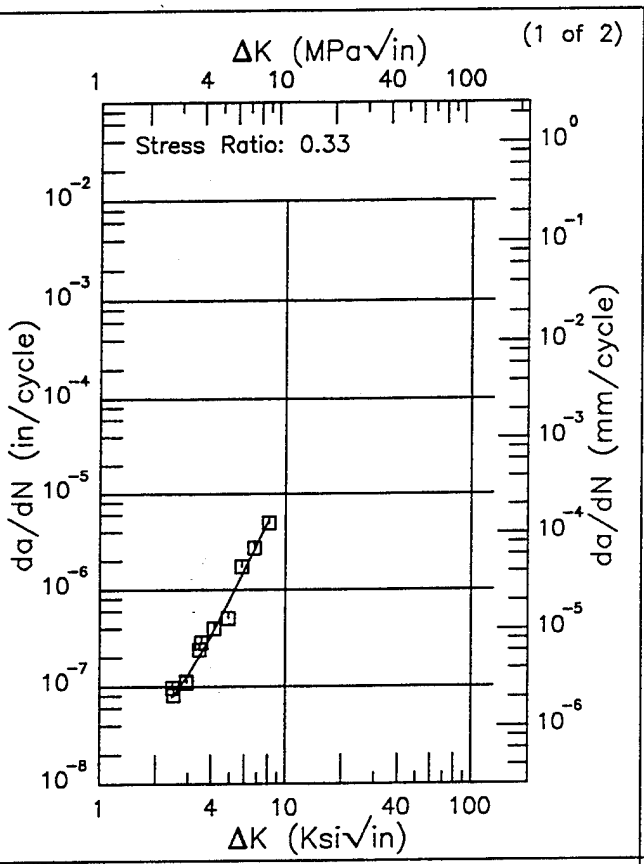
2048

R

Condition/Ht: T851
Form: 4 in. Plate
Specimen Type: CT
Orientation: T–L
Frequency: 30 Hz
Environment: S.T.W.; RT

Yield Strength: 57.3 ksi
Ult. Strength: 63.7 ksi
Specimen Thk: 0.25 in.
Specimen Width: 2.55 in.
Ref: AL001

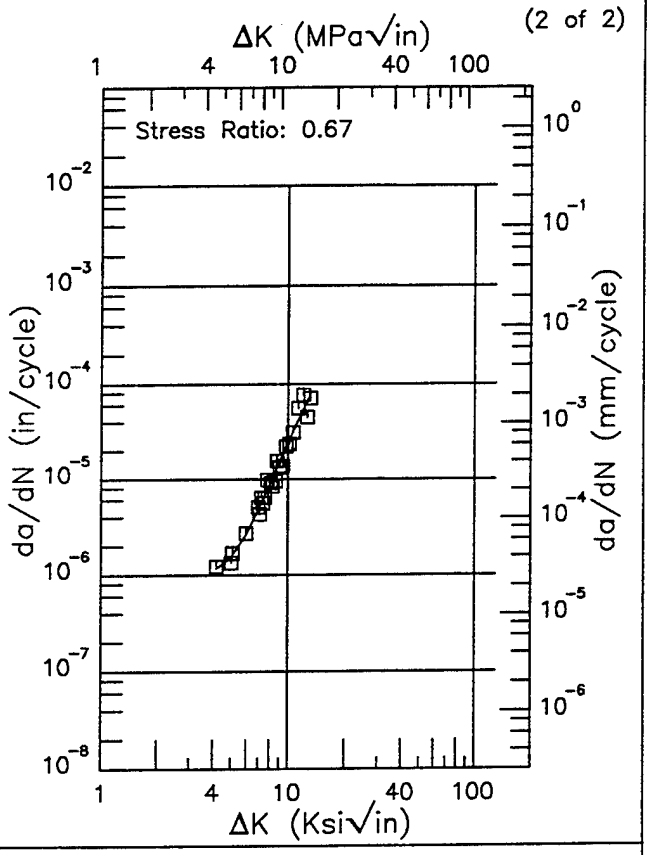
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 2.46 (min) | 0.0778 |
| 2.5 | 0.0808 |
| 3. | 0.131 |
| 3.5 | 0.213 |
| 4. | 0.337 |
| 5. | 0.777 |
| 6. | 1.60 |
| 7. | 2.97 |
| 8. | 5.05 |
| 8.09 (max) | 5.28 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 17.95 | 0. .5 .8 1.25 2. |

(2 of 2)



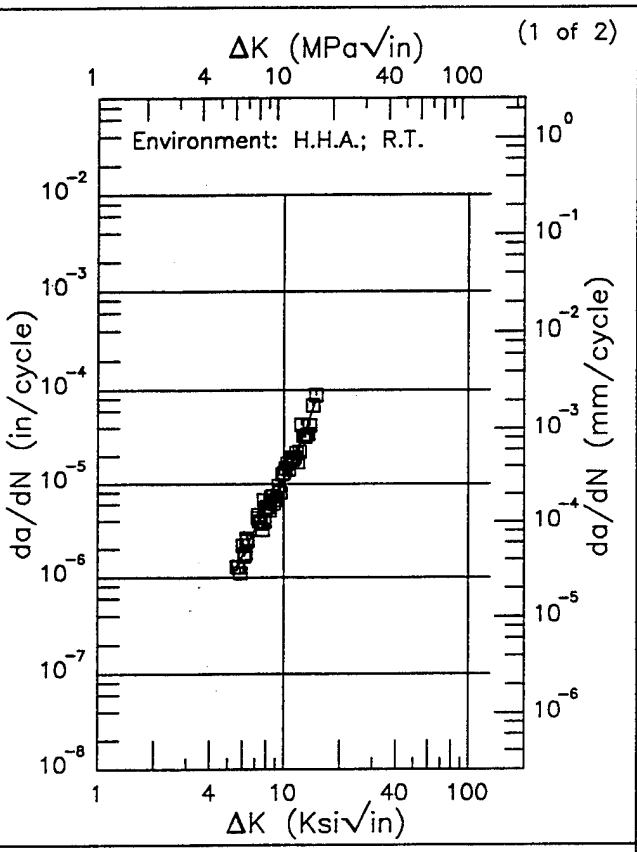

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.19 (min) | 1.16 |
| 5. | 1.52 |
| 6. | 2.61 |
| 7. | 4.81 |
| 8. | 8.72 |
| 9. | 15.1 |
| 10. | 24.6 |
| 13. | 73.6 |
| 13.10 (max) | 75.7 |

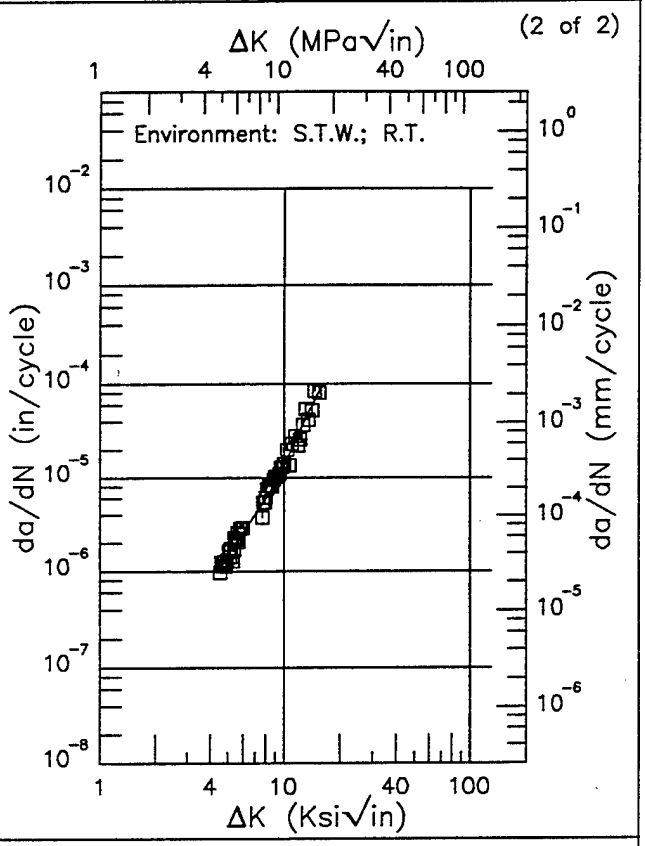
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 18.31 | 0. .5 .8 1.25 2. |

**Figure 7.7.3.1.7**

Condition/Ht: T851
Form: 4 in. Plate
Specimen Type: CT
Orientation: S-L
Stress Ratio: 0.33
Frequency: 2 - 20 Hz

Yield Strength: 56 ksi
Ult. Strength: 62.5 ksi
Specimen Thk: 1 in.
Specimen Width: 3.805 in.
Ref: AL001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.60 (min) | 1.18 |
| 6. | 1.70 |
| 7. | 3.33 |
| 8. | 5.39 |
| 9. | 7.99 |
| 10. | 11.5 |
| 13. | 35.7 |
| 14.81 (max) | 78.8 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.50 (min) | 1.05 |
| 5. | 1.48 |
| 6. | 2.54 |
| 7. | 3.97 |
| 8. | 5.97 |
| 9. | 8.90 |
| 10. | 13.3 |
| 13. | 42.2 |
| 15.41 (max) | 84.1 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 17.48 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 15.03 | 0. .5 .8 1.25 2. |

**Figure 7.7.3.1.8**

TABLE 7.8.1.2.1



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2091 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: H.H.A.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T6 | FORGING | 0.1 | 10 | | | | 31.48 | | |
| T8 275F 12HRS | SHEET | 0. | 10 | | 0.29 | 6.52 | 21.28 | | |
| | | 0.1 | 10 | | 0.35 | 7.55 | | | |
| | | 0.5 | 10 | | 1.49 | 10.05 | 86.99 | | |
| | PLATE | 0. | 10 | | | 5.71 | 24.79 | | |
| | | 0.1 | 10 | | | 5.69 | 21.89 | | |
| | | 0.5 | 10 | | 1.56 | 10.52 | 73.37 | | |

## TABLE 7.8.1.2.2

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2091 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T3 | SHEET | 0.02 | 1-10 | | | 3.46 | 11.27 | | |
| T81 335F 32HRS | SHEET | 0.1 | 5 | | | 6.18 | 37.78 | | |
| T851 335F 16HRS | PLATE | 0.1 | 5 | | | 6.36 | 56.32 | | |

TABLE 7.8.1.2.3



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2091 AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: H.H.A.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level ($Ksi\sqrt{in}$) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T6 | FORGING | 0.1 | 10 | | | 1.69 | 49.06 | | |
| T8 275F 12HRS | SHEET | 0. | 10 | | 0.18 | 5.06 | 24.87 | | |
| | | 0.1 | 10 | | 0.71 | 3.98 | | | |
| | | 0.5 | 10 | | 1.39 | 7.9 | | | |
| | PLATE | 0. | 10 | | 0.14 | 5.3 | 17.56 | | |
| | | 0.1 | 10 | | | 4.94 | 28.8 | | |
| | | 0.5 | 12 | | 0.67 | 7.52 | 95.59 | | |

## TABLE 7.8.1.2.4

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2091 AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T3 | SHEET | 0.02 | 1-25 | | 0.46 | 2.42 | 28.28 | | |
| T81 335F 32HRS | SHEET | 0.1 | 5 | | 0.41 | 3.76 | 40.5 | | |
| T851 335F 16HRS | PLATE | 0.1 | 5 | | 0.58 | 7.59 | 61.17 | | |

## TABLE 7.8.1.2.5



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2091 AT ROOM TEMPERATURE

**ORIENTATION: C-S** **ENVIRONMENT: H.H.A.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T8 275F 12HRS | SHEET | 0. | 10 | | | 10.42 | 30.73 | | |
| | | 0.5 | 10 | | 2.65 | 16.41 | | | |
| | PLATE | 0. | 10 | | 0.84 | 11.07 | 131.91 | | |
| | | 0.5 | 10 | | 2.55 | 17.54 | | | |

# RESISTANCE CURVE

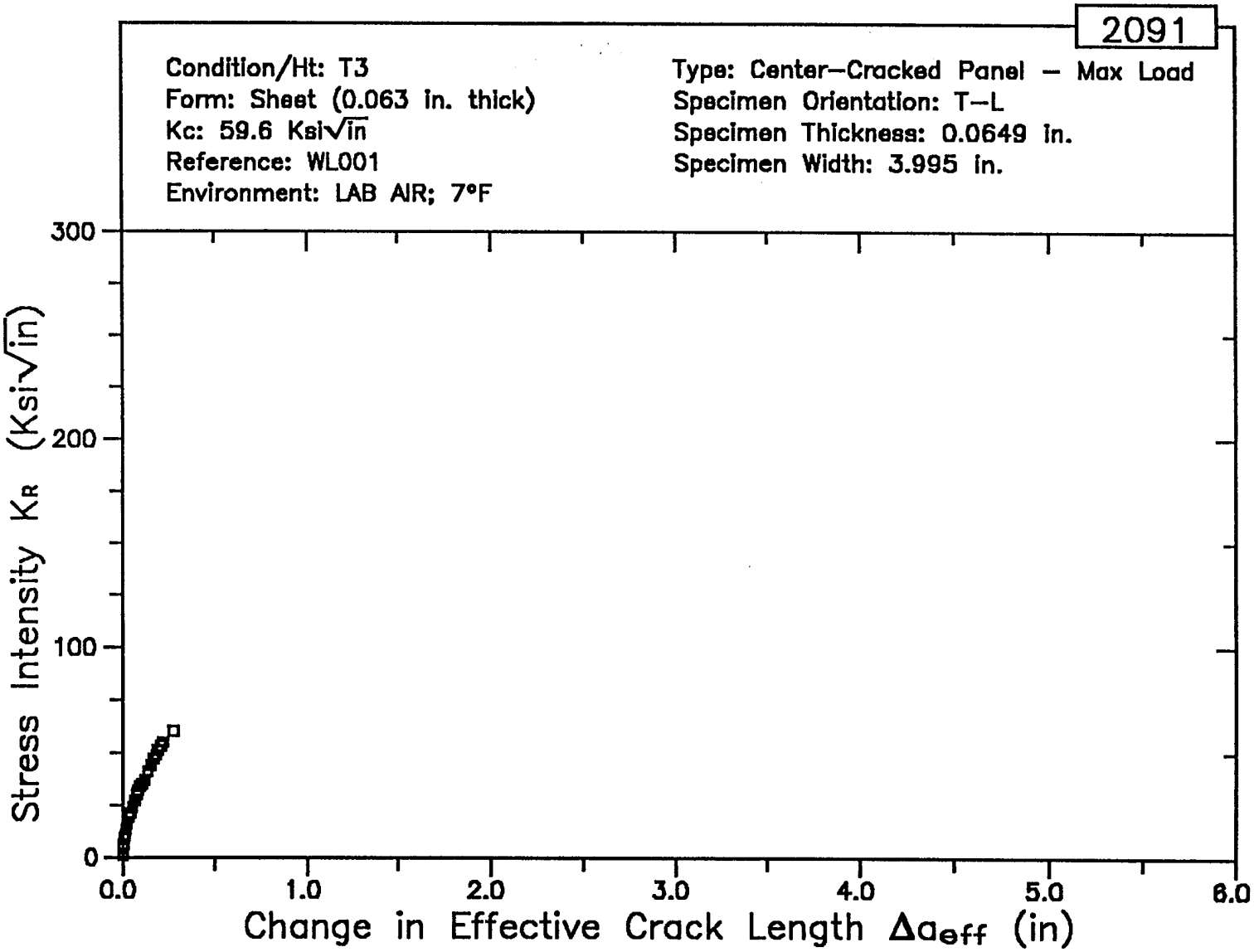



Figure 7.8.2.3.1

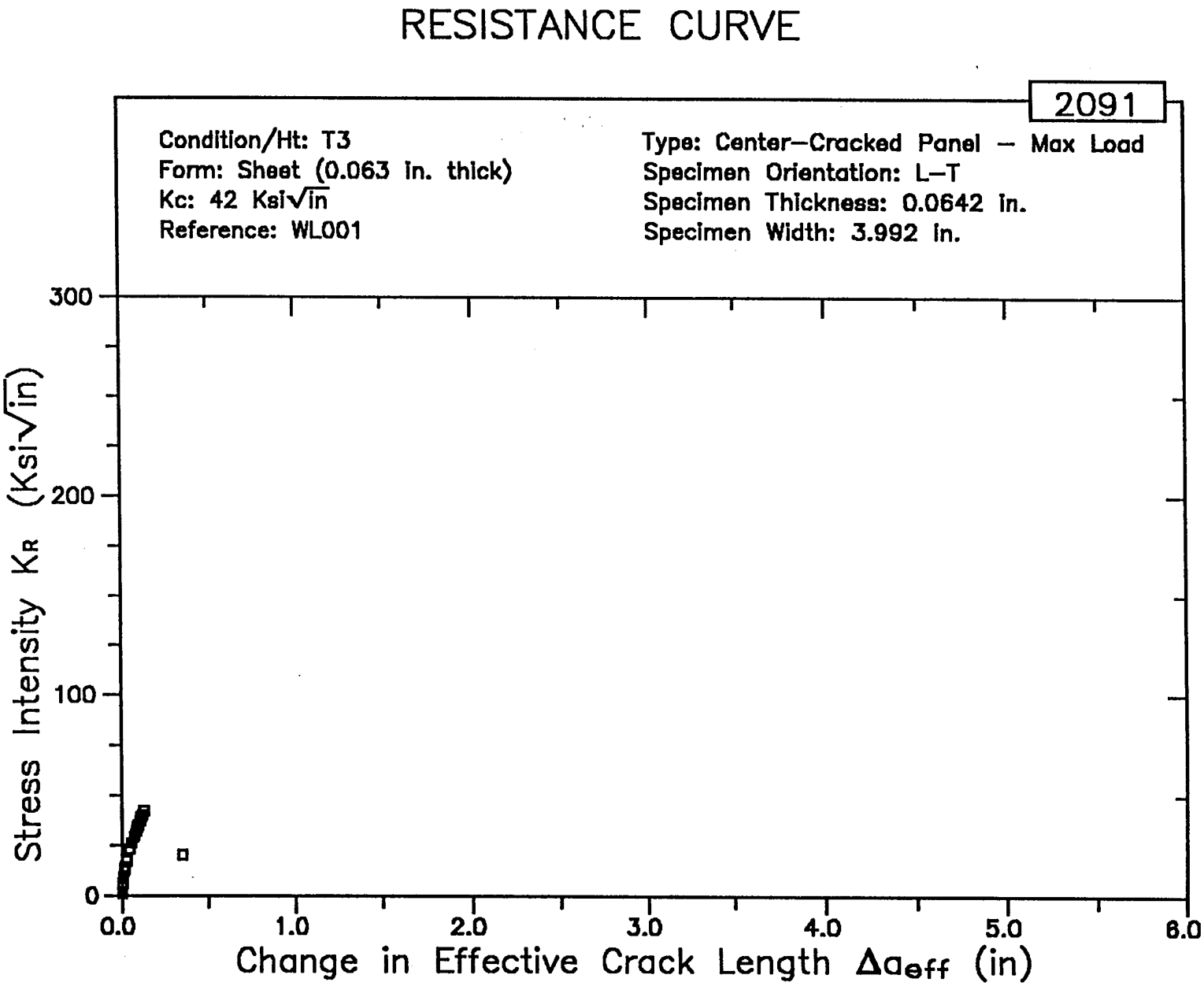



Figure 7.8.2.3.2

# RESISTANCE CURVE

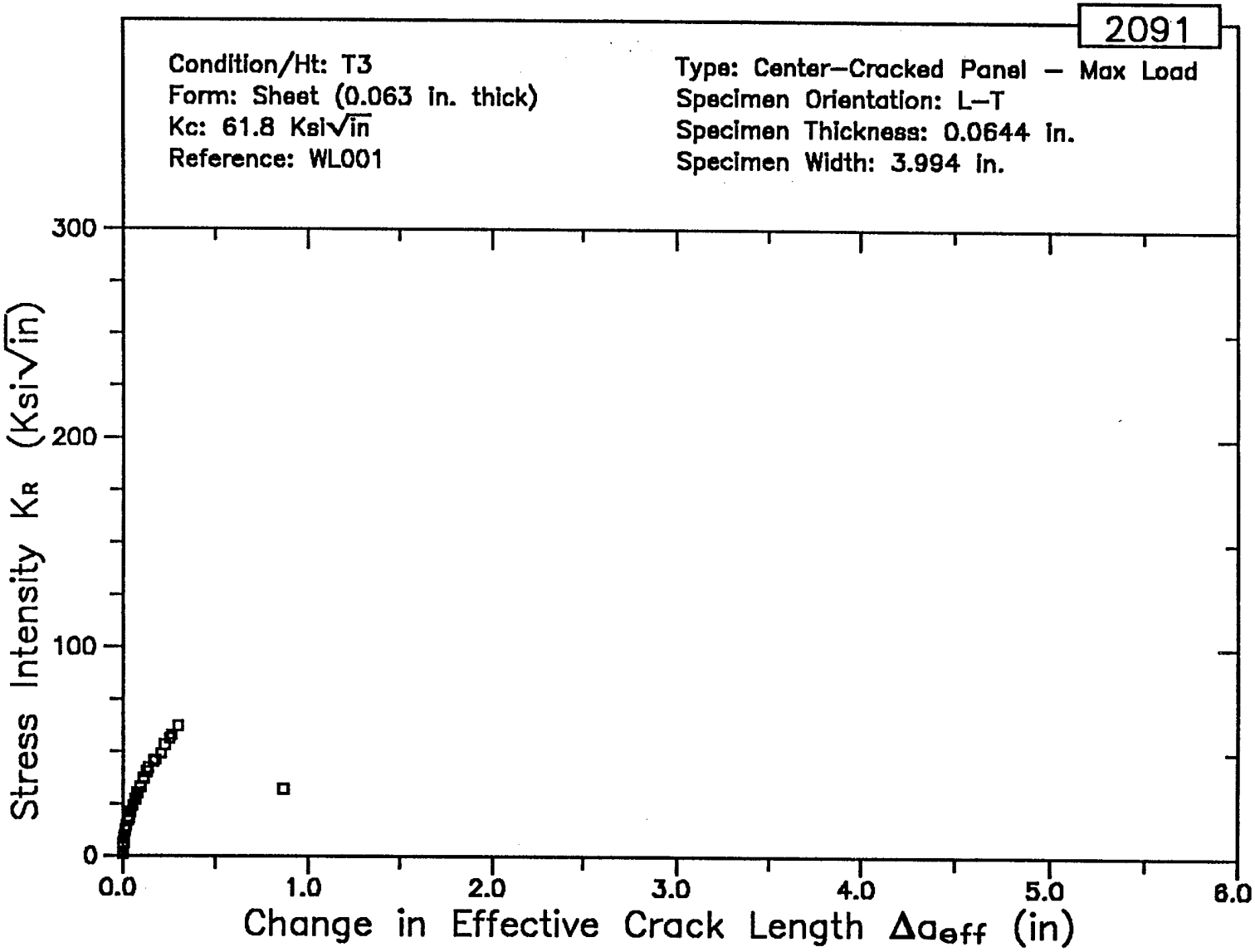



Figure 7.8.2.3.3

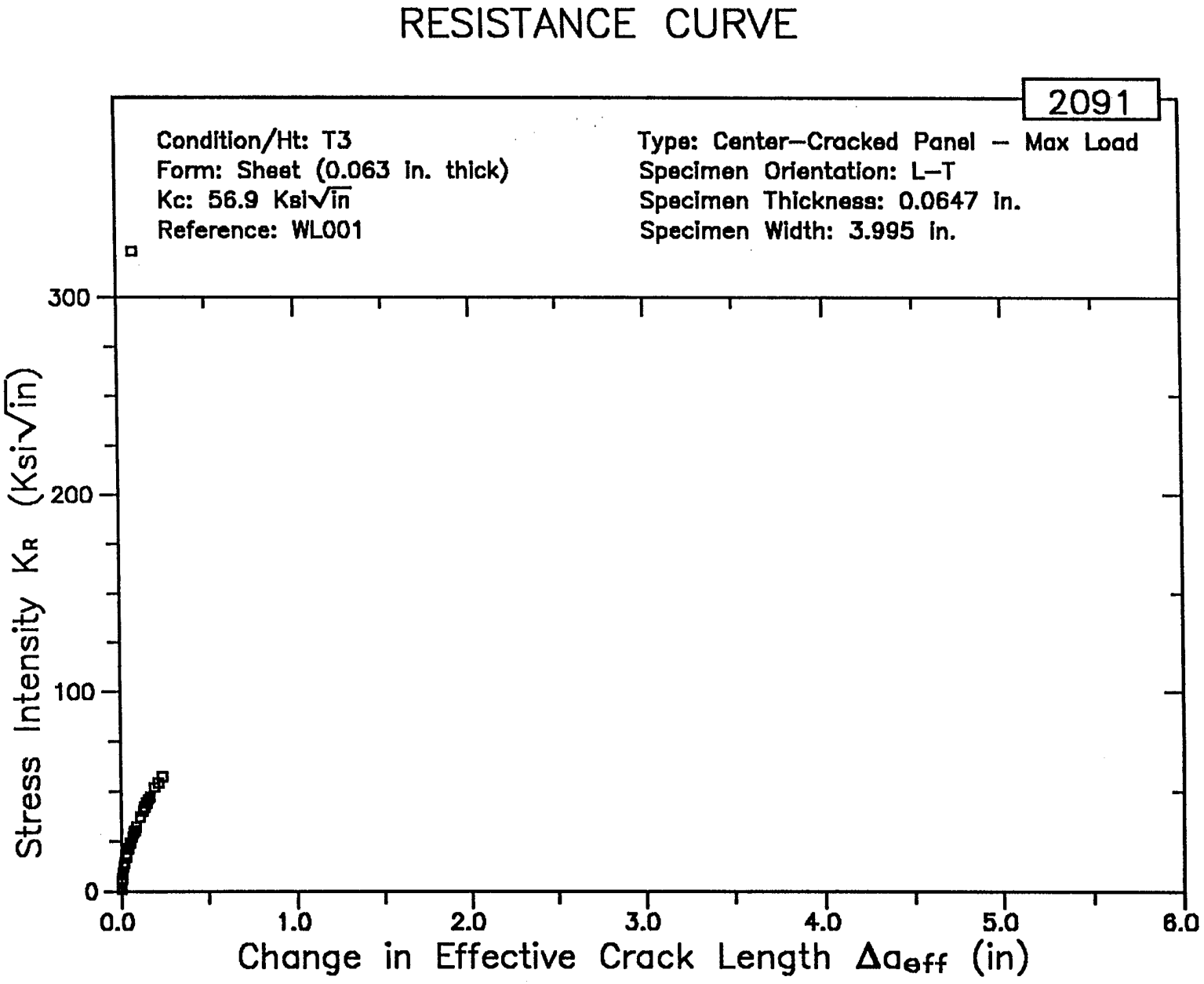



Figure 7.8.2.3.4

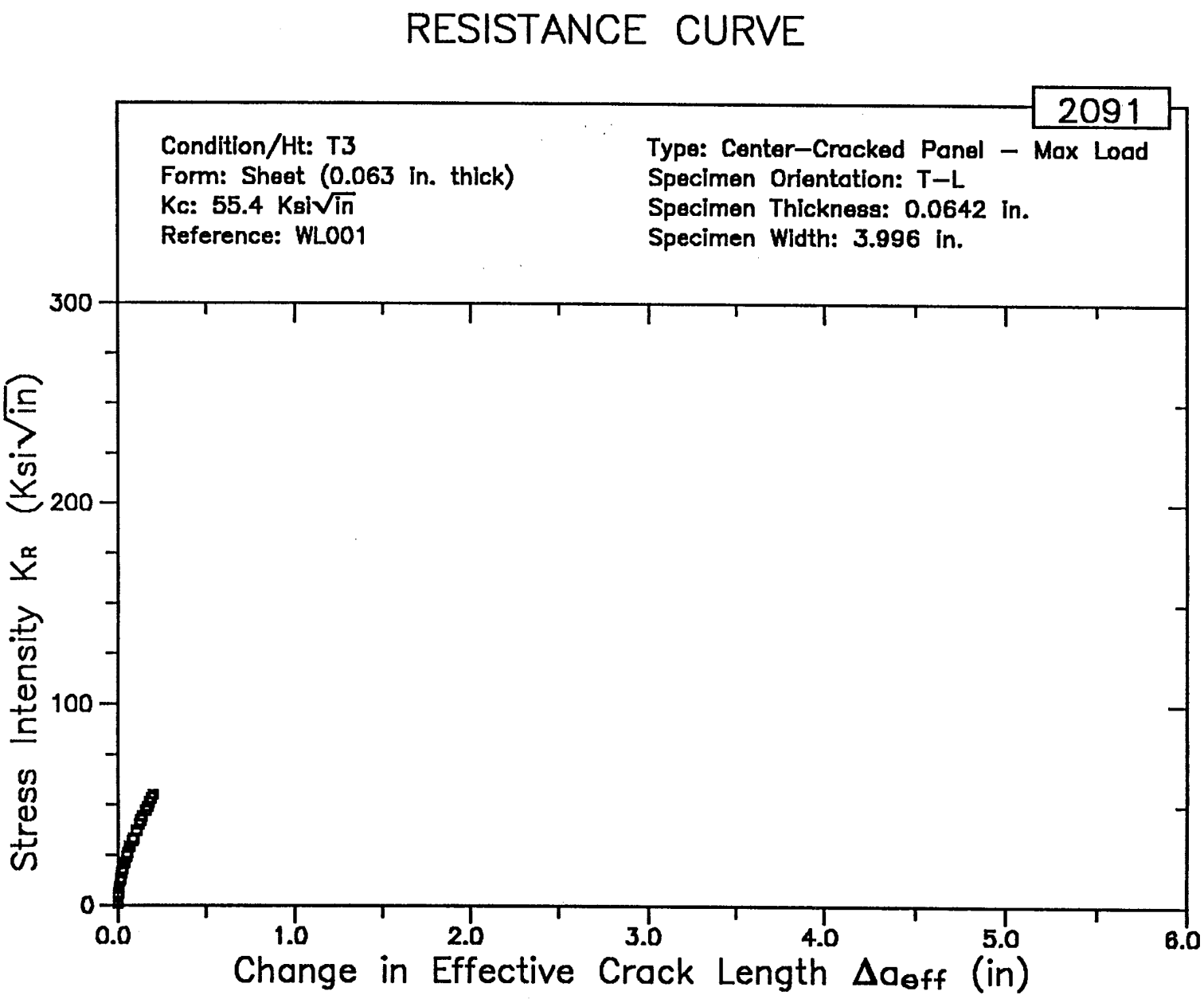



Figure 7.8.2.3.5

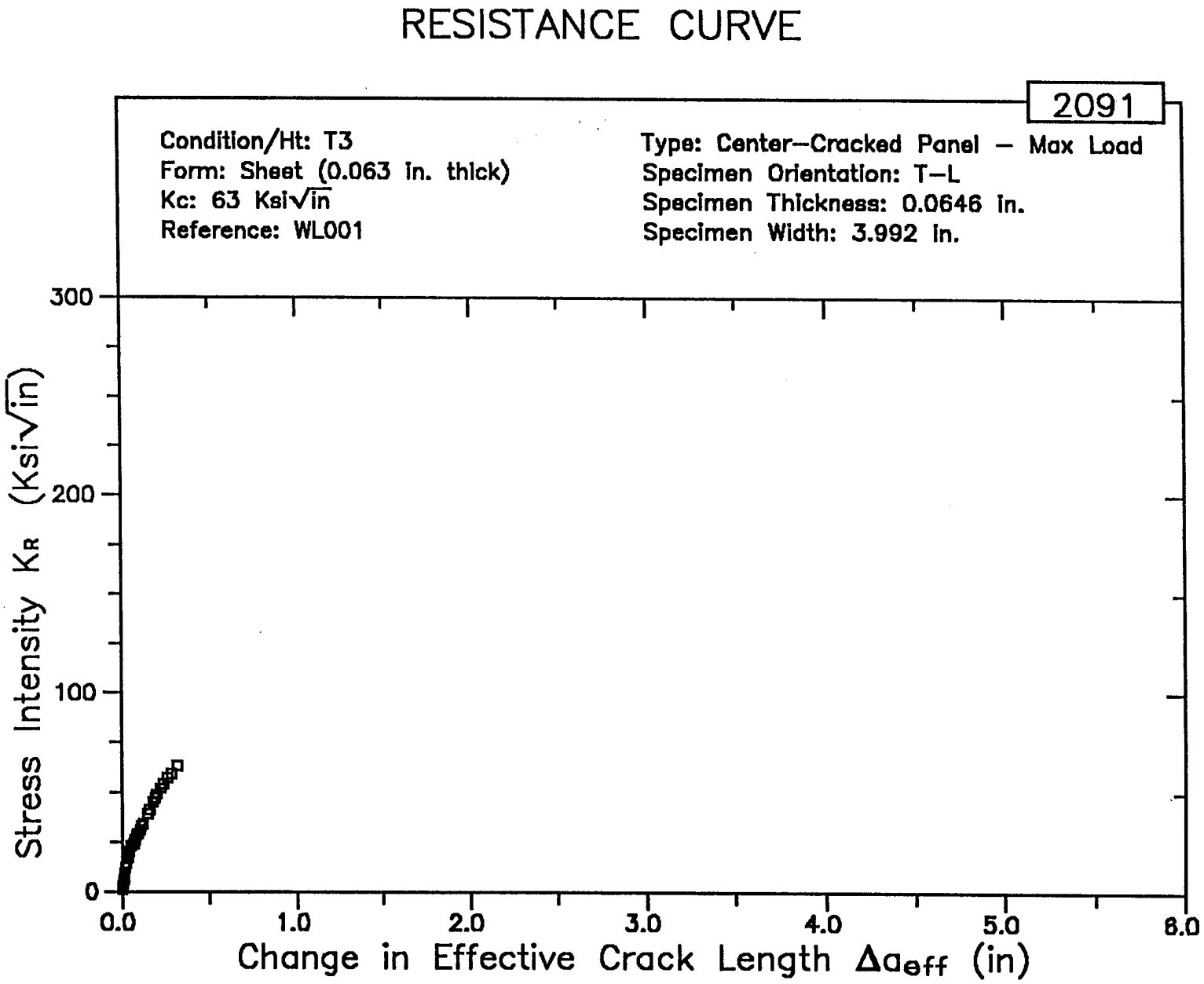



Figure 7.8.2.3.6

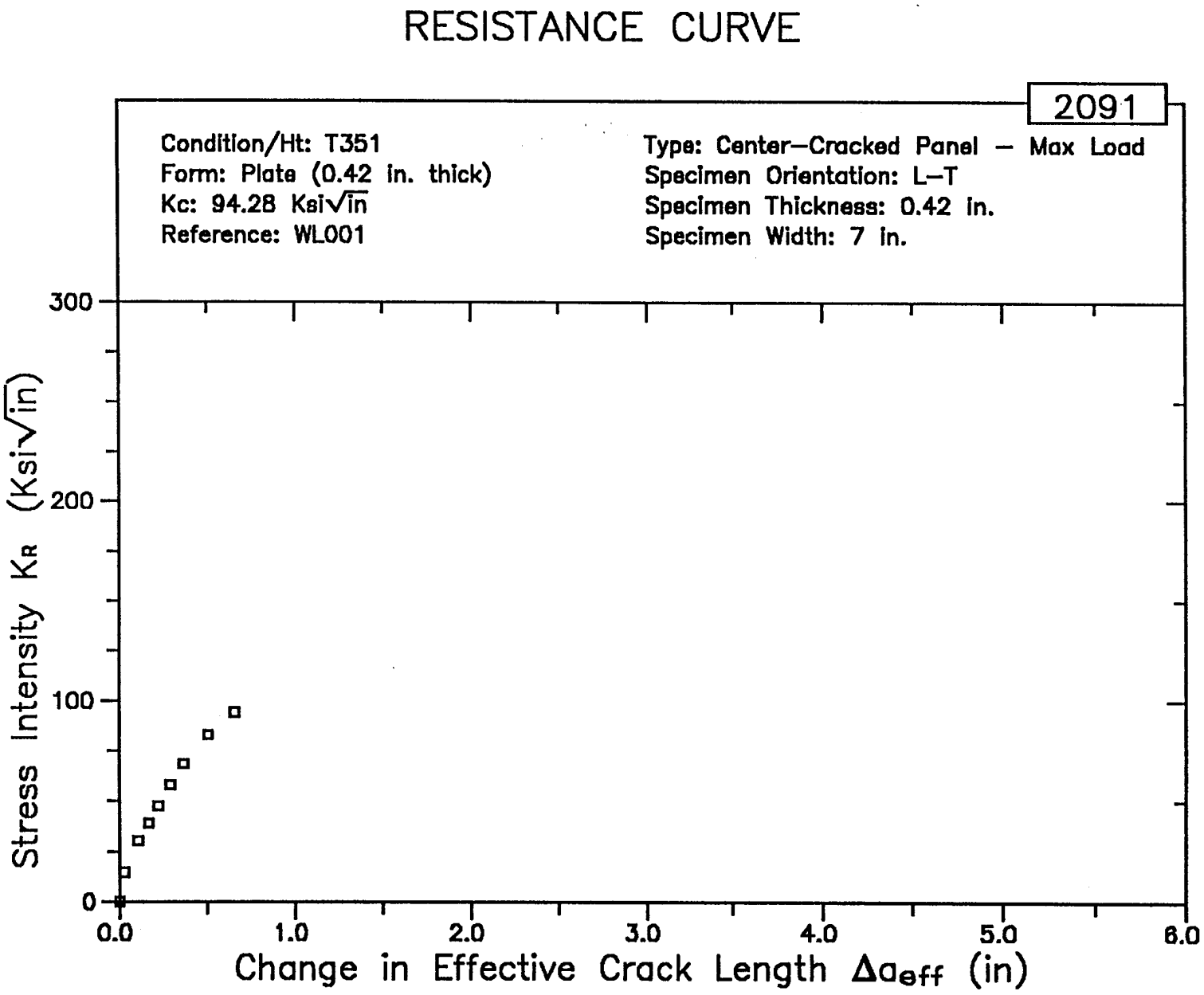



Figure 7.8.2.3.7

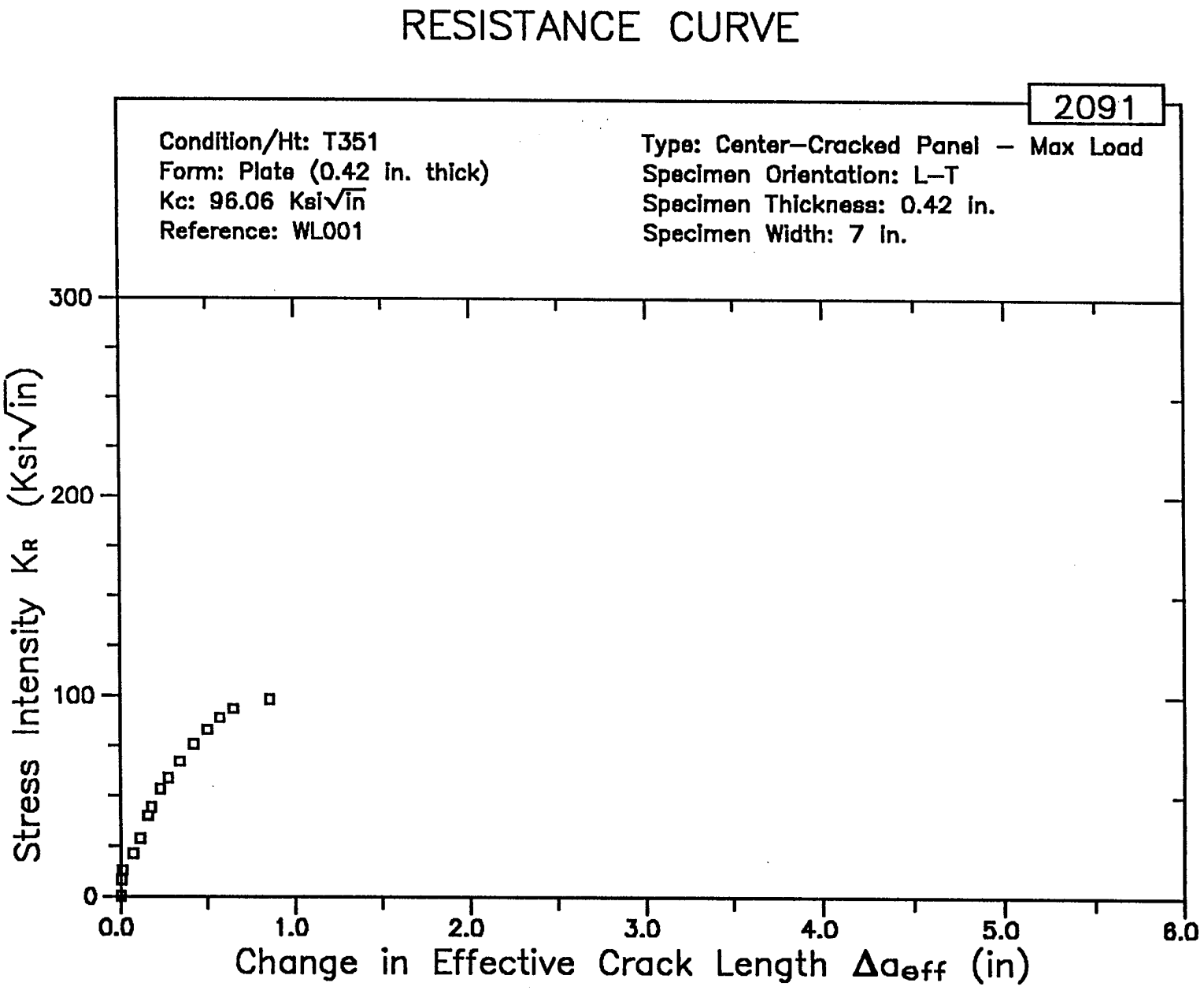



Figure 7.8.2.3.8

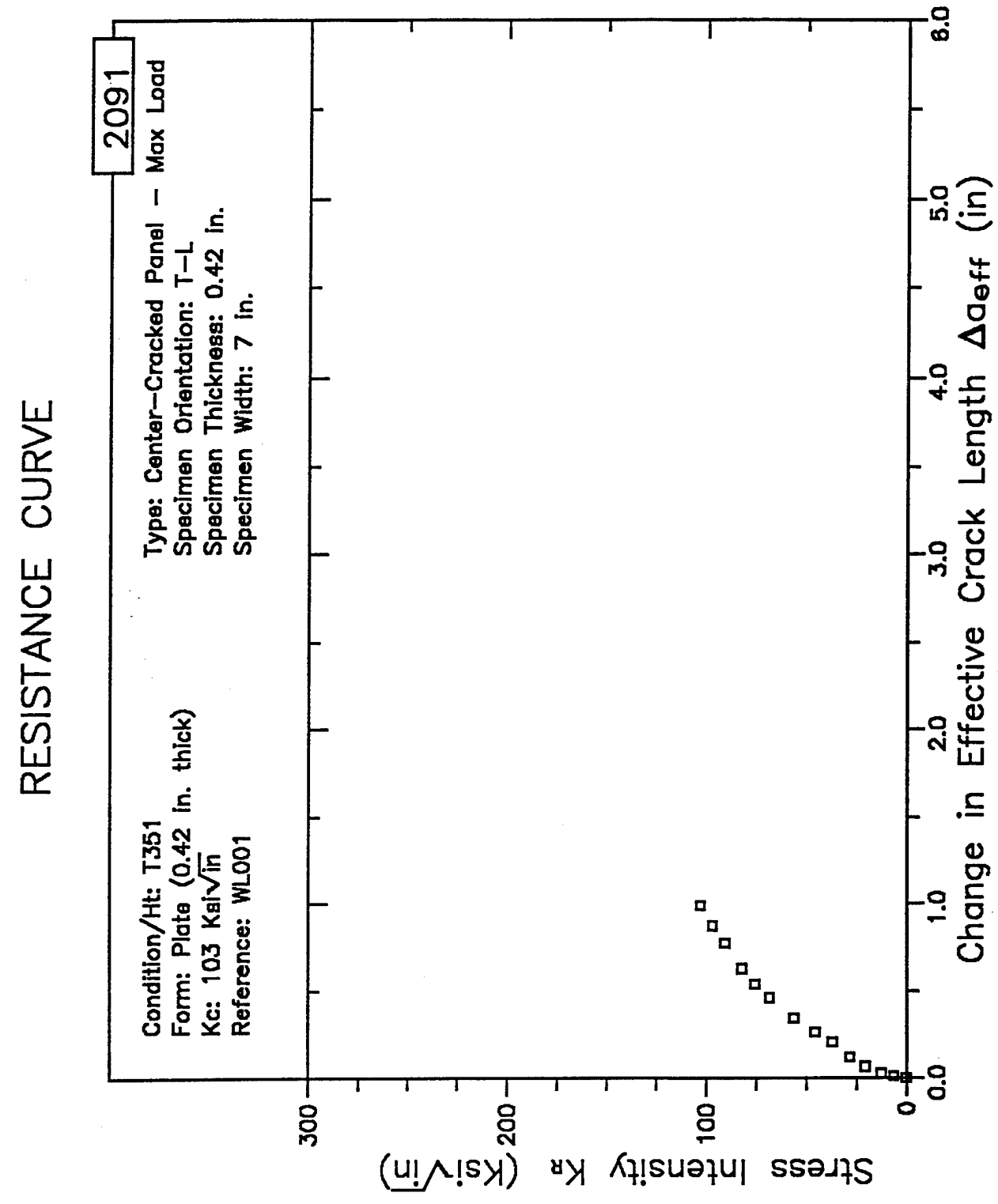


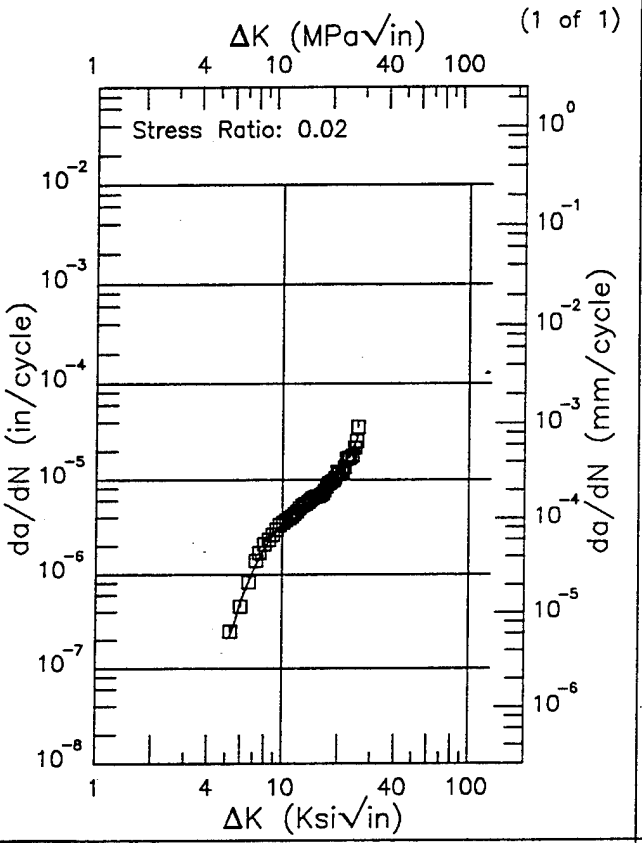

**Figure 7.8.2.3.9**

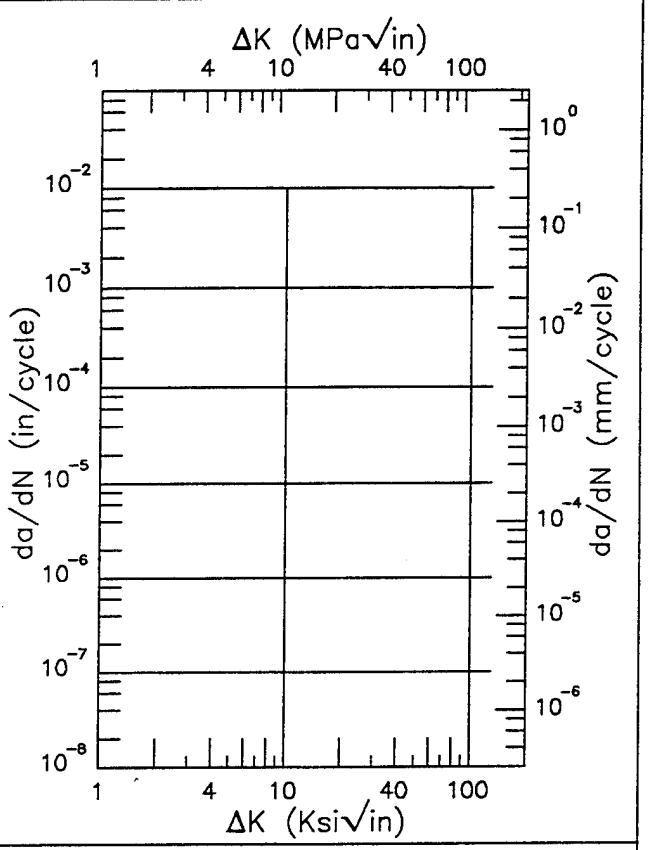
2091

R

Condition/Ht: T3
Form: 0.06 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 1 – 10 Hz
Environment: LAB AIR; RT

Yield Strength: 42.3 ksi
Ult. Strength: 61 ksi
Specimen Thk: 0.064 in.
Specimen Width: 3.912 in.
Ref: WL001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.25 (min) | 0.216 |
| 6. | 0.518 |
| 7. | 1.14 |
| 8. | 1.90 |
| 9. | 2.70 |
| 10. | 3.46 |
| 13. | 5.40 |
| 16. | 7.28 |
| 20. | 11.3 |
| 25. | 26.3 |
| 25.29 (max) | 28.0 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 7.16 | 0. .5 .8 1.25 2. |

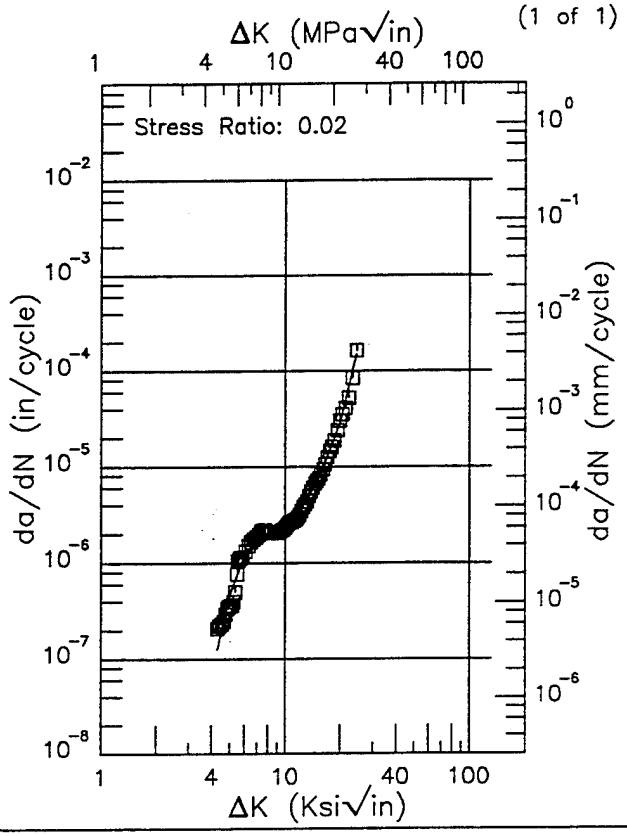
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

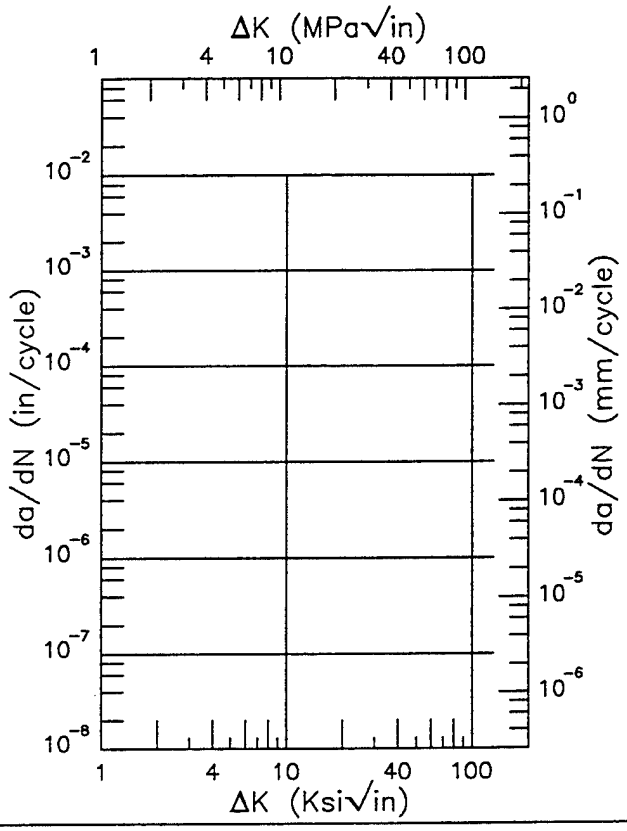
**Figure 7.8.3.1.1**

Condition/Ht: T3
Form: 0.06 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T-L
Frequency: 1 - 25 Hz
Environment: LAB AIR; RT

Yield Strength: 42.5 ksi
Ult. Strength: 57.3 ksi
Specimen Thk: 0.071 in.
Specimen Width: 3.914 in.
Ref: WL001

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.31 (min) | 0.126 |
| 5. | 0.465 |
| 6. | 1.18 |
| 7. | 1.73 |
| 8. | 2.02 |
| 9. | 2.21 |
| 10. | 2.42 |
| 13. | 4.28 |
| 16. | 9.57 |
| 20. | 28.3 |
| 24.44 (max) | 150. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 15.36 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

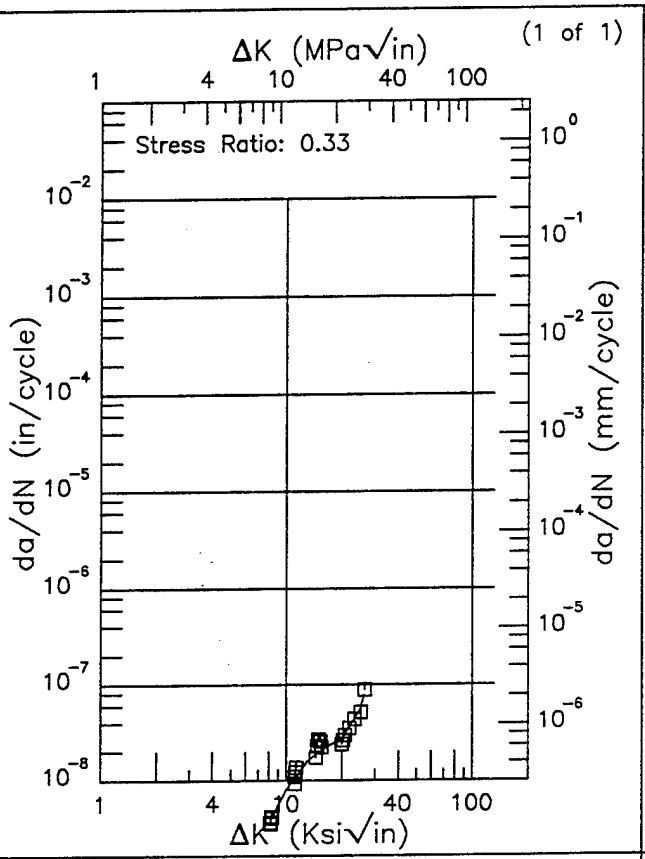
**Figure 7.8.3.1.2**

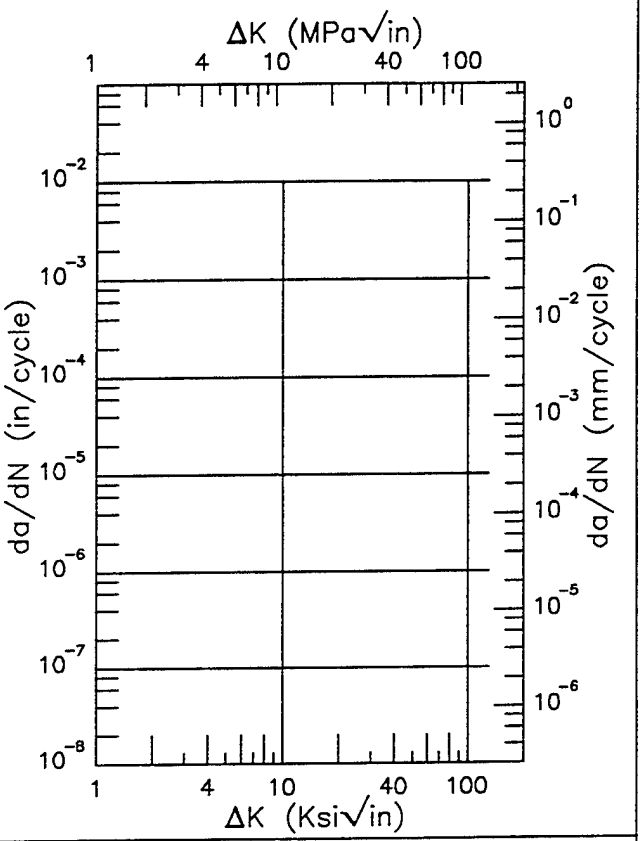
2091

R

Condition/Ht: T351
Form: 0.42 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency:
Environment: ;0.°F

Yield Strength: 46.7 ksi
Ult. Strength: 64.7 ksi
Specimen Thk: 0.423 in.
Specimen Width: 2.007 in.
Ref: WL001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 8.19 (min) | 0.00371 |
| 9. | 0.00544 |
| 10. | 0.00791 |
| 13. | 0.0158 |
| 16. | 0.0220 |
| 20. | 0.0270 |
| 25. | 0.0556 |
| 26.30 (max) | 0.0785 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 13.00 | 0. .5 .8 1.25 2. |

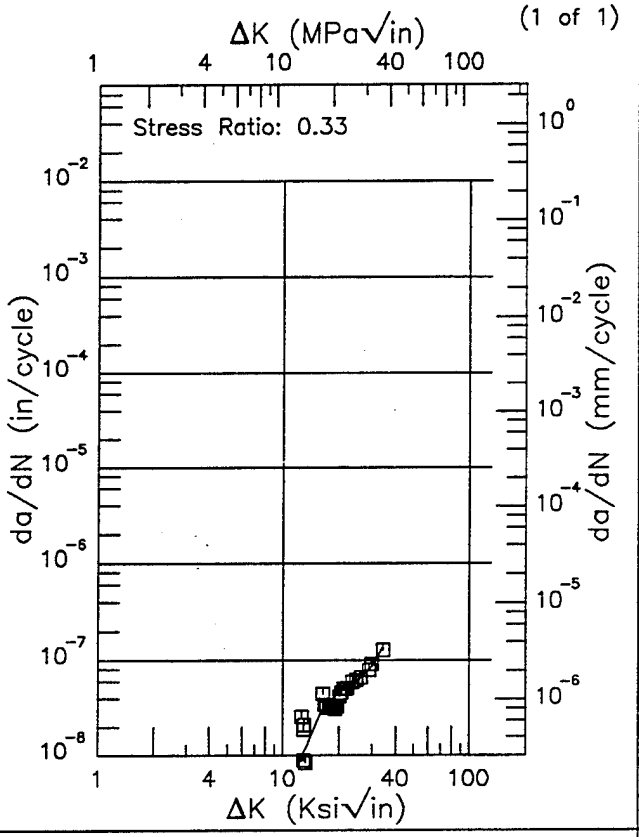
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

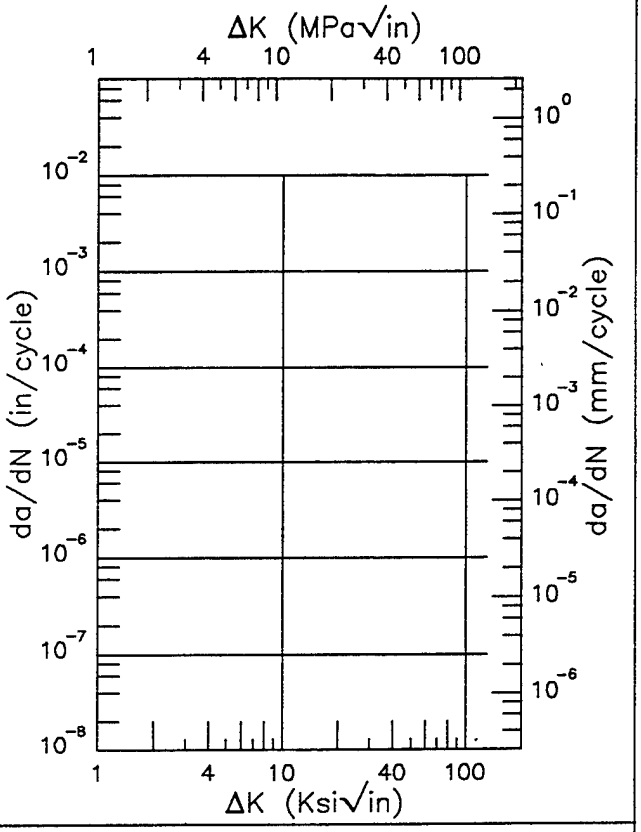
**Figure 7.8.3.1.3**

2091 R

Condition/Ht: T351
Form: 0.42 in. Plate
Specimen Type: CT
Orientation: T–L
Frequency:
Environment: ;0.°F

Yield Strength: 51.7 ksi
Ult. Strength: 64.1 ksi
Specimen Thk: 0.422 in.
Specimen Width: 2.003 in.
Ref: WL001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 12.58 (min) | 0.00861 |
| 13. | 0.0108 |
| 16. | 0.0287 |
| 20. | 0.0461 |
| 25. | 0.0607 |
| 30. | 0.0868 |
| 34.00 (max) | 0.135 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 49.55 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

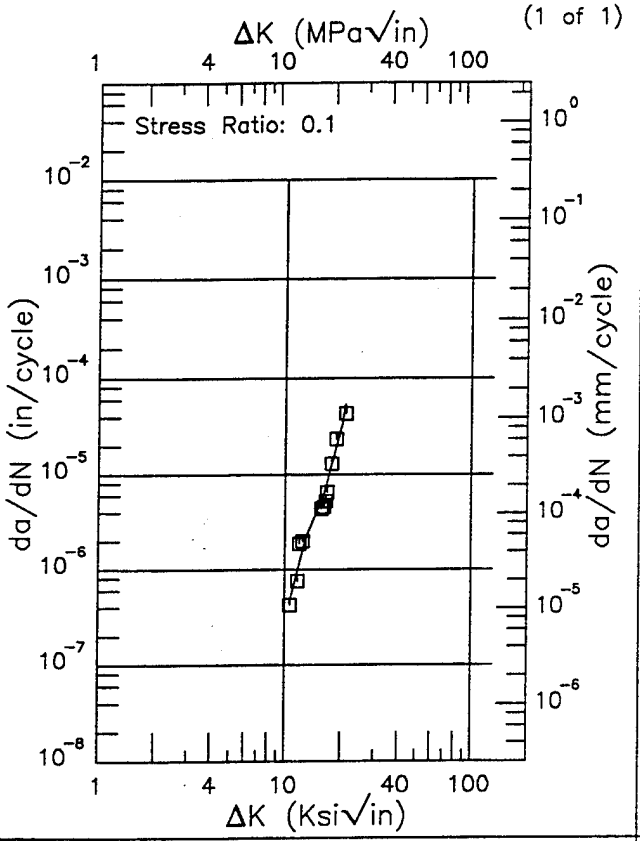
**Figure 7.8.3.1.4**

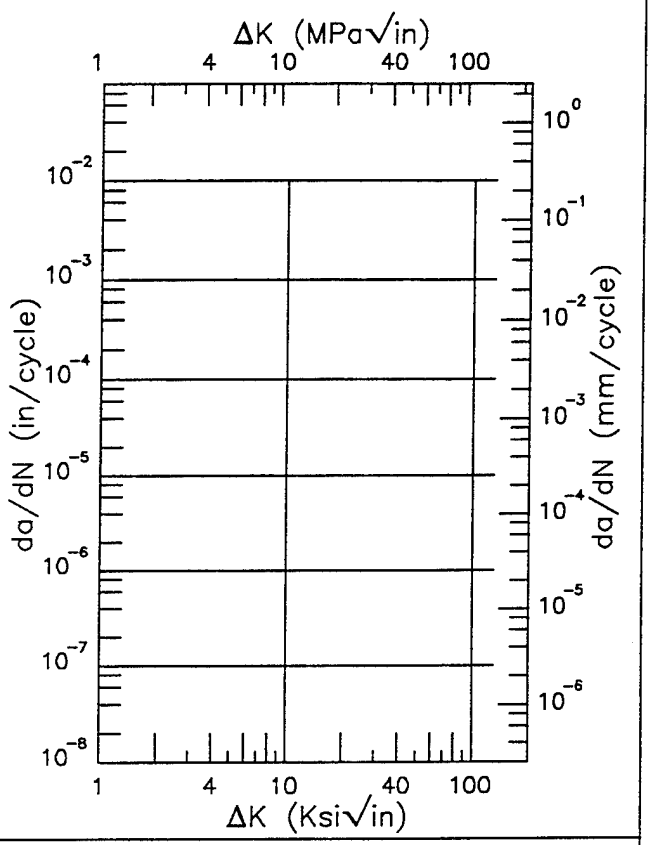
2091

R

Condition/Ht: T6
Form: 2.24 in. Forging
Specimen Type: CT
Orientation: L–T
Frequency: 10 Hz
Environment: H.H.A.; RT

Yield Strength: 65.4 ksi
Ult. Strength: 68.9 ksi
Specimen Thk: 0.252 in.
Specimen Width: 2.025 in.
Ref: WL001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 10.59 (min) | 0.451 |
| 13. | 2.14 |
| 16. | 6.04 |
| 20. | 31.5 |
| 20.98 (max) | 54.0 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 28.68 | 0. .5 .8 1.25 2. |

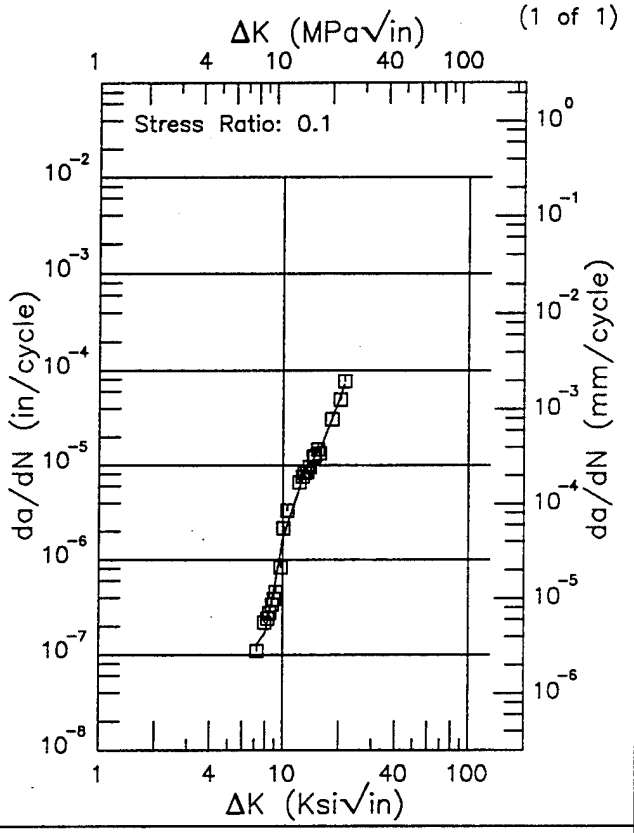
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

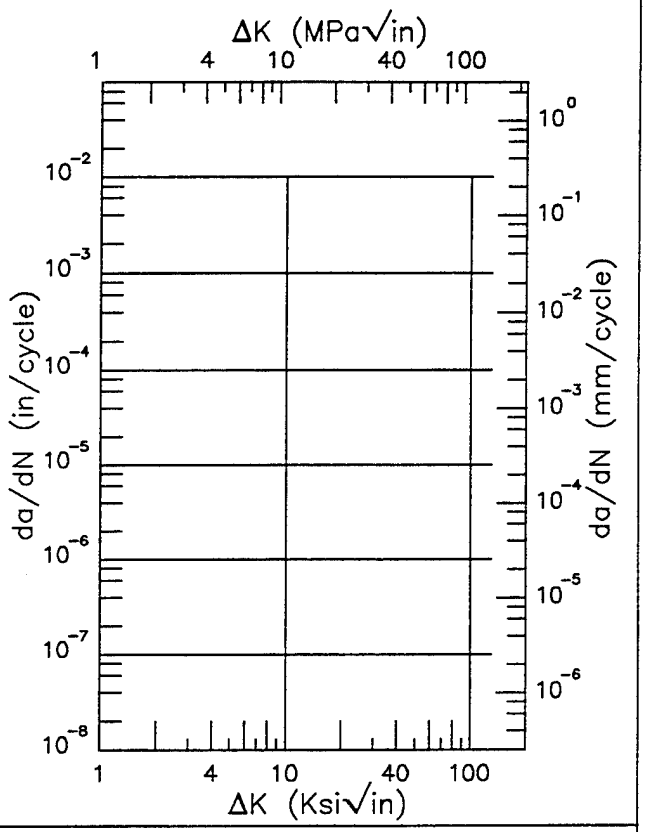
**Figure 7.8.3.1.5**

Condition/Ht: T6
Form: 2.24 in. Forging
Specimen Type: CT
Orientation: T–L
Frequency: 10 Hz
Environment: H.H.A.; RT

Yield Strength: 69.6 ksi
Ult. Strength: 79.7 ksi
Specimen Thk: 0.25 in.
Specimen Width: 2.002 in.
Ref: WL001

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 7.22 (min) | 0.126 |
| 8. | 0.172 |
| 9. | 0.518 |
| 10. | 1.69 |
| 13. | 8.21 |
| 16. | 15.9 |
| 20. | 49.1 |
| 21.20 (max) | 71.2 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

RMS % Error
17.07

Life Prediction Ratio Summary
0. .5 .8 1.25 2.

RMS % Error

Life Prediction Ratio Summary
0. .5 .8 1.25 2.

**Figure 7.8.3.1.6**

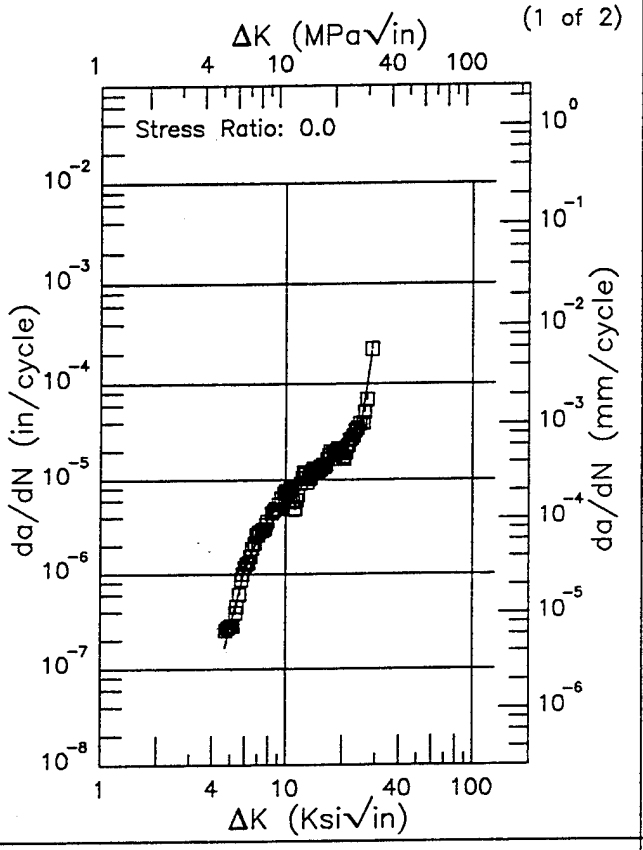
2091

R

Condition/Ht: T8 275F 12HRS
Form: 0.06 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 10 Hz
Environment: H.H.A.; RT

Yield Strength: 46.5 ksi
Ult. Strength: 64.6 ksi
Specimen Thk: 0.063 – 0.064 in.
Specimen Width: 3.746 – 3.75 in.
Ref: WL001

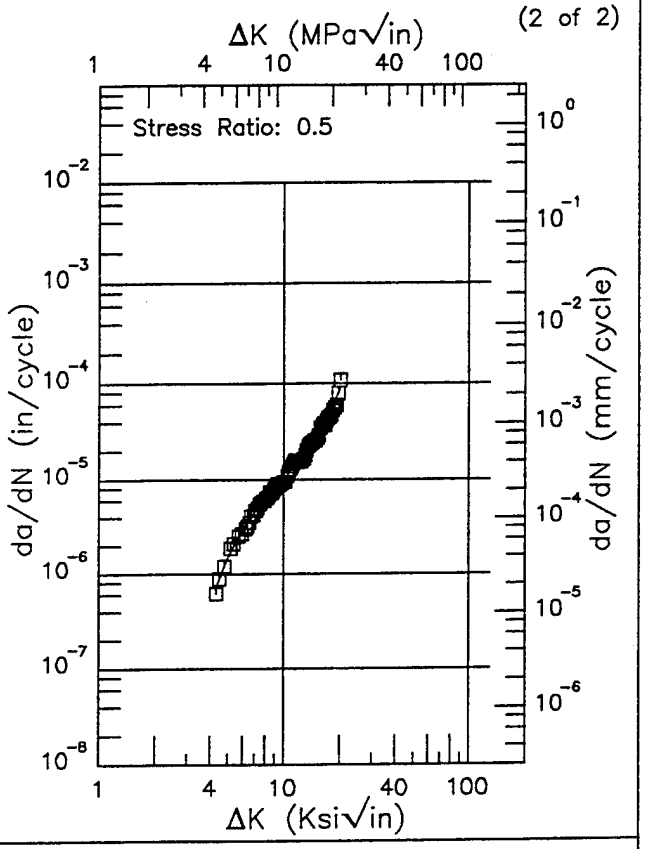
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.71 (min) | 0.168 |
| 5. | 0.289 |
| 6. | 1.07 |
| 7. | 2.33 |
| 8. | 3.78 |
| 9. | 5.19 |
| 10. | 6.52 |
| 13. | 10.3 |
| 16. | 14.5 |
| 20. | 21.3 |
| 25. | 37.5 |
| 28.60 (max) | 213. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 14.11 | 0. .5 .8 1.25 2. |

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.30 (min) | 0.694 |
| 5. | 1.49 |
| 6. | 2.94 |
| 7. | 4.50 |
| 8. | 6.13 |
| 9. | 7.92 |
| 10. | 10.1 |
| 13. | 19.4 |
| 16. | 33.5 |
| 20. | 87.0 |
| 20.06 (max) | 88.7 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 7.08 | 0. .5 .8 1.25 2. |

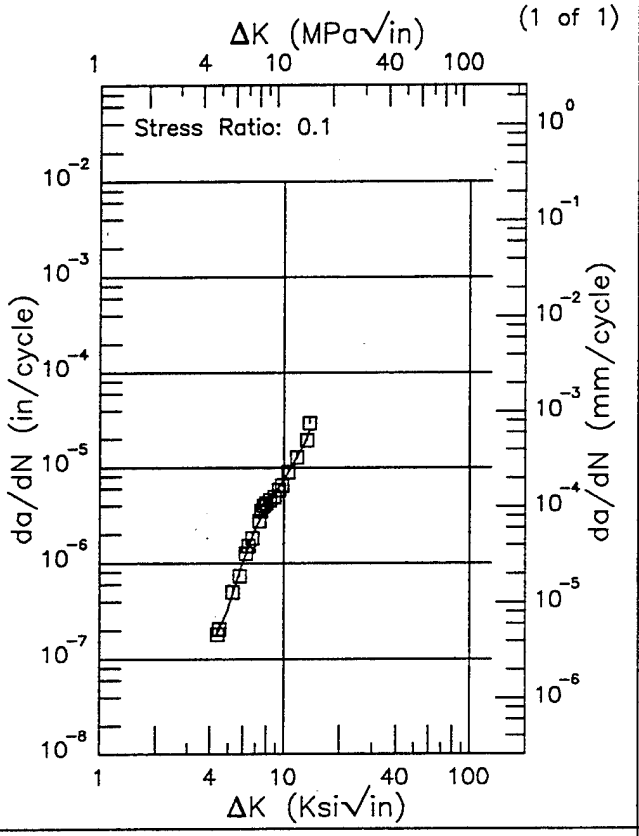
**Figure 7.8.3.1.7**

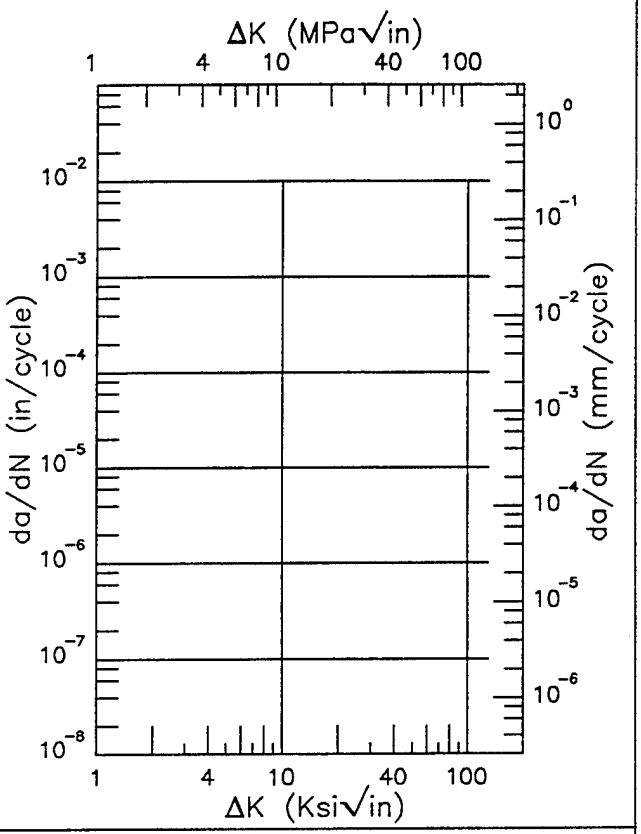
2091 R

Condition/Ht: T8 275F 12HRS
Form: 0.06 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 10 Hz
Environment: H.H.A.; RT

Yield Strength: 47.7 ksi
Ult. Strength: 66.2 ksi
Specimen Thk: 0.063 in.
Specimen Width: 3.003 in.
Ref: WL001

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.35 (min) | 0.186 |
| 5. | 0.353 |
| 6. | 1.04 |
| 7. | 2.33 |
| 8. | 3.84 |
| 9. | 5.51 |
| 10. | 7.55 |
| 13. | 17.9 |
| 13.76 (max) | 24.8 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 8.06 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.8.3.1.8**

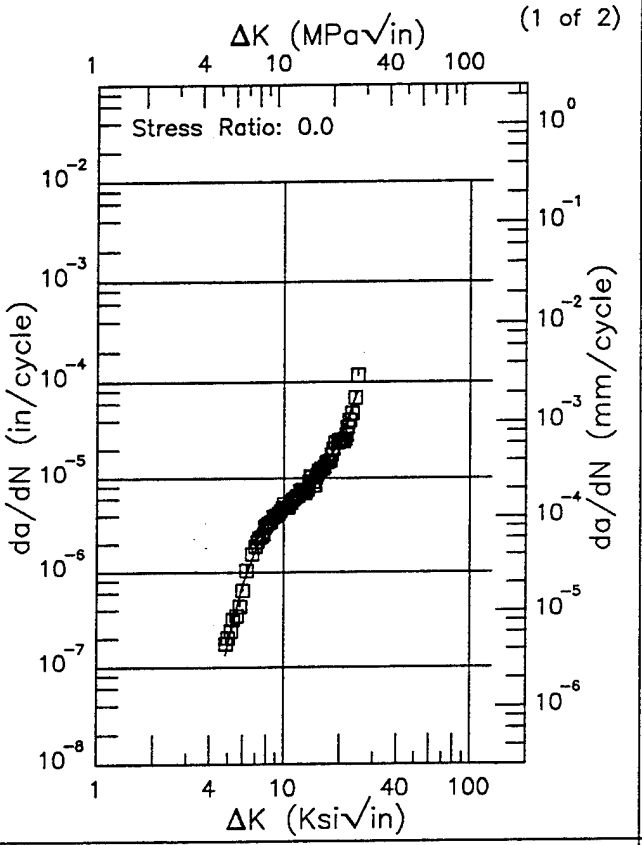
2091

R

Condition/Ht: T8 275F 12HRS
Form: 0.06 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 10 Hz
Environment: H.H.A.; RT

Yield Strength: 47.4 ksi
Ult. Strength: 62.1 ksi
Specimen Thk: 0.062 – 0.064 in.
Specimen Width: 3.75 – 3.751 in.
Ref: WL001

(1 of 2)



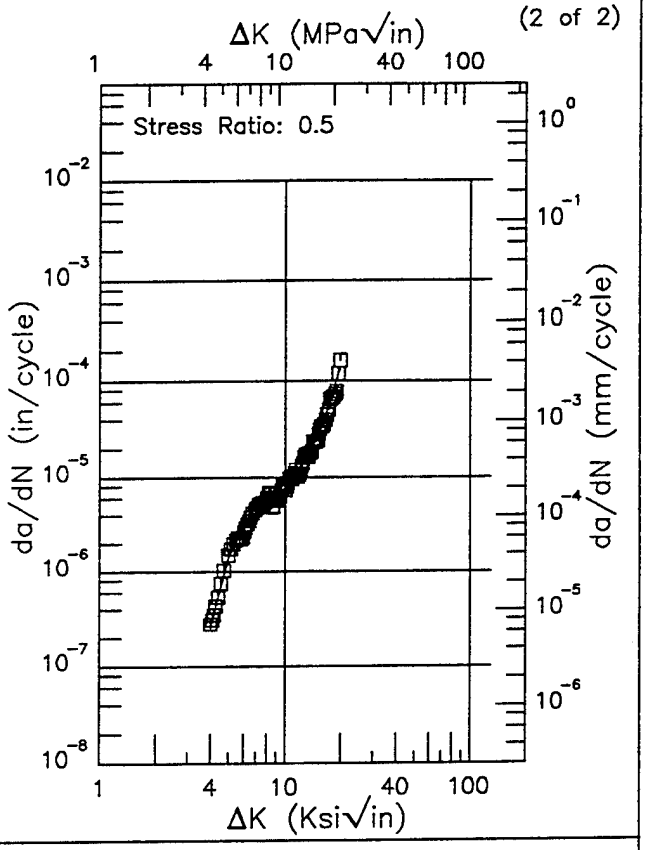

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.86 (min) | 0.134 |
| 5. | 0.177 |
| 6. | 0.743 |
| 7. | 1.72 |
| 8. | 2.89 |
| 9. | 4.03 |
| 10. | 5.06 |
| 13. | 7.88 |
| 16. | 11.9 |
| 20. | 24.9 |
| 24.65 (max) | 80.9 |

| RMS % Error |
|---|
| 11.18 |

Life Prediction Ratio Summary

0. .5 .8 1.25 2.

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.99 (min) | 0.252 |
| 4. | 0.262 |
| 5. | 1.39 |
| 6. | 2.97 |
| 7. | 4.31 |
| 8. | 5.38 |
| 9. | 6.47 |
| 10. | 7.90 |
| 13. | 15.9 |
| 16. | 35.1 |
| 19.71 (max) | 131. |

| RMS % Error |
|---|
| 9.81 |

Life Prediction Ratio Summary

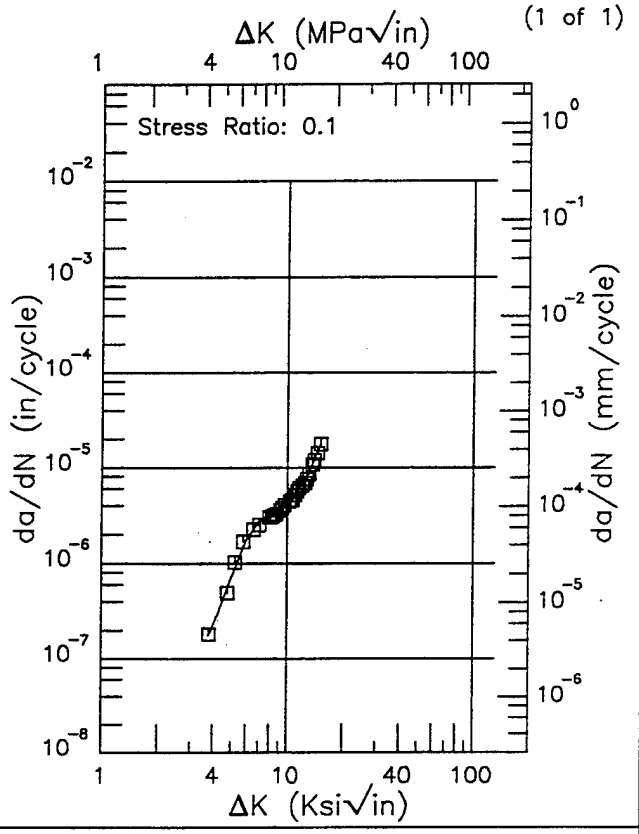
0. .5 .8 1.25 2.

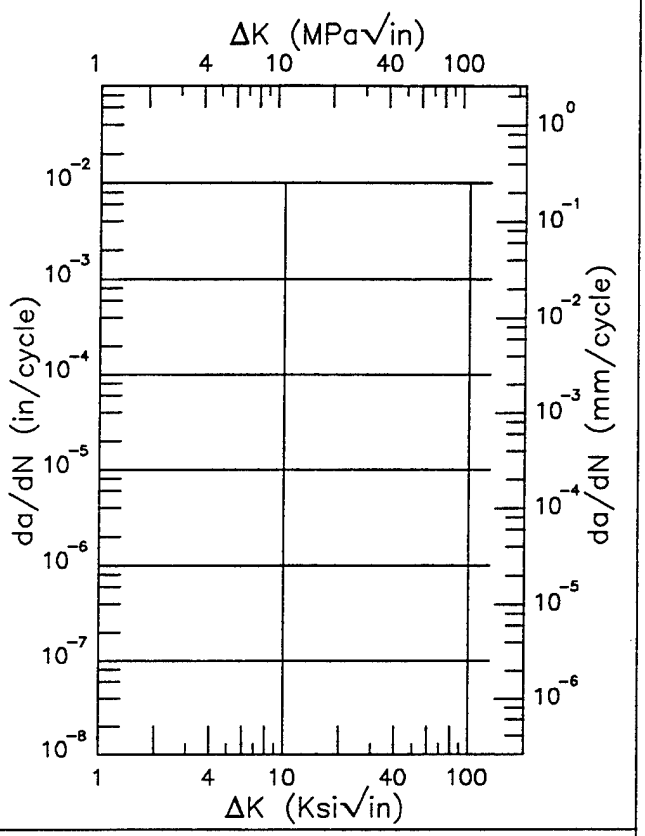
**Figure 7.8.3.1.9**

2091 R

Condition/Ht: T8 275F 12HRS
Form: 0.06 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 10 Hz
Environment: H.H.A.; RT

Yield Strength: 47.5 ksi
Ult. Strength: 63 ksi
Specimen Thk: 0.063 in.
Specimen Width: 3 in.
Ref: WL001




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 3.78 (min) | 0.177 |
| 4. | 0.224 |
| 5. | 0.711 |
| 6. | 1.74 |
| 7. | 2.69 |
| 8. | 3.07 |
| 9. | 3.35 |
| 10. | 3.98 |
| 13. | 8.61 |
| 15.10 (max) | 18.2 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 6.07 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.8.3.1.10**

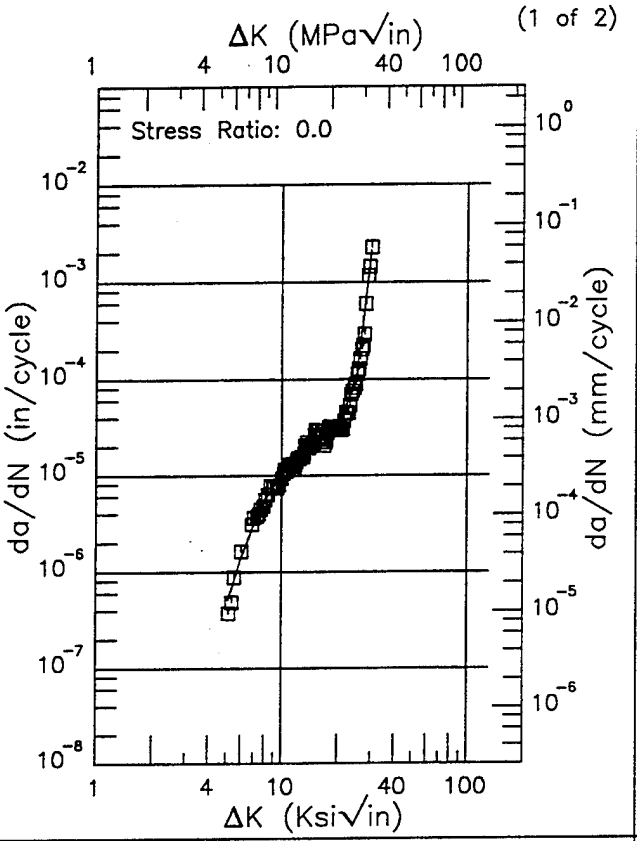
2091

R

Condition/Ht: T8 275F 12HRS
Form: 0.06 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T45
Frequency: 10 Hz
Environment: H.H.A.; RT

Yield Strength: 44.2 ksi
Ult. Strength:
Specimen Thk: 0.064 – 0.066 in.
Specimen Width: 3.748 – 3.751 in.
Ref: WL001

(1 of 2)



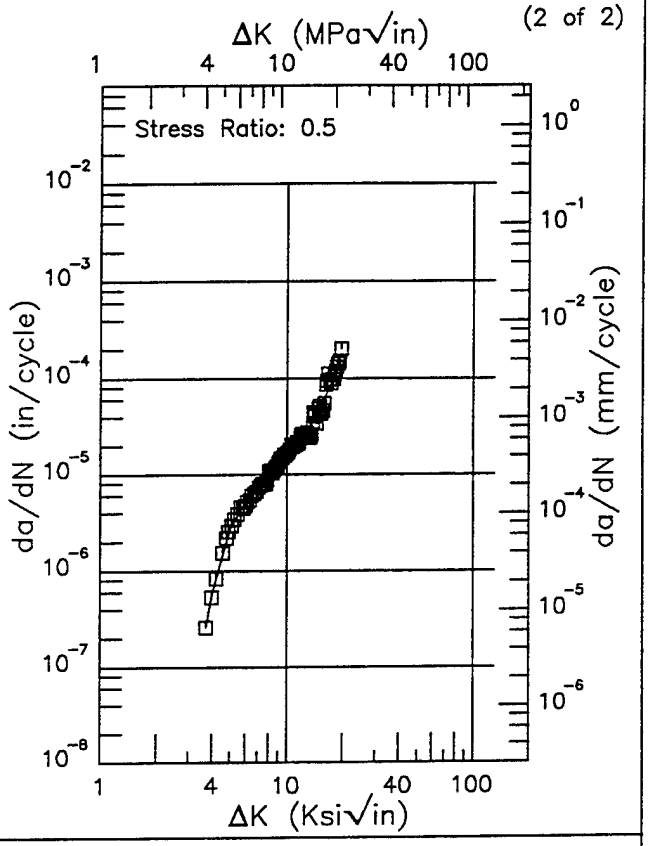

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.14 (min) | 0.516 |
| 6. | 1.37 |
| 7. | 3.02 |
| 8. | 5.24 |
| 9. | 7.78 |
| 10. | 10.4 |
| 13. | 17.6 |
| 16. | 23.2 |
| 20. | 30.7 |
| 25. | 108. |
| 30. | 2040. |
| 30.04 (max) | 2104. |

| RMS % Error |
|---|
| 15.62 |

Life Prediction Ratio Summary

0. .5 .8 1.25 2.

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.72 (min) | 0.260 |
| 4. | 0.556 |
| 5. | 2.65 |
| 6. | 5.07 |
| 7. | 7.11 |
| 8. | 9.41 |
| 9. | 12.6 |
| 10. | 16.4 |
| 13. | 28.6 |
| 16. | 61.7 |
| 19.55 (max) | 152. |

| RMS % Error |
|---|
| 11.94 |

Life Prediction Ratio Summary

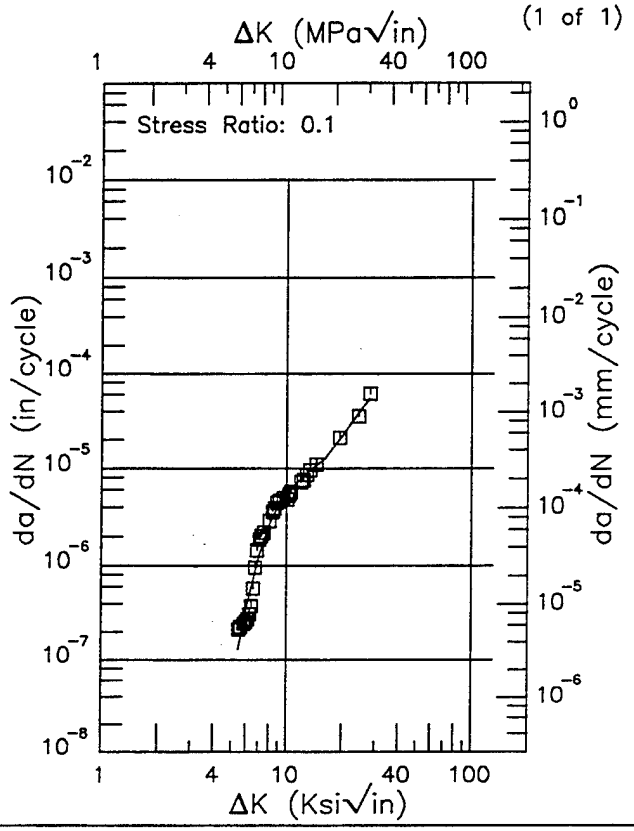
0. .5 .8 1.25 2.

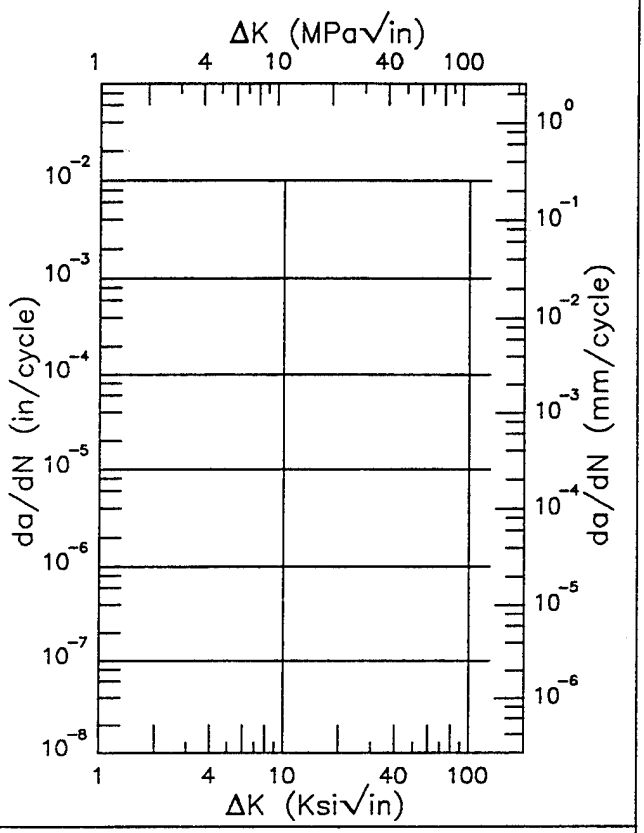
**Figure 7.8.3.1.11**

2091 R

Condition/Ht: T8 275F 12HRS
Form: 0.42 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 10 Hz
Environment: H.H.A.; RT

Yield Strength: 53 ksi
Ult. Strength: 70.8 ksi
Specimen Thk: 0.253 in.
Specimen Width: 3.009 in.
Ref: WL001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.48 (min) | 0.129 |
| 6. | 0.339 |
| 7. | 1.20 |
| 8. | 2.59 |
| 9. | 4.18 |
| 10. | 5.69 |
| 13. | 9.13 |
| 16. | 12.7 |
| 20. | 21.9 |
| 25. | 41.3 |
| 27.95 (max) | 54.0 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 23.44 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

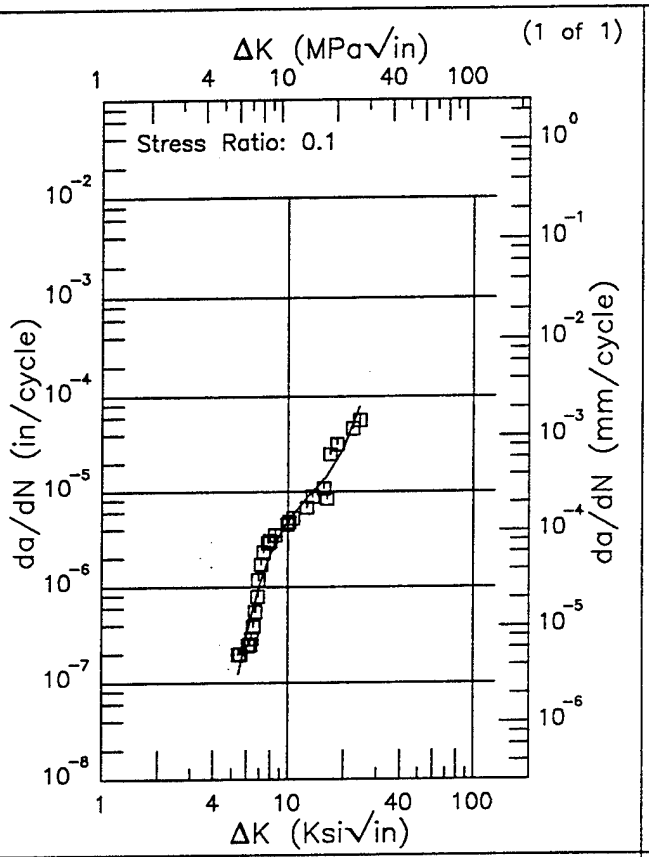
**Figure 7.8.3.1.12**

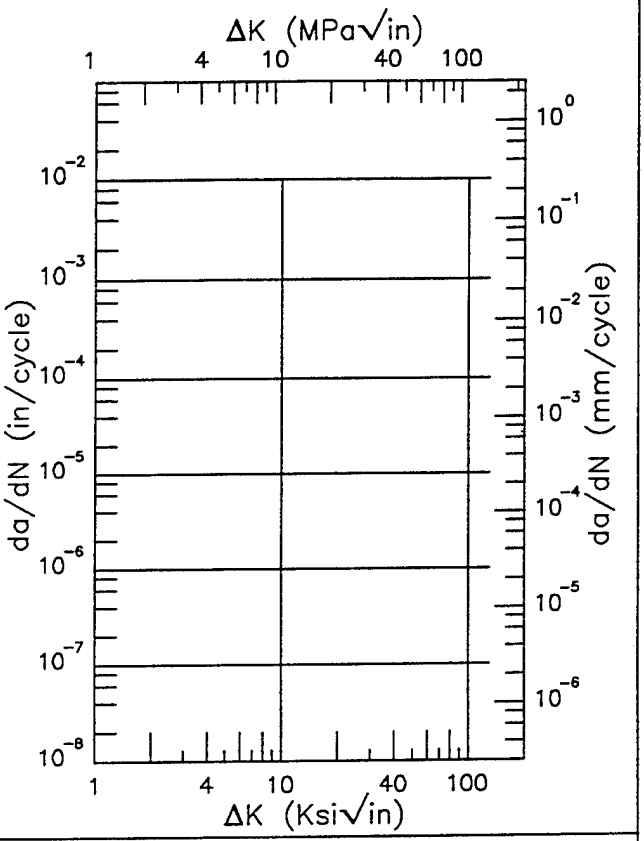
2091

R

Condition/Ht: T8 275F 12HRS
Form: 0.42 in. Plate
Specimen Type: CT
Orientation: T–L
Frequency: 10 Hz
Environment: H.H.A.; RT

Yield Strength: 60.5 ksi
Ult. Strength: 71.7 ksi
Specimen Thk: 0.253 in.
Specimen Width: 3.009 in.
Ref: WL001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.45 (min) | 0.123 |
| 6. | 0.316 |
| 7. | 1.02 |
| 8. | 2.15 |
| 9. | 3.52 |
| 10. | 4.94 |
| 13. | 9.08 |
| 16. | 14.3 |
| 20. | 28.8 |
| 24.33 (max) | 78.0 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 35.25 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

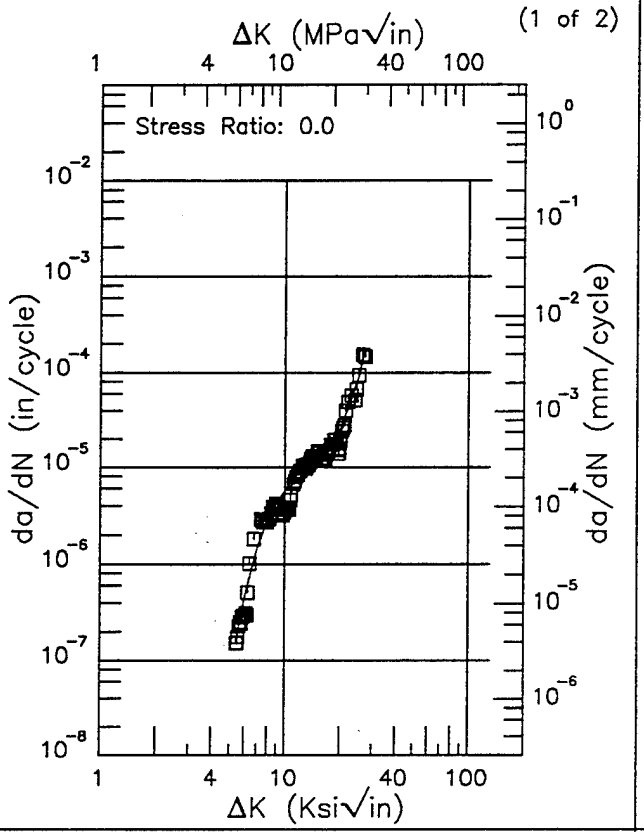
**Figure 7.8.3.1.13**

2091 R

Condition/Ht: T8 275F 12HRS
Form: 0.42 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 10 Hz
Environment: H.H.A.; RT

Yield Strength: 52.4 ksi
Ult. Strength: 69.2 ksi
Specimen Thk: 0.25 – 0.251 in.
Specimen Width: 3.757 – 3.759 in.
Ref: WL001

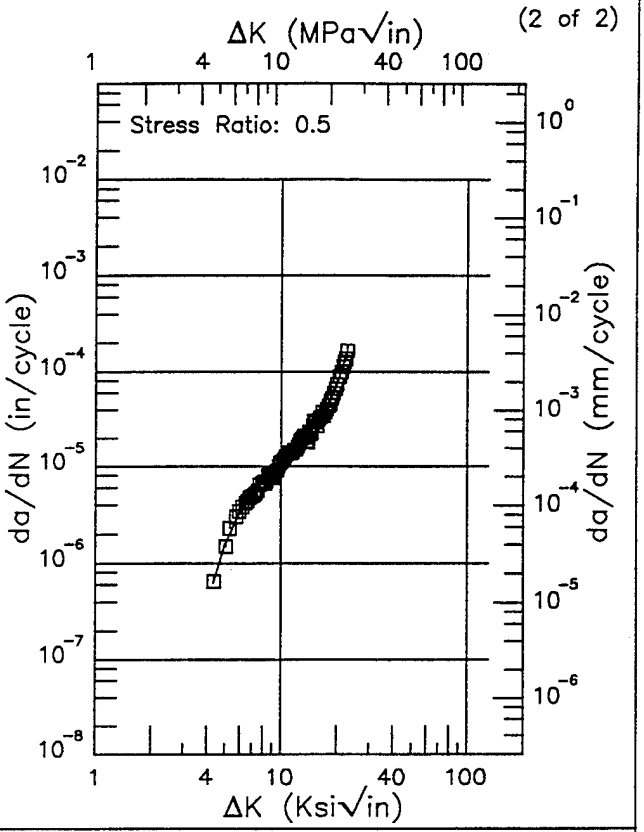
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 5.44 (min) | 0.161 |
| 6. | 0.430 |
| 7. | 1.39 |
| 8. | 2.81 |
| 9. | 4.33 |
| 10. | 5.71 |
| 13. | 8.87 |
| 16. | 12.6 |
| 20. | 24.8 |
| 25. | 89.2 |
| 27.15 (max) | 177. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 22.12 | 0. .5 .8 1.25 2. |

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.34 (min) | 0.627 |
| 5. | 1.56 |
| 6. | 3.35 |
| 7. | 5.07 |
| 8. | 6.66 |
| 9. | 8.38 |
| 10. | 10.5 |
| 13. | 19.1 |
| 16. | 30.4 |
| 20. | 73.4 |
| 22.54 (max) | 158. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 6.81 | 0. .5 .8 1.25 2. |

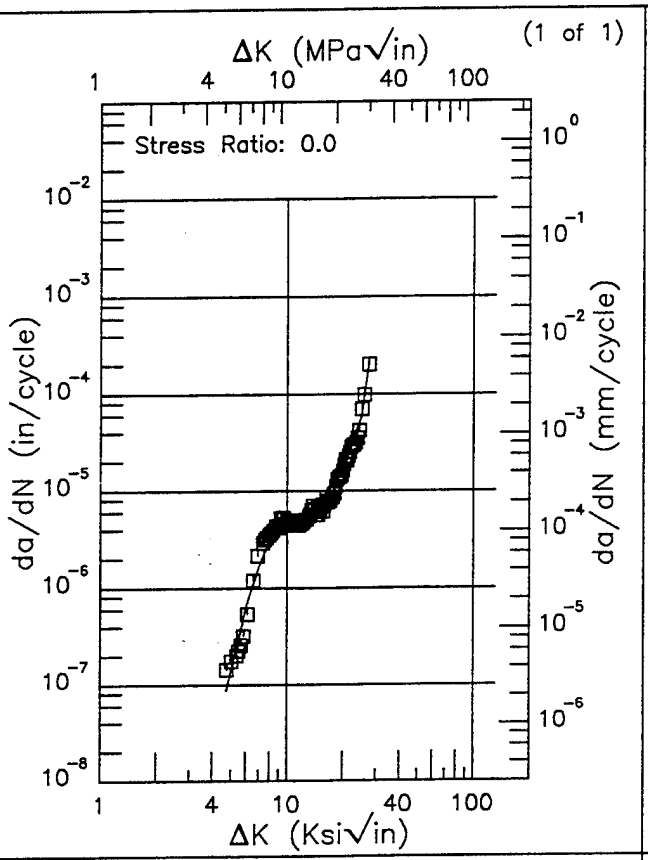
**Figure 7.8.3.1.14**

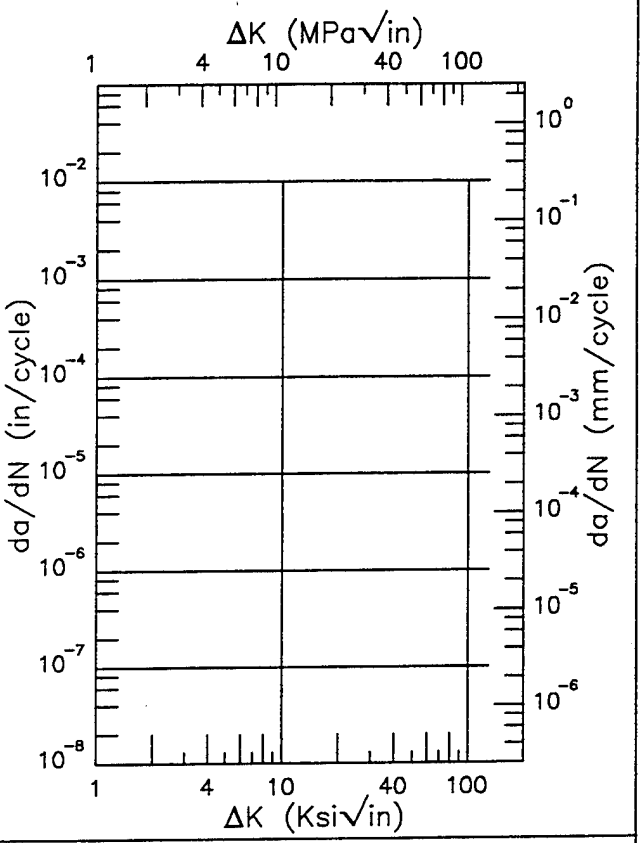
R 2091

Condition/Ht: T8 275F 12HRS
Form: 0.42 in. Plate
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 10 Hz
Environment: H.H.A.; RT

Yield Strength: 58.3 ksi
Ult. Strength: 68.8 ksi
Specimen Thk: 0.25 in.
Specimen Width: 3.754 in.
Ref: WL001

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.75 (min) | 0.0869 |
| 5. | 0.140 |
| 6. | 0.618 |
| 7. | 1.63 |
| 8. | 3.03 |
| 9. | 4.39 |
| 10. | 5.30 |
| 13. | 5.40 |
| 16. | 6.71 |
| 20. | 17.6 |
| 25. | 58.5 |
| 27.25 (max) | 220. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 16.04 | 0. .5 .8 1.25 2. |

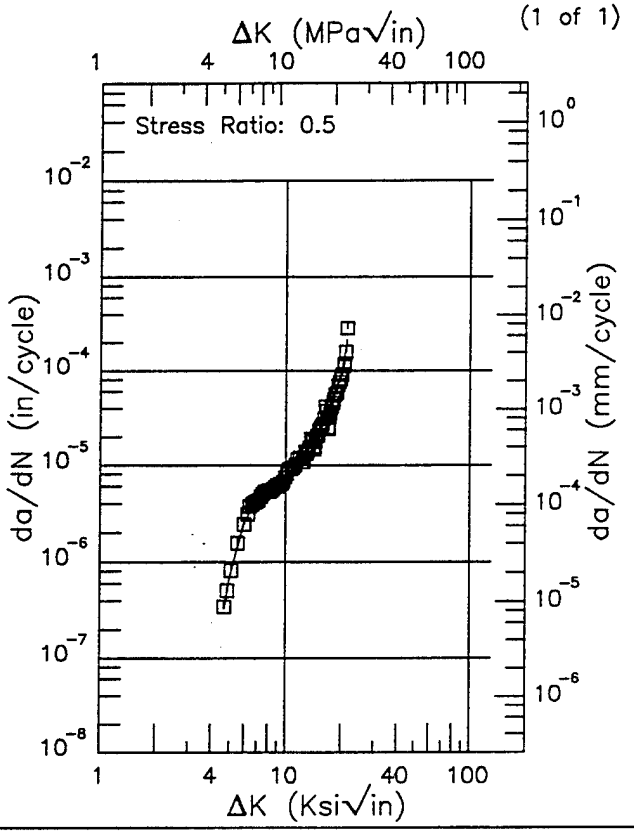
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

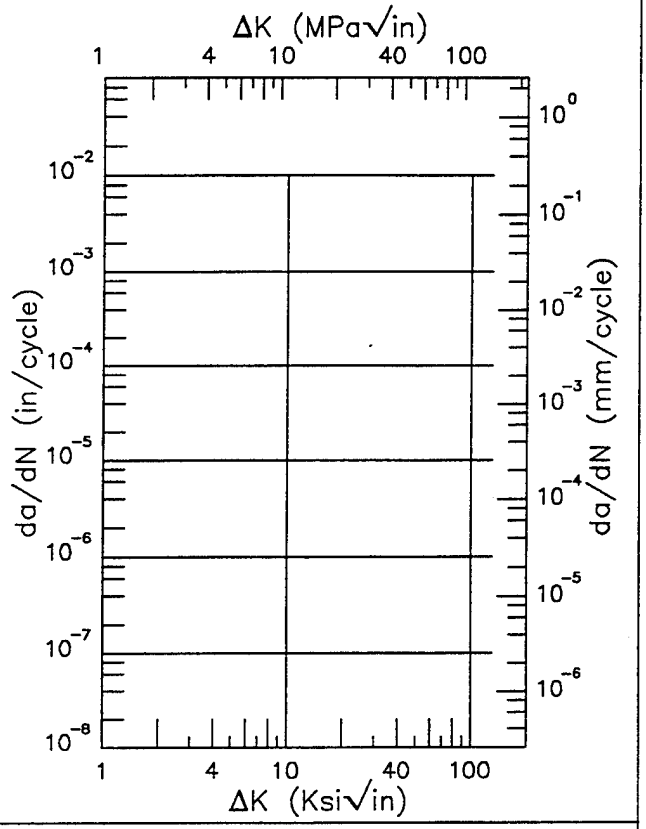
**Figure 7.8.3.1.15**

Condition/Ht: T8 275F 12HRS
Form: 0.42 in. Plate
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 12 Hz
Environment: H.H.A.; RT

Yield Strength: 58.3 ksi
Ult. Strength: 68.8 ksi
Specimen Thk: 0.25 in.
Specimen Width: 3.759 in.
Ref: WL001

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.69 (min) | 0.332 |
| 5. | 0.675 |
| 6. | 2.53 |
| 7. | 4.28 |
| 8. | 5.36 |
| 9. | 6.27 |
| 10. | 7.52 |
| 13. | 14.3 |
| 16. | 28.2 |
| 20. | 95.6 |
| 21.31 (max) | 211. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 11.96 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

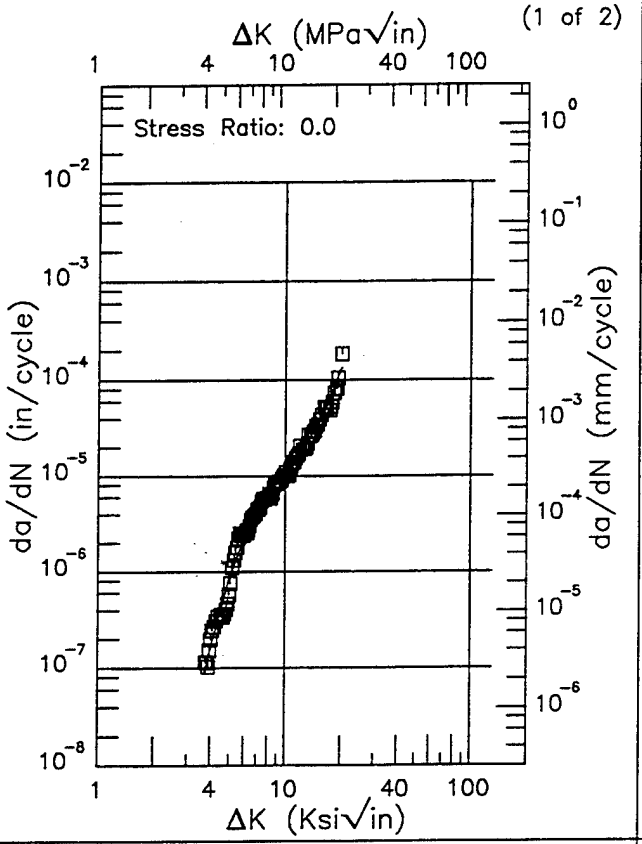
**Figure 7.8.3.1.16**

R 2091

Condition/Ht: T8 275F 12HRS
Form: 0.42 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T45
Frequency: 10 Hz
Environment: H.H.A.; RT

Yield Strength: 45.6 ksi
Ult. Strength: 63.1 ksi
Specimen Thk: 0.24 – 0.25 in.
Specimen Width: 3.753 in.
Ref: WL001

(1 of 2)

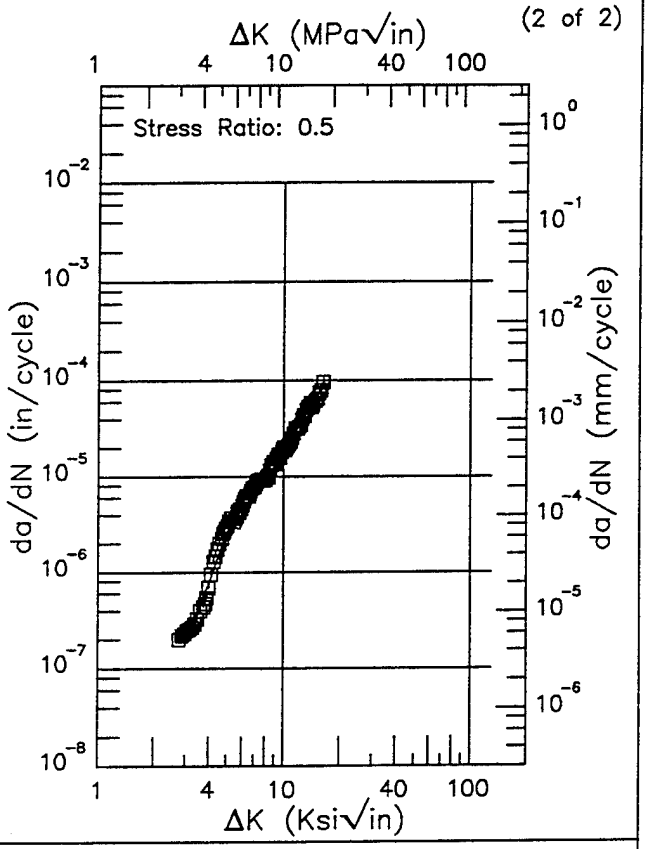



| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.75 (min) | 0.0877 |
| 4. | 0.159 |
| 5. | 0.840 |
| 6. | 2.20 |
| 7. | 4.06 |
| 8. | 6.19 |
| 9. | 8.51 |
| 10. | 11.1 |
| 13. | 21.9 |
| 16. | 44.5 |
| 20. | 132. |
| 20.04 (max) | 133. |

RMS % Error: 15.98

Life Prediction Ratio Summary: 0. .5 .8 1.25 2.

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.76 (min) | 0.184 |
| 3. | 0.219 |
| 3.5 | 0.390 |
| 4. | 0.763 |
| 5. | 2.55 |
| 6. | 5.63 |
| 7. | 8.24 |
| 8. | 10.2 |
| 9. | 12.8 |
| 10. | 17.5 |
| 13. | 45.3 |
| 16. | 85.1 |
| 16.24 (max) | 92.6 |

RMS % Error: 11.50

Life Prediction Ratio Summary: 0. .5 .8 1.25 2.

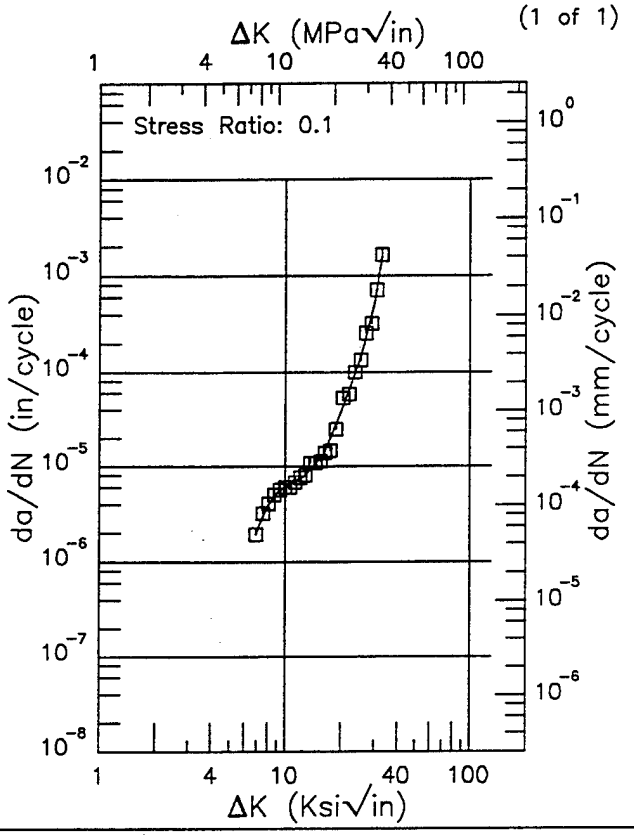
**Figure 7.8.3.1.17**

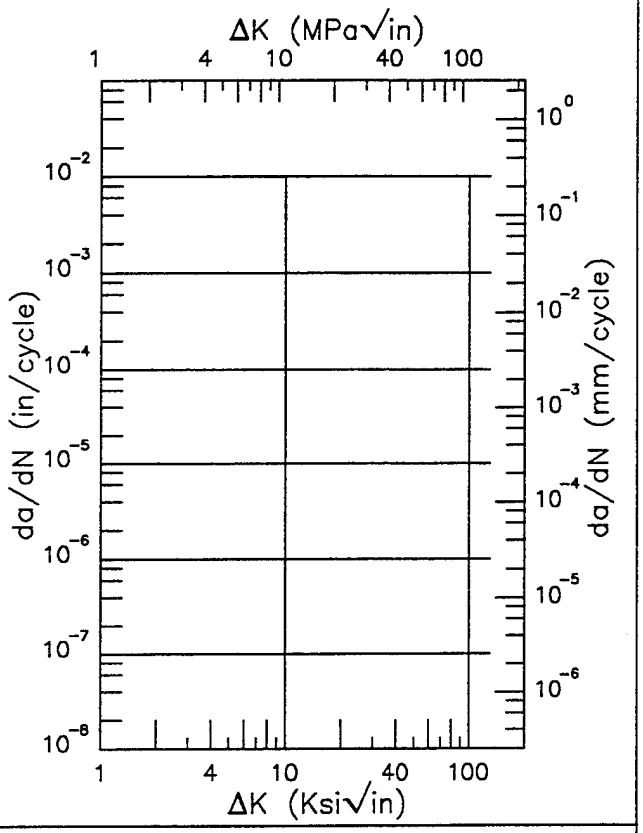
2091 R

Condition/Ht: T81 335F 32HRS
Form: 0.06 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 5 Hz
Environment: LAB AIR; RT

Yield Strength: 50.4 ksi
Ult. Strength: 67.4 ksi
Specimen Thk: 0.064 in.
Specimen Width: 5.996 in.
Ref: WL001

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.94 (min) | 2.01 |
| 7. | 2.10 |
| 8. | 3.84 |
| 9. | 5.25 |
| 10. | 6.18 |
| 13. | 8.13 |
| 16. | 13.2 |
| 20. | 37.8 |
| 25. | 135. |
| 30. | 517. |
| 32.83 (max) | 1618. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 10.33 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.8.3.1.18**

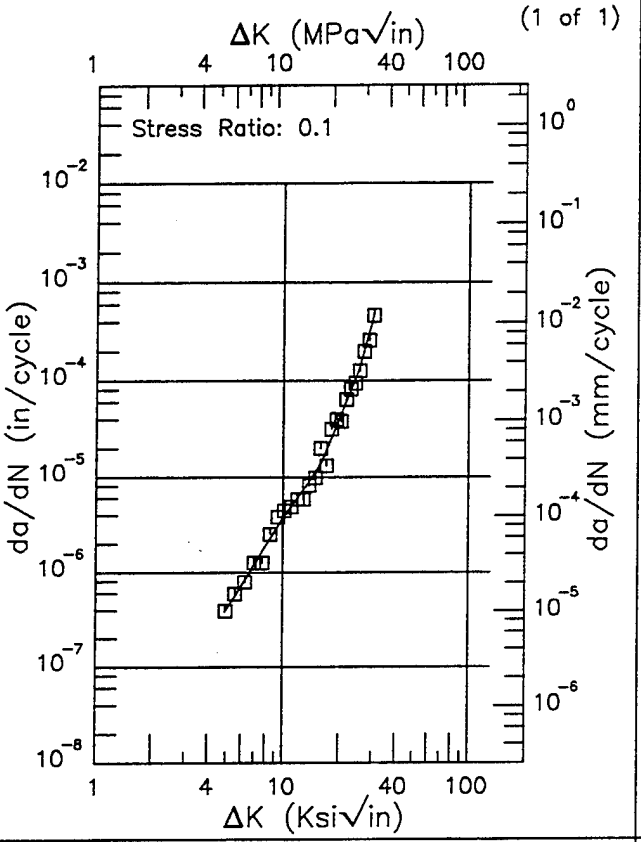
2091

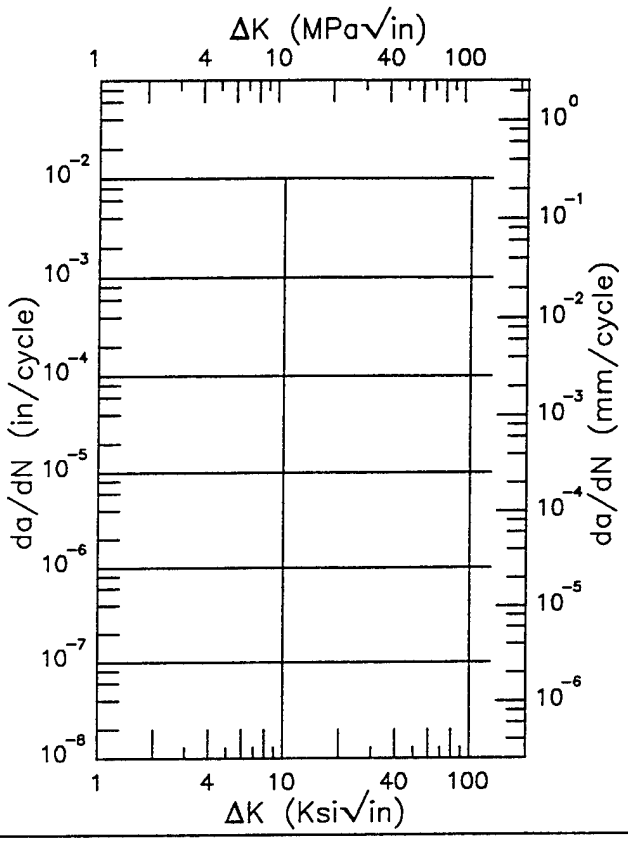
R

Condition/Ht: T81 335F 32HRS
Form: 0.06 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 5 Hz
Environment: LAB AIR; RT

Yield Strength: 49.4 ksi
Ult. Strength: 65.2 ksi
Specimen Thk: 0.064 in.
Specimen Width: 5.995 in.
Ref: WL001

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.92 (min) | 0.386 |
| 5. | 0.406 |
| 6. | 0.719 |
| 7. | 1.20 |
| 8. | 1.86 |
| 9. | 2.72 |
| 10. | 3.76 |
| 13. | 7.62 |
| 16. | 14.2 |
| 20. | 40.5 |
| 25. | 122. |
| 30. | 414. |
| 30.32 (max) | 469. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 16.33 | 0. .5 .8 1.25 2. |

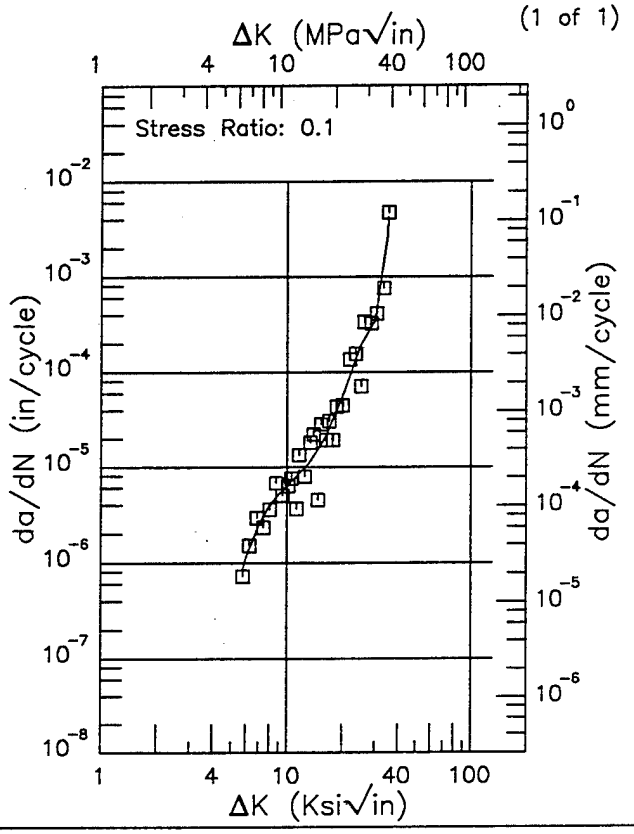
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

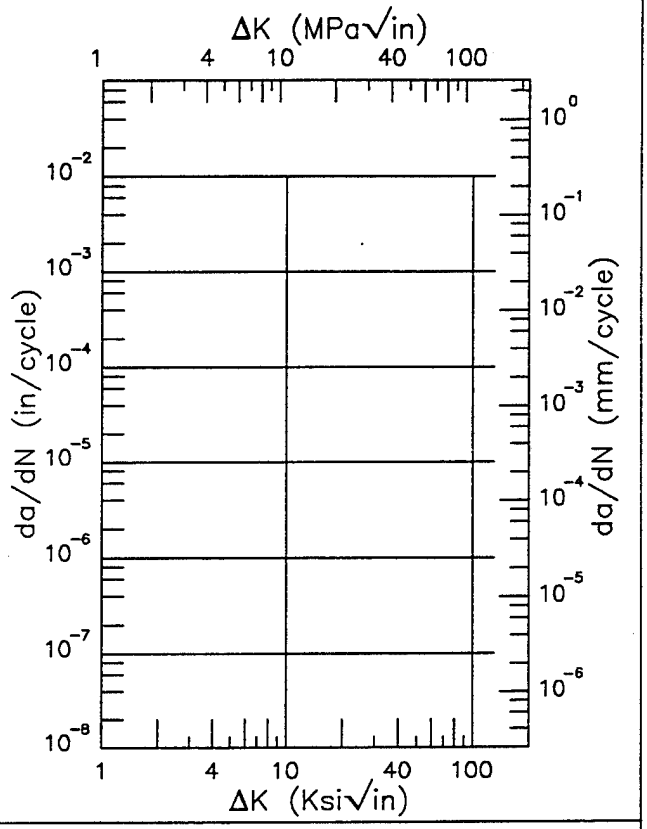
**Figure 7.8.3.1.19**

Condition/Ht: T851 335F 16HRS
Form: 0.42 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 5 Hz
Environment: LAB AIR; RT

Yield Strength: 55.9 ksi
Ult. Strength: 71.9 ksi
Specimen Thk: 0.419 in.
Specimen Width: 2.56 in.
Ref: WL001

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.76 (min) | 0.845 |
| 6. | 1.11 |
| 7. | 2.45 |
| 8. | 3.88 |
| 9. | 5.18 |
| 10. | 6.36 |
| 13. | 10.7 |
| 16. | 20.4 |
| 20. | 56.3 |
| 25. | 190. |
| 30. | 345. |
| 35. | 2721. |
| 35.52 (max) | 4262. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 38.43 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.8.3.1.20**

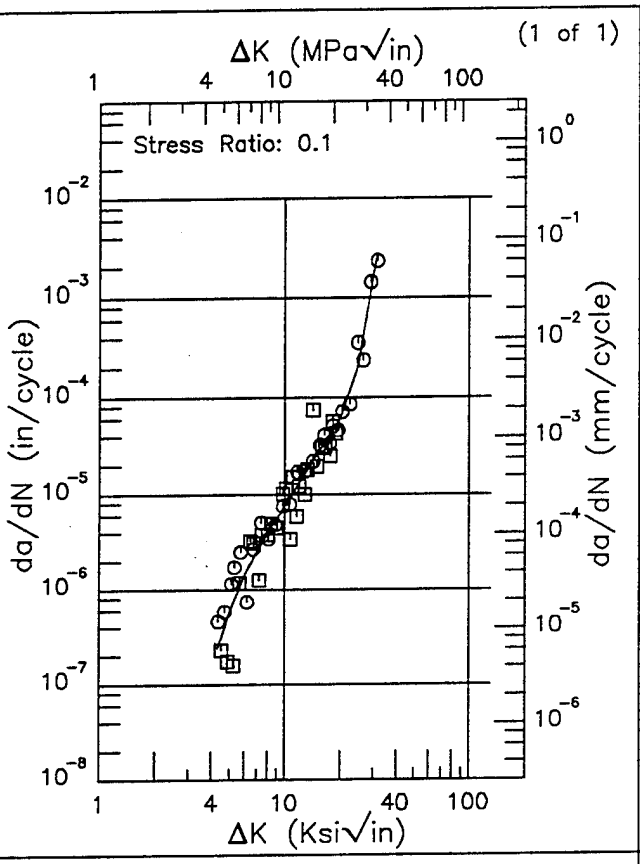
2091

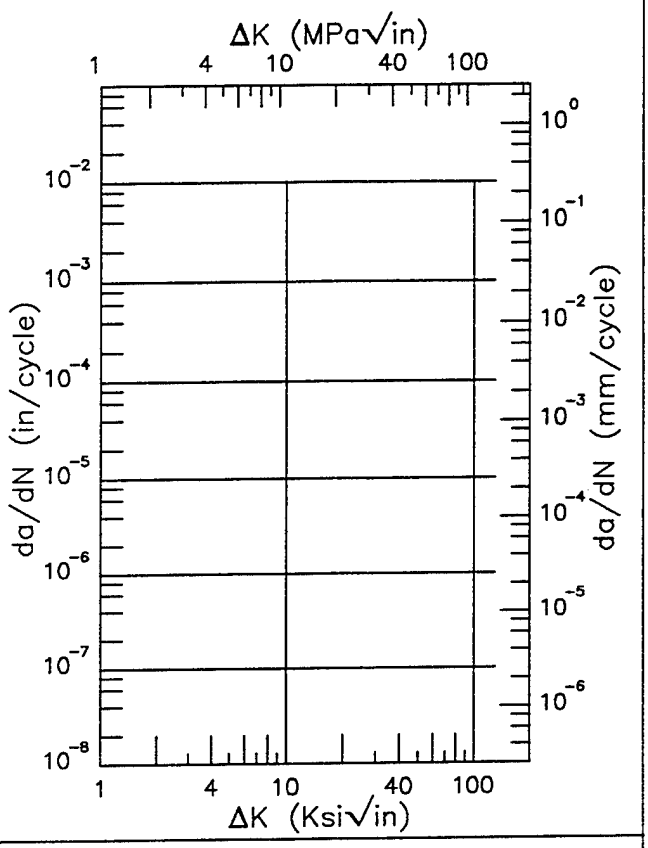
R

Condition/Ht: T851 335F 16HRS
Form: 0.42 in. Plate
Specimen Type: CT
Orientation: T-L
Frequency: 5 Hz
Environment: LAB AIR; RT

Yield Strength: 60.7 ksi
Ult. Strength: 72.7 ksi
Specimen Thk: 0.419 - 0.42 in.
Specimen Width: 2.552 - 2.56 in.
Ref: WL001

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.33 (min) | 0.243 |
| 5. | 0.581 |
| 6. | 1.40 |
| 7. | 2.53 |
| 8. | 3.92 |
| 9. | 5.58 |
| 10. | 7.59 |
| 13. | 16.9 |
| 16. | 32.4 |
| 20. | 61.2 |
| 25. | 229. |
| 30. | 1676. |
| 31.43 (max) | 2536. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 55.64 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.8.3.1.21**

# TABLE 7.9.1.1

## MEAN PLANE STRAIN FRACTURE TOUGHNESS FOR ALUMINUM 2000/6000 SERIES ALLOY 2124 AT ROOM TEMPERATURE

| Product Form | Condition/Heat Treatment | $K_{Ic}$ ($ksi\sqrt{in}$) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Specimen Orientation | | | | | | | | |
| | | L-T | | | T-L | | | S-L | | |
| | | Mean $K_{Ic}$ | Std Dev | n | Mean $K_{Ic}$ | Std Dev | n | Mean $K_{Ic}$ | Std Dev | n |
| Plate | T851 | 29.7 | 2.8 | 364 | 25.1 | 2.3 | 362 | 21.7 | 2.1 | 393 |
| | T851 (417) | 28.9 | 2.8 | 27 | 23.8 | 2.4 | 28 | 21.3 | 2. | 19 |
| | T851 (SP) | 27.2 | 4.7 | 10 | 23.1 | 2.7 | 7 | 21.4 | 3.2 | 10 |

## TABLE 7.9.1.2.1



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2124 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: Dry Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* ($Ksi\sqrt{in}$) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.1 | 30 | | | | 54.9 | | |
| | | 0.1 | 30 | 0.03 | 0.31 | 2.25 | 47.08 | | |
| | | 0.1 | 30 | | | | 39.11 | | |
| | | 0.5 | 30 | | | 6.3 | | | |
| | | 0.5 | 30 | 0.08 | 0.62 | 6.97 | | | |
| | | 0.5 | 30 | | | 7.65 | | | |

## TABLE 7.9.1.2.2



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2124 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: H.H.A**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* ($Ksi\sqrt{in}$) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.33 | 25 | 0.04 | 1.37 | 12.01 | 162.83 | | |

## TABLE 7.9.1.2.3



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2124 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: S.T.W.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi*$\sqrt{in}$) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.1 | 1 | | 0.23 | 5.67 | 47.64 | | |
| | | 0.3 | 1 | | 0.6 | 8.52 | 117.68 | | |
| | | 0.5 | 1 | | 1.08 | 9.59 | | | |

## TABLE 7.9.1.2.4



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK
## 2124 AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: H.H.A.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi*$\sqrt{in}$) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.1 | 1 | | 0.24 | 5.65 | 78.67 | | |
| | | 0.1 | 10-33 | | | 5.21 | | | |
| | | 0.1 | 10-33 | | 0.26 | | | | |
| | | 0.25 | 6-33 | 0.04 | | | | | |
| | | 0.25 | 6-33 | | 0.71 | 6.03 | | | |
| | | 0.5 | 1 | | 1.2 | 15.29 | | | |
| | | 0.5 | 8-33 | 0.13 | | | | | |
| | | 0.5 | 8-33 | | 1.25 | 23.92 | | | |

## TABLE 7.9.1.2.5



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2124 AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: S.T.W.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.1 | 1 | | 0.34 | 7.45 | | | |
| | | 0.3 | 1 | | 0.63 | 10.27 | | | |
| | | 0.5 | 1 | | 1.09 | 18.1 | | | |

## TABLE 7.9.1.2.6

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2124 AT ROOM TEMPERATURE

**ORIENTATION: S-L** **ENVIRONMENT: Dry Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.33 | 18.3 | | | 8.55 | | | |

## TABLE 7.9.1.2.7



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2124 AT ROOM TEMPERATURE

**ORIENTATION: S-L** **ENVIRONMENT: S.T.W.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level ($Ksi\sqrt{in}$) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.1 | 1 | | 0.44 | 7.82 | 182.21 | | |
| | | 0.3 | 1 | | 0.89 | 11.57 | | | |
| | | 0.5 | 1 | | 1.38 | 18.52 | | | |

## TABLE 7.9.1.2.8

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK
## 2124 AT ROOM TEMPERATURE

**ORIENTATION: S-L** **ENVIRONMENT: Salt Fog**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Δ*K Level* (*Ksi*$\sqrt{in}$) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.33 | 18.3 | | | 16.86 | | | |

# TABLE 7.9.2.1



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T351 (417) | Plate | 2.50 | 82 | T-L | 44.2 | 3.990 | 1.999 | CT | 2.146 | 1.82 | 37.70 | --- | --- | 1973 | 86213 |
| T851 | Plate | 2.55 | R.T. | L-T | 52.8 | 6.047 | 2.504 | CT | 3.084 | 1.26 | 37.90 | 29.7 | 2.8 | 1978 | MPC01 |
| | | 5.00 | | | 55.0 | 3.000 | 1.501 | CT | 1.545 | 0.95 | 34.00 | | | 1979 | GD011 |
| | | 5.00 | | | 55.0 | 3.003 | 1.502 | CT | 1.632 | 0.93 | 33.70 | | | 1979 | GD011 |
| | | 6.00 | | | 55.1 | 2.994 | 1.499 | CT | 1.497 | 1.02 | 35.30 | | | 1978 | MPC01 |
| | | 5.00 | | | 55.2 | 3.011 | 1.500 | CT | 1.596 | 0.60 | 27.20 | | | 1978 | MPC01 |
| | | 6.00 | | | 55.5 | 3.006 | 1.498 | CT | 1.503 | 0.70 | 29.90 | | | 1978 | MPC01 |
| | | 5.50 | | | 56.3 | 3.010 | 1.498 | CT | 1.505 | 1.08 | 37.20 | | | 1978 | MPC01 |
| | | 6.00 | | | 56.5 | 3.014 | 1.499 | CT | 1.567 | 0.81 | 32.50 | | | 1978 | MPC01 |
| | | 5.50 | | | 56.7 | 2.999 | 1.500 | CT | 1.513 | 0.64 | 28.90 | | | 1980 | RA001 |
| | | 5.50 | | | 56.8 | 3.020 | 1.493 | CT | 1.480 | 0.67 | 29.70 | | | 1978 | MPC01 |
| | | 6.00 | | | 56.8 | 1.998 | 0.998 | CT | 1.048 | 0.57 | 27.20 | | | 1978 | RA001 |
| | | 5.00 | | | 56.9 | 1.986 | 0.997 | CT | 1.013 | 0.65 | 29.50 | | | 1978 | MPC01 |
| | | 5.12 | | | 56.9 | 3.000 | 1.498 | CT | 1.500 | 0.90 | 34.30 | | | 1978 | MPC01 |
| | | 6.00 | | | 57.1 | 3.000 | 1.500 | CT | 1.550 | 0.67 | 29.70 | | | 1972 | 84368 |
| | | 6.00 | | | 57.1 | 3.000 | 1.500 | CT | 1.520 | 0.65 | 29.10 | | | 1972 | 84368 |
| | | 5.25 | | | 57.2 | 3.004 | 1.498 | CT | 1.502 | 0.65 | 29.30 | | | 1978 | MPC01 |
| | | 5.00 | | | 57.2 | 3.029 | 1.496 | CT | 1.484 | 0.84 | 33.60 | | | 1978 | MPC01 |
| | | 4.90 | | | 57.3 | 3.000 | 1.498 | CT | 1.530 | 0.77 | 32.00 | | | 1978 | RA002 |
| | | 5.50 | | | 57.4 | 3.010 | 1.499 | CT | 1.565 | 0.78 | 32.30 | | | 1978 | MPC01 |
| | | 4.50 | | | 57.4 | 3.001 | 1.499 | CT | 1.522 | 0.95 | 35.40 | | | 1980 | RA001 |
| | | 5.00 | | | 57.6 | 3.000 | 1.499 | CT | 1.537 | 0.62 | 28.90 | | | 1979 | RA001 |
| | | 5.25 | | | 57.7 | 2.973 | 1.502 | CT | 1.516 | 0.75 | 32.30 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 5.00 | R.T. Cont'd | L-T Cont'd | 57.7 | 2.999 | 1.500 | CT | 1.499 | 0.63 | 29.10 | Cont'd | Cont'd | 1980 | RA001 |
| | | 5.50 | | | 57.8 | 3.022 | 1.497 | CT | 1.481 | 0.65 | 29.50 | | | 1978 | MPC01 |
| | | 5.00 | | | 57.8 | 2.997 | 1.497 | CT | 1.521 | 0.66 | 29.90 | | | 1979 | RA001 |
| | | 4.62 | | | 57.9 | 2.998 | 1.500 | CT | 1.499 | 0.93 | 35.50 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.0 | 3.010 | 1.497 | CT | 1.445 | 0.60 | 28.80 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.1 | 2.971 | 1.498 | CT | 1.456 | 0.57 | 28.00 | | | 1978 | MPC01 |
| | | 5.25 | | | 58.1 | 3.026 | 1.500 | CT | 1.513 | 0.90 | 35.20 | | | 1978 | MPC01 |
| | | 5.00 | | | 58.1 | 3.000 | 1.498 | CT | 1.573 | 0.74 | 31.79 | | | 1978 | RA001 |
| | | 5.50 | | | 58.1 | 2.984 | 1.500 | CT | 1.522 | 0.84 | 33.90 | | | 1978 | MPC01 |
| | | 4.90 | | | 58.1 | 3.005 | 1.500 | CT | 1.498 | 0.57 | 27.90 | | | 1978 | RA002 |
| | | 4.25 | | | 58.2 | 2.999 | 1.499 | CT | 1.551 | 0.65 | 29.70 | | | 1980 | RA001 |
| | | 5.00 | | | 58.2 | 3.002 | 1.500 | CT | 1.561 | 0.48 | 25.90 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.3 | 2.988 | 1.499 | CT | 1.464 | 0.57 | 28.40 | | | 1978 | MPC01 |
| | | 5.00 | | | 58.4 | 2.980 | 1.498 | CT | 1.490 | 0.67 | 30.90 | | | 1978 | MPC01 |
| | | 3.50 | | | 58.7 | 3.004 | 1.498 | CT | 1.502 | 0.72 | 31.90 | | | 1978 | MPC01 |
| | | 5.00 | | | 58.7 | 1.992 | 0.998 | CT | 1.016 | 0.50 | 26.80 | | | 1978 | MPC01 |
| | | 2.50 | | | 58.8 | 3.000 | 1.498 | CT | 1.556 | 0.60 | 28.90 | | | 1980 | RA001 |
| | | 6.00 | | | 58.8 | 2.000 | 0.995 | CT | 0.975 | 0.97 | 36.70 | | | 1980 | RA001 |
| | | 4.50 | | | 58.9 | 2.982 | 1.498 | CT | 1.491 | 0.75 | 32.70 | | | 1978 | MPC01 |
| | | 6.00 | | | 58.9 | 3.014 | 1.499 | CT | 1.537 | 0.67 | 30.90 | | | 1978 | MPC01 |
| | | 4.50 | | | 59.0 | 3.016 | 1.499 | CT | 1.478 | 0.70 | 31.60 | | | 1978 | MPC01 |
| | | 5.50 | | | 59.1 | 2.986 | 1.501 | CT | 1.523 | 0.57 | 28.60 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_c$/TYS)$^2$ (in.) | $K_{Ic}$ $K_c$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 4.55 | R.T. Cont'd | L-T Cont'd | 59.1 | 3.001 | 1.496 | CT | 1.517 | 0.75 | 32.40 | Cont'd | Cont'd | 1980 | RA001 |
| | | 5.50 | | | 59.1 | 3.000 | 1.501 | CT | 1.530 | 0.70 | 31.50 | | | 1978 | MPC01 |
| | | 6.00 | | | 59.2 | 2.977 | 1.495 | CT | 1.518 | 0.70 | 31.80 | | | 1978 | MPC01 |
| | | 6.00 | | | 59.3 | 2.986 | 1.493 | CT | 1.493 | 0.55 | 27.90 | | | 1978 | MPC01 |
| | | 4.31 | | | 59.3 | 2.000 | 1.000 | CT | 1.000 | 0.50 | 26.50 | | | 1972 | 84368 |
| | | 4.31 | | | 59.3 | 2.000 | 1.000 | CT | 0.990 | 0.52 | 27.00 | | | 1972 | 84368 |
| | | 4.00 | | | 59.3 | 3.000 | 1.499 | CT | 1.542 | 0.61 | 29.50 | | | 1978 | RA001 |
| | | 4.90 | | | 59.4 | 2.990 | 1.368 | CT | 1.465 | 0.57 | 29.00 | | | 1978 | MPC01 |
| | | 4.00 | | | 59.4 | 2.000 | 1.000 | CT | 1.000 | 0.61 | 29.40 | | | 1972 | 84368 |
| | | 4.00 | | | 59.4 | 2.000 | 1.000 | CT | 1.000 | 0.59 | 28.90 | | | 1972 | 84368 |
| | | 4.62 | | | 59.5 | 2.988 | 1.498 | CT | 1.464 | 0.62 | 30.10 | | | 1978 | MPC01 |
| | | 5.25 | | | 59.6 | 3.018 | 1.501 | CT | 1.509 | 0.81 | 34.50 | | | 1978 | MPC01 |
| | | 6.00 | | | 59.6 | 1.998 | 0.998 | CT | 1.033 | 0.73 | 32.30 | | | 1978 | RA001 |
| | | 4.00 | | | 59.6 | 2.999 | 1.499 | CT | 1.527 | 0.62 | 29.90 | | | 1980 | RA001 |
| | | 4.00 | | | 59.6 | 3.002 | 1.498 | CT | 1.542 | 0.88 | 35.50 | | | 1980 | RA001 |
| | | 4.50 | | | 59.6 | 2.997 | 1.498 | CT | 1.532 | 0.79 | 33.59 | | | 1979 | RA001 |
| | | 4.50 | | | 59.6 | 3.012 | 1.499 | CT | 1.476 | 0.70 | 31.70 | | | 1978 | MPC01 |
| | | 1.81 | | | 59.7 | 3.011 | 1.498 | CT | 1.626 | 0.60 | 29.80 | | | 1978 | MPC01 |
| | | 4.50 | | | 59.8 | 3.000 | 1.500 | CT | 1.530 | 0.76 | 33.10 | | | 1972 | 84368 |
| | | 4.50 | | | 59.8 | 3.000 | 1.500 | CT | 1.510 | 0.71 | 31.90 | | | 1972 | 84368 |
| | | 6.00 | | | 59.9 | 3.004 | 1.499 | CT | 1.532 | 0.70 | 31.80 | | | 1978 | MPC01 |
| | | 4.00 | | | 59.9 | 3.012 | 1.497 | CT | 1.566 | 0.70 | 32.30 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 5.00 | R.T. Cont'd | L-T Cont'd | 59.9 | 3.004 | 1.499 | CT | 1.532 | 0.60 | 29.80 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 3.00 | | | 59.9 | 2.994 | 1.406 | CT | 1.529 | 0.66 | 30.79 | | | 1980 | RA001 |
| | | 3.00 | | | 59.9 | 3.001 | 1.376 | CT | 1.484 | 0.60 | 29.40 | | | 1980 | RA001 |
| | | 4.00 | | | 60.0 | 3.000 | 1.499 | CT | 1.489 | 0.62 | 29.90 | | | 1980 | RA001 |
| | | 5.50 | | | 60.1 | 2.996 | 1.502 | CT | 1.528 | 0.57 | 29.40 | | | 1978 | MPC01 |
| | | 5.50 | | | 60.1 | 3.012 | 1.501 | CT | 1.506 | 0.52 | 27.70 | | | 1978 | MPC01 |
| | | 4.50 | | | 60.1 | 3.000 | 1.495 | CT | 1.533 | 0.69 | 31.60 | | | 1978 | RA002 |
| | | 2.50 | | | 60.3 | 3.002 | 1.102 | CT | 1.510 | 0.44 | 25.50 | | | 1980 | RA001 |
| | | 4.50 | | | 60.3 | 3.000 | 1.499 | CT | 1.536 | 0.57 | 28.79 | | | 1978 | RA002 |
| | | 5.00 | | | 60.4 | 2.000 | 1.001 | CT | 1.011 | 0.56 | 28.79 | | | 1978 | RA002 |
| | | 5.50 | | | 60.4 | 3.016 | 1.500 | CT | 1.508 | 0.52 | 28.00 | | | 1978 | MPC01 |
| | | 5.25 | | | 60.4 | 2.994 | 1.500 | CT | 1.497 | 0.75 | 33.50 | | | 1978 | MPC01 |
| | | 5.50 | | | 60.4 | 3.002 | 1.500 | CT | 1.531 | 0.62 | 30.30 | | | 1978 | MPC01 |
| | | 2.50 | | | 60.5 | 3.004 | 1.499 | CT | 1.523 | 0.44 | 25.40 | | | 1980 | RA001 |
| | | 4.50 | | | 60.5 | 2.978 | 1.500 | CT | 1.489 | 0.65 | 31.00 | | | 1978 | MPC01 |
| | | 5.50 | | | 60.6 | 3.004 | 1.500 | CT | 1.532 | 0.52 | 28.10 | | | 1978 | MPC01 |
| | | 3.54 | | | 60.6 | 2.994 | 1.497 | CT | 1.587 | 0.62 | 30.70 | | | 1978 | MPC01 |
| | | 5.50 | | | 60.6 | 3.026 | 1.500 | CT | 1.513 | 0.60 | 30.20 | | | 1978 | MPC01 |
| | | 5.50 | | | 60.6 | 2.998 | 1.500 | CT | 1.529 | 0.48 | 26.90 | | | 1978 | MPC01 |
| | | 2.75 | | | 60.6 | 3.001 | 1.499 | CT | 1.591 | 0.48 | 26.79 | | | 1978 | RA002 |
| | | 3.00 | | | 60.6 | 3.000 | 1.400 | CT | 1.526 | 0.64 | 30.90 | | | 1980 | RA001 |
| | | 5.50 | | | 60.8 | 3.008 | 1.497 | CT | 1.534 | 0.48 | 27.10 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 3.62 | R.T. Cont'd | L-T Cont'd | 60.8 | 3.006 | 1.496 | CT | 1.473 | 0.65 | 31.40 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 3.50 | | | 60.8 | 3.004 | 1.496 | CT | 1.492 | 0.42 | 25.00 | | | 1980 | RA001 |
| | | 5.50 | | | 60.9 | 2.980 | 1.500 | CT | 1.520 | 0.48 | 27.00 | | | 1978 | MPC01 |
| | | 4.31 | | | 60.9 | 3.004 | 1.498 | CT | 1.592 | 0.62 | 28.10 | | | 1978 | MPC01 |
| | | 5.00 | | | 60.9 | 3.010 | 1.500 | CT | 1.535 | 0.55 | 29.10 | | | 1978 | MPC01 |
| | | 5.50 | | | 60.9 | 3.028 | 1.501 | CT | 1.514 | 0.70 | 32.70 | | | 1978 | MPC01 |
| | | 4.00 | | | 60.9 | 2.999 | 1.499 | CT | 1.544 | 0.56 | 28.90 | | | 1978 | RA001 |
| | | 6.00 | | | 61.0 | 2.998 | 1.500 | CT | 1.559 | 0.70 | 32.50 | | | 1978 | MPC01 |
| | | 3.50 | | | 61.0 | 3.004 | 1.499 | CT | 1.502 | 0.72 | 33.00 | | | 1978 | MPC01 |
| | | 3.50 | | | 61.0 | 2.982 | 1.499 | CT | 1.461 | 0.70 | 32.50 | | | 1978 | MPC01 |
| | | 5.50 | | | 61.1 | 3.032 | 1.500 | CT | 1.516 | 0.48 | 26.90 | | | 1978 | MPC01 |
| | | 4.25 | | | 61.1 | 1.985 | 0.998 | CT | 1.032 | 0.78 | 34.60 | | | 1978 | MPC01 |
| | | 5.50 | | | 61.1 | 3.000 | 1.500 | CT | 1.500 | 0.53 | 28.10 | | | 1972 | 84368 |
| | | 5.50 | | | 61.1 | 3.000 | 1.500 | CT | 1.500 | 0.55 | 28.80 | | | 1972 | 84368 |
| | | 4.00 | | | 61.1 | 3.000 | 1.499 | CT | 1.571 | 0.73 | 33.09 | | | 1979 | RA001 |
| | | 4.00 | | | 61.2 | 3.000 | 1.497 | CT | 1.586 | 0.92 | 37.20 | | | 1978 | RA001 |
| | | 4.00 | | | 61.2 | 3.012 | 1.496 | CT | 1.536 | 0.67 | 31.90 | | | 1978 | MPC01 |
| | | 2.70 | | | 61.3 | 2.008 | 1.000 | CT | 1.024 | 0.81 | 35.50 | | | 1978 | MPC01 |
| | | 4.90 | | | 61.3 | 3.002 | 1.499 | CT | 1.550 | 0.50 | 27.50 | | | 1978 | RA002 |
| | | 3.00 | | | 61.3 | 3.002 | 1.497 | CT | 1.522 | 0.65 | 31.40 | | | 1980 | RA001 |
| | | 6.00 | | | 61.4 | 2.980 | 1.499 | CT | 1.520 | 0.70 | 32.80 | | | 1978 | MPC01 |
| | | 2.50 | | | 61.4 | 3.020 | 1.186 | CT | 1.540 | 0.55 | 29.10 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 2.50 | R.T. Cont'd | L-T Cont'd | 61.4 | 2.012 | 0.998 | CT | 1.006 | 0.44 | 26.00 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 5.50 | | | 61.4 | 3.031 | 1.500 | CT | 1.546 | 0.52 | 28.80 | | | 1978 | MPC01 |
| | | 4.90 | | | 61.5 | 2.976 | 1.494 | CT | 1.488 | 0.48 | 27.50 | | | 1978 | MPC01 |
| | | 4.00 | | | 61.5 | 3.001 | 1.496 | CT | 1.610 | 0.65 | 31.50 | | | 1979 | RA001 |
| | | 3.00 | | | 61.5 | 3.002 | 1.379 | CT | 1.551 | 0.82 | 35.40 | | | 1980 | RA001 |
| | | 5.50 | | | 61.6 | 3.026 | 1.500 | CT | 1.513 | 0.52 | 28.80 | | | 1978 | MPC01 |
| | | 4.00 | | | 61.6 | 2.883 | 1.499 | CT | 1.550 | 0.55 | 29.20 | | | 1978 | MPC01 |
| | | 5.50 | | | 61.6 | 3.018 | 1.501 | CT | 1.509 | 0.42 | 25.70 | | | 1978 | MPC01 |
| | | 5.50 | | | 61.6 | 2.973 | 1.500 | CT | 1.516 | 0.48 | 27.40 | | | 1978 | MPC01 |
| | | 5.00 | | | 61.6 | 2.979 | 1.501 | CT | 1.549 | 0.57 | 30.00 | | | 1978 | MPC01 |
| | | 2.00 | | | 61.8 | 2.994 | 1.500 | CT | 1.537 | 0.59 | 30.20 | | | 1980 | RA001 |
| | | 3.00 | | | 61.9 | 3.000 | 1.449 | CT | 1.536 | 0.63 | 31.29 | | | 1980 | RA001 |
| | | 5.50 | | | 61.9 | 2.994 | 1.501 | CT | 1.527 | 0.52 | 29.00 | | | 1978 | MPC01 |
| | | 2.50 | | | 61.9 | 3.001 | 1.499 | CT | 1.513 | 0.48 | 27.29 | | | 1980 | RA001 |
| | | 4.25 | | | 61.9 | 3.018 | 1.502 | CT | 1.539 | 0.57 | 29.80 | | | 1978 | MPC01 |
| | | 5.50 | | | 61.9 | 2.998 | 1.501 | CT | 1.529 | 0.55 | 29.10 | | | 1978 | MPC01 |
| | | 3.00 | | | 61.9 | 2.980 | 1.245 | CT | 1.490 | 0.65 | 31.70 | | | 1978 | MPC01 |
| | | 5.50 | | | 61.9 | 3.030 | 1.501 | CT | 1.515 | 0.48 | 27.30 | | | 1978 | MPC01 |
| | | 5.00 | | | 61.9 | 3.020 | 1.502 | CT | 1.540 | 0.57 | 30.00 | | | 1978 | MPC01 |
| | | 4.00 | | | 62.0 | 3.008 | 1.498 | CT | 1.504 | 0.78 | 35.30 | | | 1978 | MPC01 |
| | | 5.00 | | | 62.0 | 2.991 | 1.499 | CT | 1.585 | 0.57 | 30.10 | | | 1978 | MPC01 |
| | | 5.50 | | | 62.0 | 3.016 | 1.501 | CT | 1.508 | 0.40 | 25.40 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 5.50 | R.T. Cont'd | L-T Cont'd | 62.0 | 3.012 | 1.500 | CT | 1.506 | 0.42 | 25.70 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 3.50 | | | 62.0 | 3.001 | 1.490 | CT | 1.572 | 0.73 | 33.59 | | | 1979 | RA001 |
| | | 4.00 | | | 62.0 | 3.014 | 1.493 | CT | 1.477 | 0.67 | 32.70 | | | 1978 | MPC01 |
| | | 5.50 | | | 62.1 | 2.992 | 1.500 | CT | 1.526 | 0.46 | 27.10 | | | 1978 | MPC01 |
| | | 5.50 | | | 62.1 | 2.978 | 1.500 | CT | 1.519 | 0.55 | 29.60 | | | 1978 | MPC01 |
| | | 5.25 | | | 62.1 | 2.980 | 1.500 | CT | 1.520 | 0.62 | 31.30 | | | 1978 | MPC01 |
| | | 5.50 | | | 62.1 | 2.978 | 1.500 | CT | 1.519 | 0.50 | 28.20 | | | 1978 | MPC01 |
| | | 4.50 | | | 62.1 | 3.014 | 1.500 | CT | 1.507 | 0.60 | 30.80 | | | 1978 | MPC01 |
| | | 5.50 | | | 62.1 | 3.008 | 1.500 | CT | 1.504 | 0.46 | 27.20 | | | 1978 | MPC01 |
| | | 5.50 | | | 62.1 | 2.986 | 1.503 | CT | 1.523 | 0.57 | 29.90 | | | 1978 | MPC01 |
| | | 4.50 | | | 62.1 | 3.006 | 1.501 | CT | 1.503 | 0.60 | 30.80 | | | 1978 | MPC01 |
| | | 5.50 | | | 62.1 | 2.998 | 1.500 | CT | 1.559 | 0.55 | 29.30 | | | 1978 | MPC01 |
| | | 3.54 | | | 62.2 | 3.030 | 1.499 | CT | 1.515 | 0.65 | 32.10 | | | 1978 | MPC01 |
| | | 4.00 | | | 62.2 | 3.004 | 1.498 | CT | 1.562 | 0.52 | 29.20 | | | 1978 | MPC01 |
| | | 3.00 | | | 62.2 | 2.998 | 1.300 | CT | 1.485 | 0.63 | 31.29 | | | 1978 | RA002 |
| | | 1.75 | | | 62.2 | 3.000 | 1.495 | CT | 1.528 | 0.53 | 28.79 | | | 1980 | RA001 |
| | | 4.50 | | | 62.3 | 3.004 | 1.501 | CT | 1.502 | 0.55 | 29.90 | | | 1978 | MPC01 |
| | | 4.50 | | | 62.3 | 3.004 | 1.501 | CT | 1.502 | 0.67 | 32.80 | | | 1978 | MPC01 |
| | | 5.50 | | | 62.3 | 2.988 | 1.500 | CT | 1.524 | 0.42 | 25.80 | | | 1978 | MPC01 |
| | | 5.50 | | | 62.4 | 3.026 | 1.500 | CT | 1.513 | 0.46 | 27.30 | | | 1978 | MPC01 |
| | | 3.25 | | | 62.4 | 2.990 | 1.498 | CT | 1.435 | 0.72 | 34.00 | | | 1978 | MPC01 |
| | | 2.50 | | | 62.5 | 3.000 | 1.499 | CT | 1.600 | 0.60 | 30.79 | | | 1978 | RA002 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 6.00 | R.T. Cont'd | L-T Cont'd | 62.5 | 3.010 | 1.499 | CT | 1.565 | 0.72 | 34.00 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 4.90 | | | 62.5 | 3.000 | 1.499 | CT | 1.603 | 0.50 | 28.00 | | | 1978 | RA002 |
| | | 5.00 | | | 62.6 | 3.024 | 1.500 | CT | 1.542 | 0.48 | 28.00 | | | 1978 | MPC01 |
| | | 5.50 | | | 62.6 | 3.000 | 1.500 | CT | 2.100 | 0.56 | 29.70 | | | 1978 | GD003 |
| | | 5.50 | | | 62.6 | 3.000 | 1.500 | CT | 2.100 | 0.62 | 31.20 | | | 1978 | GD003 |
| | | 5.50 | | | 62.6 | 2.986 | 1.500 | CT | 1.523 | 0.52 | 28.80 | | | 1978 | MPC01 |
| | | 5.00 | | | 62.6 | 3.016 | 1.500 | CT | 1.508 | 0.44 | 26.90 | | | 1978 | MPC01 |
| | | 4.75 | | | 62.6 | 3.000 | 1.500 | CT | 1.546 | 0.66 | 32.20 | | | 1980 | RA001 |
| | | 5.50 | | | 62.6 | 3.000 | 1.500 | CT | 2.100 | 0.58 | 30.20 | | | 1978 | GD003 |
| | | 3.12 | | | 62.7 | 3.015 | 1.377 | CT | 1.447 | 0.65 | 32.00 | | | 1978 | MPC01 |
| | | 3.12 | | | 62.7 | 3.030 | 1.498 | CT | 1.515 | 0.62 | 31.60 | | | 1978 | MPC01 |
| | | 3.00 | | | 62.7 | 3.002 | 1.188 | CT | 1.581 | 0.51 | 28.50 | | | 1978 | RA002 |
| | | 3.75 | | | 62.8 | 3.029 | 1.497 | CT | 1.575 | 0.52 | 28.90 | | | 1978 | MPC01 |
| | | 4.00 | | | 62.8 | 3.001 | 1.251 | CT | 1.525 | 0.47 | 27.30 | | | 1980 | RA001 |
| | | 5.00 | | | 62.9 | 3.032 | 1.500 | CT | 1.516 | 0.48 | 28.20 | | | 1978 | MPC01 |
| | | 5.00 | | | 62.9 | 2.972 | 1.500 | CT | 1.486 | 0.46 | 27.20 | | | 1978 | MPC01 |
| | | 2.50 | | | 62.9 | 2.000 | 1.000 | CT | --- | 0.67 | 32.10 | | | 1974 | 88742 |
| | | 5.50 | | | 62.9 | 3.024 | 1.500 | CT | 1.512 | 0.48 | 28.00 | | | 1978 | MPC01 |
| | | 3.12 | | | 62.9 | 3.002 | 1.498 | CT | 1.514 | 0.67 | 32.59 | | | 1980 | RA001 |
| | | 4.25 | | | 62.9 | 3.039 | 1.500 | CT | 1.550 | 0.48 | 27.80 | | | 1978 | MPC01 |
| | | 2.50 | | | 62.9 | 2.000 | 1.000 | CT | --- | 0.74 | 33.70 | | | 1974 | 88742 |
| | | 2.50 | | | 62.9 | 2.000 | 1.000 | CT | --- | 0.67 | 32.00 | | | 1974 | 88742 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 3.12 | R.T. Cont'd | L-T Cont'd | 63.0 | 3.025 | 1.498 | CT | 1.482 | 0.62 | 32.10 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 4.25 | | | 63.0 | 3.010 | 1.500 | CT | 1.535 | 0.52 | 29.10 | | | 1978 | MPC01 |
| | | 6.00 | | | 63.1 | 3.002 | 1.499 | CT | 1.561 | 0.62 | 31.70 | | | 1978 | MPC01 |
| | | 2.00 | | | 63.1 | 3.006 | 1.500 | CT | 1.503 | 0.48 | 27.90 | | | 1978 | MPC01 |
| | | 2.50 | | | 63.1 | 2.970 | 1.201 | CT | 1.674 | 0.50 | 28.40 | | | 1978 | MPC01 |
| | | 2.00 | | | 63.1 | 3.020 | 1.499 | CT | 1.510 | 0.55 | 30.20 | | | 1978 | MPC01 |
| | | 4.25 | | | 63.2 | 2.977 | 1.500 | CT | 1.518 | 0.46 | 27.40 | | | 1978 | MPC01 |
| | | 4.50 | | | 63.2 | 3.016 | 1.500 | CT | 1.508 | 0.55 | 30.20 | | | 1978 | MPC01 |
| | | 4.50 | | | 63.2 | 2.984 | 1.500 | CT | 1.492 | 0.57 | 30.50 | | | 1978 | MPC01 |
| | | 5.00 | | | 63.2 | 3.008 | 1.500 | CT | 1.534 | 0.60 | 31.40 | | | 1978 | MPC01 |
| | | 4.50 | | | 63.2 | 3.012 | 1.500 | CT | 1.506 | 0.60 | 31.00 | | | 1978 | MPC01 |
| | | 2.00 | | | 63.2 | 3.000 | 1.497 | CT | 1.591 | 0.50 | 28.50 | | | 1978 | RA001 |
| | | 2.75 | | | 63.2 | 3.002 | 1.483 | CT | 1.520 | 0.50 | 28.29 | | | 1980 | RA001 |
| | | 4.50 | | | 63.4 | 3.022 | 1.499 | CT | 1.511 | 0.55 | 30.30 | | | 1978 | MPC01 |
| | | 4.50 | | | 63.4 | 3.000 | 1.500 | CT | 1.520 | 0.44 | 26.70 | | | 1972 | 84368 |
| | | 4.50 | | | 63.4 | 3.000 | 1.500 | CT | 1.540 | 0.46 | 27.20 | | | 1972 | 84368 |
| | | 1.50 | | | 63.4 | 3.000 | 1.483 | CT | 1.568 | 0.59 | 30.79 | | | 1980 | RA001 |
| | | 4.25 | | | 63.5 | 2.986 | 1.500 | CT | 1.523 | 0.50 | 29.20 | | | 1978 | MPC01 |
| | | 4.00 | | | 63.5 | 3.014 | 1.499 | CT | 1.567 | 0.60 | 31.60 | | | 1978 | MPC01 |
| | | 1.75 | | | 63.5 | 3.004 | 1.500 | CT | 1.517 | 0.53 | 29.29 | | | 1978 | RA002 |
| | | 1.75 | | | 63.6 | 3.001 | 1.496 | CT | 1.583 | 0.52 | 29.10 | | | 1978 | RA001 |
| | | 3.00 | | | 63.6 | 1.998 | 0.999 | CT | 1.019 | 0.43 | 26.50 | | | 1979 | RA001 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ Ksi√in.) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 2.75 | R.T. Cont'd | L-T Cont'd | 63.6 | 2.999 | 1.496 | CT | 1.543 | 0.54 | 29.60 | Cont'd | Cont'd | 1980 | RA001 |
| | | 3.00 | | | 63.6 | 2.986 | 1.499 | CT | 1.523 | 0.55 | 29.90 | | | 1978 | MPC01 |
| | | 3.12 | | | 63.6 | 2.985 | 1.499 | CT | 1.582 | 0.70 | 33.80 | | | 1978 | MPC01 |
| | | 2.50 | | | 63.7 | 3.002 | 1.499 | CT | 1.561 | 0.52 | 29.70 | | | 1978 | MPC01 |
| | | 4.00 | | | 63.7 | 3.019 | 1.499 | CT | 1.570 | 0.42 | 26.70 | | | 1978 | MPC01 |
| | | 2.50 | | | 63.7 | 3.001 | 1.495 | CT | 1.607 | 0.53 | 29.40 | | | 1978 | RA002 |
| | | 2.00 | | | 63.8 | 3.016 | 1.498 | CT | 1.508 | 0.46 | 27.60 | | | 1978 | MPC01 |
| | | 2.50 | | | 63.8 | 3.010 | 1.498 | CT | 1.535 | 0.52 | 29.40 | | | 1978 | MPC01 |
| | | 3.62 | | | 63.8 | 2.995 | 1.499 | CT | 1.529 | 0.49 | 28.29 | | | 1980 | RA001 |
| | | 2.50 | | | 63.8 | 3.000 | 1.499 | CT | 1.584 | 0.56 | 30.20 | | | 1978 | RA002 |
| | | 3.50 | | | 63.9 | 3.000 | 1.500 | CT | 1.520 | 0.61 | 31.50 | | | 1972 | 84368 |
| | | 2.35 | | | 63.9 | 3.001 | 1.500 | CT | 1.581 | 0.51 | 29.00 | | | 1978 | RA002 |
| | | 3.00 | | | 63.9 | 3.000 | 1.397 | CT | 1.532 | 0.54 | 29.90 | | | 1980 | RA001 |
| | | 4.25 | | | 63.9 | 3.014 | 1.501 | CT | 1.507 | 0.62 | 32.50 | | | 1978 | MPC01 |
| | | 3.50 | | | 63.9 | 3.000 | 1.500 | CT | 1.510 | 0.61 | 31.60 | | | 1972 | 84368 |
| | | 3.00 | | | 64.0 | 2.996 | 1.400 | CT | 1.618 | 0.50 | 29.40 | | | 1978 | MPC01 |
| | | 4.25 | | | 64.0 | 3.020 | 1.500 | CT | 1.510 | 0.62 | 32.30 | | | 1978 | MPC01 |
| | | 3.00 | | | 64.0 | 3.021 | 1.247 | CT | 1.450 | 0.44 | 27.50 | | | 1978 | MPC01 |
| | | 4.90 | | | 64.0 | 3.000 | 1.499 | CT | 1.572 | 0.56 | 30.29 | | | 1978 | RA002 |
| | | 5.50 | | | 64.0 | 2.977 | 1.500 | CT | 1.518 | 0.46 | 27.90 | | | 1978 | MPC01 |
| | | 3.00 | | | 64.1 | 2.999 | 1.488 | CT | 1.574 | 0.69 | 33.70 | | | 1978 | RA001 |
| | | 2.50 | | | 64.1 | 3.000 | 1.499 | CT | 1.623 | 0.56 | 30.40 | | | 1978 | RA002 |

# TABLE 7.9.2.1 (CONTINUED)

## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ (Ksi√in.)) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 2.35 | R.T. Cont'd | L-T Cont'd | 64.1 | 1.498 | 0.751 | CT | 0.790 | 0.20 | 18.29 | Cont'd | Cont'd | 1978 | RA002 |
| | | 3.00 | | | 64.2 | 3.000 | 1.499 | CT | 1.548 | 0.57 | 30.70 | | | 1980 | RA001 |
| | | 4.25 | | | 64.2 | 3.024 | 1.500 | CT | 1.512 | 0.46 | 27.90 | | | 1978 | MPC01 |
| | | 2.00 | | | 64.2 | 2.000 | 1.002 | CT | 1.008 | 0.43 | 26.79 | | | 1978 | RA002 |
| | | 3.50 | | | 64.2 | 2.999 | 1.499 | CT | 1.550 | 0.67 | 33.40 | | | 1978 | RA001 |
| | | 2.25 | | | 64.2 | 2.989 | 0.999 | CT | 1.554 | 0.36 | 25.00 | | | 1978 | MPC01 |
| | | 3.00 | | | 64.2 | 3.002 | 1.495 | CT | 1.533 | 0.40 | 25.70 | | | 1980 | RA001 |
| | | 1.57 | | | 64.2 | 3.000 | 1.500 | CT | 1.590 | 0.46 | 27.40 | | | 1972 | 84368 |
| | | 3.62 | | | 64.3 | 2.978 | 1.499 | CT | 1.608 | 0.46 | 27.80 | | | 1978 | MPC01 |
| | | 3.54 | | | 64.3 | 3.014 | 1.498 | CT | 1.507 | 0.48 | 28.50 | | | 1978 | MPC01 |
| | | 2.35 | | | 64.3 | 3.001 | 1.499 | CT | 1.527 | 0.51 | 29.20 | | | 1980 | RA001 |
| | | 4.25 | | | 64.4 | 3.008 | 1.500 | CT | 1.534 | 0.55 | 30.80 | | | 1978 | MPC01 |
| | | 3.00 | | | 64.4 | 2.975 | 1.300 | CT | 1.636 | 0.48 | 28.60 | | | 1978 | MPC01 |
| | | 2.00 | | | 64.4 | 3.016 | 1.499 | CT | 1.538 | 0.50 | 29.50 | | | 1978 | MPC01 |
| | | 4.50 | | | 64.4 | 3.024 | 1.500 | CT | 1.512 | 0.62 | 32.20 | | | 1978 | MPC01 |
| | | 1.12 | | | 64.4 | 3.000 | 1.140 | CT | 1.537 | 0.53 | 29.79 | | | 1980 | RA001 |
| | | 1.50 | | | 64.5 | 2.990 | 1.493 | CT | 1.525 | 0.57 | 31.60 | | | 1978 | MPC01 |
| | | 4.25 | | | 64.5 | 3.008 | 1.500 | CT | 1.534 | 0.50 | 29.60 | | | 1978 | MPC01 |
| | | 2.50 | | | 64.5 | 3.004 | 1.498 | CT | 1.546 | 0.44 | 27.10 | | | 1980 | RA001 |
| | | 2.50 | | | 64.5 | 2.010 | 0.998 | CT | 1.005 | 0.34 | 24.00 | | | 1978 | MPC01 |
| | | 2.50 | | | 64.5 | 2.510 | 1.249 | CT | 1.280 | 0.50 | 29.40 | | | 1978 | MPC01 |
| | | 2.50 | | | 64.5 | 2.999 | 1.494 | CT | 1.536 | 0.39 | 25.70 | | | 1980 | RA001 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 2.50 | R.T. Cont'd | L-T Cont'd | 64.5 | 2.498 | 1.250 | CT | 1.274 | 0.48 | 28.50 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 4.25 | | | 64.7 | 3.026 | 1.499 | CT | 1.543 | 0.60 | 31.80 | | | 1978 | MPC01 |
| | | 2.50 | | | 64.7 | 3.014 | 1.102 | CT | 1.567 | 0.40 | 26.50 | | | 1978 | MPC01 |
| | | 2.75 | | | 64.7 | 3.024 | 1.500 | CT | 1.542 | 0.70 | 34.80 | | | 1978 | MPC01 |
| | | 4.25 | | | 64.7 | 3.028 | 1.501 | CT | 1.514 | 0.62 | 32.50 | | | 1978 | MPC01 |
| | | 3.00 | | | 64.8 | 3.000 | 1.499 | CT | 1.558 | 0.40 | 26.00 | | | 1979 | RA001 |
| | | 2.00 | | | 64.8 | 3.002 | 1.496 | CT | 1.554 | 0.40 | 26.10 | | | 1980 | RA001 |
| | | 2.20 | | | 64.8 | 3.001 | 1.498 | CT | 1.554 | 0.52 | 29.70 | | | 1980 | RA001 |
| | | 2.50 | | | 64.9 | 2.010 | 1.000 | CT | 1.005 | 0.55 | 30.60 | | | 1978 | MPC01 |
| | | 2.50 | | | 64.9 | 2.508 | 1.250 | CT | 1.279 | 0.42 | 27.20 | | | 1978 | MPC01 |
| | | 2.50 | | | 64.9 | 2.486 | 1.250 | CT | 1.268 | 0.42 | 26.90 | | | 1978 | MPC01 |
| | | 3.25 | | | 64.9 | 3.016 | 1.497 | CT | 1.508 | 0.70 | 34.40 | | | 1978 | MPC01 |
| | | 1.81 | | | 64.9 | 2.982 | 1.493 | CT | 1.521 | 0.52 | 29.90 | | | 1978 | MPC01 |
| | | 2.75 | | | 64.9 | 2.997 | 1.498 | CT | 1.610 | 0.60 | 32.00 | | | 1980 | RA001 |
| | | 4.90 | | | 65.0 | 3.000 | 1.500 | CT | 1.591 | 0.49 | 28.90 | | | 1978 | RA002 |
| | | 2.00 | | | 65.0 | 3.017 | 1.499 | CT | 1.569 | 0.57 | 31.20 | | | 1978 | MPC01 |
| | | 0.62 | | | 65.1 | 1.006 | 0.500 | CT | 0.503 | 0.46 | 28.40 | | | 1978 | MPC01 |
| | | 1.50 | | | 65.1 | 3.000 | 1.479 | CT | 1.532 | 0.52 | 29.90 | | | 1980 | RA001 |
| | | 2.00 | | | 65.1 | 3.000 | 1.496 | CT | 1.581 | 0.59 | 31.79 | | | 1980 | RA001 |
| | | 4.00 | | | 65.2 | 3.979 | 2.000 | CT | 2.069 | 0.50 | 29.40 | | | 1978 | MPC01 |
| | | 2.00 | | | 65.2 | 2.008 | 0.899 | CT | 1.044 | 0.44 | 27.60 | | | 1978 | MPC01 |
| | | 2.50 | | | 65.2 | 2.999 | 1.498 | CT | 1.555 | 0.48 | 28.70 | | | 1980 | RA001 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 1.75 | R.T. Cont'd | L-T Cont'd | 65.2 | 2.999 | 1.500 | CT | 1.567 | 0.61 | 32.30 | Cont'd | Cont'd | 1980 | RA001 |
| | | 1.57 | | | 65.2 | 3.000 | 1.500 | CT | 1.530 | 0.73 | 35.20 | | | 1972 | 84368 |
| | | 3.00 | | | 65.2 | 3.008 | 1.400 | CT | 1.594 | 0.48 | 28.90 | | | 1978 | MPC01 |
| | | 1.57 | | | 65.2 | 3.000 | 1.500 | CT | 1.480 | 0.69 | 34.20 | | | 1972 | 84368 |
| | | 3.00 | | | 65.2 | 2.001 | 0.997 | CT | 1.012 | 0.54 | 30.50 | | | 1978 | RA002 |
| | | 2.35 | | | 65.2 | 2.016 | 1.001 | CT | 0.988 | 0.40 | 26.70 | | | 1978 | MPC01 |
| | | 4.00 | | | 65.2 | 4.039 | 1.997 | CT | 2.060 | 0.48 | 29.10 | | | 1978 | MPC01 |
| | | 2.50 | | | 65.3 | 3.000 | 1.499 | CT | 1.522 | 0.45 | 28.00 | | | 1980 | RA001 |
| | | 2.00 | | | 65.3 | 1.994 | 0.999 | CT | 1.017 | 0.42 | 27.30 | | | 1978 | MPC01 |
| | | 2.50 | | | 65.4 | 2.000 | 1.000 | CT | 1.010 | 0.44 | 27.30 | | | 1972 | 84368 |
| | | 2.04 | | | 65.4 | 1.500 | 0.750 | CT | 0.740 | 0.27 | 21.30 | | | 1972 | 84368 |
| | | 2.50 | | | 65.4 | 2.000 | 1.000 | CT | 1.020 | 0.43 | 27.10 | | | 1972 | 84368 |
| | | 1.81 | | | 65.4 | 2.012 | 0.998 | CT | 1.046 | 0.44 | 27.80 | | | 1978 | MPC01 |
| | | 2.00 | | | 65.4 | 3.003 | 1.501 | CT | 1.568 | 0.54 | 30.40 | | | 1978 | RA002 |
| | | 3.50 | | | 65.4 | 3.000 | 1.500 | CT | 1.540 | 0.44 | 27.90 | | | 1972 | 84368 |
| | | 2.04 | | | 65.4 | 1.500 | 0.750 | CT | 0.750 | 0.26 | 21.10 | | | 1972 | 84368 |
| | | 3.00 | | | 65.4 | 2.975 | 1.245 | CT | 1.517 | 0.55 | 30.80 | | | 1978 | MPC01 |
| | | 2.00 | | | 65.4 | 3.030 | 1.500 | CT | 1.515 | 0.48 | 29.00 | | | 1978 | MPC01 |
| | | 2.50 | | | 65.4 | 2.990 | 1.498 | CT | 1.525 | 0.55 | 30.90 | | | 1978 | MPC01 |
| | | 3.00 | | | 65.5 | 1.997 | 0.998 | CT | 1.014 | 0.59 | 32.00 | | | 1979 | RA001 |
| | | 2.50 | | | 65.5 | 1.998 | 0.998 | CT | 0.979 | 0.50 | 29.50 | | | 1978 | MPC01 |
| | | 4.00 | | | 65.5 | 3.000 | 1.500 | CT | 1.580 | 0.31 | 23.00 | | | 1972 | 84368 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 4.00 | R.T. Cont'd | L-T Cont'd | 65.5 | 3.000 | 1.500 | CT | 1.560 | 0.30 | 22.50 | Cont'd | Cont'd | 1972 | 84368 |
| | | 2.50 | | | 65.6 | 4.000 | 2.000 | CT | 2.100 | 0.78 | 36.70 | | | 1972 | 84368 |
| | | 2.50 | | | 65.6 | 4.000 | 2.000 | CT | 2.100 | 0.77 | 36.40 | | | 1972 | 84368 |
| | | 3.00 | | | 65.6 | 3.001 | 1.478 | CT | 1.574 | 0.49 | 29.20 | | | 1978 | RA001 |
| | | 5.50 | | | 65.7 | 3.018 | 1.500 | CT | 1.509 | 0.44 | 28.10 | | | 1978 | MPC01 |
| | | 2.50 | | | 65.7 | 2.983 | 1.499 | CT | 1.551 | 0.42 | 27.00 | | | 1978 | MPC01 |
| | | 1.12 | | | 65.7 | 3.018 | 1.135 | CT | 1.479 | 0.34 | 24.70 | | | 1978 | MPC01 |
| | | 3.00 | | | 65.8 | 3.028 | 1.400 | CT | 1.605 | 0.62 | 33.10 | | | 1978 | MPC01 |
| | | 1.75 | | | 65.9 | 3.003 | 1.501 | CT | 1.583 | 0.60 | 32.50 | | | 1978 | RA002 |
| | | 2.40 | | | 65.9 | 3.003 | 1.498 | CT | 1.534 | 0.49 | 29.40 | | | 1980 | RA001 |
| | | 2.25 | | | 66.0 | 2.016 | 0.999 | CT | 1.068 | 0.38 | 26.30 | | | 1978 | MPC01 |
| | | 1.50 | | | 66.0 | 3.000 | 1.500 | CT | --- | 0.52 | 30.00 | | | 1982 | NC003 |
| | | 3.00 | | | 66.0 | 2.400 | 0.755 | CT | 1.356 | 0.60 | 32.40 | | | 1972 | 84306 |
| | | 1.25 | | | 66.0 | 2.006 | 0.998 | CT | 1.083 | 0.44 | 28.20 | | | 1978 | MPC01 |
| | | 2.50 | | | 66.0 | 3.003 | 1.187 | CT | 1.520 | 0.51 | 30.10 | | | 1978 | RA002 |
| | | 1.50 | | | 66.0 | 3.000 | 1.500 | CT | --- | 0.52 | 30.00 | | | 1982 | NC003 |
| | | 1.50 | | | 66.1 | 3.001 | 1.496 | CT | 1.564 | 0.54 | 31.00 | | | 1980 | RA001 |
| | | 2.50 | | | 66.2 | 4.000 | 2.000 | CT | 2.150 | 0.65 | 33.70 | | | 1972 | 84368 |
| | | 2.50 | | | 66.2 | 4.000 | 2.000 | CT | 2.160 | 0.69 | 34.90 | | | 1972 | 84368 |
| | | 2.00 | | | 66.2 | 3.000 | 1.500 | CT | 1.550 | 0.52 | 30.30 | | | 1972 | 84368 |
| | | 1.50 | | | 66.2 | 3.018 | 1.478 | CT | 1.509 | 0.50 | 29.80 | | | 1978 | MPC01 |
| | | 1.12 | | | 66.2 | 2.004 | 1.000 | CT | 1.022 | 0.46 | 28.90 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)

## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ Ksi√in.) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 2.00 | R.T. Cont'd | L-T Cont'd | 66.2 | 3.000 | 1.500 | CT | 1.560 | 0.53 | 30.40 | Cont'd | Cont'd | 1972 | 84368 |
| | | 1.50 | | | 66.2 | 2.996 | 1.448 | CT | 1.528 | 0.46 | 29.00 | | | 1978 | MPC01 |
| | | 0.87 | | | 66.2 | 1.500 | 0.750 | CT | 0.750 | 0.38 | 26.30 | | | 1978 | MPC01 |
| | | 2.50 | | | 66.2 | 2.999 | 1.497 | CT | 1.539 | 0.45 | 28.20 | | | 1978 | RA002 |
| | | 1.37 | | | 66.3 | 2.013 | 0.998 | CT | 1.067 | 0.34 | 25.10 | | | 1978 | MPC01 |
| | | 2.25 | | | 66.3 | 3.018 | 1.493 | CT | 1.539 | 0.48 | 29.30 | | | 1978 | MPC01 |
| | | 2.50 | | | 66.3 | 1.998 | 0.999 | CT | 1.021 | 0.36 | 25.50 | | | 1979 | RA001 |
| | | 2.00 | | | 66.4 | 4.000 | 2.000 | CT | --- | 0.54 | 30.90 | | | 1978 | UD005 |
| | | 1.12 | | | 66.4 | 2.982 | 1.153 | CT | 1.461 | 0.34 | 25.00 | | | 1978 | MPC01 |
| | | 2.00 | | | 66.4 | 2.000 | 0.752 | CT | 1.014 | 0.26 | 21.40 | | | 1972 | 84306 |
| | | 2.00 | | | 66.4 | 2.000 | 0.748 | CT | 1.018 | 0.34 | 24.60 | | | 1972 | 84306 |
| | | 2.00 | | | 66.4 | 4.000 | 2.000 | CT | --- | 0.51 | 30.10 | | | 1978 | UD005 |
| | | 1.75 | | | 66.4 | 3.003 | 1.503 | CT | 1.563 | 0.52 | 30.40 | | | 1978 | RA002 |
| | | 2.00 | | | 66.4 | 2.000 | 0.753 | CT | 1.255 | 0.35 | 24.70 | | | 1972 | 84306 |
| | | 2.50 | | | 66.4 | 1.994 | 0.999 | CT | 1.057 | 0.38 | 26.10 | | | 1978 | MPC01 |
| | | 2.00 | | | 66.4 | 4.000 | 2.000 | CT | --- | 0.52 | 30.40 | | | 1978 | UD005 |
| | | 1.50 | | | 66.5 | 2.998 | 1.499 | CT | 1.541 | 0.50 | 29.79 | | | 1978 | RA001 |
| | | 2.00 | | | 66.6 | 2.983 | 1.499 | CT | 1.581 | 0.57 | 32.20 | | | 1978 | MPC01 |
| | | 2.75 | | | 66.6 | 3.002 | 1.503 | CT | 1.561 | 0.50 | 30.00 | | | 1978 | RA002 |
| | | 1.12 | | | 66.7 | 3.017 | 1.185 | CT | 1.599 | 0.48 | 29.80 | | | 1978 | MPC01 |
| | | 2.50 | | | 66.7 | 3.024 | 1.201 | CT | 1.542 | 0.42 | 27.80 | | | 1978 | MPC01 |
| | | 0.87 | | | 66.7 | 1.504 | 0.750 | CT | 0.752 | 0.46 | 28.90 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)

## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 1.55 | R.T. Cont'd | L-T Cont'd | 66.7 | 3.000 | 1.497 | CT | 1.487 | 0.42 | 27.50 | Cont'd | Cont'd | 1980 | RA001 |
| | | 1.62 | | | 66.7 | 3.001 | 1.501 | CT | 1.575 | 0.45 | 28.60 | | | 1978 | RA002 |
| | | 3.00 | | | 66.9 | 3.015 | 1.495 | CT | 1.628 | 0.62 | 33.50 | | | 1978 | MPC01 |
| | | 2.25 | | | 66.9 | 3.015 | 1.499 | CT | 1.598 | 0.48 | 29.80 | | | 1978 | MPC01 |
| | | 1.75 | | | 67.0 | 3.000 | 1.500 | CT | 1.580 | 0.45 | 28.30 | | | 1972 | 84368 |
| | | 3.00 | | | 67.0 | 2.993 | 1.435 | CT | 1.616 | 0.67 | 35.10 | | | 1978 | MPC01 |
| | | 1.55 | | | 67.0 | 2.978 | 1.496 | CT | 1.489 | 0.44 | 28.70 | | | 1978 | MPC01 |
| | | 1.50 | | | 67.0 | 3.030 | 1.441 | CT | 1.515 | 0.40 | 27.30 | | | 1978 | MPC01 |
| | | 1.50 | | | 67.0 | 3.012 | 1.481 | CT | 1.506 | 0.40 | 27.20 | | | 1978 | MPC01 |
| | | 1.75 | | | 67.0 | 3.000 | 1.500 | CT | 1.570 | 0.45 | 28.60 | | | 1972 | 84368 |
| | | 1.73 | | | 67.1 | 2.999 | 1.499 | CT | 1.536 | 0.48 | 29.60 | | | 1978 | RA002 |
| | | 1.75 | | | 67.1 | 3.011 | 1.499 | CT | 1.626 | 0.42 | 27.80 | | | 1978 | MPC01 |
| | | 1.57 | | | 67.2 | 3.000 | 1.500 | CT | 1.560 | 0.37 | 26.00 | | | 1972 | 84368 |
| | | 1.75 | | | 67.2 | 3.003 | 1.496 | CT | 1.587 | 0.48 | 29.50 | | | 1980 | RA001 |
| | | 2.03 | | | 67.2 | 2.982 | 1.501 | CT | 1.521 | 0.55 | 31.70 | | | 1978 | MPC01 |
| | | 2.03 | | | 67.2 | 2.998 | 1.501 | CT | 1.529 | 0.60 | 33.50 | | | 1978 | MPC01 |
| | | 1.57 | | | 67.2 | 3.000 | 1.500 | CT | 1.560 | 0.39 | 26.50 | | | 1972 | 84368 |
| | | 1.50 | | | 67.2 | 2.509 | 1.252 | CT | 1.282 | 0.45 | 28.79 | | | 1981 | MA002 |
| | | 1.50 | | | 67.2 | 2.512 | 1.253 | CT | 1.298 | 0.46 | 29.00 | | | 1981 | MA002 |
| | | 1.50 | | | 67.6 | 2.997 | 1.494 | CT | 1.525 | 0.45 | 28.79 | | | 1978 | RA001 |
| | | 1.55 | | | 67.7 | 3.000 | 1.501 | CT | 1.575 | 0.38 | 26.50 | | | 1979 | RA001 |
| | | 2.00 | | | 67.7 | 3.029 | 1.498 | CT | 1.545 | 0.44 | 28.60 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 1.55 | R.T. Cont'd | L-T Cont'd | 67.8 | 1.998 | 0.999 | CT | 1.019 | 0.40 | 27.70 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 1.50 | | | 67.9 | 1.985 | 0.999 | CT | 1.032 | 0.42 | 28.00 | | | 1978 | MPC01 |
| | | 1.75 | | | 68.0 | 2.998 | 1.498 | CT | 1.589 | 0.55 | 32.40 | | | 1978 | MPC01 |
| | | 1.37 | | | 68.2 | 2.984 | 1.376 | CT | 1.462 | 0.38 | 26.90 | | | 1978 | MPC01 |
| | | 1.25 | | | 68.4 | 2.017 | 0.999 | CT | 1.089 | 0.38 | 26.90 | | | 1978 | MPC01 |
| | | 1.73 | | | 68.4 | 3.003 | 1.503 | CT | 1.611 | 0.48 | 30.20 | | | 1978 | RA002 |
| | | 1.62 | | | 68.8 | 3.001 | 1.451 | CT | 1.522 | 0.40 | 27.79 | | | 1980 | RA001 |
| | | 1.50 | | | 69.1 | 3.002 | 1.492 | CT | 1.528 | 0.36 | 26.70 | | | 1980 | RA001 |
| | | 1.75 | | | 69.5 | 2.998 | 1.500 | CT | 1.559 | 0.44 | 29.20 | | | 1978 | MPC01 |
| | | 2.52 | | | 69.7 | 2.000 | 1.000 | CT | 0.960 | 0.34 | 25.50 | | | 1972 | 84368 |
| | | 2.52 | | | 69.7 | 2.000 | 1.000 | CT | 0.960 | 0.35 | 26.00 | | | 1972 | 84368 |
| | | 2.52 | | | 69.7 | 2.000 | 1.000 | CT | 0.940 | 0.33 | 25.20 | | | 1972 | 84368 |
| T851 | Plate | 3.00 | R.T. | T-L | --- | 3.014 | 1.372 | CT | 1.477 | --- | 26.40 | 25.1 | 2.3 | 1978 | MPC01 |
| | | 5.00 | | | 53.0 | 3.004 | 1.502 | CT | 1.533 | 0.56 | 25.10 | | | 1979 | GD011 |
| | | 6.00 | | | 53.9 | 3.020 | 1.499 | CT | 1.510 | 0.44 | 23.10 | | | 1978 | MPC01 |
| | | 5.50 | | | 54.2 | 2.973 | 1.497 | CT | 1.516 | 0.50 | 24.80 | | | 1978 | MPC01 |
| | | 5.25 | | | 54.4 | 2.998 | 1.498 | CT | 1.559 | 0.50 | 24.80 | | | 1978 | MPC01 |
| | | 6.00 | | | 54.6 | 2.979 | 1.499 | CT | 1.579 | 0.57 | 26.60 | | | 1978 | MPC01 |
| | | 6.00 | | | 54.9 | 3.008 | 1.499 | CT | 1.594 | 0.55 | 26.00 | | | 1978 | MPC01 |
| | | 5.25 | | | 54.9 | 3.012 | 1.499 | CT | 1.536 | 0.42 | 22.90 | | | 1978 | MPC01 |
| | | 6.00 | | | 54.9 | 2.985 | 1.499 | CT | 1.552 | 0.67 | 28.80 | | | 1978 | MPC01 |
| | | 6.00 | | | 55.0 | 3.000 | 1.500 | CT | 1.580 | 0.48 | 24.10 | | | 1972 | 84368 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ Ksi√in.) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 6.00 | R.T. Cont'd | T-L Cont'd | 55.0 | 3.000 | 1.500 | CT | 1.560 | 0.46 | 23.70 | Cont'd | Cont'd | 1972 | 84368 |
| | | 5.50 | | | 55.6 | 3.017 | 1.498 | CT | 1.569 | 0.70 | 29.90 | | | 1978 | MPC01 |
| | | 5.50 | | | 55.9 | 2.999 | 1.500 | CT | 1.582 | 0.50 | 25.00 | | | 1980 | RA001 |
| | | 5.75 | | | 56.4 | 2.001 | 0.995 | CT | 1.010 | 0.60 | 27.70 | | | 1980 | RA001 |
| | | 5.50 | | | 56.5 | 3.008 | 1.499 | CT | 1.564 | 0.55 | 27.00 | | | 1978 | MPC01 |
| | | 6.00 | | | 56.7 | 3.004 | 1.499 | CT | 1.622 | 0.50 | 26.00 | | | 1978 | MPC01 |
| | | 5.50 | | | 56.7 | 3.028 | 1.500 | CT | 1.544 | 0.48 | 25.10 | | | 1978 | MPC01 |
| | | 5.50 | | | 56.8 | 3.010 | 1.498 | CT | 1.505 | 0.57 | 27.60 | | | 1978 | MPC01 |
| | | 6.00 | | | 57.0 | 3.014 | 1.498 | CT | 1.537 | 0.38 | 22.30 | | | 1978 | MPC01 |
| | | 6.00 | | | 57.0 | 2.001 | 0.998 | CT | 1.000 | 0.56 | 27.20 | | | 1980 | RA001 |
| | | 5.00 | | | 57.0 | 3.026 | 1.500 | CT | 1.604 | 0.42 | 23.90 | | | 1978 | MPC01 |
| | | 5.00 | | | 57.0 | 3.010 | 1.498 | CT | 1.505 | 0.44 | 24.10 | | | 1978 | MPC01 |
| | | 6.00 | | | 57.1 | 3.026 | 1.494 | CT | 1.513 | 0.57 | 27.80 | | | 1978 | MPC01 |
| | | 4.90 | | | 57.1 | 3.000 | 1.498 | CT | 1.556 | 0.73 | 30.90 | | | 1978 | RA002 |
| | | 5.12 | | | 57.1 | 3.028 | 1.499 | CT | 1.544 | 0.55 | 27.20 | | | 1978 | MPC01 |
| | | 5.00 | | | 57.2 | 2.996 | 1.497 | CT | 1.528 | 0.60 | 28.30 | | | 1978 | MPC01 |
| | | 5.12 | | | 57.3 | 2.987 | 1.500 | CT | 1.583 | 0.70 | 30.50 | | | 1978 | MPC01 |
| | | 4.62 | | | 57.4 | 2.981 | 1.500 | CT | 1.550 | 0.60 | 28.50 | | | 1978 | MPC01 |
| | | 5.50 | | | 57.7 | 2.994 | 1.500 | CT | 1.557 | 0.44 | 24.40 | | | 1978 | MPC01 |
| | | 5.50 | | | 57.7 | 3.008 | 1.502 | CT | 1.564 | 0.36 | 22.40 | | | 1978 | MPC01 |
| | | 5.00 | | | 57.8 | 2.006 | 0.998 | CT | 1.043 | 0.46 | 25.30 | | | 1978 | MPC01 |
| | | 5.00 | | | 57.8 | 2.998 | 1.501 | CT | 1.585 | 0.51 | 26.29 | | | 1979 | RA001 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ (Ksi√in.)) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 4.62 | R.T. Cont'd | T-L Cont'd | 57.9 | 3.020 | 1.499 | CT | 1.510 | 0.42 | 24.20 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 6.00 | | | 57.9 | 1.998 | 0.997 | CT | 1.025 | 0.47 | 25.29 | | | 1978 | RA001 |
| | | 5.50 | | | 58.0 | 2.986 | 1.500 | CT | 1.463 | 0.48 | 26.00 | | | 1978 | MPC01 |
| | | 4.50 | | | 58.0 | 2.997 | 1.497 | CT | 1.548 | 0.47 | 25.40 | | | 1979 | RA001 |
| | | 5.50 | | | 58.1 | 3.006 | 1.501 | CT | 1.533 | 0.38 | 22.80 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.2 | 2.984 | 1.498 | CT | 1.492 | 0.52 | 27.00 | | | 1978 | MPC01 |
| | | 4.25 | | | 58.4 | 3.000 | 1.499 | CT | 1.595 | 0.48 | 25.60 | | | 1980 | RA001 |
| | | 5.00 | | | 58.4 | 3.001 | 1.498 | CT | 1.612 | 0.44 | 24.60 | | | 1978 | RA001 |
| | | 5.00 | | | 58.4 | 2.996 | 1.499 | CT | 1.533 | 0.40 | 23.40 | | | 1979 | RA001 |
| | | 4.00 | | | 58.5 | 2.999 | 1.498 | CT | 1.560 | 0.43 | 24.29 | | | 1980 | RA001 |
| | | 5.00 | | | 58.5 | 3.020 | 1.498 | CT | 1.540 | 0.40 | 23.50 | | | 1978 | MPC01 |
| | | 4.50 | | | 58.5 | 3.000 | 1.500 | CT | 1.570 | 0.51 | 26.50 | | | 1972 | 84368 |
| | | 5.00 | | | 58.6 | 2.972 | 1.499 | CT | 1.605 | 0.44 | 24.80 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.6 | 2.996 | 1.501 | CT | 1.528 | 0.44 | 25.10 | | | 1978 | MPC01 |
| | | 5.25 | | | 58.6 | 3.018 | 1.499 | CT | 1.509 | 0.52 | 27.20 | | | 1978 | MPC01 |
| | | 4.00 | | | 58.7 | 1.998 | 0.998 | CT | 1.005 | 0.36 | 22.50 | | | 1979 | RA001 |
| | | 5.50 | | | 58.7 | 2.982 | 1.500 | CT | 1.521 | 0.44 | 25.20 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.8 | 3.031 | 1.500 | CT | 1.546 | 0.36 | 22.70 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.8 | 3.008 | 1.500 | CT | 1.534 | 0.30 | 21.00 | | | 1978 | MPC01 |
| | | 4.90 | | | 58.9 | 3.000 | 1.499 | CT | 1.623 | 0.40 | 23.79 | | | 1978 | RA002 |
| | | 4.55 | | | 58.9 | 3.001 | 1.500 | CT | 1.563 | 0.57 | 28.20 | | | 1980 | RA001 |
| | | 4.00 | | | 58.9 | 3.006 | 1.492 | CT | 1.533 | 0.48 | 26.40 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ MEAN | STAN DEV | | |
| T851 Cont'd | Plate Cont'd | 4.00 | R.T. Cont'd | T-L Cont'd | 58.9 | 2.998 | 1.496 | CT | 1.589 | 0.38 | 23.00 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 6.00 | | | 59.0 | 2.987 | 1.500 | CT | 1.553 | 0.62 | 29.50 | | | 1978 | MPC01 |
| | | 5.50 | | | 59.0 | 2.977 | 1.501 | CT | 1.548 | 0.48 | 26.50 | | | 1978 | MPC01 |
| | | 4.00 | | | 59.0 | 3.012 | 1.501 | CT | 1.566 | 0.42 | 24.50 | | | 1978 | MPC01 |
| | | 4.90 | | | 59.1 | 3.006 | 1.493 | CT | 1.503 | 0.44 | 25.30 | | | 1978 | MPC01 |
| | | 4.00 | | | 59.1 | 3.003 | 1.498 | CT | 1.604 | 0.56 | 28.10 | | | 1980 | RA001 |
| | | 4.90 | | | 59.1 | 3.000 | 1.499 | CT | 1.613 | 0.47 | 25.79 | | | 1978 | RA002 |
| | | 4.50 | | | 59.1 | 2.994 | 1.498 | CT | 1.587 | 0.55 | 28.20 | | | 1978 | MPC01 |
| | | 5.50 | | | 59.1 | 3.006 | 1.500 | CT | 1.533 | 0.40 | 23.70 | | | 1978 | MPC01 |
| | | 5.50 | | | 59.2 | 3.028 | 1.500 | CT | 1.544 | 0.36 | 22.80 | | | 1978 | MPC01 |
| | | 5.50 | | | 59.2 | 2.983 | 1.497 | CT | 1.551 | 0.30 | 21.00 | | | 1978 | MPC01 |
| | | 4.50 | | | 59.2 | 2.987 | 1.498 | CT | 1.553 | 0.38 | 23.20 | | | 1978 | MPC01 |
| | | 4.50 | | | 59.2 | 3.017 | 1.498 | CT | 1.599 | 0.55 | 28.20 | | | 1978 | MPC01 |
| | | 4.00 | | | 59.2 | 3.004 | 1.499 | CT | 1.562 | 0.34 | 22.40 | | | 1978 | MPC01 |
| | | 6.00 | | | 59.3 | 2.976 | 1.500 | CT | 1.577 | 0.60 | 29.60 | | | 1978 | MPC01 |
| | | 5.50 | | | 59.3 | 3.000 | 1.500 | CT | 1.510 | 0.34 | 21.80 | | | 1972 | 84368 |
| | | 5.50 | | | 59.3 | 3.000 | 1.500 | CT | 1.540 | 0.35 | 22.30 | | | 1972 | 84368 |
| | | 4.50 | | | 59.4 | 3.001 | 1.501 | CT | 1.583 | 0.36 | 22.79 | | | 1978 | RA002 |
| | | 5.50 | | | 59.6 | 3.016 | 1.499 | CT | 1.538 | 0.30 | 20.90 | | | 1978 | MPC01 |
| | | 5.50 | | | 59.6 | 3.016 | 1.500 | CT | 1.538 | 0.32 | 21.50 | | | 1978 | MPC01 |
| | | 5.50 | | | 59.6 | 3.008 | 1.502 | CT | 1.534 | 0.32 | 21.90 | | | 1978 | MPC01 |
| | | 5.00 | | | 59.7 | 2.000 | 1.001 | CT | 1.045 | 0.37 | 23.20 | | | 1978 | RA002 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 5.50 | R.T. Cont'd | T-L Cont'd | 59.8 | 3.018 | 1.500 | CT | 1.539 | 0.40 | 24.20 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 5.00 | | | 59.8 | 3.026 | 1.500 | CT | 1.543 | 0.38 | 23.50 | | | 1978 | MPC01 |
| | | 5.50 | | | 59.8 | 2.996 | 1.500 | CT | 1.558 | 0.40 | 24.10 | | | 1978 | MPC01 |
| | | 4.00 | | | 59.9 | 2.999 | 1.499 | CT | 1.570 | 0.38 | 23.40 | | | 1980 | RA001 |
| | | 4.90 | | | 59.9 | 3.003 | 1.500 | CT | 1.572 | 0.42 | 24.60 | | | 1978 | RA002 |
| | | 6.00 | | | 59.9 | 3.012 | 1.499 | CT | 1.566 | 0.65 | 30.60 | | | 1978 | MPC01 |
| | | 4.00 | | | 60.0 | 2.000 | 1.000 | CT | 1.030 | 0.38 | 23.40 | | | 1972 | 84368 |
| | | 4.50 | | | 60.0 | 3.000 | 1.500 | CT | 1.500 | 0.57 | 28.80 | | | 1978 | MPC01 |
| | | 4.50 | | | 60.0 | 3.000 | 1.496 | CT | 1.604 | 0.41 | 24.29 | | | 1978 | RA002 |
| | | 5.00 | | | 60.1 | 3.000 | 1.501 | CT | 1.530 | 0.38 | 23.80 | | | 1978 | MPC01 |
| | | 5.50 | | | 60.1 | 2.994 | 1.501 | CT | 1.557 | 0.34 | 22.50 | | | 1978 | MPC01 |
| | | 4.00 | | | 60.1 | 2.999 | 1.500 | CT | 1.493 | 0.54 | 28.10 | | | 1980 | RA001 |
| | | 5.50 | | | 60.1 | 2.992 | 1.500 | CT | 1.526 | 0.40 | 24.30 | | | 1978 | MPC01 |
| | | 5.50 | | | 60.1 | 3.002 | 1.500 | CT | 1.530 | 0.30 | 21.50 | | | 1978 | MPC01 |
| | | 5.50 | | | 60.1 | 2.994 | 1.501 | CT | 1.527 | 0.32 | 22.10 | | | 1978 | MPC01 |
| | | 5.25 | | | 60.1 | 3.026 | 1.500 | CT | 1.513 | 0.44 | 25.30 | | | 1978 | MPC01 |
| | | 5.50 | | | 60.2 | 2.988 | 1.500 | CT | 1.524 | 0.36 | 22.90 | | | 1978 | MPC01 |
| | | 4.00 | | | 60.2 | 3.000 | 1.497 | CT | 1.636 | 0.41 | 24.40 | | | 1978 | RA001 |
| | | 4.25 | | | 60.3 | 1.981 | 0.997 | CT | 1.030 | 0.46 | 26.40 | | | 1978 | MPC01 |
| | | 4.00 | | | 60.3 | 3.020 | 1.498 | CT | 1.540 | 0.50 | 27.20 | | | 1978 | MPC01 |
| | | 5.50 | | | 60.4 | 2.978 | 1.500 | CT | 1.519 | 0.38 | 23.60 | | | 1978 | MPC01 |
| | | 3.50 | | | 60.4 | 3.016 | 1.497 | CT | 1.478 | 0.46 | 26.50 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ (Ksi√in.) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 5.50 | R.T. Cont'd | T-L Cont'd | 60.4 | 3.000 | 1.500 | CT | 1.500 | 0.36 | 23.30 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 5.00 | | | 60.4 | 3.214 | 1.499 | CT | 1.539 | 0.36 | 23.40 | | | 1978 | MPC01 |
| | | 4.00 | | | 60.4 | 2.998 | 1.373 | CT | 1.588 | 0.51 | 27.40 | | | 1978 | RA001 |
| | | 1.81 | | | 60.6 | 3.002 | 1.498 | CT | 1.651 | 0.44 | 25.70 | | | 1978 | MPC01 |
| | | 5.50 | | | 60.6 | 2.998 | 1.500 | CT | 1.529 | 0.28 | 21.20 | | | 1978 | MPC01 |
| | | 5.25 | | | 60.6 | 3.018 | 1.500 | CT | 1.539 | 0.50 | 27.70 | | | 1978 | MPC01 |
| | | 5.50 | | | 60.6 | 3.018 | 1.500 | CT | 1.539 | 0.32 | 22.20 | | | 1978 | MPC01 |
| | | 3.75 | | | 60.6 | 2.996 | 1.497 | CT | 1.528 | 0.48 | 27.00 | | | 1978 | MPC01 |
| | | 5.50 | | | 60.6 | 3.014 | 1.500 | CT | 1.537 | 0.36 | 23.50 | | | 1978 | MPC01 |
| | | 5.50 | | | 60.6 | 2.996 | 1.500 | CT | 1.528 | 0.34 | 23.00 | | | 1978 | MPC01 |
| | | 4.50 | | | 60.7 | 3.020 | 1.501 | CT | 1.510 | 0.46 | 26.70 | | | 1978 | MPC01 |
| | | 4.31 | | | 60.8 | 2.000 | 1.000 | CT | 1.000 | 0.38 | 23.60 | | | 1972 | 84368 |
| | | 4.31 | | | 60.8 | 2.000 | 1.000 | CT | 0.990 | 0.39 | 23.90 | | | 1972 | 84368 |
| | | 5.00 | | | 60.9 | 2.988 | 1.500 | CT | 1.524 | 0.30 | 21.90 | | | 1978 | MPC01 |
| | | 4.00 | | | 60.9 | 2.998 | 1.499 | CT | 1.608 | 0.43 | 25.29 | | | 1979 | RA001 |
| | | 3.00 | | | 60.9 | 3.002 | 1.498 | CT | 1.567 | 0.57 | 29.29 | | | 1980 | RA001 |
| | | 3.00 | | | 61.0 | 3.001 | 1.418 | CT | 1.555 | 0.54 | 28.50 | | | 1980 | RA001 |
| | | 5.00 | | | 61.0 | 3.020 | 1.501 | CT | 1.631 | 0.46 | 26.60 | | | 1978 | MPC01 |
| | | 3.00 | | | 61.1 | 2.999 | 1.498 | CT | 1.546 | 0.46 | 26.29 | | | 1980 | RA001 |
| | | 5.50 | | | 61.1 | 3.004 | 1.490 | CT | 1.532 | 0.32 | 22.00 | | | 1978 | MPC01 |
| | | 4.00 | | | 61.1 | 3.000 | 1.498 | CT | 1.562 | 0.59 | 29.70 | | | 1978 | RA001 |
| | | 5.25 | | | 61.1 | 2.985 | 1.500 | CT | 1.552 | 0.42 | 25.50 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) a | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ MEAN | STAN DEV | | |
| T851 Cont'd | Plate Cont'd | 6.00 | R.T. Cont'd | T-L Cont'd | 61.1 | 3.008 | 1.499 | CT | 1.594 | 0.67 | 31.80 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 5.50 | | | 61.1 | 2.988 | 1.501 | CT | 1.524 | 0.32 | 22.50 | | | 1978 | MPC01 |
| | | 4.25 | | | 61.1 | 3.020 | 1.500 | CT | 1.540 | 0.34 | 22.70 | | | 1978 | MPC01 |
| | | 1.75 | | | 61.3 | 2.999 | 1.499 | CT | 1.563 | 0.40 | 24.70 | | | 1980 | RA001 |
| | | 4.90 | | | 61.3 | 3.000 | 1.499 | CT | 1.625 | 0.44 | 25.79 | | | 1978 | RA002 |
| | | 5.50 | | | 61.4 | 3.010 | 1.500 | CT | 1.535 | 0.32 | 22.30 | | | 1978 | MPC01 |
| | | 4.50 | | | 61.4 | 3.000 | 1.500 | CT | 1.570 | 0.36 | 23.30 | | | 1972 | 84368 |
| | | 4.50 | | | 61.4 | 3.000 | 1.500 | CT | 1.520 | 0.34 | 22.50 | | | 1972 | 84368 |
| | | 5.00 | | | 61.4 | 3.028 | 1.500 | CT | 1.544 | 0.32 | 22.30 | | | 1978 | MPC01 |
| | | 5.50 | | | 61.4 | 3.006 | 1.500 | CT | 1.533 | 0.28 | 21.30 | | | 1978 | MPC01 |
| | | 4.50 | | | 61.4 | 3.014 | 1.500 | CT | 1.507 | 0.50 | 27.90 | | | 1978 | MPC01 |
| | | 4.00 | | | 61.4 | 3.000 | 1.497 | CT | 1.657 | 0.50 | 27.70 | | | 1979 | RA001 |
| | | 4.50 | | | 61.4 | 3.020 | 1.500 | CT | 1.510 | 0.50 | 27.70 | | | 1978 | MPC01 |
| | | 4.50 | | | 61.4 | 3.030 | 1.500 | CT | 1.515 | 0.52 | 28.60 | | | 1978 | MPC01 |
| | | 3.00 | | | 61.4 | 3.001 | 1.438 | CT | 1.613 | 0.42 | 25.40 | | | 1978 | RA001 |
| | | 3.50 | | | 61.5 | 3.000 | 1.497 | CT | 1.602 | 0.55 | 29.00 | | | 1978 | RA001 |
| | | 5.00 | | | 61.5 | 3.000 | 1.499 | CT | 1.547 | 0.37 | 23.70 | | | 1980 | RA001 |
| | | 4.31 | | | 61.5 | 3.022 | 1.502 | CT | 1.632 | 0.42 | 25.50 | | | 1978 | MPC01 |
| | | 3.50 | | | 61.6 | 3.006 | 1.499 | CT | 1.533 | 0.50 | 28.30 | | | 1978 | MPC01 |
| | | 3.50 | | | 61.6 | 2.990 | 1.497 | CT | 1.555 | 0.52 | 28.40 | | | 1978 | MPC01 |
| | | 4.25 | | | 61.6 | 2.990 | 1.500 | CT | 1.525 | 0.32 | 22.30 | | | 1978 | MPC01 |
| | | 4.90 | | | 61.6 | 3.030 | 1.494 | CT | 1.515 | 0.38 | 24.30 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



| ALUMINUM 2124 $K_{Ic}$ | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ MEAN | STAN DEV | | |
| T851 Cont'd | Plate Cont'd | 5.50 | R.T. Cont'd | T-L Cont'd | 61.6 | 3.029 | 1.500 | CT | 1.545 | 0.32 | 22.60 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 2.25 | | | 61.6 | 2.994 | 1.502 | CT | 1.587 | 0.52 | 28.80 | | | 1978 | MPC01 |
| | | 3.00 | | | 61.7 | 2.994 | 1.404 | CT | 1.556 | 0.51 | 28.10 | | | 1980 | RA001 |
| | | 2.70 | | | 61.7 | 2.017 | 0.999 | CT | 1.049 | 0.55 | 29.30 | | | 1978 | MPC01 |
| | | 3.00 | | | 61.7 | 1.998 | 0.997 | CT | 1.031 | 0.37 | 24.00 | | | 1979 | RA001 |
| | | 5.00 | | | 61.7 | 3.004 | 1.500 | CT | 1.562 | 0.34 | 23.00 | | | 1978 | MPC01 |
| | | 4.00 | | | 61.7 | 2.994 | 1.499 | CT | 1.587 | 0.38 | 24.40 | | | 1978 | MPC01 |
| | | 2.50 | | | 61.8 | 3.000 | 1.499 | CT | 1.647 | 0.42 | 25.60 | | | 1978 | RA001 |
| | | 3.00 | | | 61.8 | 3.002 | 1.374 | CT | 1.505 | 0.37 | 23.79 | | | 1980 | RA001 |
| | | 2.50 | | | 61.8 | 2.994 | 1.056 | CT | 1.557 | 0.38 | 24.50 | | | 1978 | MPC01 |
| | | 5.50 | | | 61.9 | 3.000 | 1.500 | CT | 2.100 | 0.43 | 25.70 | | | 1978 | GD003 |
| | | 5.50 | | | 61.9 | 3.000 | 1.500 | CT | 2.100 | 0.43 | 25.70 | | | 1978 | GD003 |
| | | 2.50 | | | 61.9 | 3.000 | 1.499 | CT | 1.561 | 0.43 | 25.79 | | | 1978 | RA002 |
| | | 4.25 | | | 61.9 | 3.002 | 1.500 | CT | 1.531 | 0.28 | 21.60 | | | 1978 | MPC01 |
| | | 5.50 | | | 61.9 | 3.000 | 1.500 | CT | 2.100 | 0.44 | 26.00 | | | 1978 | GD003 |
| | | 4.25 | | | 61.9 | 3.026 | 1.502 | CT | 1.543 | 0.32 | 22.90 | | | 1978 | MPC01 |
| | | 3.12 | | | 61.9 | 3.022 | 1.499 | CT | 1.511 | 0.50 | 27.90 | | | 1978 | MPC01 |
| | | 3.62 | | | 62.0 | 2.995 | 1.498 | CT | 1.544 | 0.34 | 22.90 | | | 1980 | RA001 |
| | | 2.00 | | | 62.0 | 2.994 | 1.499 | CT | 1.597 | 0.53 | 28.70 | | | 1980 | RA001 |
| | | 2.50 | | | 62.1 | 2.000 | 1.000 | CT | --- | 0.52 | 28.20 | | | 1974 | 88742 |
| | | 4.50 | | | 62.1 | 3.002 | 1.498 | CT | 1.600 | 0.48 | 27.40 | | | 1980 | RA001 |
| | | 2.50 | | | 62.1 | 2.000 | 1.000 | CT | --- | 0.47 | 26.70 | | | 1974 | 88742 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 2.00 | R.T. Cont'd | T-L Cont'd | 62.1 | 2.002 | 1.002 | CT | 1.052 | 0.32 | 22.29 | Cont'd | Cont'd | 1978 | RA002 |
| | | 4.50 | | | 62.1 | 2.994 | 1.501 | CT | 1.527 | 0.50 | 28.30 | | | 1978 | MPC01 |
| | | 4.25 | | | 62.1 | 2.978 | 1.500 | CT | 1.519 | 0.36 | 24.00 | | | 1978 | MPC01 |
| | | 4.50 | | | 62.1 | 3.006 | 1.500 | CT | 1.533 | 0.50 | 28.20 | | | 1978 | MPC01 |
| | | 4.50 | | | 62.1 | 3.006 | 1.500 | CT | 1.503 | 0.55 | 29.40 | | | 1978 | MPC01 |
| | | 4.90 | | | 62.1 | 3.000 | 1.500 | CT | 1.617 | 0.40 | 25.10 | | | 1978 | RA002 |
| | | 2.50 | | | 62.1 | 2.000 | 1.000 | CT | --- | 0.47 | 26.90 | | | 1974 | 88742 |
| | | 4.50 | | | 62.1 | 3.016 | 1.500 | CT | 1.508 | 0.50 | 28.10 | | | 1978 | MPC01 |
| | | 2.50 | | | 62.2 | 3.021 | 0.869 | CT | 1.420 | 0.40 | 25.40 | | | 1978 | MPC01 |
| | | 2.50 | | | 62.3 | 2.989 | 1.498 | CT | 1.584 | 0.36 | 24.10 | | | 1978 | MPC01 |
| | | 1.73 | | | 62.3 | 1.992 | 1.000 | CT | 1.016 | 0.36 | 24.10 | | | 1978 | MPC01 |
| | | 3.50 | | | 62.3 | 3.001 | 1.500 | CT | 1.581 | 0.45 | 26.60 | | | 1979 | RA001 |
| | | 2.50 | | | 62.3 | 2.000 | 0.997 | CT | 1.040 | 0.30 | 21.90 | | | 1978 | MPC01 |
| | | 3.00 | | | 62.3 | 3.002 | 1.375 | CT | 1.551 | 0.61 | 31.00 | | | 1980 | RA001 |
| | | 5.50 | | | 62.4 | 2.988 | 1.499 | CT | 1.524 | 0.48 | 27.70 | | | 1978 | MPC01 |
| | | 1.50 | | | 62.4 | 3.000 | 1.484 | CT | 1.556 | 0.42 | 25.60 | | | 1980 | RA001 |
| | | 4.25 | | | 62.4 | 3.020 | 1.500 | CT | 1.540 | 0.34 | 23.10 | | | 1978 | MPC01 |
| | | 2.50 | | | 62.4 | 2.964 | 1.500 | CT | 1.526 | 0.42 | 25.70 | | | 1980 | RA001 |
| | | 3.12 | | | 62.4 | 3.003 | 1.498 | CT | 1.565 | 0.50 | 28.10 | | | 1980 | RA001 |
| | | 4.00 | | | 62.4 | 3.002 | 1.251 | CT | 1.644 | 0.33 | 22.70 | | | 1980 | RA001 |
| | | 3.00 | | | 62.4 | 3.008 | 1.482 | CT | 1.504 | 0.42 | 26.10 | | | 1978 | MPC01 |
| | | 4.25 | | | 62.5 | 2.986 | 1.500 | CT | 1.523 | 0.34 | 23.30 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 3.00 | R.T. Cont'd | T-L Cont'd | 62.5 | 2.999 | 1.363 | CT | 1.568 | 0.35 | 23.60 | Cont'd | Cont'd | 1980 | RA001 |
| | | 3.00 | | | 62.5 | 3.001 | 1.187 | CT | 1.641 | 0.39 | 25.00 | | | 1978 | RA002 |
| | | 2.75 | | | 62.5 | 3.000 | 1.496 | CT | 1.648 | 0.35 | 23.40 | | | 1978 | RA002 |
| | | 3.00 | | | 62.6 | 2.999 | 1.301 | CT | 1.515 | 0.43 | 26.20 | | | 1978 | RA002 |
| | | 4.50 | | | 62.6 | 3.012 | 1.501 | CT | 1.506 | 0.44 | 26.80 | | | 1978 | MPC01 |
| | | 2.50 | | | 62.6 | 3.000 | 1.499 | CT | 1.592 | 0.41 | 25.60 | | | 1978 | RA002 |
| | | 3.50 | | | 62.6 | 3.000 | 1.498 | CT | 1.559 | 0.35 | 23.60 | | | 1980 | RA001 |
| | | 4.00 | | | 62.7 | 3.002 | 1.498 | CT | 1.591 | 0.46 | 27.20 | | | 1978 | MPC01 |
| | | 3.12 | | | 62.7 | 3.000 | 1.498 | CT | 1.594 | 0.54 | 29.40 | | | 1978 | RA001 |
| | | 3.50 | | | 62.7 | 3.000 | 1.500 | CT | 1.550 | 0.46 | 26.80 | | | 1972 | 84368 |
| | | 4.00 | | | 62.7 | 3.019 | 1.500 | CT | 1.630 | 0.42 | 26.10 | | | 1978 | MPC01 |
| | | 3.50 | | | 62.7 | 3.000 | 1.500 | CT | 1.550 | 0.44 | 26.40 | | | 1972 | 84368 |
| | | 3.00 | | | 62.8 | 3.000 | 1.498 | CT | 1.505 | 0.32 | 22.60 | | | 1980 | RA001 |
| | | 3.00 | | | 62.8 | 3.014 | 1.301 | CT | 1.567 | 0.46 | 27.20 | | | 1978 | MPC01 |
| | | 4.25 | | | 62.8 | 2.977 | 1.500 | CT | 1.518 | 0.34 | 23.40 | | | 1978 | MPC01 |
| | | 5.00 | | | 62.9 | 2.981 | 1.500 | CT | 1.550 | 0.38 | 24.70 | | | 1978 | MPC01 |
| | | 4.25 | | | 62.9 | 2.990 | 1.500 | CT | 1.525 | 0.28 | 21.80 | | | 1978 | MPC01 |
| | | 4.25 | | | 62.9 | 3.014 | 1.500 | CT | 1.537 | 0.36 | 24.00 | | | 1978 | MPC01 |
| | | 2.00 | | | 62.9 | 3.016 | 1.497 | CT | 1.508 | 0.40 | 25.30 | | | 1978 | MPC01 |
| | | 3.12 | | | 62.9 | 2.980 | 1.448 | CT | 1.609 | 0.48 | 28.20 | | | 1978 | MPC01 |
| | | 3.00 | | | 62.9 | 2.999 | 1.399 | CT | 1.523 | 0.55 | 29.70 | | | 1980 | RA001 |
| | | 2.00 | | | 62.9 | 3.026 | 1.503 | CT | 1.513 | 0.38 | 25.00 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 3.62 | R.T. Cont'd | T-L Cont'd | 62.9 | 3.031 | 1.497 | CT | 1.485 | 0.40 | 25.20 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 3.54 | | | 63.0 | 3.019 | 1.498 | CT | 1.630 | 0.46 | 27.40 | | | 1978 | MPC01 |
| | | 2.50 | | | 63.0 | 2.489 | 1.250 | CT | 1.294 | 0.40 | 25.70 | | | 1978 | MPC01 |
| | | 2.50 | | | 63.0 | 2.528 | 1.250 | CT | 1.289 | 0.40 | 25.50 | | | 1978 | MPC01 |
| | | 2.50 | | | 63.1 | 2.998 | 1.099 | CT | 1.589 | 0.36 | 24.20 | | | 1978 | MPC01 |
| | | 3.00 | | | 63.2 | 2.000 | 0.995 | CT | 1.036 | 0.41 | 25.90 | | | 1978 | RA002 |
| | | 4.25 | | | 63.2 | 2.975 | 1.500 | CT | 1.547 | 0.32 | 22.90 | | | 1978 | MPC01 |
| | | 1.75 | | | 63.2 | 2.980 | 1.498 | CT | 1.490 | 0.28 | 22.00 | | | 1978 | MPC01 |
| | | 5.50 | | | 63.4 | 2.988 | 1.500 | CT | 1.524 | 0.32 | 22.90 | | | 1978 | MPC01 |
| | | 1.37 | | | 63.4 | 1.996 | 0.998 | CT | 1.078 | 0.30 | 22.20 | | | 1978 | MPC01 |
| | | 2.25 | | | 63.4 | 2.985 | 1.503 | CT | 1.582 | 0.44 | 27.20 | | | 1978 | MPC01 |
| | | 4.25 | | | 63.4 | 2.983 | 1.499 | CT | 1.551 | 0.30 | 22.80 | | | 1978 | MPC01 |
| | | 3.25 | | | 63.4 | 3.027 | 1.499 | CT | 1.574 | 0.42 | 26.30 | | | 1978 | MPC01 |
| | | 2.35 | | | 63.5 | 3.000 | 1.499 | CT | 1.541 | 0.35 | 24.00 | | | 1980 | RA001 |
| | | 2.50 | | | 63.5 | 3.001 | 1.496 | CT | 1.572 | 0.39 | 25.40 | | | 1980 | RA001 |
| | | 2.00 | | | 63.5 | 2.990 | 1.499 | CT | 1.555 | 0.32 | 23.40 | | | 1978 | MPC01 |
| | | 2.50 | | | 63.6 | 3.001 | 1.499 | CT | 1.600 | 0.39 | 25.40 | | | 1978 | RA002 |
| | | 3.12 | | | 63.6 | 3.027 | 1.499 | CT | 1.574 | 0.42 | 26.30 | | | 1978 | MPC01 |
| | | 2.90 | | | 63.7 | 2.992 | 0.996 | CT | 1.466 | 0.42 | 26.30 | | | 1978 | MPC01 |
| | | 3.00 | | | 63.7 | 3.001 | 1.333 | CT | 1.574 | 0.33 | 23.40 | | | 1979 | RA001 |
| | | 3.00 | | | 63.7 | 3.004 | 1.400 | CT | 1.592 | 0.32 | 23.30 | | | 1978 | MPC01 |
| | | 3.54 | | | 63.7 | 3.000 | 1.497 | CT | 1.530 | 0.42 | 26.50 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 2.50 | R.T. Cont'd | T-L Cont'd | 63.8 | 3.028 | 1.498 | CT | 1.544 | 0.36 | 24.30 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 2.75 | | | 63.8 | 2.999 | 1.498 | CT | 1.572 | 0.36 | 24.29 | | | 1980 | RA001 |
| | | 2.00 | | | 63.9 | 2.990 | 0.870 | CT | 1.465 | 0.34 | 24.20 | | | 1978 | MPC01 |
| | | 3.12 | | | 63.9 | 3.020 | 1.502 | CT | 1.480 | 0.46 | 27.60 | | | 1978 | MPC01 |
| | | 2.00 | | | 63.9 | 2.975 | 1.502 | CT | 1.517 | 0.44 | 27.20 | | | 1978 | MPC01 |
| | | 1.75 | | | 64.0 | 3.001 | 1.498 | CT | 1.554 | 0.33 | 23.29 | | | 1978 | RA001 |
| | | 2.50 | | | 64.0 | 2.989 | 1.499 | CT | 1.614 | 0.44 | 27.10 | | | 1978 | MPC01 |
| | | 3.00 | | | 64.1 | 3.001 | 1.428 | CT | 1.591 | 0.43 | 26.60 | | | 1978 | RA001 |
| | | 5.00 | | | 64.1 | 3.028 | 1.498 | CT | 1.514 | 0.38 | 25.10 | | | 1978 | MPC01 |
| | | 3.00 | | | 64.1 | 1.998 | 0.998 | CT | 1.029 | 0.41 | 26.00 | | | 1979 | RA001 |
| | | 2.50 | | | 64.1 | 2.999 | 1.498 | CT | 1.545 | 0.41 | 26.20 | | | 1980 | RA001 |
| | | 1.25 | | | 64.1 | 2.016 | 0.999 | CT | 1.028 | 0.34 | 23.80 | | | 1978 | MPC01 |
| | | 2.50 | | | 64.2 | 2.000 | 1.000 | CT | 1.040 | 0.42 | 26.30 | | | 1972 | 84368 |
| | | 4.00 | | | 64.2 | 4.004 | 2.000 | CT | 2.042 | 0.42 | 26.40 | | | 1978 | MPC01 |
| | | 1.75 | | | 64.2 | 2.996 | 0.751 | CT | 1.498 | 0.30 | 22.90 | | | 1978 | MPC01 |
| | | 4.00 | | | 64.2 | 3.000 | 1.500 | CT | 1.590 | 0.27 | 21.00 | | | 1972 | 84368 |
| | | 1.75 | | | 64.2 | 2.998 | 1.501 | CT | 1.588 | 0.44 | 27.20 | | | 1980 | RA001 |
| | | 2.75 | | | 64.2 | 3.000 | 1.496 | CT | 1.570 | 0.47 | 27.90 | | | 1980 | RA001 |
| | | 3.50 | | | 64.2 | 3.000 | 1.500 | CT | 1.520 | 0.33 | 23.30 | | | 1972 | 84368 |
| | | 2.75 | | | 64.2 | 2.987 | 1.497 | CT | 1.553 | 0.44 | 27.30 | | | 1978 | MPC01 |
| | | 3.00 | | | 64.2 | 3.017 | 1.496 | CT | 1.539 | 0.44 | 27.50 | | | 1978 | MPC01 |
| | | 4.00 | | | 64.2 | 3.975 | 1.999 | CT | 2.067 | 0.42 | 26.60 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ MEAN | STAN DEV | | |
| T851 Cont'd | Plate Cont'd | 3.50 | R.T. Cont'd | T-L Cont'd | 64.2 | 3.000 | 1.500 | CT | 1.520 | 0.32 | 22.80 | Cont'd | Cont'd | 1972 | 84368 |
| | | 4.00 | | | 64.2 | 3.000 | 1.500 | CT | 1.590 | 0.26 | 20.80 | | | 1972 | 84368 |
| | | 0.62 | | | 64.2 | 1.004 | 0.500 | CT | 0.512 | 0.46 | 28.00 | | | 1978 | MPC01 |
| | | 3.00 | | | 64.2 | 2.996 | 1.400 | CT | 1.648 | 0.34 | 24.20 | | | 1978 | MPC01 |
| | | 2.50 | | | 64.2 | 2.000 | 1.000 | CT | 1.050 | 0.41 | 26.10 | | | 1972 | 84368 |
| | | 2.50 | | | 64.2 | 3.001 | 1.497 | CT | 1.564 | 0.30 | 22.60 | | | 1980 | RA001 |
| | | 2.75 | | | 64.2 | 3.002 | 1.373 | CT | 1.539 | 0.39 | 25.60 | | | 1980 | RA001 |
| | | 2.00 | | | 64.2 | 3.003 | 1.495 | CT | 1.533 | 0.30 | 22.50 | | | 1980 | RA001 |
| | | 2.00 | | | 64.4 | 2.993 | 1.499 | CT | 1.616 | 0.36 | 25.00 | | | 1978 | MPC01 |
| | | 2.50 | | | 64.4 | 4.000 | 2.000 | CT | 2.170 | 0.54 | 29.90 | | | 1972 | 84368 |
| | | 3.62 | | | 64.4 | 2.987 | 1.501 | CT | 1.643 | 0.30 | 22.80 | | | 1978 | MPC01 |
| | | 2.50 | | | 64.4 | 4.000 | 2.000 | CT | 2.180 | 0.54 | 30.00 | | | 1972 | 84368 |
| | | 2.00 | | | 64.4 | 3.000 | 1.498 | CT | 1.551 | 0.41 | 26.10 | | | 1980 | RA001 |
| | | 3.25 | | | 64.4 | 3.030 | 1.498 | CT | 1.515 | 0.38 | 25.60 | | | 1978 | MPC01 |
| | | 3.00 | | | 64.4 | 3.007 | 1.400 | CT | 1.624 | 0.36 | 25.00 | | | 1978 | MPC01 |
| | | 1.50 | | | 64.5 | 3.002 | 1.499 | CT | 1.512 | 0.36 | 24.79 | | | 1980 | RA001 |
| | | 1.75 | | | 64.5 | 3.004 | 1.500 | CT | 1.500 | 0.36 | 24.60 | | | 1978 | RA002 |
| | | 2.50 | | | 64.6 | 2.998 | 1.500 | CT | 1.558 | 0.37 | 25.10 | | | 1980 | RA001 |
| | | 2.50 | | | 64.6 | 3.031 | 1.499 | CT | 1.576 | 0.32 | 23.40 | | | 1978 | MPC01 |
| | | 2.20 | | | 64.6 | 3.003 | 1.498 | CT | 1.553 | 0.35 | 24.20 | | | 1980 | RA001 |
| | | 2.00 | | | 64.7 | 1.990 | 0.751 | CT | 1.004 | 0.29 | 21.90 | | | 1972 | 84306 |
| | | 2.00 | | | 64.7 | 1.990 | 0.753 | CT | 1.025 | 0.32 | 23.20 | | | 1972 | 84306 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ (Ksi√in.)) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 2.00 | R.T. Cont'd | T-L Cont'd | 64.7 | 2.000 | 0.751 | CT | 1.038 | 0.33 | 23.40 | Cont'd | Cont'd | 1972 | 84306 |
| | | 2.50 | | | 64.8 | 2.489 | 1.250 | CT | 1.294 | 0.44 | 27.30 | | | 1978 | MPC01 |
| | | 2.00 | | | 64.8 | 3.011 | 1.499 | CT | 1.596 | 0.42 | 27.00 | | | 1978 | MPC01 |
| | | 2.50 | | | 64.8 | 4.000 | 2.000 | CT | 2.130 | 0.46 | 27.70 | | | 1972 | 84368 |
| | | 2.50 | | | 64.8 | 2.522 | 1.250 | CT | 1.286 | 0.42 | 27.10 | | | 1978 | MPC01 |
| | | 2.50 | | | 64.8 | 4.000 | 2.000 | CT | 2.150 | 0.47 | 28.10 | | | 1972 | 84368 |
| | | 2.25 | | | 64.9 | 1.996 | 0.998 | CT | 1.508 | 0.30 | 23.00 | | | 1978 | MPC01 |
| | | 2.50 | | | 64.9 | 2.012 | 0.999 | CT | 0.986 | 0.25 | 21.10 | | | 1978 | MPC01 |
| | | 2.35 | | | 64.9 | 3.001 | 1.500 | CT | 1.546 | 0.36 | 24.79 | | | 1978 | RA002 |
| | | 3.54 | | | 64.9 | 3.016 | 1.504 | CT | 1.508 | 0.48 | 28.70 | | | 1978 | MPC01 |
| | | 2.35 | | | 65.0 | 2.018 | 0.996 | CT | 1.009 | 0.32 | 23.80 | | | 1978 | MPC01 |
| | | 2.50 | | | 65.1 | 2.037 | 0.998 | CT | 0.986 | 0.30 | 23.00 | | | 1978 | MPC01 |
| | | 3.00 | | | 65.1 | 2.988 | 1.247 | CT | 1.464 | 0.32 | 23.60 | | | 1978 | MPC01 |
| | | 1.12 | | | 65.2 | 2.972 | 1.153 | CT | 1.486 | 0.28 | 22.20 | | | 1978 | MPC01 |
| | | 1.50 | | | 65.2 | 3.000 | 1.493 | CT | 1.500 | 0.38 | 26.00 | | | 1978 | MPC01 |
| | | 2.00 | | | 65.2 | 3.018 | 1.500 | CT | 1.509 | 0.38 | 25.80 | | | 1978 | MPC01 |
| | | 1.57 | | | 65.2 | 3.000 | 1.500 | CT | 1.520 | 0.51 | 29.40 | | | 1972 | 84368 |
| | | 1.57 | | | 65.2 | 3.000 | 1.500 | CT | 1.540 | 0.54 | 30.30 | | | 1972 | 84368 |
| | | 3.12 | | | 65.2 | 3.023 | 1.497 | CT | 1.602 | 0.44 | 27.70 | | | 1978 | MPC01 |
| | | 2.04 | | | 65.2 | 1.500 | 0.750 | CT | 0.740 | 0.22 | 19.50 | | | 1972 | 84368 |
| | | 2.04 | | | 65.2 | 1.500 | 0.750 | CT | 0.730 | 0.22 | 19.40 | | | 1972 | 84368 |
| | | 3.00 | | | 65.2 | 2.998 | 1.400 | CT | 1.619 | 0.38 | 26.00 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 2.50 | R.T. Cont'd | T-L Cont'd | 65.3 | 2.018 | 0.999 | CT | 1.009 | 0.55 | 30.80 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 1.12 | | | 65.3 | 3.029 | 1.136 | CT | 1.484 | 0.27 | 22.10 | | | 1978 | MPC01 |
| | | 2.00 | | | 65.4 | 3.000 | 1.500 | CT | 1.540 | 0.34 | 24.10 | | | 1972 | 84368 |
| | | 1.50 | | | 65.4 | 3.020 | 1.441 | CT | 1.540 | 0.42 | 27.20 | | | 1978 | MPC01 |
| | | 1.75 | | | 65.4 | 3.003 | 1.502 | CT | 1.568 | 0.40 | 26.20 | | | 1978 | RA002 |
| | | 1.75 | | | 65.4 | 3.028 | 1.499 | CT | 1.514 | 0.38 | 25.80 | | | 1978 | MPC01 |
| | | 2.00 | | | 65.4 | 3.000 | 1.500 | CT | 1.540 | 0.35 | 24.40 | | | 1972 | 84368 |
| | | 1.50 | | | 65.4 | 2.996 | 1.478 | CT | 1.528 | 0.42 | 27.10 | | | 1978 | MPC01 |
| | | 1.62 | | | 65.4 | 3.001 | 1.500 | CT | 1.558 | 0.38 | 25.50 | | | 1978 | RA002 |
| | | 1.50 | | | 65.4 | 2.999 | 1.478 | CT | 1.531 | 0.37 | 25.40 | | | 1980 | RA001 |
| | | 2.40 | | | 65.4 | 3.001 | 1.497 | CT | 1.554 | 0.32 | 23.70 | | | 1980 | RA001 |
| | | 2.50 | | | 65.4 | 3.000 | 1.500 | CT | 1.551 | 0.38 | 25.79 | | | 1980 | RA001 |
| | | 2.00 | | | 65.5 | 1.994 | 0.899 | CT | 1.057 | 0.32 | 24.00 | | | 1978 | MPC01 |
| | | 2.00 | | | 65.6 | 3.001 | 1.500 | CT | 1.561 | 0.33 | 23.90 | | | 1978 | RA002 |
| | | 1.81 | | | 65.6 | 2.015 | 0.999 | CT | 1.048 | 0.32 | 24.10 | | | 1978 | MPC01 |
| | | 1.75 | | | 65.7 | 3.000 | 1.500 | CT | 1.560 | 0.33 | 24.00 | | | 1972 | 84368 |
| | | 2.50 | | | 65.7 | 2.973 | 1.099 | CT | 1.546 | 0.28 | 22.80 | | | 1978 | MPC01 |
| | | 2.00 | | | 65.7 | 3.000 | 1.497 | CT | 1.564 | 0.34 | 24.50 | | | 1978 | RA001 |
| | | 1.75 | | | 65.7 | 3.000 | 1.500 | CT | 1.580 | 0.33 | 23.90 | | | 1972 | 84368 |
| | | 2.03 | | | 65.7 | 3.014 | 1.501 | CT | 1.537 | 0.46 | 28.70 | | | 1978 | MPC01 |
| | | 3.12 | | | 65.7 | 2.981 | 1.400 | CT | 1.580 | 0.34 | 24.90 | | | 1978 | MPC01 |
| | | 2.50 | | | 65.8 | 2.999 | 1.499 | CT | 1.579 | 0.32 | 23.70 | | | 1978 | RA002 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 0.87 | R.T. Cont'd | T-L Cont'd | 65.8 | 1.502 | 0.750 | CT | 0.766 | 0.40 | 26.50 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 0.87 | | | 65.8 | 1.508 | 0.750 | CT | 0.769 | 0.34 | 24.60 | | | 1978 | MPC01 |
| | | 2.25 | | | 65.8 | 2.002 | 0.999 | CT | 1.041 | 0.32 | 24.30 | | | 1978 | MPC01 |
| | | 2.50 | | | 65.8 | 3.002 | 1.100 | CT | 1.528 | 0.31 | 23.40 | | | 1980 | RA001 |
| | | 2.25 | | | 65.8 | 3.008 | 1.493 | CT | 1.504 | 0.30 | 23.50 | | | 1978 | MPC01 |
| | | 1.75 | | | 65.9 | 3.003 | 1.503 | CT | 1.552 | 0.36 | 25.20 | | | 1978 | RA002 |
| | | 3.00 | | | 66.0 | 2.500 | 0.755 | CT | 1.270 | 0.35 | 24.60 | | | 1972 | 84306 |
| | | 2.50 | | | 66.0 | 3.017 | 0.999 | CT | 1.448 | 0.30 | 23.30 | | | 1978 | MPC01 |
| | | 3.00 | | | 66.0 | 2.500 | 0.754 | CT | 1.279 | 0.29 | 22.60 | | | 1972 | 84306 |
| | | 2.03 | | | 66.0 | 3.020 | 1.500 | CT | 1.510 | 0.50 | 30.20 | | | 1978 | MPC01 |
| | | 3.00 | | | 66.0 | 3.026 | 1.247 | CT | 1.543 | 0.34 | 24.70 | | | 1978 | MPC01 |
| | | 1.50 | | | 66.2 | 2.988 | 1.441 | CT | 1.524 | 0.38 | 26.20 | | | 1978 | MPC01 |
| | | 1.50 | | | 66.2 | 2.997 | 1.499 | CT | 1.543 | 0.34 | 24.50 | | | 1978 | RA001 |
| | | 2.00 | | | 66.2 | 3.018 | 1.499 | CT | 1.539 | 0.38 | 26.10 | | | 1978 | MPC01 |
| | | 2.75 | | | 66.2 | 3.003 | 1.502 | CT | 1.584 | 0.43 | 27.70 | | | 1978 | RA002 |
| | | 2.50 | | | 66.2 | 1.997 | 0.999 | CT | 1.035 | 0.27 | 22.10 | | | 1979 | RA001 |
| | | 1.50 | | | 66.2 | 2.985 | 1.440 | CT | 1.552 | 0.40 | 26.60 | | | 1978 | MPC01 |
| | | 2.00 | | | 66.4 | 1.998 | 0.997 | CT | 1.019 | 0.32 | 24.50 | | | 1978 | MPC01 |
| | | 1.55 | | | 66.4 | 2.981 | 1.500 | CT | 1.550 | 0.28 | 23.00 | | | 1978 | MPC01 |
| | | 1.55 | | | 66.4 | 3.029 | 1.496 | CT | 1.484 | 0.30 | 23.70 | | | 1978 | MPC01 |
| | | 1.12 | | | 66.5 | 2.004 | 1.000 | CT | 1.022 | 0.36 | 25.40 | | | 1978 | MPC01 |
| | | 2.50 | | | 66.5 | 3.002 | 1.498 | CT | 1.544 | 0.36 | 25.50 | | | 1980 | RA001 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 1.81 | R.T. Cont'd | T-L Cont'd | 66.5 | 2.990 | 1.497 | CT | 1.495 | 0.34 | 24.70 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 1.55 | | | 66.6 | 1.998 | 0:999 | CT | 1.014 | 0.28 | 23.30 | | | 1978 | MPC01 |
| | | 1.25 | | | 66.6 | 1.981 | 1.000 | CT | 1.050 | 0.25 | 21.90 | | | 1978 | MPC01 |
| | | 1.73 | | | 66.7 | 2.999 | 1.499 | CT | 1.517 | 0.32 | 24.10 | | | 1978 | RA002 |
| | | 1.55 | | | 66.7 | 3.000 | 1.497 | CT | 1.522 | 0.31 | 23.60 | | | 1980 | RA001 |
| | | 2.50 | | | 66.8 | 1.987 | 0.998 | CT | 1.033 | 0.42 | 27.40 | | | 1978 | MPC01 |
| | | 1.50 | | | 66.9 | 1.983 | 0.999 | CT | 1.051 | 0.25 | 22.00 | | | 1978 | MPC01 |
| | | 1.50 | | | 67.1 | 2.998 | 1.496 | CT | 1.485 | 0.29 | 23.00 | | | 1978 | RA001 |
| | | 1.57 | | | 67.2 | 3.000 | 1.500 | CT | 1.590 | 0.35 | 25.30 | | | 1972 | 84368 |
| | | 1.57 | | | 67.2 | 3.000 | 1.500 | CT | 1.590 | 0.35 | 25.10 | | | 1972 | 84368 |
| | | 1.57 | | | 67.2 | 3.000 | 1.500 | CT | 1.560 | 0.32 | 24.00 | | | 1972 | 84368 |
| | | 1.57 | | | 67.2 | 3.000 | 1.500 | CT | 1.560 | 0.32 | 24.00 | | | 1972 | 84368 |
| | | 1.50 | | | 67.2 | 3.002 | 1.492 | CT | 1.524 | 0.29 | 23.20 | | | 1980 | RA001 |
| | | 1.73 | | | 67.2 | 3.002 | 1.498 | CT | 1.550 | 0.32 | 24.10 | | | 1978 | RA002 |
| | | 1.55 | | | 67.2 | 3.001 | 1.497 | CT | 1.563 | 0.28 | 22.50 | | | 1979 | RA001 |
| | | 1.75 | | | 67.3 | 3.002 | 1.496 | CT | 1.518 | 0.31 | 23.79 | | | 1980 | RA001 |
| | | 2.52 | | | 67.6 | 2.000 | 1.000 | CT | 0.960 | 0.28 | 22.60 | | | 1972 | 84368 |
| | | 2.52 | | | 67.6 | 2.000 | 1.000 | CT | 0.980 | 0.29 | 23.10 | | | 1972 | 84368 |
| | | 1.50 | | | 67.8 | 3.002 | 1.400 | CT | 1.591 | 0.27 | 22.60 | | | 1978 | MPC01 |
| | | 1.75 | | | 67.8 | 3.009 | 1.499 | CT | 1.595 | 0.28 | 23.60 | | | 1978 | MPC01 |
| | | 1.37 | | | 68.4 | 2.978 | 1.376 | CT | 1.489 | 0.25 | 22.50 | | | 1978 | MPC01 |
| | | 1.62 | | | 69.6 | 3.000 | 1.451 | CT | 1.524 | 0.29 | 24.10 | | | 1980 | RA001 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 | Plate | 2.50 | R.T. | S-T | 62.3 | 2.000 | 1.000 | CT | --- | 0.40 | 24.70 | 25.5 | 0.7 | 1974 | 88742 |
| | | 2.50 | | | 62.3 | 2.000 | 1.000 | CT | --- | 0.43 | 25.80 | | | 1974 | 88742 |
| | | 2.50 | | | 62.3 | 2.000 | 1.000 | CT | --- | 0.44 | 26.00 | | | 1974 | 88742 |
| T851 | Plate | 1.50 | R.T. | S-L | --- | 1.002 | 0.498 | CT | 0.489 | --- | 18.40 | 21.7 | 2.1 | 1980 | RA001 |
| | | 1.50 | | | --- | 1.001 | 0.497 | CT | 0.525 | --- | 20.50 | | | 1980 | RA001 |
| | | 1.50 | | | --- | 1.001 | 0.501 | CT | 0.501 | --- | 19.50 | | | 1978 | RA001 |
| | | 1.50 | | | --- | 1.001 | 0.502 | CT | 0.503 | --- | 20.20 | | | 1978 | RA001 |
| | | 1.50 | | | --- | 1.001 | 0.497 | CT | 0.518 | --- | 20.40 | | | 1980 | RA001 |
| | | 6.00 | | | 52.7 | 2.015 | 0.999 | CT | 1.068 | 0.48 | 23.40 | | | 1978 | MPC01 |
| | | 6.00 | | | 52.7 | 1.994 | 1.000 | CT | 0.977 | 0.44 | 22.30 | | | 1978 | MPC01 |
| | | 6.00 | | | 52.8 | 1.998 | 0.997 | CT | 1.029 | 0.51 | 23.90 | | | 1978 | RA001 |
| | | 6.00 | | | 53.0 | 2.000 | 1.000 | CT | 0.940 | 0.42 | 22.20 | | | 1978 | MPC01 |
| | | 5.50 | | | 53.2 | 1.985 | 0.999 | CT | 1.052 | 0.44 | 22.50 | | | 1978 | MPC01 |
| | | 5.50 | | | 53.9 | 2.014 | 1.000 | CT | 0.987 | 0.52 | 24.80 | | | 1978 | MPC01 |
| | | 5.50 | | | 54.0 | 2.002 | 0.999 | CT | 1.021 | 0.50 | 24.60 | | | 1978 | MPC01 |
| | | 5.00 | | | 54.1 | 1.992 | 1.002 | CT | 0.996 | 0.48 | 24.30 | | | 1978 | MPC01 |
| | | 5.00 | | | 54.2 | 2.004 | 0.998 | CT | 1.002 | 0.34 | 20.50 | | | 1978 | MPC01 |
| | | 4.90 | | | 54.2 | 3.000 | 1.498 | CT | 1.480 | 0.43 | 22.70 | | | 1978 | RA002 |
| | | 6.00 | | | 54.2 | 1.996 | 1.000 | CT | 0.998 | 0.34 | 20.10 | | | 1978 | MPC01 |
| | | 6.00 | | | 54.3 | 1.006 | 0.496 | CT | 0.533 | 0.34 | 20.50 | | | 1978 | MPC01 |
| | | 5.50 | | | 54.3 | 2.019 | 0.999 | CT | 0.969 | 0.38 | 21.60 | | | 1978 | MPC01 |
| | | 5.12 | | | 54.4 | 1.991 | 0.999 | CT | 1.075 | 0.40 | 21.80 | | | 1978 | MPC01 |
| | | 4.90 | | | 54.4 | 1.988 | 1.000 | CT | 0.954 | 0.32 | 19.60 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ MEAN | STAN DEV | | |
| T851 Cont'd | Plate Cont'd | 5.00 | R.T. Cont'd | S-L Cont'd | 54.6 | 1.992 | 0.996 | CT | 0.996 | 0.38 | 21.80 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 5.75 | | | 54.6 | 1.999 | 0.996 | CT | 0.986 | 0.36 | 20.90 | | | 1980 | RA001 |
| | | 6.00 | | | 54.6 | 3.000 | 1.500 | CT | 1.500 | 0.44 | 23.10 | | | 1978 | MPC01 |
| | | 5.50 | | | 54.7 | 1.984 | 0.999 | CT | 0.972 | 0.42 | 22.80 | | | 1978 | MPC01 |
| | | 6.00 | | | 54.8 | 3.000 | 1.500 | CT | 1.530 | 0.50 | 24.50 | | | 1972 | 84368 |
| | | 6.00 | | | 54.8 | 3.000 | 1.500 | CT | 1.530 | 0.50 | 24.50 | | | 1972 | 84368 |
| | | 5.00 | | | 54.9 | 2.984 | 1.199 | CT | 1.552 | 0.38 | 21.90 | | | 1978 | MPC01 |
| | | 4.50 | | | 55.2 | 2.004 | 0.996 | CT | 0.973 | 0.43 | 23.10 | | | 1980 | RA001 |
| | | 5.50 | | | 55.2 | 1.988 | 1.000 | CT | 1.014 | 0.52 | 25.90 | | | 1978 | MPC01 |
| | | 5.00 | | | 55.2 | 2.974 | 1.500 | CT | 1.576 | 0.46 | 23.90 | | | 1978 | MPC01 |
| | | 5.12 | | | 55.2 | 2.015 | 0.998 | CT | 1.048 | 0.46 | 24.20 | | | 1978 | MPC01 |
| | | 5.50 | | | 55.2 | 2.000 | 0.998 | CT | 0.978 | 0.35 | 20.90 | | | 1980 | RA001 |
| | | 6.00 | | | 55.4 | 1.993 | 1.000 | CT | 1.056 | 0.48 | 24.60 | | | 1978 | MPC01 |
| | | 6.00 | | | 55.7 | 1.996 | 1.000 | CT | 1.018 | 0.48 | 24.80 | | | 1978 | MPC01 |
| | | 5.50 | | | 55.8 | 2.021 | 0.998 | CT | 0.970 | 0.40 | 22.40 | | | 1978 | MPC01 |
| | | 5.00 | | | 55.8 | 1.998 | 1.000 | CT | 0.988 | 0.36 | 21.29 | | | 1979 | RA001 |
| | | 4.90 | | | 55.8 | 3.005 | 1.500 | CT | 1.517 | 0.36 | 21.40 | | | 1978 | RA002 |
| | | 5.00 | | | 55.9 | 2.972 | 1.498 | CT | 1.486 | 0.36 | 21.60 | | | 1978 | MPC01 |
| | | 5.00 | | | 56.0 | 2.000 | 0.999 | CT | 0.997 | 0.36 | 21.29 | | | 1980 | RA001 |
| | | 6.00 | | | 56.0 | 2.002 | 0.996 | CT | 1.002 | 0.44 | 23.60 | | | 1980 | RA001 |
| | | 5.25 | | | 56.0 | 2.975 | 1.500 | CT | 1.547 | 0.38 | 22.00 | | | 1978 | MPC01 |
| | | 5.50 | | | 56.0 | 2.010 | 1.000 | CT | 1.005 | 0.28 | 19.20 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



| ALUMINUM 2124 $K_{Ic}$ | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ MEAN | STAN DEV | | |
| T851 Cont'd | Plate Cont'd | 5.50 | R.T. Cont'd | S-L Cont'd | 56.1 | 1.990 | 1.000 | CT | 1.035 | 0.32 | 20.30 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 6.00 | | | 56.2 | 1.982 | 1.000 | CT | 1.011 | 0.48 | 24.80 | | | 1978 | MPC01 |
| | | 4.25 | | | 56.2 | 2.000 | 0.929 | CT | 0.957 | 0.33 | 20.60 | | | 1980 | RA001 |
| | | 5.00 | | | 56.3 | 2.980 | 1.498 | CT | 1.490 | 0.38 | 22.10 | | | 1978 | MPC01 |
| | | 5.50 | | | 56.3 | 2.010 | 1.000 | CT | 1.005 | 0.30 | 19.90 | | | 1978 | MPC01 |
| | | 4.50 | | | 56.3 | 2.000 | 1.001 | CT | 0.992 | 0.38 | 22.00 | | | 1978 | RA002 |
| | | 4.90 | | | 56.4 | 1.996 | 0.998 | CT | 1.018 | 0.32 | 20.60 | | | 1978 | MPC01 |
| | | 5.25 | | | 56.4 | 2.016 | 1.000 | CT | 1.008 | 0.28 | 19.30 | | | 1978 | MPC01 |
| | | 4.00 | | | 56.5 | 2.002 | 0.997 | CT | 1.026 | 0.38 | 22.29 | | | 1980 | RA001 |
| | | 5.50 | | | 56.6 | 2.008 | 1.000 | CT | 1.004 | 0.46 | 24.40 | | | 1978 | MPC01 |
| | | 5.50 | | | 56.6 | 1.994 | 0.999 | CT | 1.017 | 0.38 | 22.50 | | | 1978 | MPC01 |
| | | 6.00 | | | 56.6 | 1.998 | 0.998 | CT | 0.998 | 0.43 | 23.50 | | | 1978 | RA001 |
| | | 4.62 | | | 56.6 | 3.033 | 1.499 | CT | 1.456 | 0.46 | 24.70 | | | 1978 | MPC01 |
| | | 5.50 | | | 56.6 | 2.000 | 1.000 | CT | 1.020 | 0.36 | 22.00 | | | 1978 | MPC01 |
| | | 2.50 | | | 56.6 | 1.999 | 1.000 | CT | 1.052 | 0.35 | 21.29 | | | 1978 | RA002 |
| | | 4.90 | | | 56.7 | 3.000 | 1.499 | CT | 1.596 | 0.43 | 23.60 | | | 1978 | RA002 |
| | | 4.00 | | | 56.7 | 2.000 | 0.998 | CT | 0.980 | 0.36 | 21.60 | | | 1980 | RA001 |
| | | 5.50 | | | 56.7 | 1.992 | 0.997 | CT | 0.956 | 0.32 | 20.70 | | | 1978 | MPC01 |
| | | 4.50 | | | 56.7 | 1.998 | 0.998 | CT | 1.009 | 0.37 | 22.10 | | | 1979 | RA001 |
| | | 5.50 | | | 56.8 | 2.012 | 1.000 | CT | 1.006 | 0.36 | 21.80 | | | 1978 | MPC01 |
| | | 4.62 | | | 56.8 | 1.996 | 0.999 | CT | 0.996 | 0.30 | 20.20 | | | 1978 | MPC01 |
| | | 5.50 | | | 56.8 | 2.008 | 1.000 | CT | 1.004 | 0.28 | 19.70 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 4.90 | R.T. Cont'd | S-L Cont'd | 56.8 | 3.000 | 1.499 | CT | 1.526 | 0.37 | 22.00 | Cont'd | Cont'd | 1978 | RA002 |
| | | 5.00 | | | 56.9 | 2.988 | 1.499 | CT | 1.494 | 0.38 | 22.60 | | | 1978 | MPC01 |
| | | 5.00 | | | 56.9 | 1.997 | 0.998 | CT | 1.005 | 0.35 | 21.40 | | | 1979 | RA001 |
| | | 4.00 | | | 56.9 | 2.002 | 0.999 | CT | 0.984 | 0.35 | 21.50 | | | 1980 | RA001 |
| | | 5.50 | | | 57.0 | 2.002 | 1.000 | CT | 1.001 | 0.28 | 19.70 | | | 1978 | MPC01 |
| | | 5.50 | | | 57.0 | 1.994 | 1.000 | CT | 1.017 | 0.24 | 17.70 | | | 1978 | MPC01 |
| | | 5.50 | | | 57.0 | 2.014 | 1.000 | CT | 1.007 | 0.25 | 18.30 | | | 1978 | MPC01 |
| | | 5.50 | | | 57.0 | 1.994 | 1.000 | CT | 0.997 | 0.25 | 18.50 | | | 1978 | MPC01 |
| | | 4.50 | | | 57.0 | 2.017 | 0.999 | CT | 1.069 | 0.42 | 23.50 | | | 1978 | MPC01 |
| | | 5.50 | | | 57.1 | 2.000 | 1.000 | CT | 1.000 | 0.27 | 19.00 | | | 1978 | MPC01 |
| | | 4.75 | | | 57.1 | 2.000 | 0.998 | CT | 0.980 | 0.59 | 22.79 | | | 1980 | RA001 |
| | | 5.50 | | | 57.1 | 1.998 | 1.000 | CT | 0.999 | 0.30 | 20.50 | | | 1978 | MPC01 |
| | | 2.20 | | | 57.1 | 1.503 | 0.748 | CT | 0.774 | 0.27 | 19.00 | | | 1980 | RA001 |
| | | 5.50 | | | 57.1 | 2.008 | 1.000 | CT | 1.004 | 0.34 | 21.60 | | | 1978 | MPC01 |
| | | 5.50 | | | 57.1 | 2.010 | 1.000 | CT | 1.005 | 0.34 | 21.60 | | | 1978 | MPC01 |
| | | 5.00 | | | 57.1 | 2.012 | 1.000 | CT | 1.006 | 0.40 | 23.20 | | | 1978 | MPC01 |
| | | 5.50 | | | 57.3 | 2.010 | 1.000 | CT | 1.005 | 0.28 | 19.90 | | | 1978 | MPC01 |
| | | 4.50 | | | 57.3 | 3.000 | 1.500 | CT | 1.540 | 0.51 | 25.80 | | | 1972 | 84368 |
| | | 4.50 | | | 57.3 | 3.000 | 1.500 | CT | 1.540 | 0.47 | 24.90 | | | 1972 | 84368 |
| | | 4.00 | | | 57.3 | 1.998 | 0.999 | CT | 1.022 | 0.34 | 21.20 | | | 1978 | RA001 |
| | | 5.50 | | | 57.5 | 3.000 | 1.500 | CT | 1.470 | 0.43 | 23.90 | | | 1972 | 84368 |
| | | 5.50 | | | 57.5 | 3.000 | 1.500 | CT | 1.500 | 0.42 | 23.60 | | | 1972 | 84368 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 5.50 | R.T. Cont'd | S-L Cont'd | 57.5 | 1.998 | 1.000 | CT | 0.999 | 0.28 | 20.00 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 4.00 | | | 57.5 | 2.000 | 0.999 | CT | 0.984 | 0.33 | 21.20 | | | 1980 | RA001 |
| | | 5.50 | | | 57.5 | 1.988 | 1.000 | CT | 1.014 | 0.42 | 23.70 | | | 1978 | MPC01 |
| | | 5.50 | | | 57.6 | 1.988 | 1.000 | CT | 1.014 | 0.28 | 19.90 | | | 1978 | MPC01 |
| | | 4.31 | | | 57.6 | 1.992 | 0.999 | CT | 1.036 | 0.34 | 21.60 | | | 1978 | MPC01 |
| | | 5.50 | | | 57.6 | 2.006 | 0.999 | CT | 1.003 | 0.32 | 20.80 | | | 1978 | MPC01 |
| | | 4.00 | | | 57.6 | 3.001 | 1.500 | CT | 1.564 | 0.34 | 21.50 | | | 1978 | RA001 |
| | | 5.50 | | | 57.6 | 1.986 | 1.000 | CT | 0.993 | 0.34 | 21.60 | | | 1978 | MPC01 |
| | | 5.00 | | | 57.6 | 1.998 | 0.997 | CT | 0.997 | 0.36 | 22.10 | | | 1978 | RA001 |
| | | 5.00 | | | 57.6 | 1.992 | 1.000 | CT | 1.016 | 0.40 | 23.20 | | | 1978 | MPC01 |
| | | 4.55 | | | 57.6 | 2.004 | 0.999 | CT | 0.985 | 0.34 | 21.50 | | | 1980 | RA001 |
| | | 5.50 | | | 57.7 | 2.022 | 1.000 | CT | 1.011 | 0.30 | 20.20 | | | 1978 | MPC01 |
| | | 4.50 | | | 57.7 | 2.017 | 0.999 | CT | 1.049 | 0.38 | 22.90 | | | 1978 | MPC01 |
| | | 3.00 | | | 57.8 | 2.002 | 1.001 | CT | 1.001 | 0.30 | 20.70 | | | 1978 | MPC01 |
| | | 4.00 | | | 57.8 | 2.987 | 1.498 | CT | 1.643 | 0.40 | 23.50 | | | 1978 | MPC01 |
| | | 5.50 | | | 57.8 | 2.000 | 1.000 | CT | 1.000 | 0.36 | 22.00 | | | 1978 | MPC01 |
| | | 3.50 | | | 57.8 | 1.993 | 1.001 | CT | 1.096 | 0.32 | 21.00 | | | 1978 | MPC01 |
| | | 5.00 | | | 57.8 | 2.000 | 1.001 | CT | 1.009 | 0.29 | 19.70 | | | 1978 | RA002 |
| | | 5.50 | | | 57.8 | 1.984 | 1.000 | CT | 1.012 | 0.42 | 24.20 | | | 1978 | MPC01 |
| | | 5.50 | | | 57.9 | 1.992 | 1.000 | CT | 0.996 | 0.28 | 20.00 | | | 1978 | MPC01 |
| | | 5.50 | | | 57.9 | 2.008 | 1.000 | CT | 1.004 | 0.25 | 19.00 | | | 1978 | MPC01 |
| | | 3.62 | | | 58.0 | 2.006 | 0.998 | CT | 1.003 | 0.32 | 21.30 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 5.50 | R.T. Cont'd | S-L Cont'd | 58.0 | 3.008 | 1.501 | CT | 1.504 | 0.38 | 23.10 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 4.00 | | | 58.0 | 2.004 | 1.001 | CT | 1.002 | 0.36 | 22.30 | | | 1978 | MPC01 |
| | | 5.00 | | | 58.1 | 2.010 | 1.000 | CT | 1.005 | 0.38 | 23.00 | | | 1978 | MPC01 |
| | | 2.50 | | | 58.1 | 1.986 | 1.000 | CT | 1.013 | 0.40 | 23.80 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.1 | 2.016 | 1.000 | CT | 1.008 | 0.38 | 22.70 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.1 | 2.002 | 1.000 | CT | 1.001 | 0.40 | 23.40 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.1 | 3.024 | 1.500 | CT | 1.512 | 0.42 | 23.90 | | | 1978 | MPC01 |
| | | 2.50 | | | 58.1 | 2.008 | 0.996 | CT | 1.004 | 0.30 | 20.50 | | | 1978 | MPC01 |
| | | 5.00 | | | 58.1 | 1.992 | 1.000 | CT | 1.016 | 0.34 | 21.50 | | | 1978 | MPC01 |
| | | 4.90 | | | 58.1 | 2.000 | 1.001 | CT | 1.010 | 0.34 | 21.60 | | | 1978 | RA002 |
| | | 2.50 | | | 58.1 | 2.018 | 1.000 | CT | 1.029 | 0.42 | 24.30 | | | 1978 | MPC01 |
| | | 3.00 | | | 58.2 | 2.004 | 0.997 | CT | 1.030 | 0.31 | 20.70 | | | 1980 | RA001 |
| | | 5.50 | | | 58.2 | 2.010 | 1.000 | CT | 1.025 | 0.30 | 20.50 | | | 1978 | MPC01 |
| | | 2.70 | | | 58.2 | 1.988 | 1.002 | CT | 0.974 | 0.42 | 24.10 | | | 1978 | MPC01 |
| | | 5.00 | | | 58.2 | 2.006 | 0.999 | CT | 1.023 | 0.40 | 23.40 | | | 1978 | MPC01 |
| | | 5.00 | | | 58.2 | 1.984 | 0.999 | CT | 1.012 | 0.38 | 22.90 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.2 | 3.008 | 1.500 | CT | 1.504 | 0.40 | 23.70 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.3 | 1.996 | 1.000 | CT | 0.998 | 0.30 | 20.60 | | | 1978 | MPC01 |
| | | 5.25 | | | 58.3 | 3.020 | 1.500 | CT | 1.510 | 0.44 | 24.80 | | | 1978 | MPC01 |
| | | 3.12 | | | 58.3 | 2.016 | 1.001 | CT | 0.988 | 0.36 | 22.40 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.3 | 1.998 | 1.000 | CT | 0.999 | 0.30 | 20.50 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.3 | 1.998 | 1.000 | CT | 0.999 | 0.30 | 20.60 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 5.50 | R.T. Cont'd | S-L Cont'd | 58.3 | 2.014 | 1.000 | CT | 1.007 | 0.40 | 23.40 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 5.50 | | | 58.3 | 2.014 | 1.000 | CT | 1.007 | 0.28 | 20.00 | | | 1978 | MPC01 |
| | | 3.00 | | | 58.3 | 2.000 | 0.998 | CT | 0.983 | 0.32 | 20.90 | | | 1980 | RA001 |
| | | 5.50 | | | 58.3 | 2.016 | 0.990 | CT | 1.008 | 0.30 | 20.90 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.3 | 2.004 | 0.999 | CT | 1.002 | 0.50 | 26.60 | | | 1978 | MPC01 |
| | | 4.00 | | | 58.4 | 1.999 | 1.000 | CT | 1.015 | 0.28 | 19.79 | | | 1979 | RA001 |
| | | 1.81 | | | 58.4 | 1.502 | 0.748 | CT | 0.766 | 0.24 | 18.50 | | | 1978 | MPC01 |
| | | 4.50 | | | 58.4 | 2.978 | 1.500 | CT | 1.489 | 0.46 | 25.20 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.4 | 2.020 | 0.997 | CT | 1.010 | 0.28 | 20.40 | | | 1978 | MPC01 |
| | | 5.00 | | | 58.4 | 3.010 | 1.500 | CT | 1.565 | 0.40 | 23.40 | | | 1978 | MPC01 |
| | | 2.50 | | | 58.5 | 1.996 | 1.000 | CT | 0.998 | 0.30 | 20.70 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.5 | 2.018 | 1.000 | CT | 1.009 | 0.34 | 22.00 | | | 1978 | MPC01 |
| | | 4.25 | | | 58.5 | 1.987 | 0.999 | CT | 1.033 | 0.40 | 23.50 | | | 1978 | MPC01 |
| | | 4.25 | | | 58.5 | 1.996 | 1.000 | CT | 0.998 | 0.27 | 19.60 | | | 1978 | MPC01 |
| | | 5.00 | | | 58.6 | 1.983 | 0.999 | CT | 1.031 | 0.36 | 22.30 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.6 | 2.006 | 0.999 | CT | 1.003 | 0.30 | 20.80 | | | 1978 | MPC01 |
| | | 3.50 | | | 58.6 | 2.008 | 1.000 | CT | 1.024 | 0.34 | 21.80 | | | 1978 | MPC01 |
| | | 5.00 | | | 58.6 | 1.988 | 1.000 | CT | 1.014 | 0.42 | 24.50 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.6 | 2.008 | 1.000 | CT | 1.004 | 0.40 | 23.90 | | | 1978 | MPC01 |
| | | 4.50 | | | 58.6 | 2.996 | 1.500 | CT | 1.498 | 0.48 | 26.00 | | | 1978 | MPC01 |
| | | 5.00 | | | 58.6 | 1.994 | 0.999 | CT | 1.017 | 0.38 | 23.00 | | | 1978 | MPC01 |
| | | 4.00 | | | 58.6 | 1.996 | 0.999 | CT | 0.998 | 0.32 | 21.10 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 5.50 | R.T. Cont'd | S-L Cont'd | 58.6 | 1.998 | 1.000 | CT | 0.999 | 0.38 | 22.90 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 5.50 | | | 58.6 | 2.018 | 0.999 | CT | 1.009 | 0.48 | 26.00 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.7 | 2.010 | 1.000 | CT | 1.005 | 0.27 | 19.50 | | | 1978 | MPC01 |
| | | 3.54 | | | 58.7 | 1.998 | 0.997 | CT | 0.999 | 0.32 | 21.70 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.8 | 2.016 | 1.000 | CT | 1.008 | 0.48 | 26.00 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.8 | 2.004 | 0.998 | CT | 1.002 | 0.38 | 23.20 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.8 | 2.000 | 1.000 | CT | 1.000 | 0.36 | 22.50 | | | 1978 | MPC01 |
| | | 4.25 | | | 58.8 | 2.002 | 1.000 | CT | 1.001 | 0.34 | 21.90 | | | 1978 | MPC01 |
| | | 3.50 | | | 58.8 | 1.996 | 1.000 | CT | 1.078 | 0.30 | 20.70 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.8 | 2.014 | 1.000 | CT | 1.007 | 0.34 | 22.30 | | | 1978 | MPC01 |
| | | 4.50 | | | 58.8 | 2.999 | 1.500 | CT | 1.487 | 0.34 | 21.79 | | | 1978 | RA002 |
| | | 5.50 | | | 58.8 | 2.006 | 0.998 | CT | 1.003 | 0.40 | 23.80 | | | 1978 | MPC01 |
| | | 5.50 | | | 58.9 | 2.020 | 1.000 | CT | 1.010 | 0.28 | 20.30 | | | 1978 | MPC01 |
| | | 4.00 | | | 58.9 | 1.984 | 1.001 | CT | 1.012 | 0.38 | 23.10 | | | 1978 | MPC01 |
| | | 4.50 | | | 58.9 | 2.992 | 1.500 | CT | 1.496 | 0.44 | 25.00 | | | 1978 | MPC01 |
| | | 4.25 | | | 59.0 | 1.996 | 1.000 | CT | 1.018 | 0.36 | 23.00 | | | 1978 | MPC01 |
| | | 5.00 | | | 59.1 | 1.988 | 1.000 | CT | 1.014 | 0.34 | 22.00 | | | 1978 | MPC01 |
| | | 5.00 | | | 59.1 | 1.986 | 1.000 | CT | 1.013 | 0.34 | 22.00 | | | 1978 | MPC01 |
| | | 5.50 | | | 59.1 | 2.000 | 1.000 | CT | 1.400 | 0.30 | 20.79 | | | 1978 | GD003 |
| | | 5.50 | | | 59.1 | 2.002 | 1.000 | CT | 1.001 | 0.36 | 22.80 | | | 1978 | MPC01 |
| | | 5.50 | | | 59.1 | 2.000 | 1.000 | CT | 1.400 | 0.34 | 22.00 | | | 1978 | GD003 |
| | | 5.50 | | | 59.1 | 1.996 | 1.000 | CT | 0.998 | 0.28 | 20.20 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 5.00 | R.T. Cont'd | S-L Cont'd | 59.1 | 1.984 | 0.999 | CT | 1.012 | 0.32 | 21.60 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 5.00 | | | 59.1 | 2.010 | 1.000 | CT | 1.005 | 0.36 | 23.00 | | | 1978 | MPC01 |
| | | 2.75 | | | 59.1 | 2.000 | 1.000 | CT | 1.013 | 0.29 | 20.29 | | | 1978 | RA002 |
| | | 5.50 | | | 59.1 | 1.980 | 1.000 | CT | 0.990 | 0.46 | 25.90 | | | 1978 | MPC01 |
| | | 5.50 | | | 59.1 | 2.000 | 1.000 | CT | 1.400 | 0.32 | 21.40 | | | 1978 | GD003 |
| | | 5.50 | | | 59.1 | 2.008 | 1.000 | CT | 1.004 | 0.42 | 24.30 | | | 1978 | MPC01 |
| | | 3.12 | | | 59.2 | 1.998 | 0.999 | CT | 1.004 | 0.40 | 23.70 | | | 1978 | RA001 |
| | | 5.00 | | | 59.2 | 1.986 | 1.001 | CT | 1.013 | 0.36 | 22.90 | | | 1978 | MPC01 |
| | | 3.12 | | | 59.2 | 2.018 | 0.996 | CT | 0.989 | 0.32 | 21.80 | | | 1978 | MPC01 |
| | | 4.50 | | | 59.2 | 2.998 | 1.500 | CT | 1.499 | 0.48 | 26.30 | | | 1978 | MPC01 |
| | | 4.50 | | | 59.2 | 3.018 | 1.500 | CT | 1.509 | 0.48 | 26.10 | | | 1978 | MPC01 |
| | | 5.00 | | | 59.2 | 2.024 | 1.001 | CT | 1.012 | 0.36 | 22.90 | | | 1978 | MPC01 |
| | | 5.00 | | | 59.3 | 1.992 | 1.001 | CT | 1.016 | 0.40 | 23.90 | | | 1978 | MPC01 |
| | | 5.50 | | | 59.3 | 1.998 | 1.000 | CT | 0.999 | 0.42 | 24.90 | | | 1978 | MPC01 |
| | | 4.00 | | | 59.3 | 2.000 | 1.000 | CT | 0.980 | 0.38 | 23.40 | | | 1972 | 84368 |
| | | 4.25 | | | 59.3 | 1.990 | 0.987 | CT | 1.015 | 0.42 | 24.40 | | | 1978 | MPC01 |
| | | 5.00 | | | 59.3 | 1.978 | 1.001 | CT | 1.009 | 0.42 | 24.70 | | | 1978 | MPC01 |
| | | 4.00 | | | 59.3 | 2.000 | 1.000 | CT | 0.980 | 0.44 | 24.80 | | | 1972 | 84368 |
| | | 5.50 | | | 59.3 | 2.008 | 1.000 | CT | 1.024 | 0.50 | 26.90 | | | 1978 | MPC01 |
| | | 4.25 | | | 59.3 | 2.024 | 1.000 | CT | 1.012 | 0.30 | 21.20 | | | 1978 | MPC01 |
| | | 5.00 | | | 59.3 | 2.014 | 1.001 | CT | 1.007 | 0.40 | 24.00 | | | 1978 | MPC01 |
| | | 5.50 | | | 59.4 | 2.018 | 1.000 | CT | 1.009 | 0.34 | 22.20 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 4.25 | R.T. Cont'd | S-L Cont'd | 59.4 | 1.998 | 1.000 | CT | 0.999 | 0.40 | 23.90 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 4.25 | | | 59.4 | 1.994 | 1.000 | CT | 1.017 | 0.38 | 23.70 | | | 1978 | MPC01 |
| | | 3.12 | | | 59.4 | 2.000 | 0.992 | CT | 1.000 | 0.30 | 21.20 | | | 1978 | MPC01 |
| | | 2.50 | | | 59.4 | 2.000 | 1.001 | CT | 1.018 | 0.35 | 22.50 | | | 1978 | RA002 |
| | | 4.25 | | | 59.4 | 1.994 | 1.001 | CT | 0.997 | 0.50 | 27.20 | | | 1978 | MPC01 |
| | | 1.75 | | | 59.4 | 1.002 | 0.499 | CT | 0.511 | 0.30 | 20.70 | | | 1980 | RA001 |
| | | 4.25 | | | 59.5 | 1.990 | 1.000 | CT | 1.015 | 0.48 | 26.30 | | | 1978 | MPC01 |
| | | 5.50 | | | 59.5 | 2.006 | 1.000 | CT | 1.003 | 0.36 | 22.70 | | | 1978 | MPC01 |
| | | 3.00 | | | 59.5 | 2.000 | 0.999 | CT | 1.000 | 0.30 | 21.00 | | | 1978 | MPC01 |
| | | 5.25 | | | 59.5 | 3.012 | 1.500 | CT | 1.506 | 0.42 | 24.50 | | | 1978 | MPC01 |
| | | 4.31 | | | 59.6 | 2.000 | 1.000 | CT | 0.970 | 0.42 | 24.50 | | | 1972 | 84368 |
| | | 5.50 | | | 59.6 | 1.977 | 1.000 | CT | 1.008 | 0.40 | 24.30 | | | 1978 | MPC01 |
| | | 5.50 | | | 59.6 | 1.986 | 1.000 | CT | 1.013 | 0.32 | 21.80 | | | 1978 | MPC01 |
| | | 5.50 | | | 59.6 | 2.010 | 1.000 | CT | 1.005 | 0.34 | 22.50 | | | 1978 | MPC01 |
| | | 4.31 | | | 59.6 | 2.000 | 1.000 | CT | 0.950 | 0.41 | 24.10 | | | 1972 | 84368 |
| | | 3.00 | | | 59.6 | 1.997 | 0.998 | CT | 0.999 | 0.26 | 19.50 | | | 1978 | RA001 |
| | | 4.25 | | | 59.7 | 2.014 | 1.002 | CT | 1.007 | 0.44 | 25.30 | | | 1978 | MPC01 |
| | | 3.50 | | | 59.7 | 2.004 | 0.995 | CT | 0.999 | 0.27 | 19.70 | | | 1980 | RA001 |
| | | 2.00 | | | 59.7 | 1.500 | 0.749 | CT | 0.756 | 0.38 | 23.29 | | | 1980 | RA001 |
| | | 5.50 | | | 59.8 | 2.012 | 1.000 | CT | 1.006 | 0.34 | 22.50 | | | 1978 | MPC01 |
| | | 3.50 | | | 59.8 | 1.998 | 0.998 | CT | 1.001 | 0.32 | 21.70 | | | 1979 | RA001 |
| | | 3.25 | | | 59.8 | 1.989 | 0.999 | CT | 1.054 | 0.30 | 21.20 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 5.50 | R.T. Cont'd | S-L Cont'd | 59.8 | 1.987 | 1.000 | CT | 1.033 | 0.28 | 20.50 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 4.50 | | | 59.8 | 3.000 | 1.500 | CT | 1.530 | 0.36 | 22.70 | | | 1972 | 84368 |
| | | 4.50 | | | 59.8 | 3.000 | 1.500 | CT | 1.520 | 0.35 | 22.50 | | | 1972 | 84368 |
| | | 3.54 | | | 59.8 | 2.014 | 1.000 | CT | 1.007 | 0.34 | 22.30 | | | 1978 | MPC01 |
| | | 5.00 | | | 59.8 | 2.010 | 1.000 | CT | 1.005 | 0.36 | 23.10 | | | 1978 | MPC01 |
| | | 4.25 | | | 59.9 | 1.994 | 1.000 | CT | 1.017 | 0.27 | 20.30 | | | 1978 | MPC01 |
| | | 2.00 | | | 59.9 | 1.502 | 0.751 | CT | 0.751 | 0.22 | 18.40 | | | 1978 | MPC01 |
| | | 2.50 | | | 59.9 | 1.498 | 0.744 | CT | 0.760 | 0.26 | 19.60 | | | 1980 | RA001 |
| | | 3.00 | | | 59.9 | 2.006 | 1.001 | CT | 1.003 | 0.27 | 19.80 | | | 1978 | MPC01 |
| | | 3.50 | | | 59.9 | 2.000 | 1.000 | CT | 0.990 | 0.27 | 19.80 | | | 1972 | 84368 |
| | | 3.50 | | | 59.9 | 2.000 | 1.000 | CT | 0.990 | 0.32 | 21.40 | | | 1972 | 84368 |
| | | 4.50 | | | 59.9 | 2.998 | 1.500 | CT | 1.499 | 0.48 | 26.50 | | | 1978 | MPC01 |
| | | 5.50 | | | 60.0 | 1.998 | 1.000 | CT | 0.999 | 0.28 | 20.40 | | | 1978 | MPC01 |
| | | 2.90 | | | 60.0 | 1.988 | 0.998 | CT | 0.974 | 0.30 | 21.00 | | | 1978 | MPC01 |
| | | 3.00 | | | 60.0 | 2.003 | 0.995 | CT | 1.004 | 0.39 | 23.70 | | | 1980 | RA001 |
| | | 5.00 | | | 60.1 | 1.996 | 0.999 | CT | 0.998 | 0.44 | 25.70 | | | 1978 | MPC01 |
| | | 4.00 | | | 60.1 | 2.002 | 0.998 | CT | 0.998 | 0.35 | 22.60 | | | 1980 | RA001 |
| | | 4.50 | | | 60.1 | 3.008 | 1.501 | CT | 1.504 | 0.38 | 23.80 | | | 1978 | MPC01 |
| | | 3.54 | | | 60.1 | 2.004 | 0.998 | CT | 1.002 | 0.42 | 24.80 | | | 1978 | MPC01 |
| | | 3.12 | | | 60.1 | 1.957 | 0.998 | CT | 1.019 | 0.36 | 23.40 | | | 1978 | MPC01 |
| | | 2.50 | | | 60.2 | 2.010 | 0.996 | CT | 1.005 | 0.32 | 22.00 | | | 1978 | MPC01 |
| | | 4.50 | | | 60.2 | 3.029 | 1.500 | CT | 1.484 | 0.42 | 24.70 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 4.25 | R.T. Cont'd | S-L Cont'd | 60.2 | 1.986 | 1.000 | CT | 1.013 | 0.32 | 21.70 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 5.50 | | | 60.2 | 2.016 | 1.000 | CT | 1.008 | 0.24 | 19.00 | | | 1978 | MPC01 |
| | | 4.00 | | | 60.2 | 3.000 | 1.500 | CT | 1.540 | 0.27 | 20.00 | | | 1972 | 84368 |
| | | 4.00 | | | 60.2 | 3.000 | 1.500 | CT | 1.560 | 0.27 | 19.90 | | | 1972 | 84368 |
| | | 2.50 | | | 60.4 | 1.999 | 0.999 | CT | 1.096 | 0.28 | 20.40 | | | 1978 | RA002 |
| | | 4.00 | | | 60.5 | 2.014 | 0.999 | CT | 1.007 | 0.34 | 22.60 | | | 1978 | MPC01 |
| | | 5.00 | | | 60.6 | 1.996 | 0.999 | CT | 1.018 | 0.34 | 23.00 | | | 1978 | MPC01 |
| | | 5.50 | | | 60.6 | 2.004 | 0.999 | CT | 1.002 | 0.30 | 21.70 | | | 1978 | MPC01 |
| | | 5.00 | | | 60.6 | 2.004 | 0.999 | CT | 1.022 | 0.36 | 23.10 | | | 1978 | MPC01 |
| | | 3.00 | | | 60.6 | 1.999 | 1.000 | CT | 0.963 | 0.29 | 20.70 | | | 1978 | RA002 |
| | | 3.00 | | | 60.6 | 2.004 | 0.996 | CT | 0.998 | 0.29 | 20.90 | | | 1980 | RA001 |
| | | 3.00 | | | 60.6 | 1.999 | 0.998 | CT | 0.991 | 0.27 | 20.00 | | | 1980 | RA001 |
| | | 4.00 | | | 60.6 | 3.026 | 1.501 | CT | 1.513 | 0.38 | 23.70 | | | 1978 | MPC01 |
| | | 4.00 | | | 60.6 | 2.992 | 1.500 | CT | 1.526 | 0.36 | 23.20 | | | 1978 | MPC01 |
| | | 4.25 | | | 60.7 | 2.016 | 1.000 | CT | 1.008 | 0.28 | 21.20 | | | 1978 | MPC01 |
| | | 3.12 | | | 60.7 | 1.998 | 0.997 | CT | 1.039 | 0.30 | 21.60 | | | 1978 | MPC01 |
| | | 2.50 | | | 60.7 | 0.986 | 0.502 | CT | 0.498 | 0.22 | 18.10 | | | 1978 | RA002 |
| | | 3.00 | | | 60.7 | 1.992 | 0.999 | CT | 1.019 | 0.24 | 19.20 | | | 1978 | MPC01 |
| | | 3.00 | | | 60.8 | 1.997 | 0.998 | CT | 1.020 | 0.30 | 21.40 | | | 1978 | RA001 |
| | | 5.00 | | | 60.8 | 2.016 | 1.000 | CT | 1.008 | 0.25 | 20.00 | | | 1978 | MPC01 |
| | | 3.62 | | | 60.8 | 1.996 | 0.999 | CT | 0.979 | 0.25 | 19.50 | | | 1980 | RA001 |
| | | 3.00 | | | 60.9 | 2.006 | 1.001 | CT | 1.023 | 0.27 | 20.20 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 3.62 | R.T. Cont'd | S-L Cont'd | 60.9 | 3.014 | 1.499 | CT | 1.567 | 0.28 | 20.80 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 4.25 | | | 60.9 | 1.984 | 1.000 | CT | 1.012 | 0.30 | 21.70 | | | 1978 | MPC01 |
| | | 3.50 | | | 60.9 | 2.016 | 0.997 | CT | 1.008 | 0.34 | 22.70 | | | 1978 | MPC01 |
| | | 3.00 | | | 60.9 | 2.000 | 1.000 | CT | 0.991 | 0.31 | 21.70 | | | 1978 | RA002 |
| | | 5.50 | | | 60.9 | 2.004 | 1.000 | CT | 1.002 | 0.27 | 20.30 | | | 1978 | MPC01 |
| | | 2.50 | | | 60.9 | 2.006 | 0.998 | CT | 1.003 | 0.28 | 21.30 | | | 1978 | MPC01 |
| | | 4.00 | | | 60.9 | 1.997 | 0.999 | CT | 1.002 | 0.36 | 23.20 | | | 1978 | RA001 |
| | | 2.00 | | | 61.0 | 1.498 | 0.751 | CT | 0.756 | 0.29 | 21.10 | | | 1978 | RA002 |
| | | 5.50 | | | 61.1 | 2.014 | 1.003 | CT | 1.007 | 0.32 | 22.30 | | | 1978 | MPC01 |
| | | 4.25 | | | 61.1 | 1.996 | 1.001 | CT | 0.998 | 0.36 | 23.50 | | | 1978 | MPC01 |
| | | 3.50 | | | 61.1 | 1.998 | 0.999 | CT | 1.022 | 0.33 | 22.20 | | | 1978 | RA001 |
| | | 1.62 | | | 61.2 | 0.986 | 0.503 | CT | 0.480 | 0.24 | 19.10 | | | 1978 | RA002 |
| | | 3.00 | | | 61.2 | 1.996 | 0.998 | CT | 1.018 | 0.25 | 19.70 | | | 1978 | MPC01 |
| | | 3.00 | | | 61.2 | 2.000 | 0.999 | CT | 0.980 | 0.28 | 20.79 | | | 1980 | RA001 |
| | | 3.75 | | | 61.3 | 3.016 | 1.499 | CT | 1.538 | 0.30 | 21.90 | | | 1978 | MPC01 |
| | | 2.50 | | | 61.3 | 1.499 | 0.745 | CT | 0.750 | 0.24 | 19.29 | | | 1980 | RA001 |
| | | 5.50 | | | 61.4 | 1.986 | 1.003 | CT | 1.013 | 0.34 | 23.00 | | | 1978 | MPC01 |
| | | 3.50 | | | 61.4 | 2.000 | 1.000 | CT | 0.990 | 0.43 | 25.40 | | | 1972 | 84368 |
| | | 2.50 | | | 61.4 | 2.000 | 1.000 | CT | 1.100 | 0.27 | 20.80 | | | 1978 | MPC01 |
| | | 2.00 | | | 61.4 | 0.997 | 0.498 | CT | 0.504 | 0.25 | 19.60 | | | 1978 | RA001 |
| | | 3.50 | | | 61.4 | 2.000 | 1.000 | CT | 0.990 | 0.41 | 24.70 | | | 1972 | 84368 |
| | | 4.90 | | | 61.4 | 3.000 | 1.500 | CT | 1.585 | 0.36 | 23.40 | | | 1978 | RA002 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 4.00 | R.T. Cont'd | S-L Cont'd | 61.5 | 3.000 | 1.500 | CT | 1.530 | 0.30 | 21.70 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 1.75 | | | 61.6 | 0.998 | 0.503 | CT | 0.520 | 0.21 | 17.90 | | | 1980 | RA001 |
| | | 3.00 | | | 61.6 | 2.000 | 1.001 | CT | 1.012 | 0.22 | 18.50 | | | 1978 | RA002 |
| | | 4.90 | | | 61.6 | 3.000 | 1.499 | CT | 1.592 | 0.35 | 23.10 | | | 1978 | RA002 |
| | | 5.50 | | | 61.6 | 1.986 | 1.000 | CT | 1.013 | 0.38 | 24.30 | | | 1978 | MPC01 |
| | | 2.35 | | | 61.7 | 1.502 | 0.750 | CT | 0.763 | 0.33 | 22.50 | | | 1980 | RA001 |
| | | 1.73 | | | 61.7 | 1.004 | 0.497 | CT | 0.542 | 0.21 | 18.40 | | | 1978 | MPC01 |
| | | 3.12 | | | 61.7 | 2.002 | 0.998 | CT | 0.996 | 0.29 | 21.29 | | | 1980 | RA001 |
| | | 3.00 | | | 61.8 | 1.999 | 0.994 | CT | 1.000 | 0.23 | 19.10 | | | 1980 | RA001 |
| | | 3.00 | | | 61.8 | 1.980 | 0.999 | CT | 1.010 | 0.27 | 20.80 | | | 1978 | MPC01 |
| | | 2.00 | | | 61.9 | 1.498 | 0.749 | CT | 0.794 | 0.25 | 20.10 | | | 1978 | MPC01 |
| | | 4.75 | | | 62.0 | 2.004 | 1.000 | CT | 1.002 | 0.25 | 20.40 | | | 1978 | MPC01 |
| | | 2.50 | | | 62.0 | 1.984 | 0.998 | CT | 1.012 | 0.24 | 19.70 | | | 1978 | MPC01 |
| | | 2.25 | | | 62.0 | 0.998 | 0.499 | CT | 0.539 | 0.24 | 19.80 | | | 1978 | MPC01 |
| | | 3.00 | | | 62.0 | 2.010 | 1.001 | CT | 1.005 | 0.27 | 20.80 | | | 1978 | MPC01 |
| | | 3.00 | | | 62.0 | 1.995 | 0.998 | CT | 0.960 | 0.30 | 21.60 | | | 1980 | RA001 |
| | | 3.00 | | | 62.0 | 1.997 | 0.999 | CT | 1.007 | 0.24 | 19.40 | | | 1979 | RA001 |
| | | 2.50 | | | 62.0 | 1.499 | 0.744 | CT | 0.741 | 0.23 | 18.90 | | | 1980 | RA001 |
| | | 5.50 | | | 62.1 | 2.001 | 1.000 | CT | 1.006 | 0.30 | 22.00 | | | 1978 | MPC01 |
| | | 2.50 | | | 62.1 | 2.000 | 1.000 | CT | 1.020 | 0.40 | 25.30 | | | 1978 | MPC01 |
| | | 2.50 | | | 62.1 | 2.000 | 1.000 | CT | 0.940 | 0.31 | 21.80 | | | 1972 | 84368 |
| | | 3.00 | | | 62.1 | 1.997 | 0.998 | CT | 1.022 | 0.29 | 21.50 | | | 1979 | RA001 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ MEAN | STAN DEV | | |
| T851 Cont'd | Plate Cont'd | 2.50 | R.T. Cont'd | S-L Cont'd | 62.1 | 2.000 | 1.000 | CT | 0.960 | 0.34 | 22.90 | Cont'd | Cont'd | 1972 | 84368 |
| | | 2.50 | | | 62.1 | 1.998 | 1.000 | CT | 1.019 | 0.38 | 24.50 | | | 1978 | MPC01 |
| | | 3.00 | | | 62.1 | 2.003 | 0.998 | CT | 0.995 | 0.29 | 21.50 | | | 1980 | RA001 |
| | | 1.50 | | | 62.2 | 0.996 | 0.501 | CT | 0.508 | 0.34 | 23.10 | | | 1978 | MPC01 |
| | | 2.00 | | | 62.2 | 1.489 | 0.746 | CT | 0.774 | 0.25 | 20.20 | | | 1978 | MPC01 |
| | | 2.75 | | | 62.2 | 1.988 | 1.001 | CT | 1.014 | 0.28 | 21.50 | | | 1978 | MPC01 |
| | | 2.75 | | | 62.2 | 2.004 | 0.996 | CT | 1.004 | 0.31 | 22.20 | | | 1980 | RA001 |
| | | 1.75 | | | 62.2 | 1.000 | 0.500 | CT | 0.503 | 0.21 | 18.10 | | | 1978 | RA002 |
| | | 1.50 | | | 62.2 | 0.998 | 0.501 | CT | 0.509 | 0.34 | 23.10 | | | 1978 | MPC01 |
| | | 2.50 | | | 62.2 | 1.502 | 0.750 | CT | 0.768 | 0.30 | 21.60 | | | 1980 | RA001 |
| | | 4.75 | | | 62.4 | 1.994 | 1.001 | CT | 1.017 | 0.30 | 22.40 | | | 1978 | MPC01 |
| | | 2.75 | | | 62.4 | 1.499 | 0.746 | CT | 0.755 | 0.33 | 22.79 | | | 1980 | RA001 |
| | | 2.50 | | | 62.5 | 2.000 | 1.001 | CT | 1.020 | 0.24 | 19.60 | | | 1978 | MPC01 |
| | | 5.50 | | | 62.6 | 2.000 | 1.000 | CT | 1.000 | 0.28 | 21.60 | | | 1978 | MPC01 |
| | | 1.75 | | | 62.6 | 0.979 | 0.500 | CT | 0.475 | 0.31 | 22.29 | | | 1978 | RA002 |
| | | 2.50 | | | 62.6 | 2.000 | 1.001 | CT | 0.979 | 0.28 | 21.10 | | | 1978 | RA002 |
| | | 5.50 | | | 62.6 | 2.000 | 1.000 | CT | 1.000 | 0.30 | 22.10 | | | 1978 | MPC01 |
| | | 2.50 | | | 62.6 | 2.020 | 0.998 | CT | 0.990 | 0.30 | 22.10 | | | 1978 | MPC01 |
| | | 2.00 | | | 62.6 | 1.512 | 0.751 | CT | 0.771 | 0.22 | 19.20 | | | 1978 | MPC01 |
| | | 2.04 | | | 62.7 | 1.500 | 0.750 | CT | 0.730 | 0.21 | 18.10 | | | 1972 | 84368 |
| | | 2.04 | | | 62.7 | 1.500 | 0.750 | CT | 0.730 | 0.20 | 17.60 | | | 1972 | 84368 |
| | | 2.50 | | | 62.7 | 1.500 | 0.751 | CT | 0.776 | 0.22 | 18.70 | | | 1980 | RA001 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 2.50 | R.T. Cont'd | S-L Cont'd | 62.7 | 1.500 | 0.747 | CT | 0.738 | 0.28 | 21.00 | Cont'd | Cont'd | 1980 | RA001 |
| | | 2.03 | | | 62.8 | 1.471 | 0.750 | CT | 0.764 | 0.32 | 23.00 | | | 1978 | MPC01 |
| | | 1.50 | | | 62.8 | 1.008 | 0.498 | CT | 0.534 | 0.28 | 21.40 | | | 1978 | MPC01 |
| | | 2.25 | | | 62.8 | 1.510 | 0.749 | CT | 0.785 | 0.21 | 18.50 | | | 1978 | MPC01 |
| | | 2.00 | | | 62.8 | 1.493 | 0.748 | CT | 0.791 | 0.25 | 20.60 | | | 1978 | MPC01 |
| | | 2.00 | | | 62.9 | 1.489 | 0.749 | CT | 0.774 | 0.28 | 21.50 | | | 1978 | MPC01 |
| | | 3.00 | | | 62.9 | 2.015 | 1.001 | CT | 1.048 | 0.30 | 22.60 | | | 1978 | MPC01 |
| | | 2.03 | | | 62.9 | 1.496 | 0.750 | CT | 0.763 | 0.36 | 24.10 | | | 1978 | MPC01 |
| | | 2.50 | | | 62.9 | 2.000 | 1.000 | CT | 0.930 | 0.28 | 21.20 | | | 1972 | 84368 |
| | | 2.50 | | | 62.9 | 2.000 | 1.000 | CT | 0.930 | 0.28 | 21.10 | | | 1972 | 84368 |
| | | 1.81 | | | 63.0 | 1.006 | 0.496 | CT | 0.533 | 0.18 | 17.10 | | | 1978 | MPC01 |
| | | 1.50 | | | 63.0 | 1.002 | 0.500 | CT | 0.521 | 0.32 | 22.80 | | | 1978 | MPC01 |
| | | 2.00 | | | 63.0 | 1.002 | 0.495 | CT | 0.531 | 0.22 | 19.20 | | | 1978 | MPC01 |
| | | 1.50 | | | 63.0 | 1.000 | 0.500 | CT | 0.510 | 0.27 | 21.00 | | | 1978 | MPC01 |
| | | 1.57 | | | 63.0 | 1.000 | 0.500 | CT | 0.490 | 0.29 | 21.60 | | | 1972 | 84368 |
| | | 2.40 | | | 63.2 | 1.500 | 0.747 | CT | 0.749 | 0.27 | 20.79 | | | 1980 | RA001 |
| | | 3.00 | | | 63.3 | 1.994 | 1.001 | CT | 1.017 | 0.30 | 22.40 | | | 1978 | MPC01 |
| | | 1.81 | | | 63.4 | 0.998 | 0.499 | CT | 0.509 | 0.16 | 17.00 | | | 1978 | MPC01 |
| | | 2.75 | | | 63.4 | 2.000 | 0.998 | CT | 0.983 | 0.32 | 22.79 | | | 1980 | RA001 |
| | | 2.50 | | | 63.5 | 2.000 | 1.000 | CT | 0.960 | 0.29 | 21.80 | | | 1972 | 84368 |
| | | 2.50 | | | 63.5 | 2.000 | 1.000 | CT | 0.970 | 0.31 | 22.20 | | | 1972 | 84368 |
| | | 1.55 | | | 63.5 | 0.999 | 0.501 | CT | 0.469 | 0.22 | 19.00 | | | 1980 | RA001 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ (Ksi√in.)) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 1.55 | R.T. Cont'd | S-L Cont'd | 63.6 | 1.000 | 0.498 | CT | 0.540 | 0.28 | 22.10 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 1.75 | | | 63.6 | 1.010 | 0.499 | CT | 0.525 | 0.18 | 17.50 | | | 1978 | MPC01 |
| | | 2.50 | | | 63.7 | 2.000 | 0.998 | CT | 0.960 | 0.27 | 21.20 | | | 1978 | MPC01 |
| | | 2.35 | | | 63.9 | 0.998 | 0.498 | CT | 0.539 | 0.18 | 17.40 | | | 1978 | MPC01 |
| | | 1.50 | | | 63.9 | 0.999 | 0.501 | CT | 0.487 | 0.27 | 21.00 | | | 1980 | RA001 |
| | | 2.00 | | | 64.1 | 1.502 | 0.751 | CT | 0.766 | 0.28 | 22.00 | | | 1978 | MPC01 |
| | | 3.12 | | | 64.2 | 2.006 | 0.999 | CT | 1.003 | 0.24 | 20.50 | | | 1978 | MPC01 |
| | | 2.75 | | | 64.3 | 1.499 | 0.752 | CT | 0.767 | 0.29 | 21.90 | | | 1978 | RA002 |
| | | 1.55 | | | 64.3 | 1.000 | 0.497 | CT | 0.540 | 0.28 | 21.90 | | | 1978 | MPC01 |
| | | 1.57 | | | 64.4 | 1.000 | 0.500 | CT | 0.490 | 0.27 | 21.30 | | | 1972 | 84368 |
| | | 1.57 | | | 64.4 | 1.000 | 0.500 | CT | 0.500 | 0.25 | 20.50 | | | 1972 | 84368 |
| | | 2.50 | | | 64.4 | 2.000 | 0.998 | CT | 0.964 | 0.26 | 20.90 | | | 1978 | RA002 |
| | | 2.50 | | | 64.4 | 1.499 | 0.745 | CT | 0.754 | 0.17 | 17.20 | | | 1980 | RA001 |
| | | 2.00 | | | 64.5 | 1.518 | 0.751 | CT | 0.774 | 0.25 | 20.70 | | | 1978 | MPC01 |
| | | 1.75 | | | 64.5 | 1.012 | 0.501 | CT | 0.526 | 0.19 | 18.30 | | | 1978 | MPC01 |
| | | 2.00 | | | 64.6 | 1.499 | 0.751 | CT | 0.793 | 0.19 | 18.00 | | | 1978 | RA002 |
| | | 1.75 | | | 64.8 | 0.979 | 0.502 | CT | 0.509 | 0.24 | 20.10 | | | 1978 | RA002 |
| | | 2.50 | | | 64.8 | 2.002 | 0.998 | CT | 1.021 | 0.18 | 18.00 | | | 1978 | MPC01 |
| | | 2.00 | | | 64.8 | 1.504 | 0.751 | CT | 0.782 | 0.22 | 20.00 | | | 1978 | MPC01 |
| | | 2.00 | | | 64.8 | 1.498 | 0.746 | CT | 0.746 | 0.18 | 17.79 | | | 1980 | RA001 |
| | | 2.25 | | | 64.9 | 1.489 | 0.749 | CT | 0.774 | 0.19 | 18.30 | | | 1978 | MPC01 |
| | | 2.00 | | | 64.9 | 1.491 | 0.750 | CT | 0.805 | 0.22 | 20.10 | | | 1978 | MPC01 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 2.00 | R.T. Cont'd | S-L Cont'd | 64.9 | 1.500 | 0.750 | CT | 0.740 | 0.22 | 19.20 | Cont'd | Cont'd | 1972 | 84368 |
| | | 2.00 | | | 64.9 | 1.500 | 0.750 | CT | 0.740 | 0.22 | 19.10 | | | 1972 | 84368 |
| | | 1.73 | | | 65.0 | 0.986 | 0.502 | CT | 0.467 | 0.26 | 21.10 | | | 1978 | RA002 |
| | | 1.75 | | | 65.2 | 0.998 | 0.500 | CT | 0.495 | 0.18 | 17.50 | | | 1980 | RA001 |
| | | 1.75 | | | 65.2 | 1.000 | 0.500 | CT | 0.500 | 0.17 | 17.29 | | | 1978 | RA001 |
| | | 1.75 | | | 65.3 | 1.010 | 0.505 | CT | 0.505 | 0.18 | 18.10 | | | 1978 | MPC01 |
| | | 1.75 | | | 65.3 | 1.000 | 0.500 | CT | 0.460 | 0.19 | 18.20 | | | 1972 | 84368 |
| | | 1.75 | | | 65.3 | 1.000 | 0.500 | CT | 0.490 | 0.22 | 19.50 | | | 1972 | 84368 |
| | | 1.57 | | | 65.4 | 1.000 | 0.500 | CT | 0.470 | 0.21 | 18.80 | | | 1972 | 84368 |
| | | 2.25 | | | 65.5 | 1.489 | 0.749 | CT | 0.774 | 0.22 | 19.90 | | | 1978 | MPC01 |
| | | 2.50 | | | 65.6 | 2.016 | 0.999 | CT | 1.028 | 0.21 | 19.60 | | | 1978 | MPC01 |
| | | 2.25 | | | 65.6 | 1.504 | 0.749 | CT | 0.782 | 0.25 | 21.30 | | | 1978 | MPC01 |
| | | 2.50 | | | 65.7 | 1.991 | 1.001 | CT | 1.055 | 0.24 | 21.00 | | | 1978 | MPC01 |
| | | 1.55 | | | 65.8 | 0.996 | 0.500 | CT | 0.528 | 0.18 | 18.00 | | | 1978 | MPC01 |
| | | 2.50 | | | 66.1 | 1.500 | 0.749 | CT | 0.760 | 0.16 | 16.79 | | | 1979 | RA001 |
| | | 2.52 | | | 66.3 | 2.000 | 1.000 | CT | 0.970 | 0.24 | 20.60 | | | 1972 | 84368 |
| | | 2.52 | | | 66.3 | 2.000 | 1.000 | CT | 0.950 | 0.20 | 18.80 | | | 1972 | 84368 |
| | | 1.62 | | | 66.6 | 1.001 | 0.498 | CT | 0.475 | 0.16 | 16.90 | | | 1980 | RA001 |
| | | 1.73 | | | 67.2 | 1.001 | 0.498 | CT | 0.519 | 0.21 | 19.90 | | | 1978 | RA002 |
| | | 1.75 | | | 67.4 | 1.000 | 0.520 | CT | 0.520 | 0.15 | 17.50 | | | 1978 | MPC01 |
| | | 1.55 | | | 68.1 | 1.001 | 0.499 | CT | 0.517 | 0.19 | 18.79 | | | 1979 | RA001 |

# TABLE 7.9.2.1 (CONTINUED)



| ALUMINUM 2124 $K_{Ic}$ | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ Ksi√in.) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
| T851 | Plate | 3.50 | 81 | L-T | 64.4 | 3.000 | 1.500 | CT | 1.547 | 0.45 | 27.40 | 28.5 | 1.6 | 1973 | 86213 |
| | | 3.50 | | | 64.4 | 3.000 | 1.499 | CT | 1.533 | 0.53 | 29.60 | | | 1973 | 86213 |
| T851 | Plate | 3.50 | 81 | T-L | 63.7 | 3.000 | 1.498 | CT | 1.601 | 0.39 | 25.00 | 24.7 | 0.4 | 1973 | 86213 |
| | | 3.50 | | | 63.7 | 3.000 | 1.498 | CT | 1.618 | 0.37 | 24.40 | | | 1973 | 86213 |
| T851 | Plate | 3.50 | 82 | S-L | 59.8 | 2.000 | 0.998 | CT | 0.986 | 0.35 | 22.40 | 22.1 | 0.4 | 1973 | 86213 |
| | | 3.50 | | | 59.8 | 2.000 | 0.998 | CT | 0.941 | 0.33 | 21.80 | | | 1973 | 86213 |
| T851 | Plate | 3.00 | 84 | S-L | 61.3 | 2.000 | 0.999 | CT | 0.931 | 0.38 | 23.90 | 24.5 | 0.8 | 1973 | 86213 |
| | | 3.00 | | | 61.6 | 2.000 | 0.999 | CT | 0.954 | 0.41 | 25.00 | | | 1973 | 86213 |
| T851 | Plate | 2.50 | 250 | L-T | 56.9 | 2.000 | 1.000 | CT | --- | 0.78 | 31.90 | 33.0 | 1.0 | 1974 | 88742 |
| | | 2.50 | | | 56.9 | 2.000 | 1.000 | CT | --- | 0.88 | 33.90 | | | 1974 | 88742 |
| | | 2.50 | | | 56.9 | 2.000 | 1.000 | CT | --- | 0.85 | 33.30 | | | 1974 | 88742 |
| T851 | Plate | 2.50 | 250 | T-L | 57.3 | 2.000 | 1.000 | CT | --- | 0.59 | 27.70 | 27.2 | 0.4 | 1974 | 88742 |
| | | 2.50 | | | 57.3 | 2.000 | 1.000 | CT | --- | 0.56 | 26.90 | | | 1974 | 88742 |
| | | 2.50 | | | 57.3 | 2.000 | 1.000 | CT | --- | 0.56 | 27.10 | | | 1974 | 88742 |
| T851 | Plate | 2.50 | 250 | S-T | 55.9 | 2.000 | 1.000 | CT | --- | 0.46 | 24.60 | 25.4 | 1.1 | 1974 | 88742 |
| | | 2.50 | | | 55.9 | 2.000 | 1.000 | CT | --- | 0.53 | 26.20 | | | 1974 | 88742 |
| T851 (417) | Plate | 4.50 | -320 | L-T | 76.4 | 3.000 | 1.500 | CT | 1.478 | 0.44 | 31.90 | 32.7 | 1.1 | 1973 | 86213 |
| | | 1.75 | | | 80.9 | 3.000 | 1.500 | CT | 1.641 | 0.43 | 33.50 | | | 1973 | 86213 |
| T851 (417) | Plate | 1.75 | -320 | T-L | 78.1 | 3.000 | 1.500 | CT | 1.648 | 0.35 | 29.10 | --- | --- | 1973 | 86213 |
| T851 (417) | Plate | 4.50 | -320 | S-L | 72.3 | 3.000 | 1.501 | CT | 1.514 | 0.23 | 22.10 | --- | --- | 1973 | 86213 |
| T851 (417) | Plate | 4.50 | -112 | L-T | 67.6 | 3.000 | 1.501 | CT | 1.474 | 0.43 | 27.90 | 28.8 | 1.2 | 1973 | 86213 |
| | | 1.75 | | | 73.2 | 3.000 | 1.499 | CT | 1.642 | 0.41 | 29.60 | | | 1973 | 86213 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 (417) | Plate | 4.50 | -112 | T-L | 66.0 | 3.000 | 1.498 | CT | 1.567 | 0.33 | 24.10 | 24.4 | 0.4 | 1973 | 86213 |
| | | 1.75 | | | 70.7 | 3.000 | 1.500 | CT | 1.623 | 0.30 | 24.60 | | | 1973 | 86213 |
| T851 (417) | Plate | 4.50 | -112 | S-L | 64.8 | 3.000 | 1.500 | CT | 1.461 | 0.27 | 21.30 | --- | --- | 1973 | 86213 |
| T851 (417) | Plate | 4.00 | R.T. | L-T | 60.6 | 2.000 | 1.000 | NB | 0.925 | 0.80 | 34.30 | 28.9 | 2.8 | 1973 | 86213 |
| | | 5.50 | | | 61.1 | 3.000 | 1.501 | CT | 1.495 | 0.56 | 28.80 | | | 1973 | 86213 |
| | | 5.50 | | | 61.1 | 3.000 | 1.501 | CT | 1.496 | 0.53 | 28.10 | | | 1973 | 86213 |
| | | 4.00 | | | 62.5 | 2.000 | 1.000 | NB | 0.932 | 0.65 | 31.90 | | | 1973 | 86213 |
| | | 4.00 | | | 62.5 | 2.000 | 1.000 | NB | 0.941 | 0.68 | 32.70 | | | 1973 | 86213 |
| | | 4.50 | | | 63.1 | 3.000 | 1.501 | CT | 1.479 | 0.44 | 26.60 | | | 1973 | 86213 |
| | | 4.50 | | | 63.4 | 3.000 | 1.502 | CT | 1.518 | 0.44 | 26.70 | | | 1973 | 86213 |
| | | 4.50 | | | 63.4 | 3.000 | 1.500 | CT | 1.536 | 0.46 | 27.70 | | | 1973 | 86213 |
| | | 3.50 | | | 63.9 | 3.000 | 1.501 | CT | 1.510 | 0.61 | 31.60 | | | 1973 | 86213 |
| | | 3.50 | | | 63.9 | 3.000 | 1.501 | CT | 1.523 | 0.61 | 31.50 | | | 1973 | 86213 |
| | | 1.57 | | | 64.2 | 3.000 | 1.501 | CT | 1.581 | 0.48 | 28.00 | | | 1973 | 86213 |
| | | 1.57 | | | 64.2 | 3.000 | 1.501 | CT | 1.589 | 0.46 | 27.40 | | | 1973 | 86213 |
| | | 1.57 | | | 65.2 | 3.000 | 1.501 | CT | 1.477 | 0.69 | 34.20 | | | 1973 | 86213 |
| | | 1.57 | | | 65.2 | 3.000 | 1.500 | CT | 1.526 | 0.73 | 35.20 | | | 1973 | 86213 |
| | | 3.00 | | | 65.4 | 1.000 | 0.499 | CT | 0.519 | 0.36 | 24.80 | | | 1973 | 86213 |
| | | 3.00 | | | 65.4 | 3.000 | 1.412 | CT | 1.546 | 0.48 | 28.70 | | | 1973 | 86213 |
| | | 3.00 | | | 65.4 | 3.000 | 0.999 | CT | 1.536 | 0.45 | 27.80 | | | 1973 | 86213 |
| | | 3.00 | | | 65.4 | 2.000 | 0.999 | CT | 1.014 | 0.42 | 26.80 | | | 1973 | 86213 |
| | | 3.00 | | | 66.2 | 1.000 | 0.498 | CT | 0.515 | 0.36 | 25.00 | | | 1973 | 86213 |
| | | 3.00 | | | 66.2 | 3.000 | 1.412 | CT | 1.532 | 0.48 | 28.90 | | | 1973 | 86213 |

# TABLE 7.9.2.1 (CONTINUED)



| ALUMINUM 2124 $K_{Ic}$ | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ MEAN | STAN DEV | | |
| T851 (417) Cont'd | Plate Cont'd | 3.00 | R.T. Cont'd | L-T Cont'd | 66.2 | 3.000 | 0.998 | CT | 1.530 | 0.48 | 28.90 | Cont'd | Cont'd | 1973 | 86213 |
| | | 3.00 | | | 66.2 | 2.000 | 0.998 | CT | 1.015 | 0.40 | 26.50 | | | 1973 | 86213 |
| | | 1.75 | | | 67.0 | 3.000 | 1.502 | CT | 1.583 | 0.45 | 28.30 | | | 1973 | 86213 |
| | | 1.75 | | | 67.0 | 3.000 | 1.501 | CT | 1.572 | 0.46 | 28.60 | | | 1973 | 86213 |
| | | 1.57 | | | 67.2 | 3.000 | 1.502 | CT | 1.555 | 0.39 | 26.50 | | | 1973 | 86213 |
| | | 1.57 | | | 67.2 | 3.000 | 1.502 | CT | 1.560 | 0.37 | 26.00 | | | 1973 | 86213 |
| | | 1.75 | | | 67.6 | 3.000 | 1.499 | CT | 1.631 | 0.46 | 29.10 | | | 1973 | 86213 |
| T851 (417) | Plate | 5.50 | R.T. | T-L | 59.3 | 3.000 | 1.501 | CT | 1.514 | 0.34 | 21.80 | 23.8 | 2.4 | 1973 | 86213 |
| | | 5.50 | | | 59.3 | 3.000 | 1.501 | CT | 1.540 | 0.35 | 22.30 | | | 1973 | 86213 |
| | | 4.00 | | | 59.4 | 2.000 | 1.001 | NB | 0.938 | 0.49 | 26.40 | | | 1973 | 86213 |
| | | 4.50 | | | 61.4 | 3.000 | 1.501 | CT | 1.523 | 0.34 | 22.50 | | | 1973 | 86213 |
| | | 4.50 | | | 61.4 | 3.000 | 1.501 | CT | 1.566 | 0.36 | 23.30 | | | 1973 | 86213 |
| | | 4.50 | | | 61.5 | 3.000 | 1.500 | CT | 1.482 | 0.29 | 21.10 | | | 1973 | 86213 |
| | | 4.00 | | | 62.6 | 2.000 | 0.998 | NB | 0.918 | 0.40 | 24.90 | | | 1973 | 86213 |
| | | 3.50 | | | 62.7 | 3.000 | 1.501 | CT | 1.546 | 0.46 | 26.80 | | | 1973 | 86213 |
| | | 3.50 | | | 62.7 | 3.000 | 1.501 | CT | 1.550 | 0.44 | 26.40 | | | 1973 | 86213 |
| | | 3.00 | | | 64.4 | 1.000 | 0.499 | CT | 0.525 | 0.27 | 21.10 | | | 1973 | 86213 |
| | | 3.00 | | | 64.4 | 2.000 | 0.999 | CT | 0.996 | 0.26 | 20.70 | | | 1973 | 86213 |
| | | 3.00 | | | 64.4 | 3.000 | 1.412 | CT | 1.553 | 0.31 | 22.70 | | | 1973 | 86213 |
| | | 3.00 | | | 64.4 | 3.000 | 0.998 | CT | 1.520 | 0.31 | 22.70 | | | 1973 | 86213 |
| | | 3.00 | | | 64.4 | 3.000 | 0.498 | CT | 1.526 | 0.31 | 22.70 | | | 1973 | 86213 |
| | | 3.00 | | | 64.8 | 3.000 | 1.412 | CT | 1.551 | 0.29 | 22.20 | | | 1973 | 86213 |

# TABLE 7.9.2.1 (CONTINUED)

## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ Ksi√in.) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 (417) Cont'd | Plate Cont'd | 3.00 | R.T. Cont'd | T-L Cont'd | 64.8 | 3.000 | 0.998 | CT | 1.541 | 0.31 | 22.70 | Cont'd | Cont'd | 1973 | 86213 |
| | | 3.00 | | | 64.8 | 1.000 | 0.498 | CT | 0.516 | 0.28 | 21.80 | | | 1973 | 86213 |
| | | 3.00 | | | 64.8 | 2.000 | 0.998 | CT | 1.034 | 0.28 | 21.50 | | | 1973 | 86213 |
| | | 3.00 | | | 64.8 | 3.000 | 0.497 | CT | 1.512 | 0.30 | 22.50 | | | 1973 | 86213 |
| | | 1.57 | | | 65.2 | 3.000 | 1.501 | CT | 1.541 | 0.54 | 30.30 | | | 1973 | 86213 |
| | | 1.57 | | | 65.2 | 3.000 | 1.501 | CT | 1.522 | 0.51 | 29.40 | | | 1973 | 86213 |
| | | 1.75 | | | 65.7 | 3.000 | 1.502 | CT | 1.565 | 0.33 | 24.00 | | | 1973 | 86213 |
| | | 1.75 | | | 65.7 | 3.000 | 1.500 | CT | 1.577 | 0.33 | 23.90 | | | 1973 | 86213 |
| | | 1.75 | | | 66.0 | 3.000 | 1.500 | CT | 1.643 | 0.34 | 24.50 | | | 1973 | 86213 |
| | | 1.57 | | | 67.2 | 3.000 | 1.502 | CT | 1.561 | 0.32 | 24.00 | | | 1973 | 86213 |
| | | 1.57 | | | 67.2 | 3.000 | 1.502 | CT | 1.565 | 0.32 | 24.00 | | | 1973 | 86213 |
| | | 1.57 | | | 67.2 | 3.000 | 1.501 | CT | 1.591 | 0.35 | 25.10 | | | 1973 | 86213 |
| | | 1.57 | | | 67.2 | 3.000 | 1.501 | CT | 1.591 | 0.35 | 25.30 | | | 1973 | 86213 |
| T851 (417) | Plate | 5.50 | R.T. | S-L | 57.5 | 3.000 | 1.499 | CT | 1.500 | 0.42 | 23.60 | 21.3 | 2.0 | 1973 | 86213 |
| | | 5.50 | | | 57.5 | 3.000 | 1.501 | CT | 1.466 | 0.43 | 23.90 | | | 1973 | 86213 |
| | | 4.00 | | | 59.3 | 2.000 | 0.997 | CT | 0.981 | 0.44 | 24.80 | | | 1973 | 86213 |
| | | 4.50 | | | 59.8 | 3.000 | 1.501 | CT | 1.534 | 0.36 | 22.70 | | | 1973 | 86213 |
| | | 4.50 | | | 59.8 | 3.000 | 1.501 | CT | 1.523 | 0.35 | 22.50 | | | 1973 | 86213 |
| | | 3.00 | | | 60.0 | 2.000 | 1.000 | CT | 1.015 | 0.29 | 20.40 | | | 1973 | 86213 |
| | | 4.50 | | | 60.9 | 3.000 | 1.501 | CT | 1.459 | 0.29 | 20.70 | | | 1973 | 86213 |
| | | 2.50 | | | 62.1 | 2.000 | 0.996 | CT | 0.963 | 0.34 | 22.90 | | | 1973 | 86213 |
| | | 2.50 | | | 62.1 | 2.000 | 0.998 | CT | 0.939 | 0.31 | 21.80 | | | 1973 | 86213 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 (417) Cont'd | Plate Cont'd | 2.50 | R.T. Cont'd | S-L Cont'd | 62.9 | 2.000 | 0.998 | CT | 0.926 | 0.28 | 21.10 | Cont'd | Cont'd | 1973 | 86213 |
| | | 2.50 | | | 62.9 | 2.000 | 0.998 | CT | 0.931 | 0.28 | 21.20 | | | 1973 | 86213 |
| | | 1.57 | | | 63.0 | 1.000 | 0.501 | CT | 0.500 | 0.28 | 21.00 | | | 1973 | 86213 |
| | | 1.57 | | | 63.0 | 1.000 | 0.500 | CT | 0.493 | 0.29 | 21.60 | | | 1973 | 86213 |
| | | 2.50 | | | 63.1 | 2.000 | 0.998 | CT | 0.929 | 0.26 | 20.30 | | | 1973 | 86213 |
| | | 1.57 | | | 64.4 | 1.000 | 0.500 | CT | 0.489 | 0.27 | 21.30 | | | 1973 | 86213 |
| | | 1.57 | | | 64.4 | 1.000 | 0.500 | CT | 0.499 | 0.25 | 20.50 | | | 1973 | 86213 |
| | | 1.75 | | | 65.3 | 0.990 | 0.501 | CT | 0.459 | 0.19 | 18.20 | | | 1973 | 86213 |
| | | 1.62 | | | 65.4 | 1.000 | 0.500 | CT | 0.488 | 0.16 | 16.70 | | | 1973 | 86213 |
| | | 1.57 | | | 65.4 | 0.990 | 0.500 | CT | 0.471 | 0.21 | 18.80 | | | 1973 | 86213 |
| T851 (417) | Plate | 3.50 | 81 | L-T | 65.4 | 3.000 | 1.500 | CT | 1.537 | 0.45 | 27.90 | 29.5 | 2.6 | 1973 | 86213 |
| | | 2.00 | | | 65.5 | 3.990 | 2.000 | CT | 2.087 | 0.62 | 32.50 | | | 1973 | 86213 |
| | | 2.00 | | | 67.9 | 3.990 | 1.995 | CT | 2.032 | 0.43 | 28.10 | | | 1973 | 86213 |
| T851 (417) | Plate | 3.50 | 81 | T-L | 64.2 | 3.000 | 1.498 | CT | 1.520 | 0.33 | 23.30 | 25.3 | 3.8 | 1973 | 86213 |
| | | 3.50 | | | 64.2 | 3.000 | 1.499 | CT | 1.545 | 0.32 | 22.80 | | | 1973 | 86213 |
| | | 2.00 | | | 65.3 | 4.000 | 2.000 | CT | 2.159 | 0.56 | 30.90 | | | 1973 | 86213 |
| | | 2.00 | | | 66.7 | 4.000 | 1.999 | CT | 2.142 | 0.33 | 24.30 | | | 1973 | 86213 |
| T851 (417) | Plate | 3.75 | 82 | L-T | 61.3 | 2.000 | 0.999 | CT | 1.015 | 0.51 | 27.80 | 28.0 | 3.5 | 1973 | 86213 |
| | | 3.38 | | | 61.6 | 2.000 | 1.000 | CT | 0.955 | 0.47 | 26.70 | | | 1973 | 86213 |
| | | 3.38 | | | 61.6 | 2.000 | 1.000 | CT | 0.950 | 0.51 | 27.80 | | | 1973 | 86213 |
| | | 3.15 | | | 63.0 | 2.000 | 0.998 | CT | 0.995 | 0.49 | 28.00 | | | 1973 | 86213 |
| | | 3.75 | | | 64.2 | 2.000 | 1.001 | CT | 1.000 | 0.45 | 27.10 | | | 1973 | 86213 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 (417) Cont'd | Plate Cont'd | 3.75 | 82 Cont'd | L-T Cont'd | 64.2 | 2.000 | 0.998 | CT | 0.997 | 0.44 | 27.00 | Cont'd | Cont'd | 1973 | 86213 |
| | | 3.75 | | | 64.6 | 2.000 | 1.000 | CT | 1.012 | 0.43 | 26.90 | | | 1973 | 86213 |
| | | 3.15 | | | 65.1 | 2.000 | 0.999 | CT | 0.980 | 0.43 | 27.00 | | | 1973 | 86213 |
| | | 3.38 | | | 65.3 | 2.000 | 1.000 | CT | 0.957 | 0.41 | 26.40 | | | 1973 | 86213 |
| | | 3.38 | | | 65.3 | 2.000 | 0.998 | CT | 0.965 | 0.41 | 26.30 | | | 1973 | 86213 |
| | | 2.50 | | | 65.4 | 1.990 | 1.002 | CT | 1.018 | 0.43 | 27.10 | | | 1973 | 86213 |
| | | 2.50 | | | 65.4 | 1.990 | 1.001 | CT | 1.006 | 0.44 | 27.30 | | | 1973 | 86213 |
| | | 2.50 | | | 65.6 | 4.000 | 1.997 | CT | 2.103 | 0.77 | 36.40 | | | 1973 | 86213 |
| | | 2.50 | | | 65.6 | 4.000 | 1.997 | CT | 2.097 | 0.78 | 36.70 | | | 1973 | 86213 |
| | | 3.15 | | | 65.7 | 2.000 | 0.999 | CT | 0.960 | 0.39 | 26.10 | | | 1973 | 86213 |
| | | 3.15 | | | 65.7 | 2.000 | 0.998 | CT | 0.959 | 0.41 | 26.70 | | | 1973 | 86213 |
| | | 2.50 | | | 65.8 | 4.000 | 1.998 | CT | 2.181 | 0.51 | 29.80 | | | 1973 | 86213 |
| | | 2.50 | | | 66.2 | 3.990 | 1.998 | CT | 2.146 | 0.65 | 33.70 | | | 1973 | 86213 |
| | | 2.50 | | | 66.2 | 3.990 | 2.000 | CT | 2.159 | 0.69 | 34.90 | | | 1973 | 86213 |
| | | 2.75 | | | 67.0 | 2.000 | 1.000 | CT | 0.958 | 0.36 | 25.50 | | | 1973 | 86213 |
| | | 2.75 | | | 67.4 | 2.000 | 0.998 | CT | 0.953 | 0.34 | 24.90 | | | 1973 | 86213 |
| | | 2.75 | | | 67.4 | 2.000 | 0.998 | CT | 0.945 | 0.34 | 24.80 | | | 1973 | 86213 |
| | | 2.75 | | | 68.6 | 2.000 | 0.999 | CT | 0.958 | 0.34 | 25.30 | | | 1973 | 86213 |
| | | 2.52 | | | 69.7 | 2.000 | 0.999 | CT | 0.963 | 0.35 | 26.00 | | | 1973 | 86213 |
| | | 2.52 | | | 69.7 | 2.000 | 0.998 | CT | 0.939 | 0.33 | 25.20 | | | 1973 | 86213 |
| | | 2.52 | | | 69.7 | 2.000 | 1.001 | CT | 0.960 | 0.33 | 25.50 | | | 1973 | 86213 |

# TABLE 7.9.2.1 (CONTINUED)



| ALUMINUM 2124 $K_{Ic}$ | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ MEAN | STAN DEV | | |
| T851 (417) | Plate | 3.75 | 82 | T-L | 59.2 | 2.000 | 0.999 | CT | 1.014 | 0.42 | 24.20 | 25.0 | 2.4 | 1973 | 86213 |
| | | 3.38 | | | 61.0 | 2.000 | 0.998 | CT | 0.958 | 0.54 | 28.40 | | | 1973 | 86213 |
| | | 3.38 | | | 61.0 | 2.000 | 0.999 | CT | 0.974 | 0.51 | 27.50 | | | 1973 | 86213 |
| | | 3.00 | | | 61.8 | 3.000 | 1.500 | CT | 1.560 | 0.29 | 21.10 | | | 1973 | 86213 |
| | | 3.75 | | | 63.0 | 2.000 | 1.000 | CT | 0.999 | 0.34 | 23.20 | | | 1973 | 86213 |
| | | 3.75 | | | 63.0 | 2.000 | 1.001 | CT | 1.005 | 0.34 | 23.30 | | | 1973 | 86213 |
| | | 3.15 | | | 63.4 | 2.000 | 1.000 | CT | 1.000 | 0.43 | 26.30 | | | 1973 | 86213 |
| | | 3.75 | | | 63.8 | 2.000 | 1.001 | CT | 1.011 | 0.34 | 23.50 | | | 1973 | 86213 |
| | | 2.50 | | | 64.2 | 1.990 | 1.001 | CT | 1.039 | 0.42 | 26.30 | | | 1973 | 86213 |
| | | 2.50 | | | 64.2 | 1.990 | 1.001 | CT | 1.055 | 0.41 | 26.10 | | | 1973 | 86213 |
| | | 3.15 | | | 64.2 | 2.000 | 1.000 | CT | 1.003 | 0.38 | 24.90 | | | 1973 | 86213 |
| | | 2.50 | | | 64.4 | 4.000 | 1.997 | CT | 2.099 | 0.35 | 24.00 | | | 1973 | 86213 |
| | | 2.50 | | | 64.4 | 4.000 | 1.997 | CT | 2.183 | 0.54 | 30.00 | | | 1973 | 86213 |
| | | 2.50 | | | 64.4 | 3.990 | 1.999 | CT | 2.172 | 0.54 | 29.90 | | | 1973 | 86213 |
| | | 3.38 | | | 64.7 | 2.000 | 0.998 | CT | 0.989 | 0.41 | 26.10 | | | 1973 | 86213 |
| | | 2.50 | | | 64.8 | 4.000 | 2.001 | CT | 2.134 | 0.46 | 27.70 | | | 1973 | 86213 |
| | | 2.50 | | | 64.8 | 4.000 | 1.998 | CT | 2.153 | 0.47 | 28.10 | | | 1973 | 86213 |
| | | 3.15 | | | 65.0 | 2.000 | 1.001 | CT | 0.982 | 0.37 | 25.00 | | | 1973 | 86213 |
| | | 3.15 | | | 65.0 | 2.000 | 0.998 | CT | 0.995 | 0.36 | 24.60 | | | 1973 | 86213 |
| | | 2.75 | | | 65.3 | 2.000 | 0.999 | CT | 0.968 | 0.35 | 24.30 | | | 1973 | 86213 |
| | | 1.62 | | | 65.4 | 3.000 | 1.500 | CT | 1.581 | 0.26 | 21.20 | | | 1973 | 86213 |
| | | 2.75 | | | 66.1 | 2.000 | 1.000 | CT | 0.957 | 0.34 | 24.40 | | | 1973 | 86213 |
| | | 2.75 | | | 66.1 | 2.000 | 1.001 | CT | 0.949 | 0.32 | 23.60 | | | 1973 | 86213 |
| | | 2.75 | | | 66.9 | 2.000 | 0.998 | CT | 0.940 | 0.27 | 22.10 | | | 1973 | 86213 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 (417) Cont'd | Plate Cont'd | 2.52 | 82 Cont'd | T-L Cont'd | 67.0 | 2.000 | 0.998 | CT | 0.979 | 0.31 | 23.70 | Cont'd | Cont'd | 1973 | 86213 |
| | | 2.52 | | | 67.6 | 2.000 | 0.998 | CT | 0.955 | 0.28 | 22.60 | | | 1973 | 86213 |
| | | 2.52 | | | 67.6 | 2.000 | 1.000 | CT | 0.976 | 0.29 | 23.10 | | | 1973 | 86213 |
| | | 2.52 | | | 68.6 | 2.000 | 0.995 | CT | 0.987 | 0.29 | 23.40 | | | 1973 | 86213 |
| T851 (417) | Plate | 3.75 | 82 | S-L | 58.1 | 2.000 | 1.000 | CT | 0.976 | 0.37 | 22.30 | 22.0 | 2.3 | 1973 | 86213 |
| | | 3.38 | | | 59.6 | 2.000 | 1.001 | CT | 0.947 | 0.40 | 23.90 | | | 1973 | 86213 |
| | | 3.50 | | | 59.9 | 2.000 | 0.998 | CT | 0.987 | 0.27 | 19.80 | | | 1973 | 86213 |
| | | 3.50 | | | 59.9 | 2.000 | 0.998 | CT | 0.992 | 0.32 | 21.40 | | | 1973 | 86213 |
| | | 3.50 | | | 61.4 | 1.990 | 1.001 | CT | 0.985 | 0.40 | 24.70 | | | 1973 | 86213 |
| | | 3.50 | | | 61.4 | 1.990 | 1.001 | CT | 0.988 | 0.43 | 25.40 | | | 1973 | 86213 |
| | | 3.38 | | | 61.4 | 2.000 | 0.998 | CT | 0.962 | 0.48 | 26.90 | | | 1973 | 86213 |
| | | 3.75 | | | 62.2 | 2.000 | 1.001 | CT | 0.983 | 0.36 | 23.60 | | | 1973 | 86213 |
| | | 3.15 | | | 62.3 | 2.000 | 1.000 | CT | 0.938 | 0.34 | 22.90 | | | 1973 | 86213 |
| | | 3.15 | | | 62.6 | 2.000 | 0.999 | CT | 0.955 | 0.33 | 22.90 | | | 1973 | 86213 |
| | | 2.75 | | | 63.3 | 2.000 | 1.000 | CT | 0.935 | 0.28 | 21.30 | | | 1973 | 86213 |
| | | 2.50 | | | 63.5 | 1.990 | 1.001 | CT | 0.965 | 0.29 | 21.80 | | | 1973 | 86213 |
| | | 2.50 | | | 63.5 | 1.990 | 1.001 | CT | 0.974 | 0.31 | 22.20 | | | 1973 | 86213 |
| | | 2.75 | | | 64.2 | 2.000 | 0.998 | CT | 0.929 | 0.25 | 20.50 | | | 1973 | 86213 |
| | | 2.52 | | | 65.1 | 2.000 | 1.000 | CT | 0.963 | 0.29 | 22.00 | | | 1973 | 86213 |
| | | 2.75 | | | 66.0 | 2.000 | 0.999 | CT | 0.948 | 0.18 | 17.80 | | | 1973 | 86213 |
| | | 2.52 | | | 66.1 | 2.000 | 0.998 | CT | 0.947 | 0.21 | 19.30 | | | 1973 | 86213 |
| | | 2.52 | | | 66.3 | 2.000 | 0.998 | CT | 0.945 | 0.20 | 18.80 | | | 1973 | 86213 |
| | | 2.52 | | | 66.3 | 2.000 | 0.998 | CT | 0.974 | 0.24 | 20.60 | | | 1973 | 86213 |

# TABLE 7.9.2.1 (CONTINUED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_c$/TYS)$^2$ (in.) | $K_{Ic}$ $K_c$ (Ksi√in.) | $K_{Ic}$ $K_c$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 (417) | Plate | 3.75 | 84 | S-L | 62.2 | 2.000 | 0.998 | CT | 0.998 | 0.34 | 23.10 | --- | --- | 1973 | 86213 |
| T851 (SP) | Plate | 6.00 | R.T. | L-T | 57.1 | 3.000 | 1.500 | CT | 1.522 | 0.65 | 29.10 | 27.2 | 4.7 | 1973 | 86213 |
| | | 6.00 | | | 57.1 | 3.000 | 1.500 | CT | 1.549 | 0.68 | 29.70 | | | 1973 | 86213 |
| | | 4.50 | | | 59.8 | 3.000 | 1.501 | CT | 1.532 | 0.77 | 33.10 | | | 1973 | 86213 |
| | | 4.50 | | | 59.8 | 3.000 | 1.500 | CT | 1.509 | 0.71 | 31.90 | | | 1973 | 86213 |
| | | 2.04 | | | 65.4 | 1.500 | 0.752 | CT | 0.752 | 0.26 | 21.10 | | | 1973 | 86213 |
| | | 2.04 | | | 65.4 | 1.500 | 0.752 | CT | 0.738 | 0.27 | 21.30 | | | 1973 | 86213 |
| | | 4.00 | | | 65.5 | 3.000 | 1.500 | CT | 1.578 | 0.31 | 23.00 | | | 1973 | 86213 |
| | | 4.00 | | | 65.5 | 2.990 | 1.501 | CT | 1.562 | 0.30 | 22.50 | | | 1973 | 86213 |
| | | 2.00 | | | 66.2 | 3.000 | 1.501 | CT | 1.555 | 0.52 | 30.30 | | | 1973 | 86213 |
| | | 2.00 | | | 66.2 | 3.000 | 1.502 | CT | 1.564 | 0.53 | 30.40 | | | 1973 | 86213 |
| T851 (SP) | Plate | 6.00 | R.T. | T-L | 55.0 | 3.000 | 1.500 | CT | 1.563 | 0.46 | 23.70 | 23.1 | 2.7 | 1973 | 86213 |
| | | 6.00 | | | 55.0 | 3.000 | 1.500 | CT | 1.576 | 0.48 | 24.10 | | | 1973 | 86213 |
| | | 4.50 | | | 58.5 | 3.000 | 1.500 | CT | 1.567 | 0.51 | 26.50 | | | 1973 | 86213 |
| | | 2.04 | | | 65.2 | 1.500 | 0.751 | CT | 0.729 | 0.22 | 19.40 | | | 1973 | 86213 |
| | | 2.04 | | | 65.2 | 1.500 | 0.752 | CT | 0.741 | 0.22 | 19.50 | | | 1973 | 86213 |
| | | 2.00 | | | 65.4 | 3.000 | 1.500 | CT | 1.541 | 0.34 | 24.10 | | | 1973 | 86213 |
| | | 2.00 | | | 65.4 | 3.000 | 1.502 | CT | 1.542 | 0.35 | 24.40 | | | 1973 | 86213 |

# TABLE 7.9.2.1 (CONCLUDED)



## ALUMINUM 2124 $K_{Ic}$

| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ MEAN | STAN DEV | | |
| T851 (SP) | Plate | 6.00 | R.T. | S-L | 54.8 | 3.000 | 1.500 | CT | 1.535 | 0.50 | 24.50 | 21.4 | 3.2 | 1973 | 86213 |
| | | 6.00 | | | 54.8 | 3.000 | 1.500 | CT | 1.526 | 0.50 | 24.50 | | | 1973 | 86213 |
| | | 4.50 | | | 57.3 | 3.000 | 1.500 | CT | 1.542 | 0.47 | 24.90 | | | 1973 | 86213 |
| | | 4.50 | | | 57.3 | 3.000 | 1.502 | CT | 1.543 | 0.51 | 25.80 | | | 1973 | 86213 |
| | | 4.00 | | | 60.2 | 3.000 | 1.501 | CT | 1.540 | 0.28 | 20.00 | | | 1973 | 86213 |
| | | 4.00 | | | 60.2 | 3.000 | 1.502 | CT | 1.560 | 0.27 | 19.90 | | | 1973 | 86213 |
| | | 2.04 | | | 62.7 | 1.500 | 0.751 | CT | 0.726 | 0.21 | 18.10 | | | 1973 | 86213 |
| | | 2.04 | | | 62.7 | 1.500 | 0.752 | CT | 0.729 | 0.20 | 17.60 | | | 1973 | 86213 |
| | | 2.00 | | | 64.9 | 1.490 | 0.750 | CT | 0.739 | 0.22 | 19.10 | | | 1973 | 86213 |
| | | 2.00 | | | 64.9 | 1.500 | 0.750 | CT | 0.739 | 0.22 | 19.20 | | | 1973 | 86213 |

# TABLE 7.9.2.2



## ALUMINUM 2124 $K_C$

| CONDITION HEAT TREAT | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | CRACK LENGTH | | GROSS STRESS | | $K_{app}$ | | | $K_C$ | | | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | INIT (in.) $2a_o$ | FINAL (in.) $2a_f$ | ONSET (Ksi) $\sigma_o$ | MAX (Ksi) $\sigma_{max}$ | $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ MEAN | STAN DEV | $K_C$ (Ksi$\sqrt{in}$) | $K_C$ MEAN | STAN DEV | | |
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T851 | Plate | 0.25 | R.T. | T-L | 59.7 | 3.000 | 0.248 | 1.230 | 1.600 | 15.50 | 22.60 | 35.13 | 33.3 | 4.3 | 43.80* | 38.2 | 2.8 | 1973 | 86213 |
| | | 0.25 | | | 55.4 | 3.000 | 0.249 | 1.143 | 1.786 | 15.50 | 22.10 | 32.56 | | | 48.04* | | | 1973 | 86213 |
| | | 0.25 | | | 55.4 | 3.000 | 0.249 | 1.127 | 1.710 | 15.20 | 20.40 | 29.76 | | | 42.28* | | | 1973 | 86213 |
| | | 0.25 | | | 55.5 | 3.000 | 0.249 | 1.122 | 1.786 | 16.20 | 20.20 | 29.39 | | | 43.91* | | | 1973 | 86213 |
| | | 0.25 | | | 55.5 | 3.000 | 0.249 | 1.120 | 1.763 | 15.00 | 20.90 | 30.37 | | | 44.75* | | | 1973 | 86213 |
| | | 0.25 | | | 59.8 | 3.000 | 0.249 | 1.220 | 1.780 | 18.80 | 26.80 | 41.41 | | | 58.04* | | | 1973 | 86213 |
| | | 0.25 | | | 62.9 | 3.000 | 0.249 | 1.240 | 1.700 | 13.40 | 18.60 | 29.09 | | | 38.31 | | | 1973 | 86213 |
| | | 0.25 | | | 55.4 | 3.000 | 0.250 | 1.127 | 1.755 | 14.30 | 21.70 | 31.66 | | | 46.23* | | | 1973 | 86213 |
| | | 0.25 | | | 57.4 | 3.000 | 0.250 | 1.320 | 1.790 | 15.00 | 20.30 | 33.30 | | | 44.24* | | | 1973 | 86213 |
| | | 0.25 | | | 57.4 | 3.000 | 0.250 | 1.210 | 1.720 | 14.70 | 20.90 | 32.10 | | | 43.59* | | | 1973 | 86213 |
| | | 0.25 | | | 59.7 | 3.000 | 0.250 | 1.190 | 1.700 | 16.40 | 25.00 | 37.93 | | | 51.50* | | | 1973 | 86213 |
| | | 0.25 | | | 59.7 | 3.000 | 0.250 | 1.220 | 1.690 | 16.30 | 22.20 | 34.30 | | | 45.45* | | | 1973 | 86213 |
| | | 0.25 | | | 59.8 | 3.000 | 0.250 | 1.230 | 1.700 | 16.00 | 23.40 | 36.37 | | | 48.20* | | | 1973 | 86213 |
| | | 0.25 | | | 59.9 | 3.000 | 0.250 | 1.220 | 1.700 | 14.00 | 20.90 | 32.29 | | | 43.05* | | | 1973 | 86213 |
| | | 0.25 | | | 59.9 | 3.000 | 0.250 | 1.240 | 1.640 | 13.40 | 18.50 | 28.93 | | | 36.73 | | | 1973 | 86213 |
| | | 0.25 | | | 59.9 | 3.000 | 0.250 | 1.250 | 1.640 | 13.30 | 17.10 | 26.90 | | | 33.95 | | | 1973 | 86213 |
| | | 0.25 | | | 61.1 | 3.000 | 0.250 | 1.240 | 1.770 | 17.70 | 26.80 | 41.91 | | | 57.67* | | | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.9.2.2 (CONCLUDED)



## ALUMINUM 2124 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($K_{app}$ (Ksi$\sqrt{in}$)) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($K_C$ (Ksi$\sqrt{in}$)) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T851 Cont'd | Plate Cont'd | 0.25 | R.T. Cont'd | T-L Cont'd | 61.1 | 3.000 | 0.250 | 1.240 | 1.800 | 17.30 | 29.10 | 45.51* | Cont'd | Cont'd | 63.82* | Cont'd | Cont'd | 1973 | 86213 |
| | | 0.25 | | | 61.1 | 3.000 | 0.250 | 1.240 | 1.710 | 18.80 | 26.60 | 41.60 | | | 55.13* | | | 1973 | 86213 |
| | | 0.25 | | | 62.9 | 3.000 | 0.250 | 1.240 | 1.600 | 13.30 | 19.90 | 31.12 | | | 38.57 | | | 1973 | 86213 |
| | | 0.25 | | | 62.9 | 3.000 | 0.250 | 1.200 | 1.650 | 14.00 | 21.20 | 32.36 | | | 42.35 | | | 1973 | 86213 |
| | | 0.25 | | | 55.5 | 3.000 | 0.251 | 1.128 | 1.778 | 14.90 | 21.90 | 31.99 | | | 47.36* | | | 1973 | 86213 |
| | | 0.25 | | | 57.4 | 3.000 | 0.251 | 1.220 | 1.740 | 15.30 | 18.50 | 28.58 | | | 39.07 | | | 1973 | 86213 |
| | | 0.25 | | | 59.8 | 3.000 | 0.252 | 1.220 | 1.880 | 16.80 | 23.60 | 36.46 | | | 54.52* | | | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

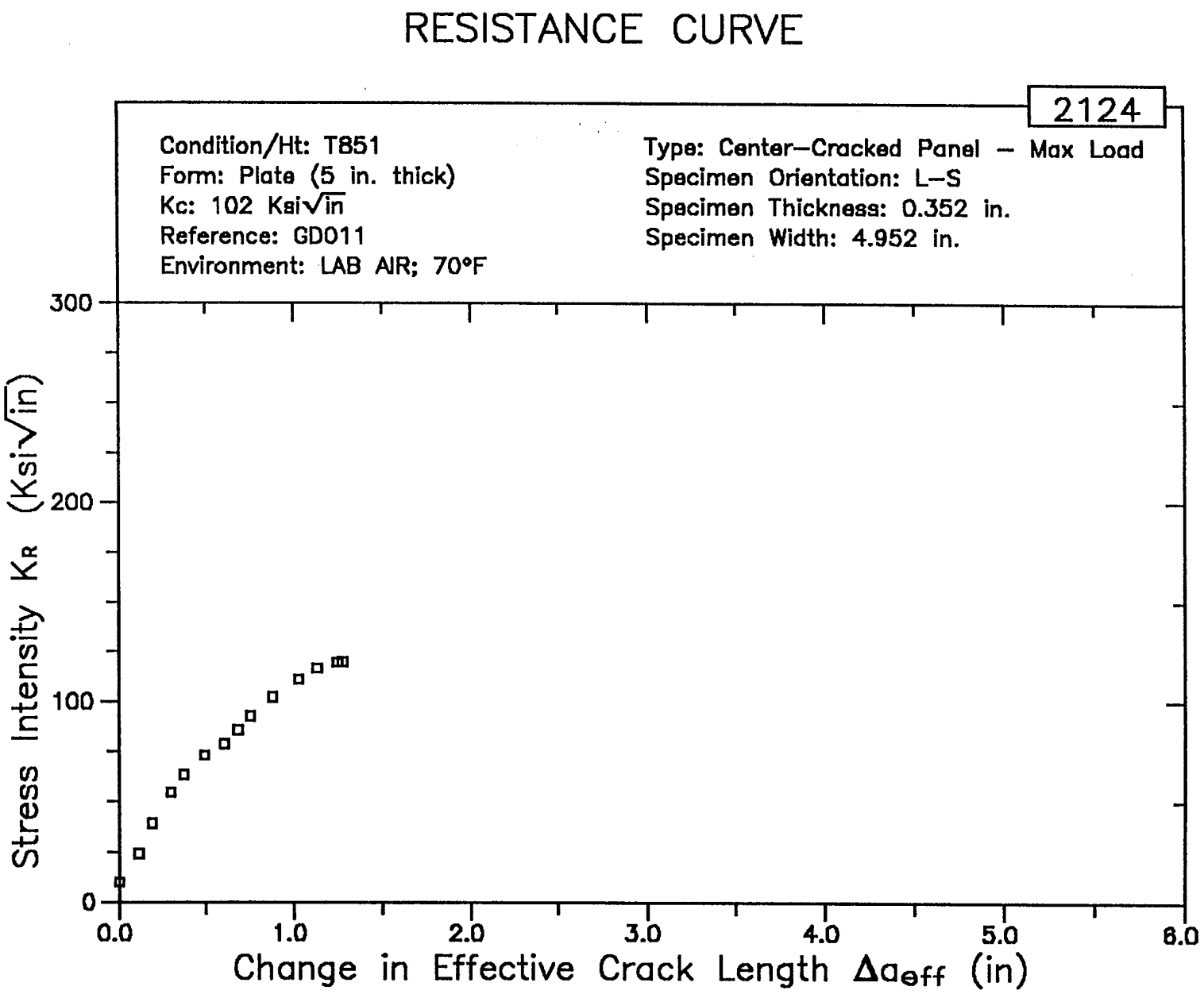



Figure 7.9.2.3.1

# RESISTANCE CURVE

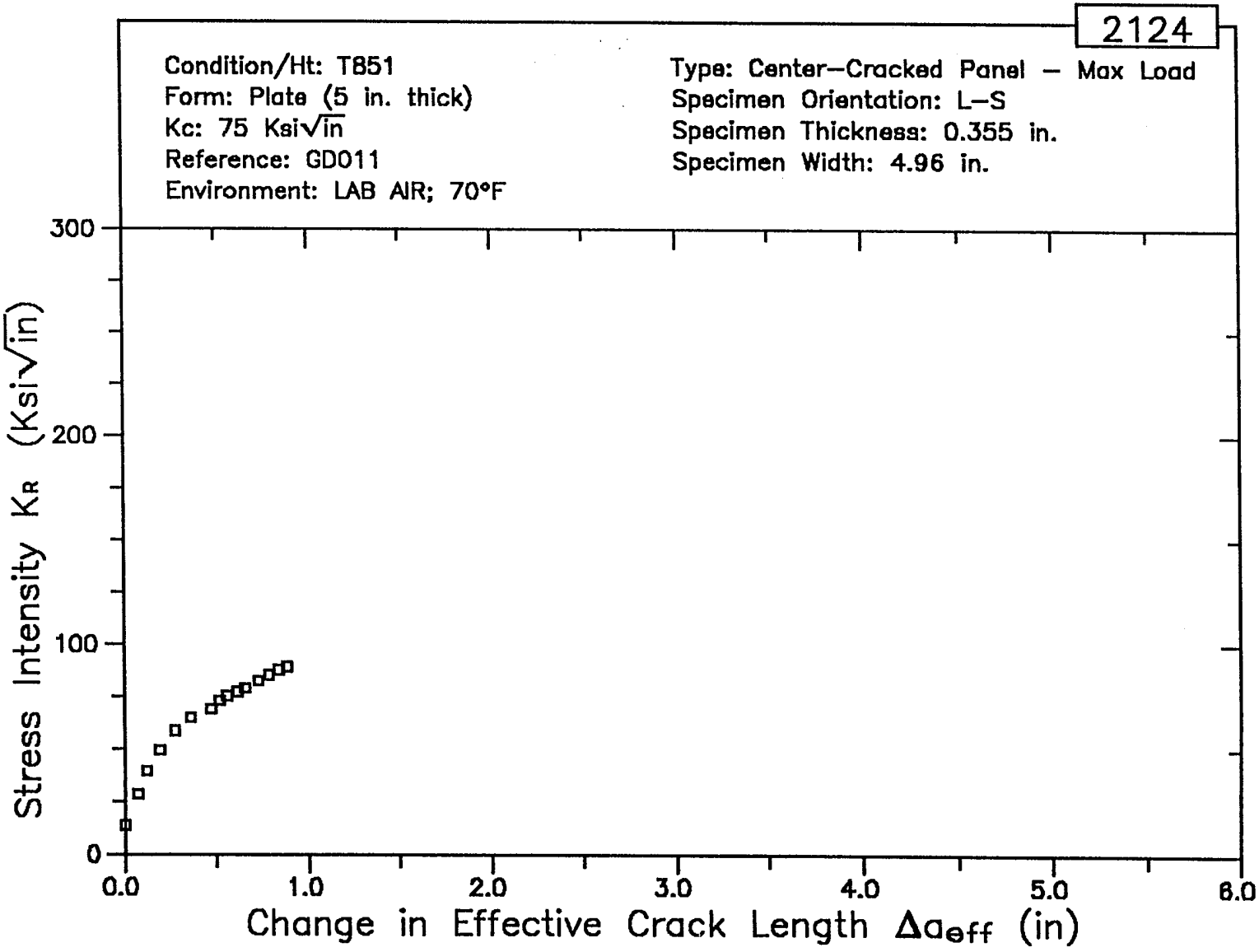



Figure 7.9.2.3.2

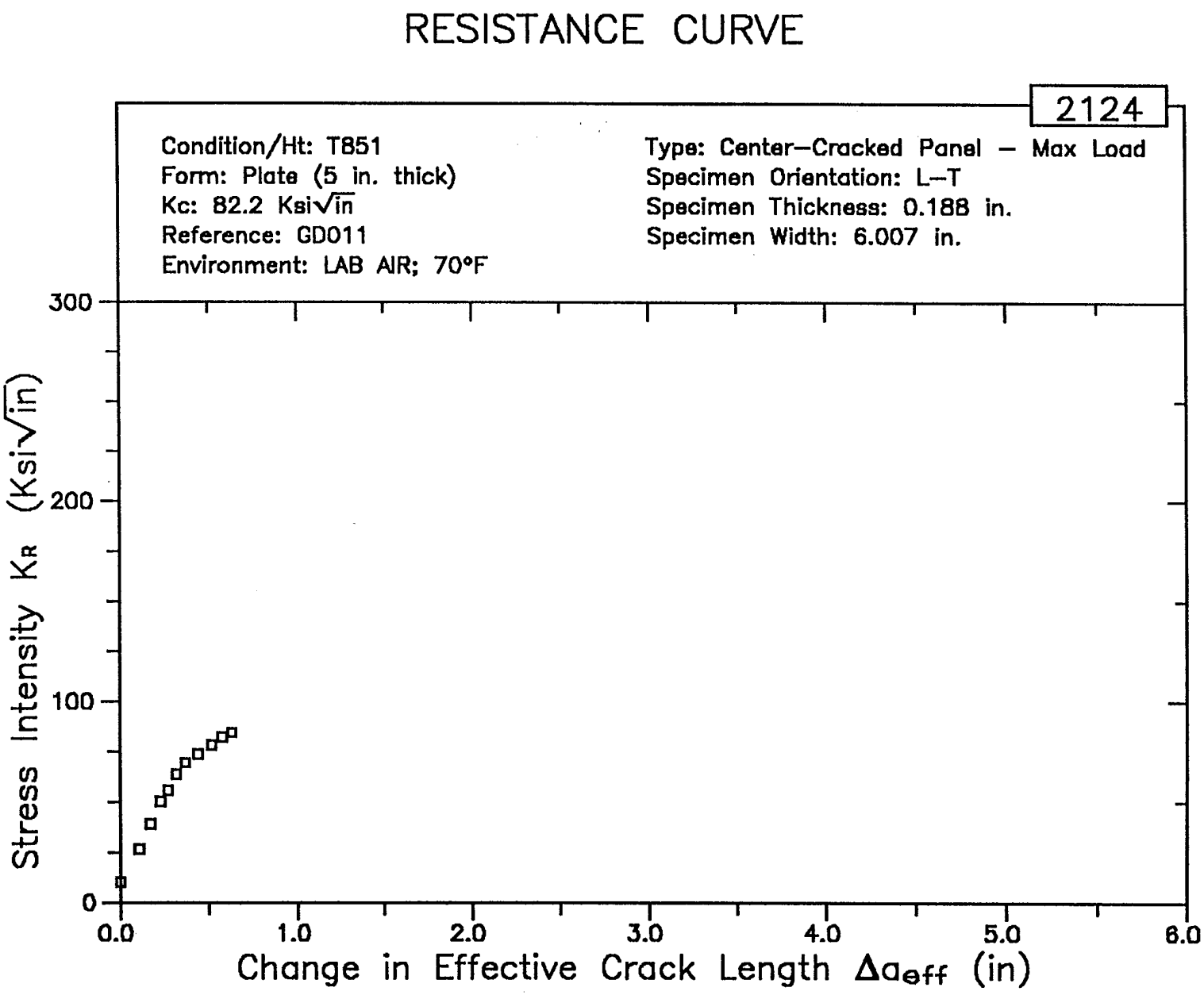



**Figure 7.9.2.3.3**

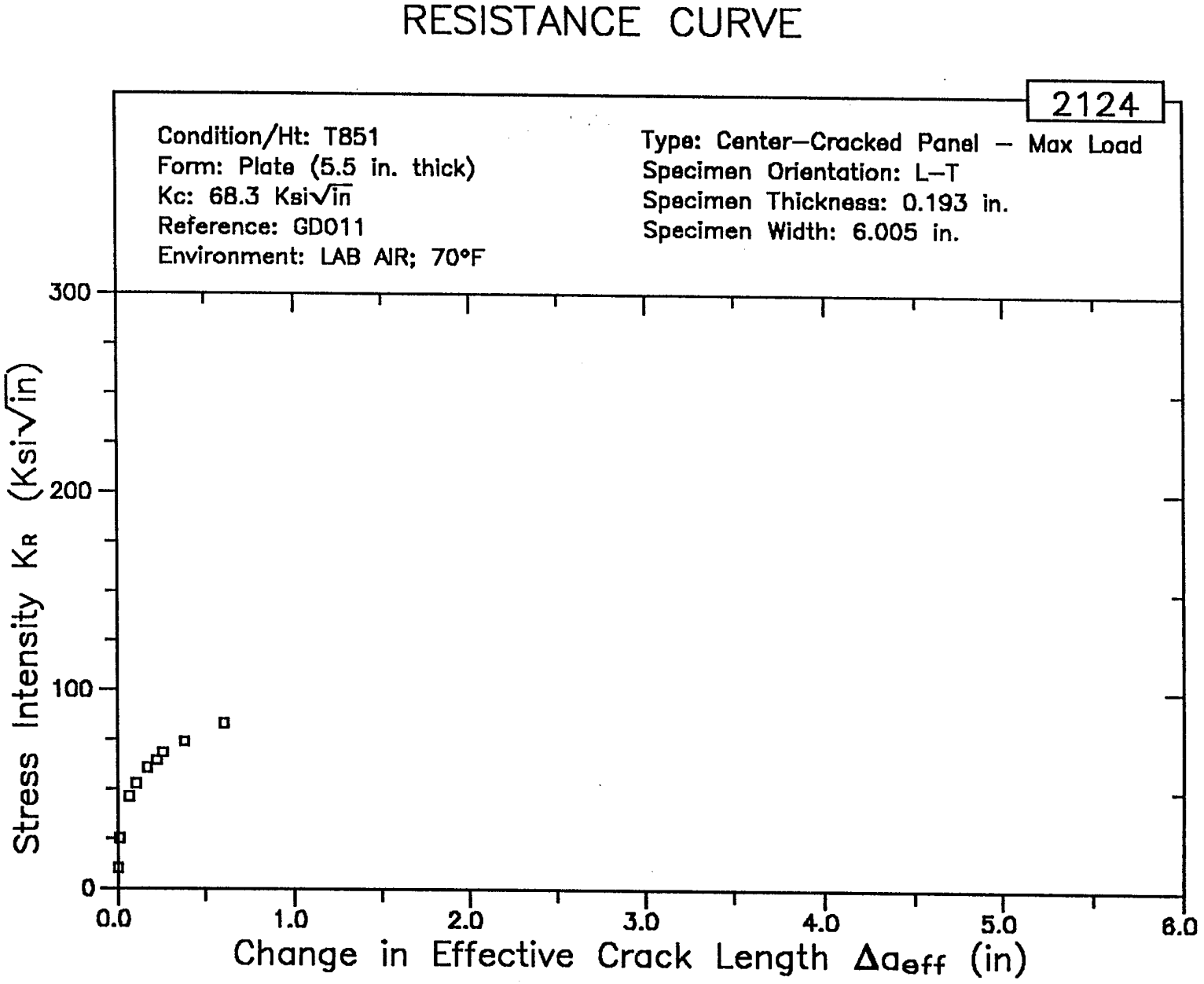



Figure 7.9.2.3.4

# RESISTANCE CURVE

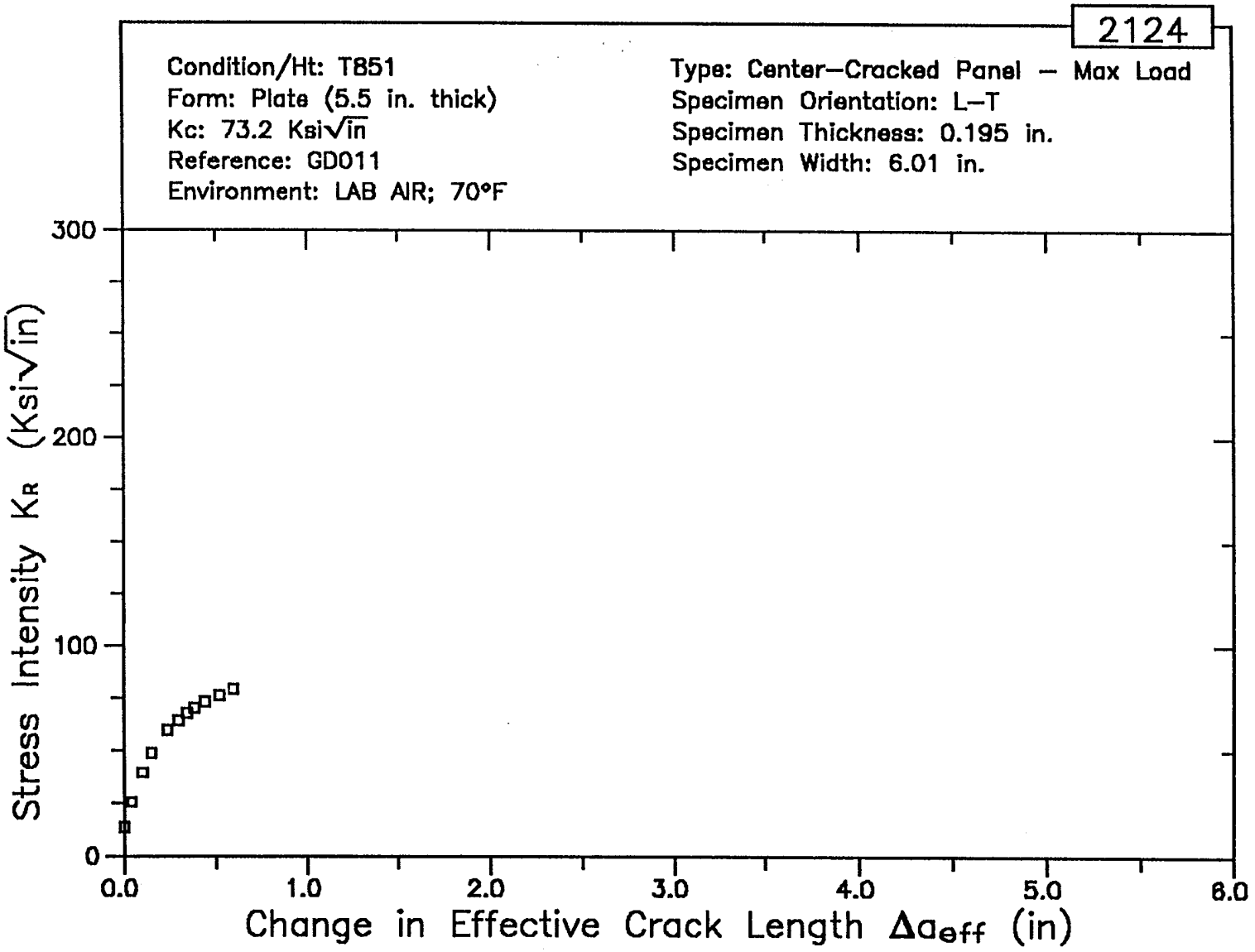



Figure 7.9.2.3.5

# RESISTANCE CURVE

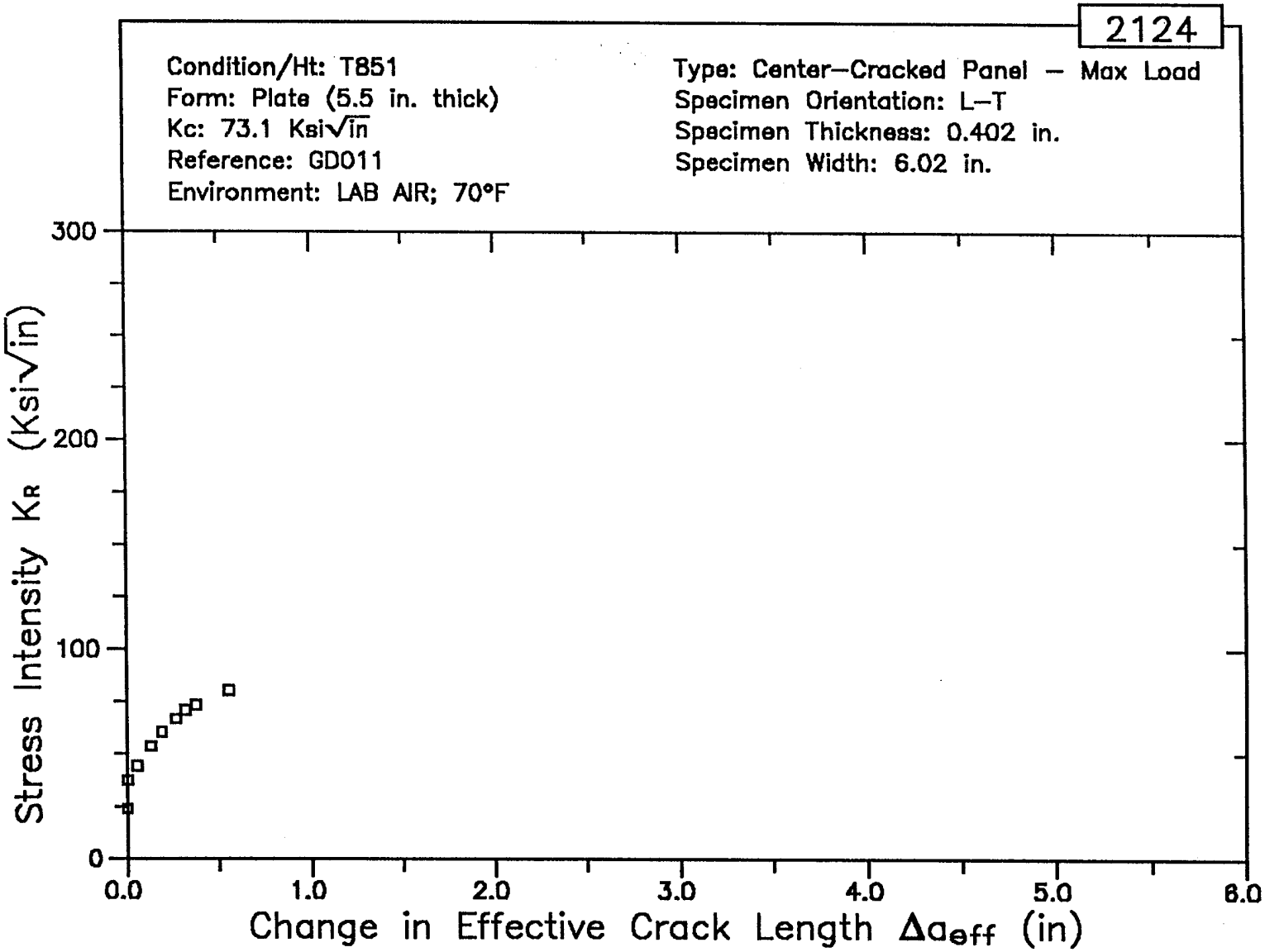



Figure 7.9.2.3.6

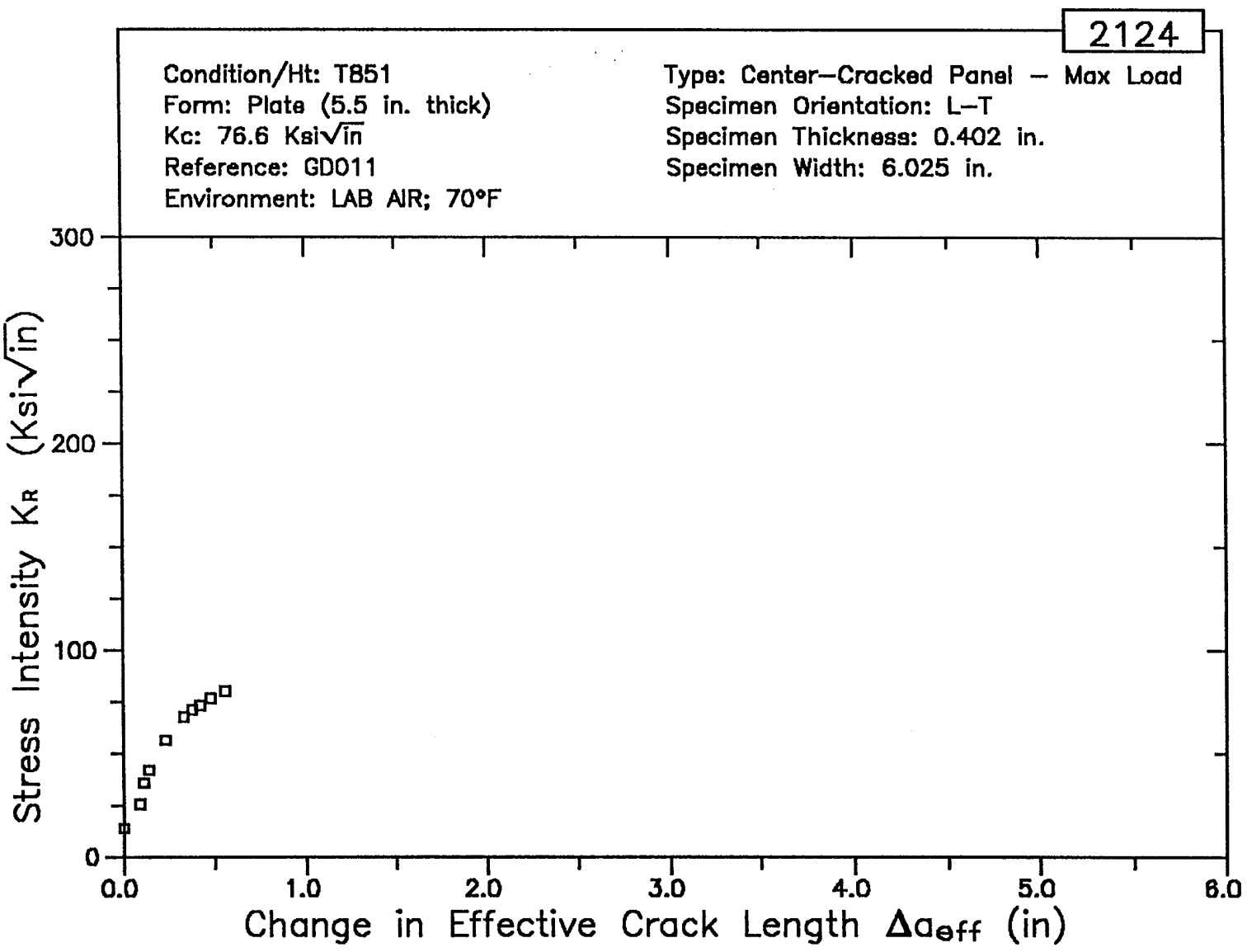



Figure 7.9.2.3.7

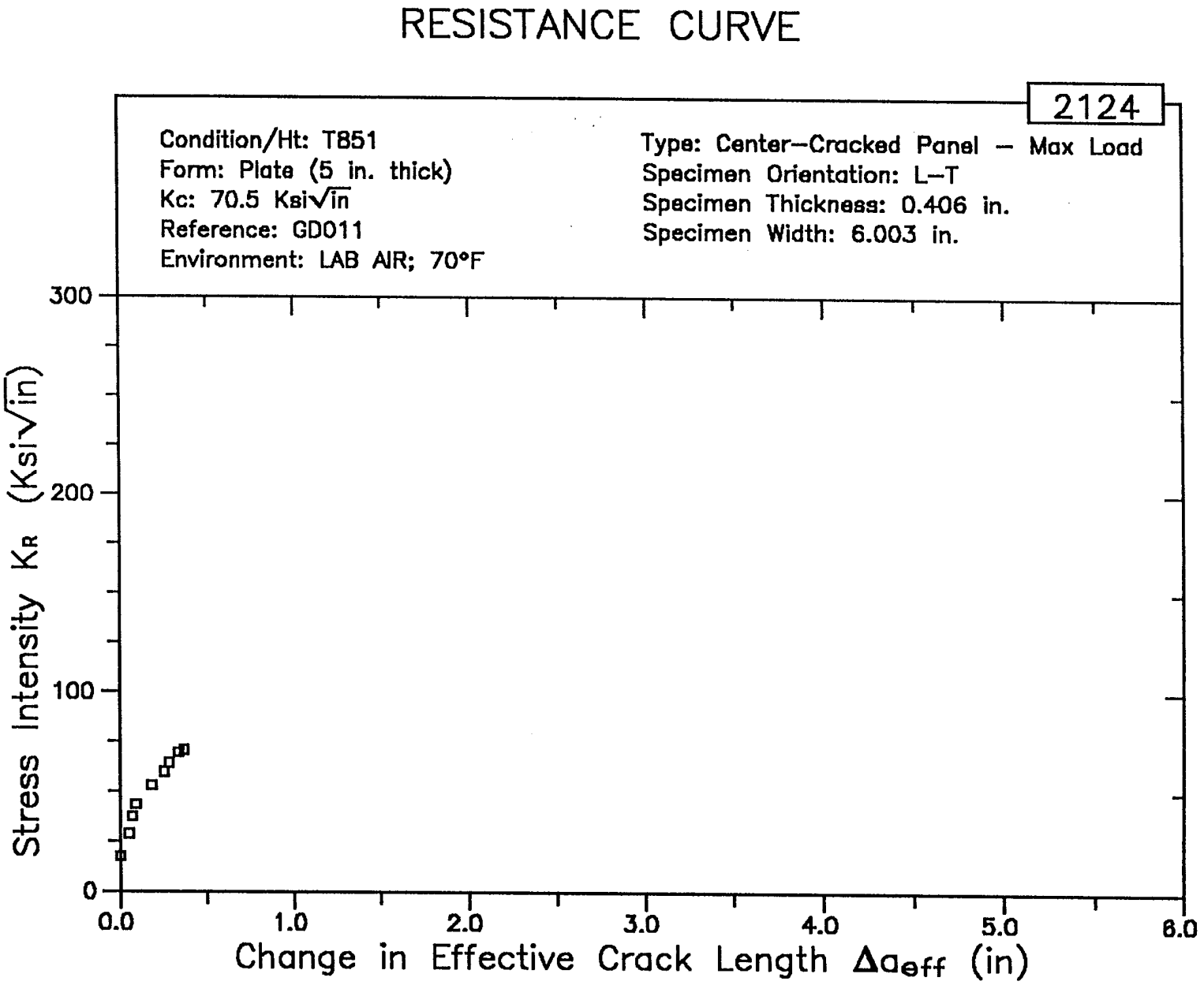



Figure 7.9.2.3.8

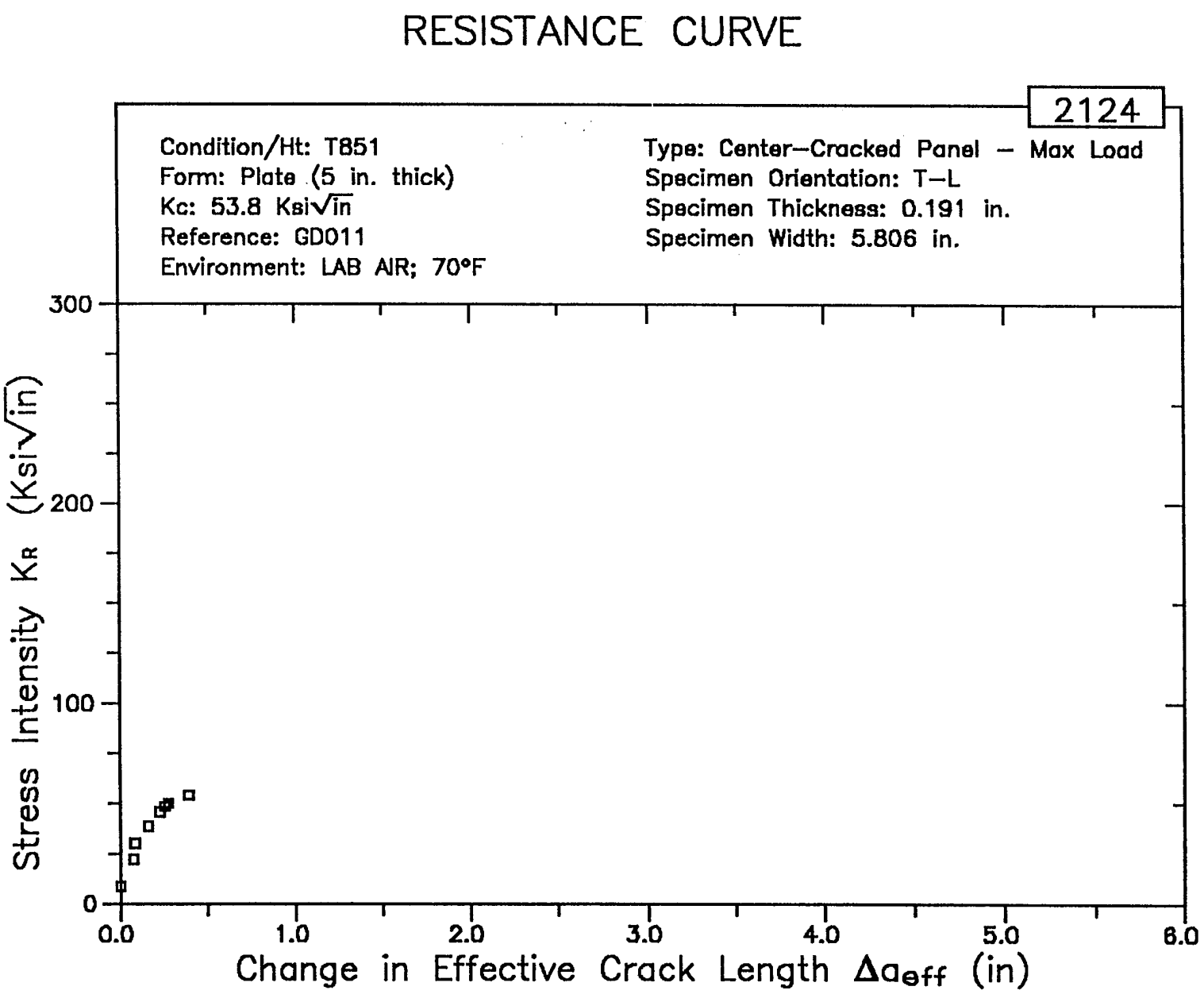



Figure 7.9.2.3.9

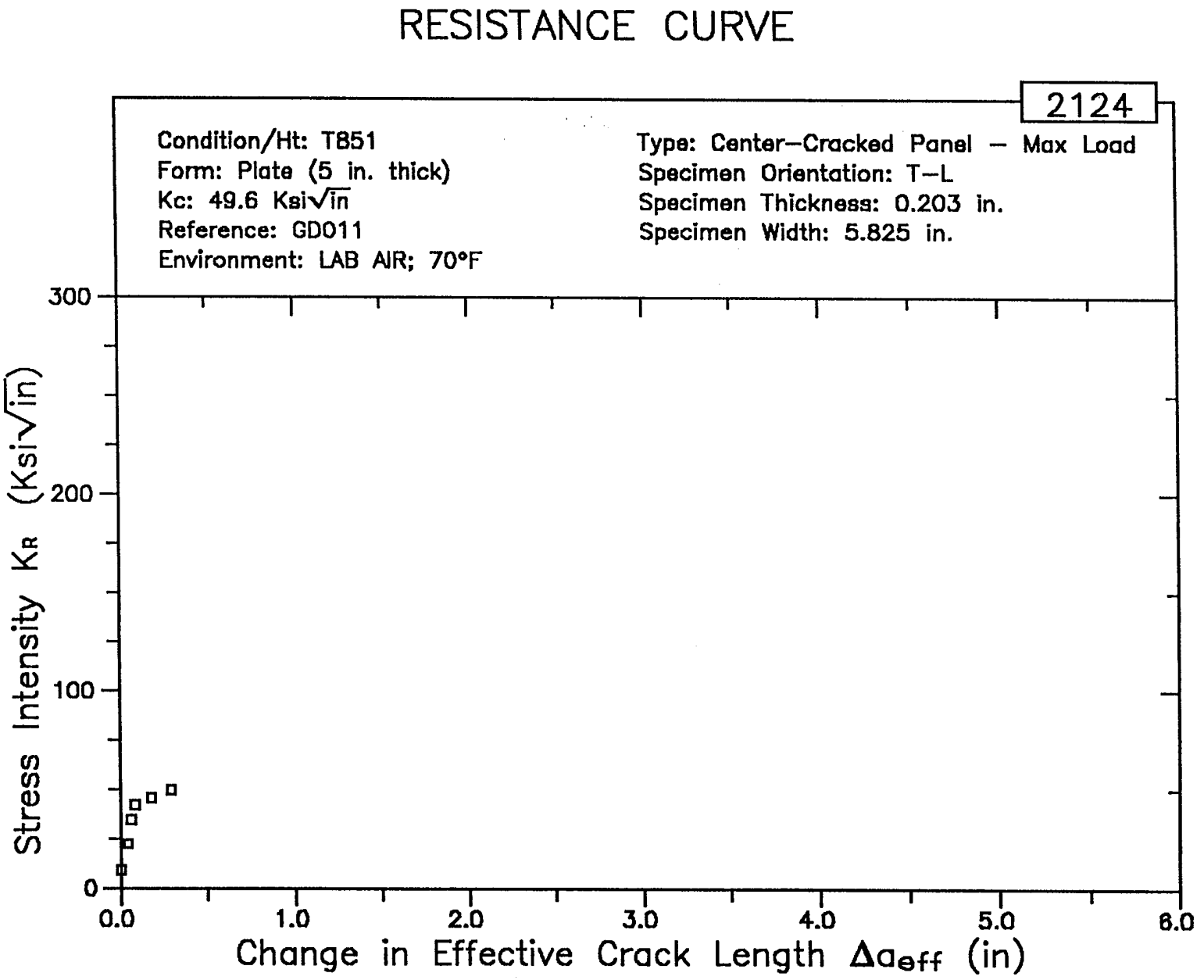



Figure 7.9.2.3.10

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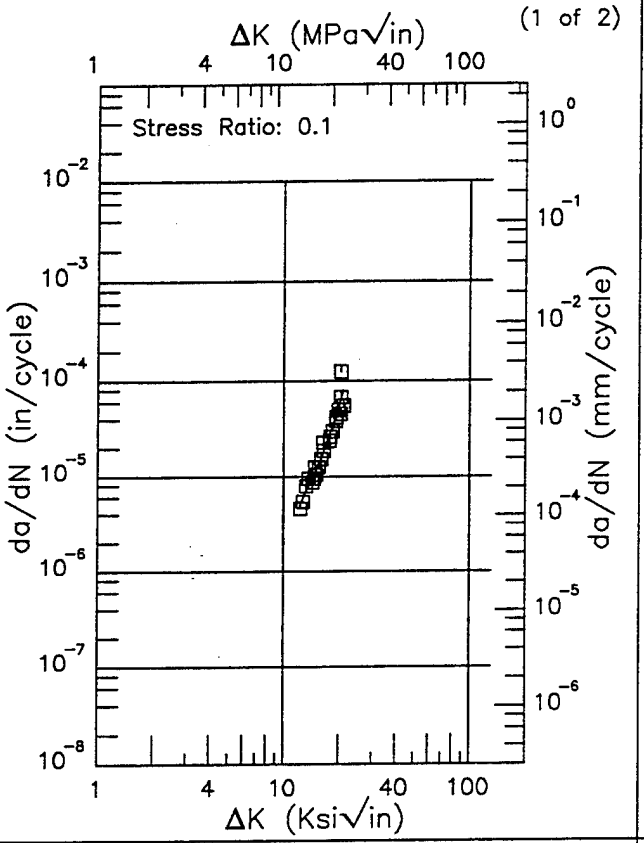
2124

R

Condition/Ht: T851
Form: 2 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 30 Hz
Environment: DRY AIR; RT

Yield Strength: 66.4 ksi
Ult. Strength: 72.1 ksi
Specimen Thk: 1.5 in.
Specimen Width: 2.55 in.
Ref: UD005

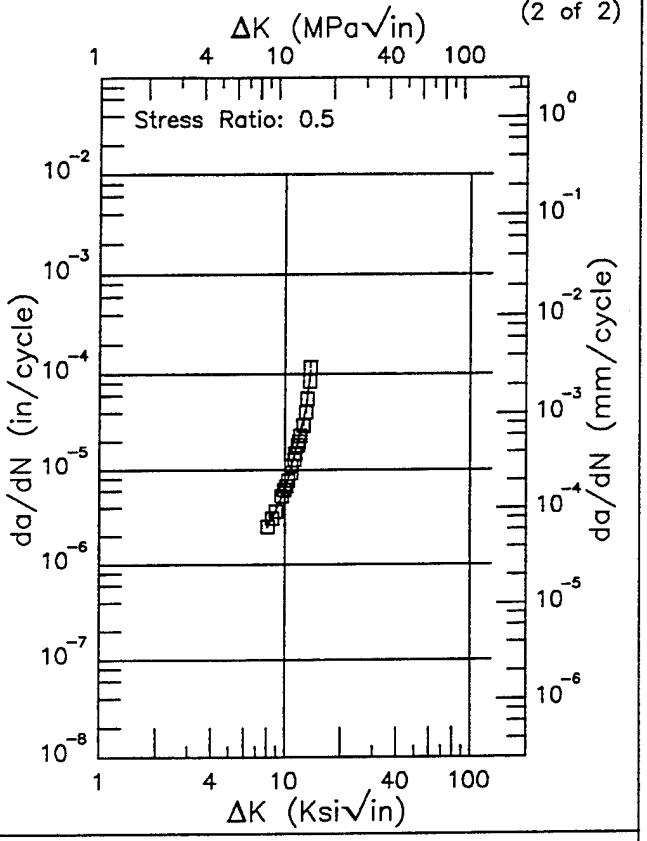
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 12.27 (min) | 4.86 |
| 13. | 6.49 |
| 16. | 15.8 |
| 20. | 54.9 |
| 20.98 (max) | 80.2 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 23.85 | 0. .5 .8 1.25 2. |

(2 of 2)



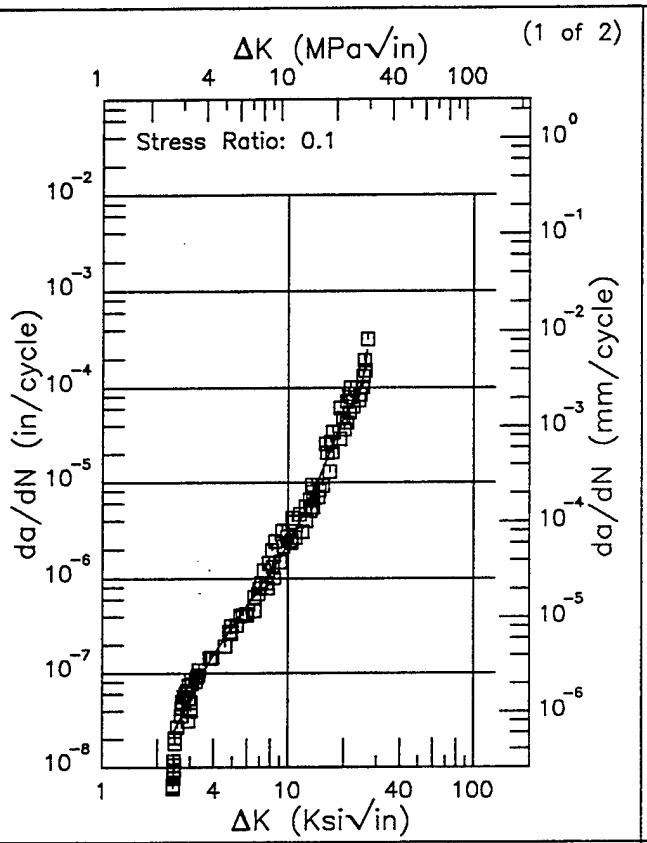

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 8.07 (min) | 2.49 |
| 9. | 3.72 |
| 10. | 6.30 |
| 13. | 44.1 |
| 13.67 (max) | 109. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 7.65 | 0. .5 .8 1.25 2. |

**Figure 7.9.3.1.1**

Condition/Ht: T851
Form: 2 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 30 Hz
Environment: DRY AIR; RT

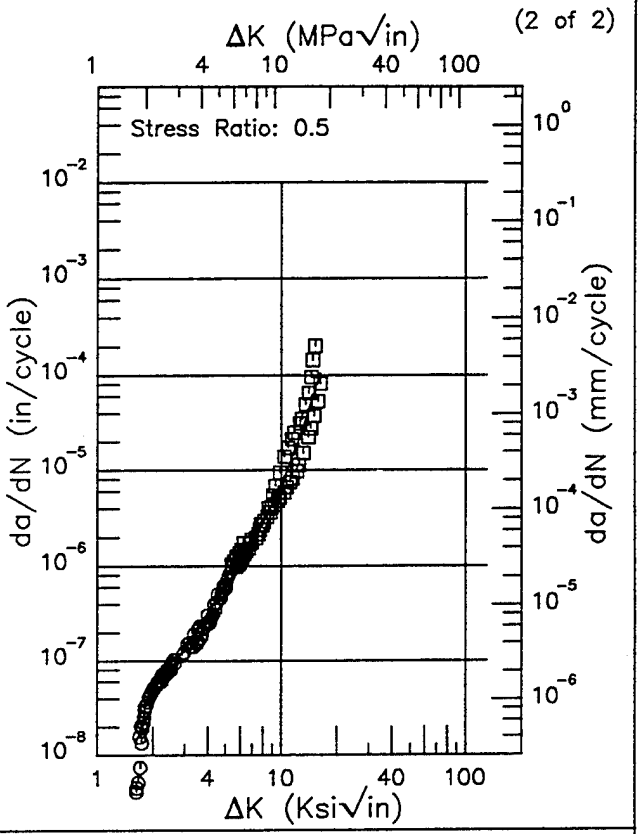
Yield Strength: 66.4 ksi
Ult. Strength: 72.1 ksi
Specimen Thk: 0.375 in.
Specimen Width: 2.55 in.
Ref: UD005




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.42 (min) | 0.0224 |
| 2.5 | 0.0260 |
| 3. | 0.0560 |
| 3.5 | 0.0995 |
| 4. | 0.157 |
| 5. | 0.312 |
| 6. | 0.526 |
| 7. | 0.808 |
| 8. | 1.17 |
| 9. | 1.64 |
| 10. | 2.25 |
| 13. | 5.88 |
| 16. | 16.5 |
| 20. | 47.1 |
| 25. | 113. |
| 26.67 (max) | 246. |

RMS % Error
32.05

Life Prediction Ratio Summary
0. .5 .8 1.25 2.




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 1.62 (min) | 0.0140 |
| 2. | 0.0350 |
| 2.5 | 0.0793 |
| 3. | 0.142 |
| 3.5 | 0.224 |
| 4. | 0.327 |
| 5. | 0.615 |
| 6. | 1.06 |
| 7. | 1.74 |
| 8. | 2.80 |
| 9. | 4.44 |
| 10. | 6.97 |
| 13. | 26.1 |
| 16. | 94.2 |
| 16.28 (max) | 106. |

RMS % Error
36.77

Life Prediction Ratio Summary
0. .5 .8 1.25 2.

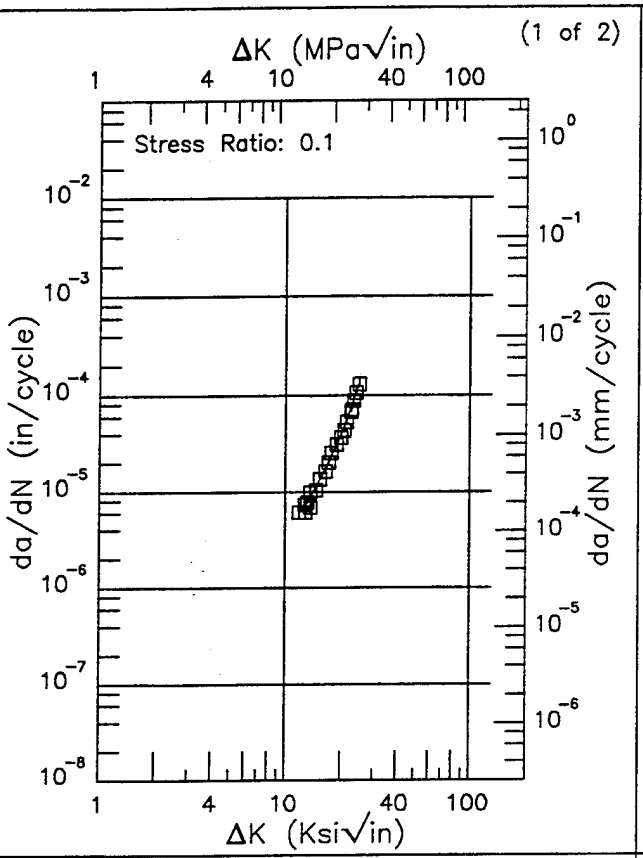
**Figure 7.9.3.1.2**

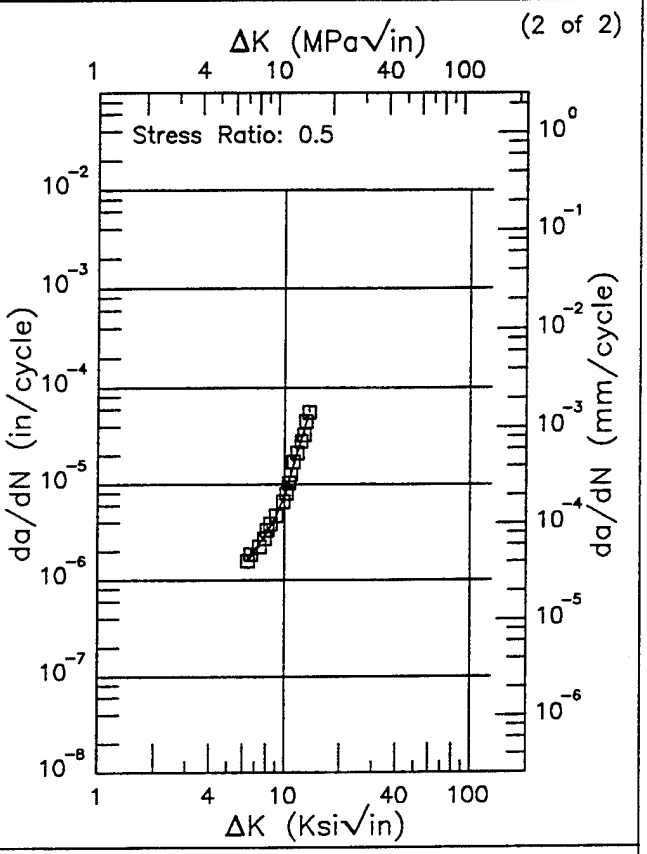
2124

R

Condition/Ht: T851
Form: 2 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 30 Hz
Environment: DRY AIR; RT

Yield Strength: 66.4 ksi
Ult. Strength: 72.1 ksi
Specimen Thk: 0.75 in.
Specimen Width: 2.55 in.
Ref: UD005




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 11.86 (min) | 6.08 |
| 13. | 7.41 |
| 16. | 15.6 |
| 20. | 39.1 |
| 24.84 (max) | 130. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.39 (min) | 1.59 |
| 7. | 2.05 |
| 8. | 3.00 |
| 9. | 4.59 |
| 10. | 7.65 |
| 13. | 41.7 |
| 13.51 (max) | 52.3 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 7.67 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 5.71 | 0. .5 .8 1.25 2. |

**Figure 7.9.3.1.3**

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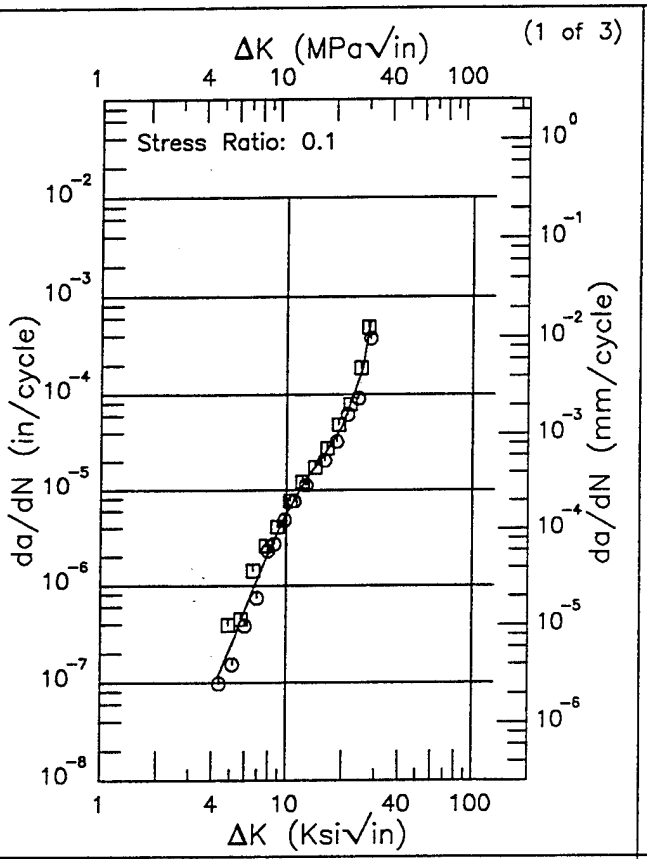
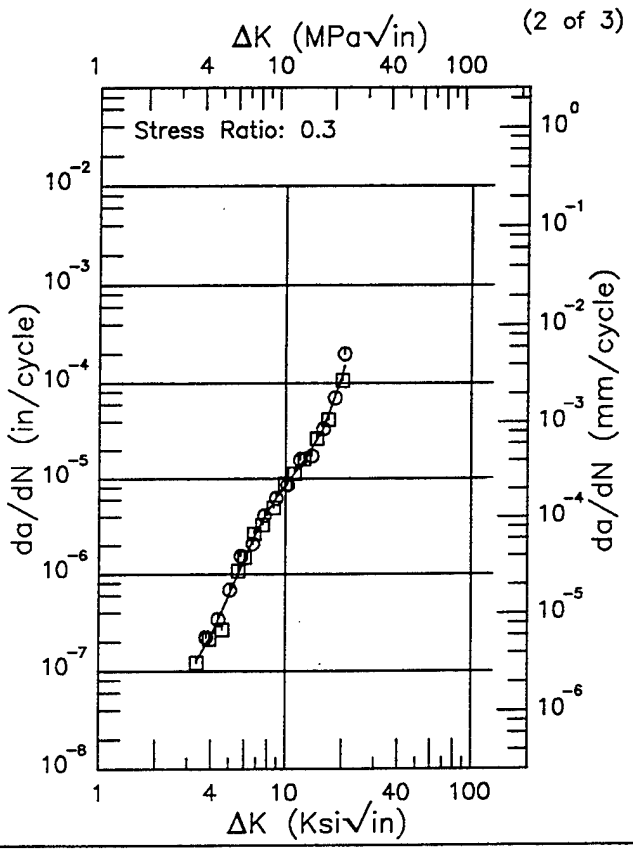
2124

R

Condition/Ht: T851
Form: 5.5 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 1 Hz
Environment: S.T.W.; RT

Yield Strength: 62.6 ksi
Ult. Strength: 69.4 ksi
Specimen Thk: 0.744 – 0.75 in.
Specimen Width: 5 in.
Ref: GD003




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.36 (min) | 0.117 |
| 5. | 0.227 |
| 6. | 0.555 |
| 7. | 1.18 |
| 8. | 2.19 |
| 9. | 3.69 |
| 10. | 5.67 |
| 13. | 13.8 |
| 16. | 23.9 |
| 20. | 47.6 |
| 25. | 163. |
| 28.12 (max) | 572. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.34 (min) | 0.127 |
| 3.5 | 0.146 |
| 4. | 0.232 |
| 5. | 0.605 |
| 6. | 1.39 |
| 7. | 2.71 |
| 8. | 4.45 |
| 9. | 6.40 |
| 10. | 8.52 |
| 13. | 16.9 |
| 16. | 33.9 |
| 20. | 118. |
| 20.62 (max) | 151. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 28.83 | 0. .5 .8 1.25 2. |

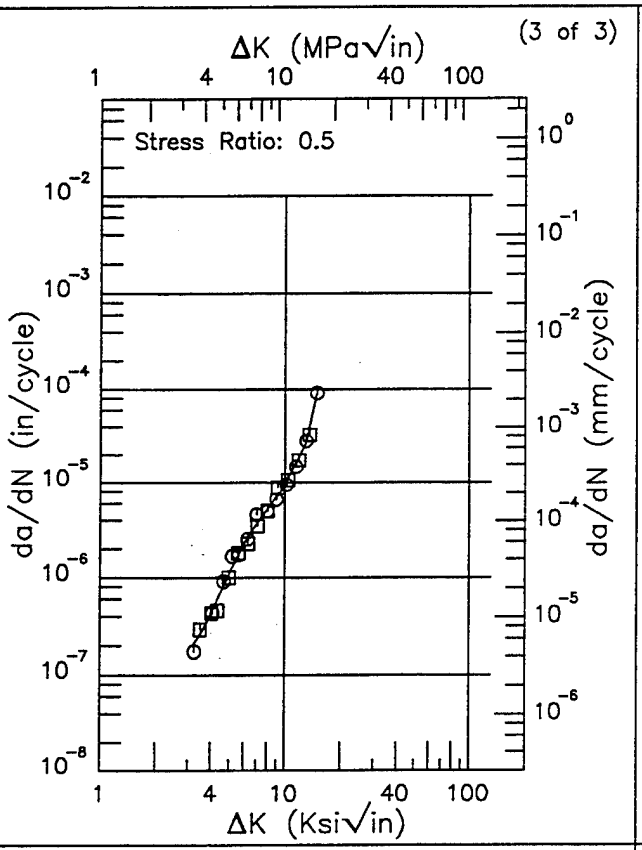
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 13.58 | 0. .5 .8 1.25 2. |

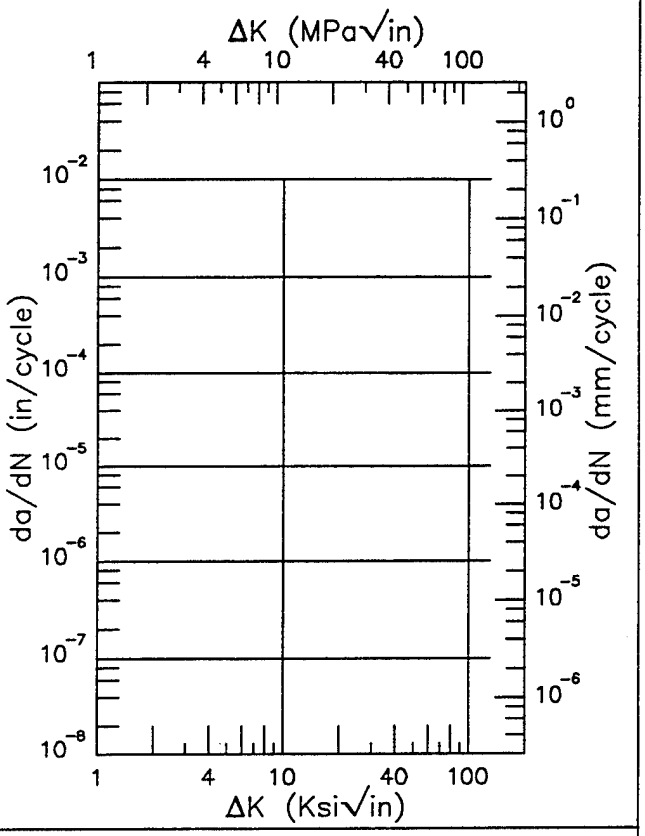
**Figure 7.9.3.1.4**

2124 R

Condition/Ht: T851
Form: 5.5 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 1 Hz
Environment: S.T.W.; RT

Yield Strength: 62.6 ksi
Ult. Strength: 69.4 ksi
Specimen Thk: 0.744 – 0.75 in.
Specimen Width: 5 in.
Ref: GD003




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 3.24 (min) | 0.206 |
| 3.5 | 0.260 |
| 4. | 0.424 |
| 5. | 1.08 |
| 6. | 2.23 |
| 7. | 3.63 |
| 8. | 5.18 |
| 9. | 7.07 |
| 10. | 9.59 |
| 13. | 26.9 |
| 14.78 (max) | 89.7 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 12.66 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.9.3.1.4 (Concluded)**

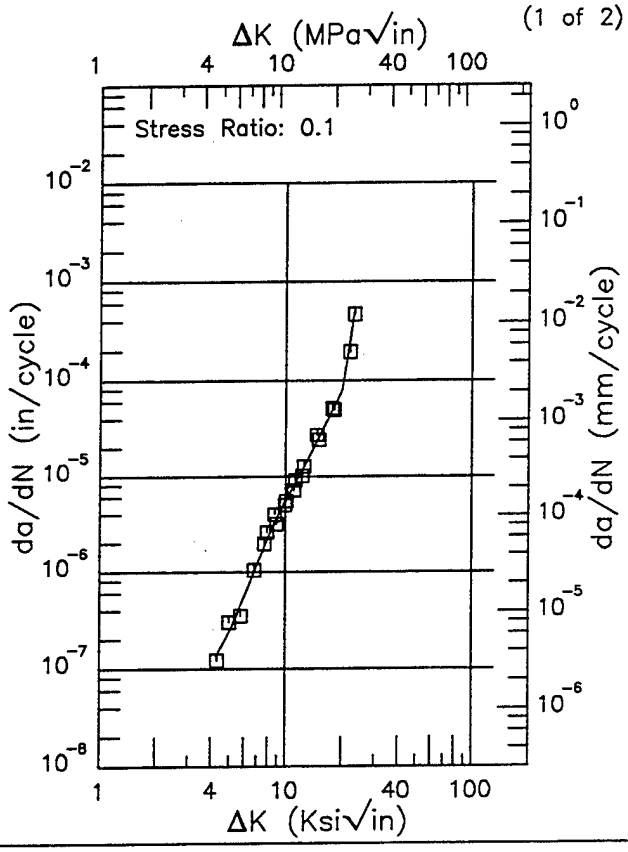
2124

R

Condition/Ht: T851
Form: 5.5 in. Plate
Specimen Type: CT
Orientation: T–L
Frequency: 1 Hz
Environment: H.H.A.; RT

Yield Strength: 61.9 ksi
Ult. Strength: 69 ksi
Specimen Thk: 0.75 – 0.751 in.
Specimen Width: 5 in.
Ref: GD003

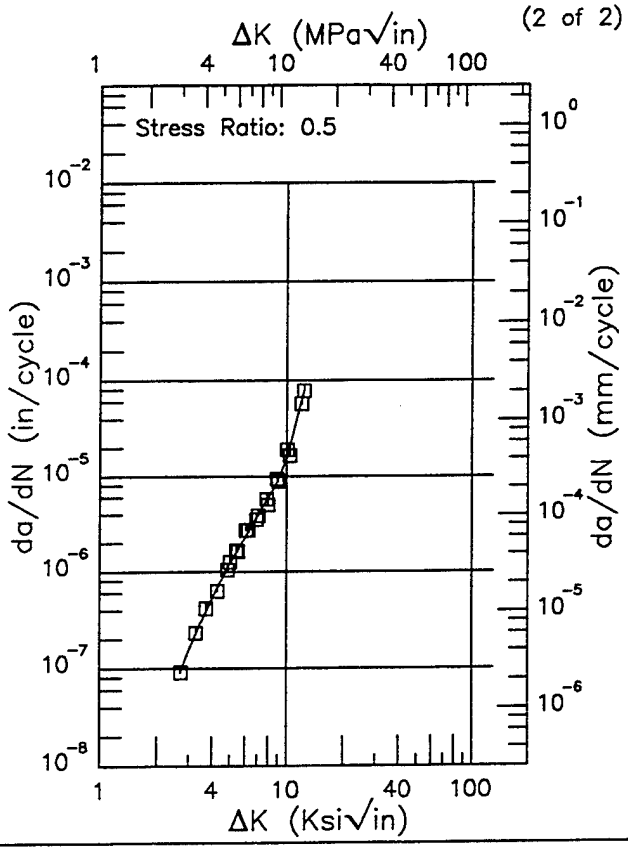
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.28 (min) | 0.135 |
| 5. | 0.239 |
| 6. | 0.550 |
| 7. | 1.18 |
| 8. | 2.24 |
| 9. | 3.77 |
| 10. | 5.65 |
| 13. | 14.3 |
| 16. | 33.6 |
| 20. | 78.7 |
| 23.19 (max) | 501. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 13.66 | 0. .5 .8 1.25 2. |

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.71 (min) | 0.0906 |
| 3. | 0.152 |
| 3.5 | 0.306 |
| 4. | 0.526 |
| 5. | 1.20 |
| 6. | 2.27 |
| 7. | 3.81 |
| 8. | 5.89 |
| 9. | 9.06 |
| 10. | 15.3 |
| 12.38 (max) | 80.8 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 7.66 | 0. .5 .8 1.25 2. |

**Figure 7.9.3.1.5**

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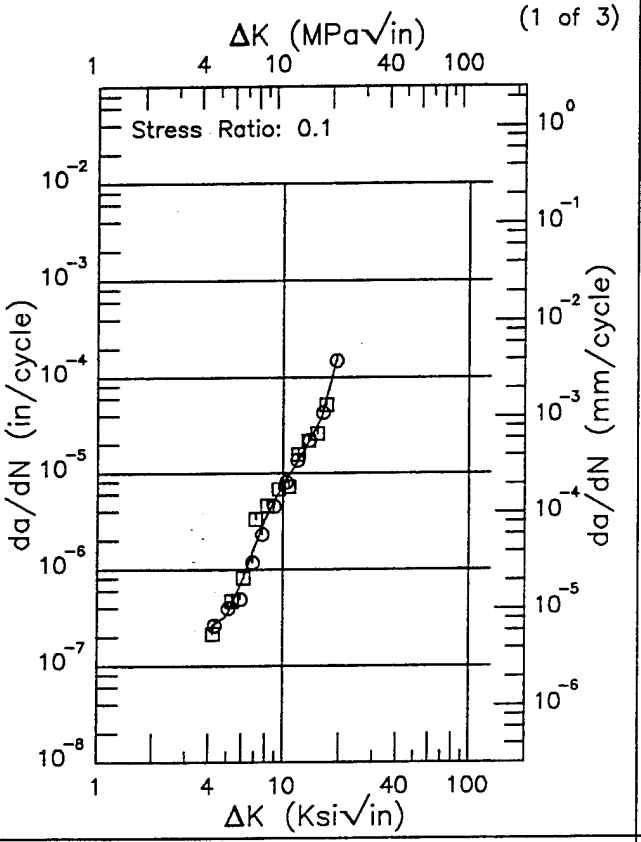
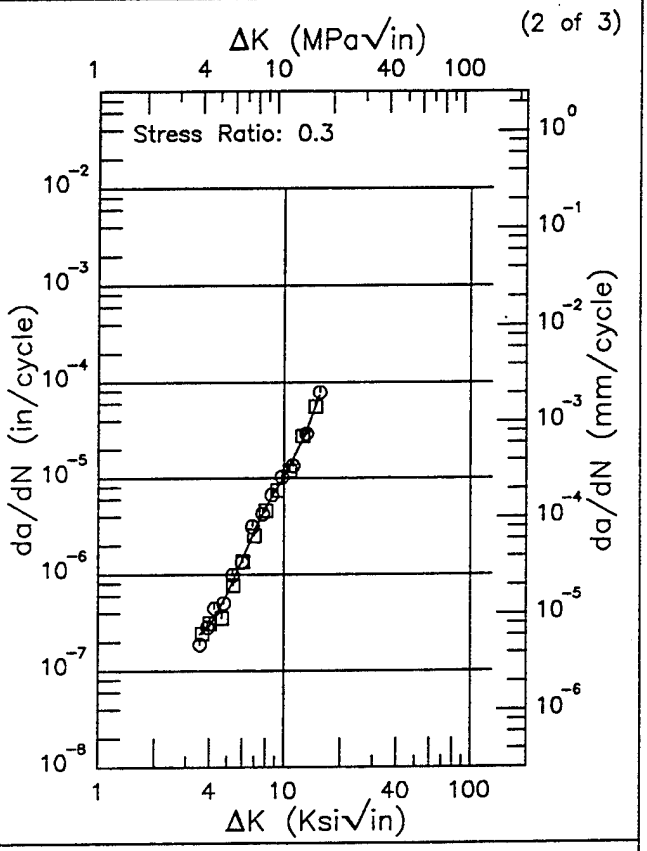
## 2124

R

Condition/Ht: T851
Form: 5.5 in. Plate
Specimen Type: CT
Orientation: T–L
Frequency: 1 Hz
Environment: S.T.W.; RT

Yield Strength: 61.9 ksi
Ult. Strength: 69 ksi
Specimen Thk: 0.748 – 0.752 in.
Specimen Width: 5 in.
Ref: GD003




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.18 (min) | 0.264 |
| 5. | 0.337 |
| 6. | 0.746 |
| 7. | 1.72 |
| 8. | 3.35 |
| 9. | 5.31 |
| 10. | 7.45 |
| 13. | 17.2 |
| 16. | 37.5 |
| 19.20 (max) | 149. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.55 (min) | 0.241 |
| 4. | 0.293 |
| 5. | 0.626 |
| 6. | 1.42 |
| 7. | 2.82 |
| 8. | 4.85 |
| 9. | 7.39 |
| 10. | 10.3 |
| 13. | 29.0 |
| 15.42 (max) | 74.1 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 21.92 | 0. .5 .8 1.25 2. |

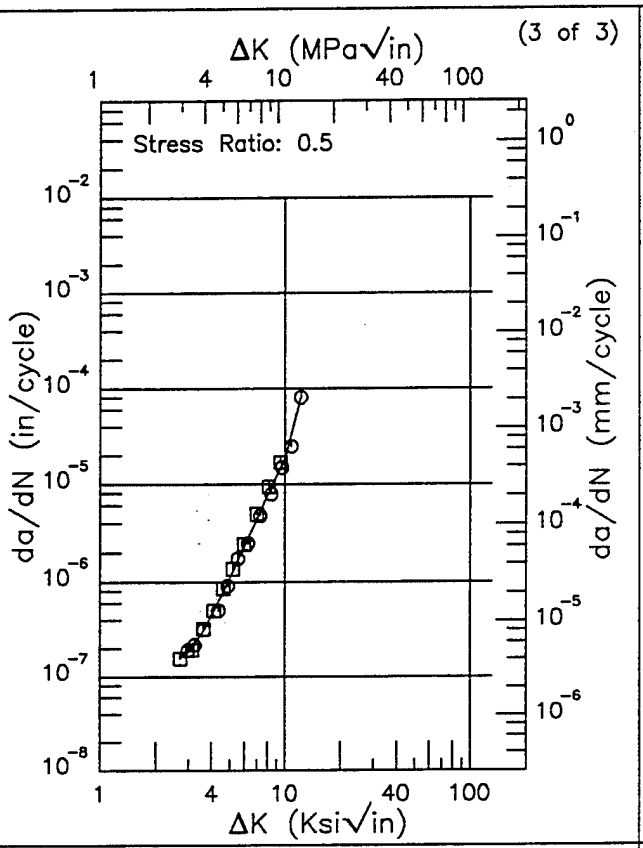
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 12.67 | 0. .5 .8 1.25 2. |

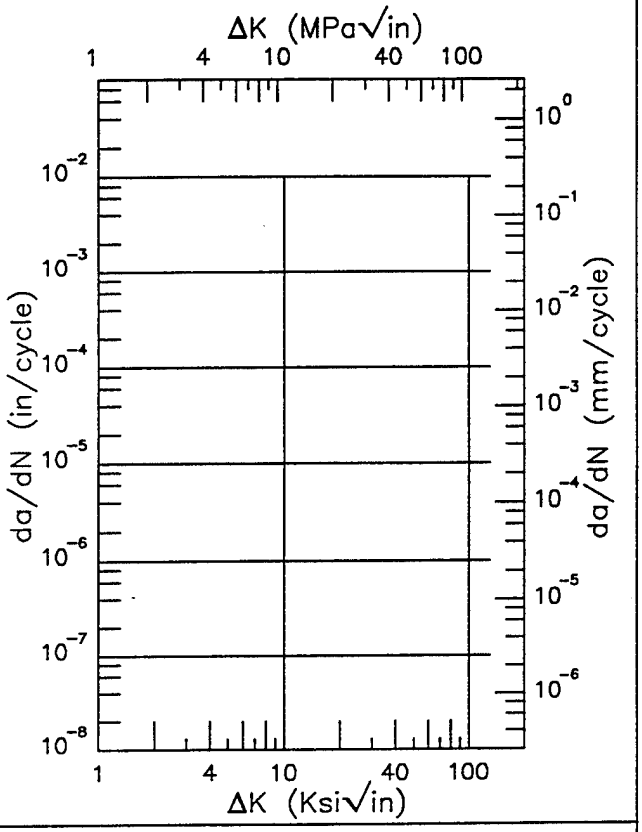
**Figure 7.9.3.1.6**

2124 R

Condition/Ht: T851
Form: 5.5 in. Plate
Specimen Type: CT
Orientation: T–L
Frequency: 1 Hz
Environment: S.T.W.; RT

Yield Strength: 61.9 ksi
Ult. Strength: 69 ksi
Specimen Thk: 0.748 – 0.752 in.
Specimen Width: 5 in.
Ref: GD003




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 2.71 (min) | 0.158 |
| 3. | 0.184 |
| 3.5 | 0.276 |
| 4. | 0.442 |
| 5. | 1.09 |
| 6. | 2.31 |
| 7. | 4.36 |
| 8. | 7.64 |
| 9. | 12.4 |
| 10. | 18.1 |
| 12.15 (max) | 79.9 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 9.95 | 0. .5 .8 1.25 2. |

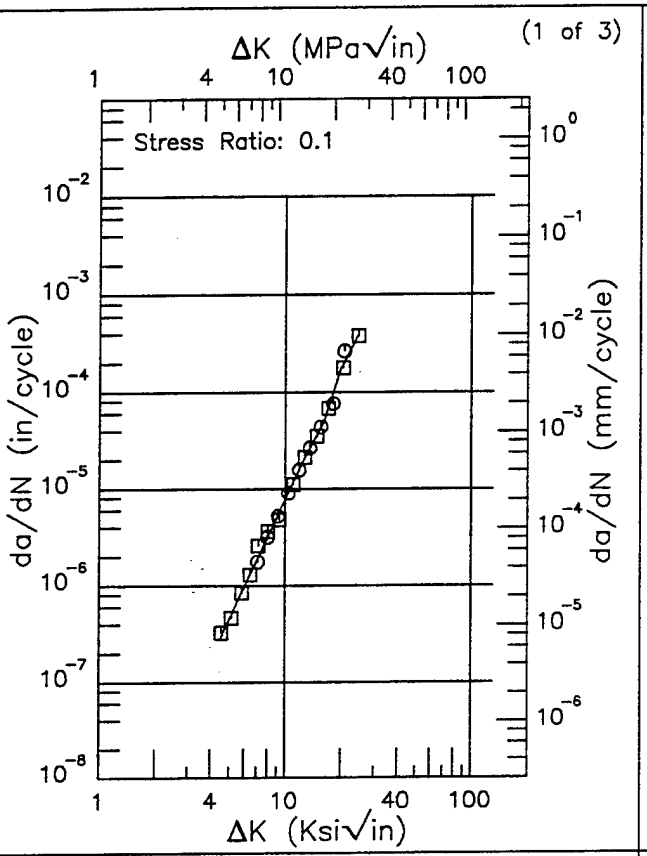
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

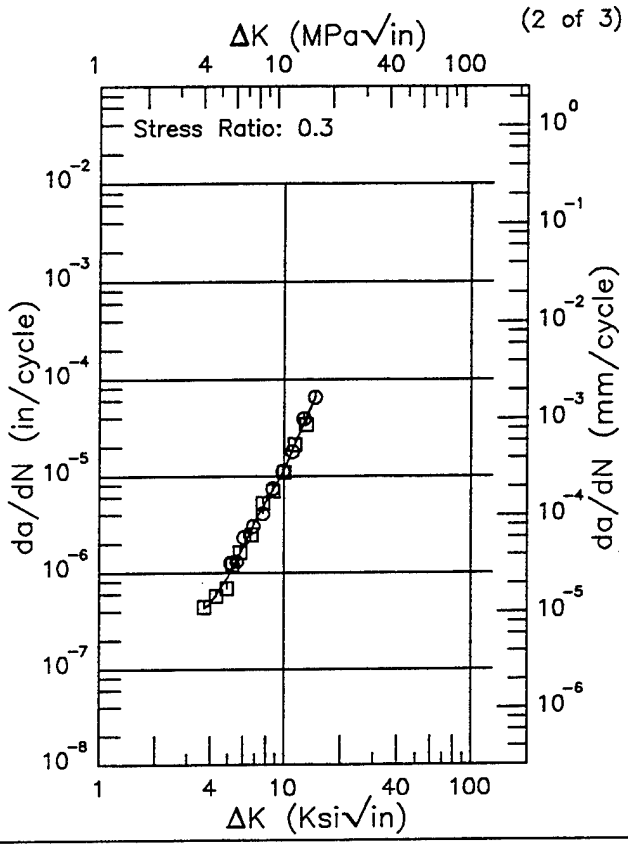
**Figure 7.9.3.1.6 (Concluded)**

R 2124

Condition/Ht: T851
Form: 5.5 in. Plate
Specimen Type: CT
Orientation: S–L
Frequency: 1 Hz
Environment: S.T.W.; RT

Yield Strength: 59.1 ksi
Ult. Strength: 63.1 ksi
Specimen Thk: 0.495 – 0.501 in.
Specimen Width: 3.99 – 4 in.
Ref: GD003




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.52 (min) | 0.288 |
| 5. | 0.443 |
| 6. | 0.951 |
| 7. | 1.80 |
| 8. | 3.11 |
| 9. | 5.05 |
| 10. | 7.82 |
| 13. | 22.6 |
| 16. | 47.9 |
| 20. | 182. |
| 24.53 (max) | 378. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.72 (min) | 0.433 |
| 4. | 0.480 |
| 5. | 0.893 |
| 6. | 1.81 |
| 7. | 3.33 |
| 8. | 5.37 |
| 9. | 7.96 |
| 10. | 11.6 |
| 13. | 38.1 |
| 14.61 (max) | 62.8 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 11.80 | 0. .5 .8 1.25 2. |

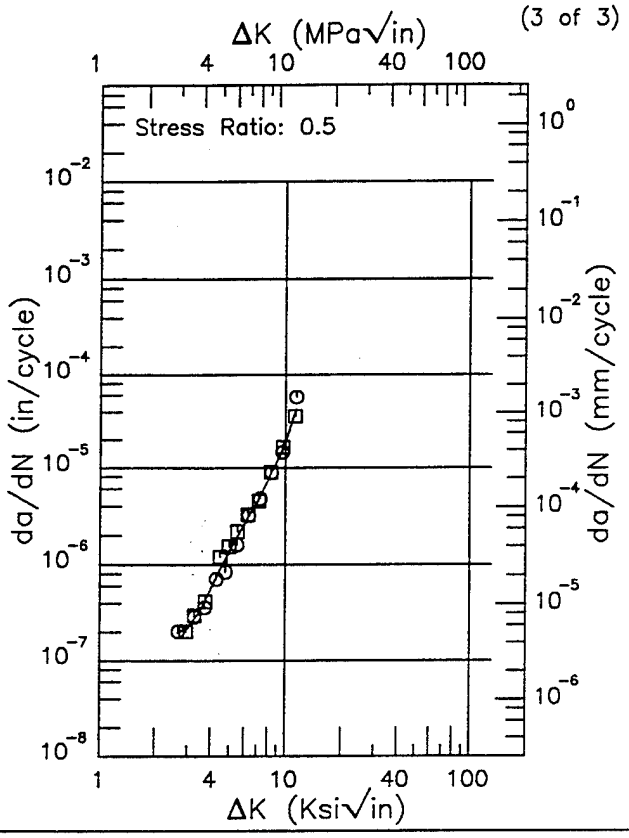
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 10.87 | 0. .5 .8 1.25 2. |

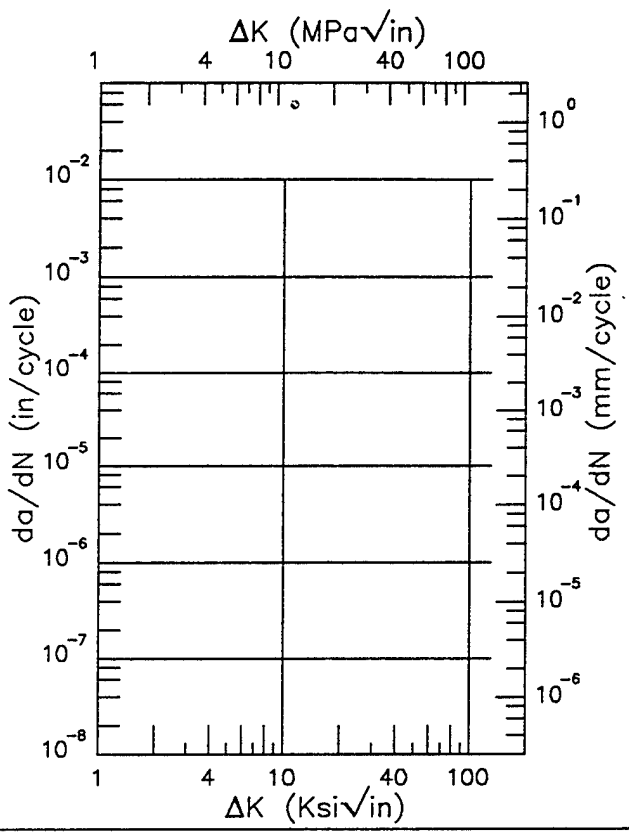
**Figure 7.9.3.1.7**

2124 R

Condition/Ht: T851
Form: 5.5 in. Plate
Specimen Type: CT
Orientation: S–L
Frequency: 1 Hz
Environment: S.T.W.; RT

Yield Strength: 59.1 ksi
Ult. Strength: 63.1 ksi
Specimen Thk: 0.495 – 0.501 in.
Specimen Width: 3.99 – 4 in.
Ref: GD003




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 2.67 (min) | 0.197 |
| 3. | 0.219 |
| 3.5 | 0.333 |
| 4. | 0.559 |
| 5. | 1.38 |
| 6. | 2.57 |
| 7. | 4.36 |
| 8. | 7.34 |
| 9. | 11.9 |
| 10. | 18.5 |
| 11.35 (max) | 42.0 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 14.14 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.9.3.1.7 (Concluded)**

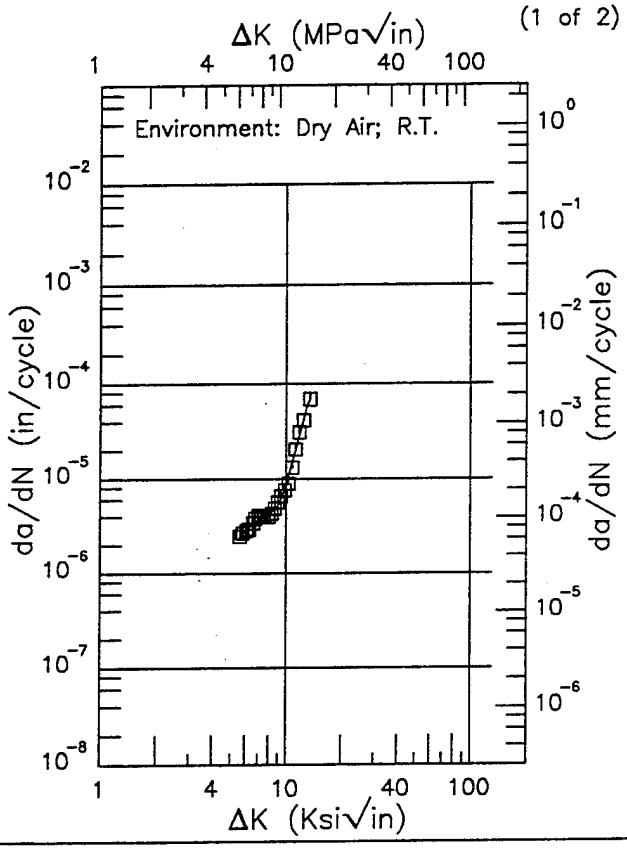
2124

E

Condition/Ht: T851
Form: 4.5 in. Plate
Specimen Type: CT
Orientation: S–L
Stress Ratio: 0.33
Frequency: 18.3 Hz

Yield Strength: 57.3 ksi
Ult. Strength: 64.1 ksi
Specimen Thk: 1.489 – 1.491 in.
Specimen Width: 3.8 in.
Ref: 86842

(1 of 2)



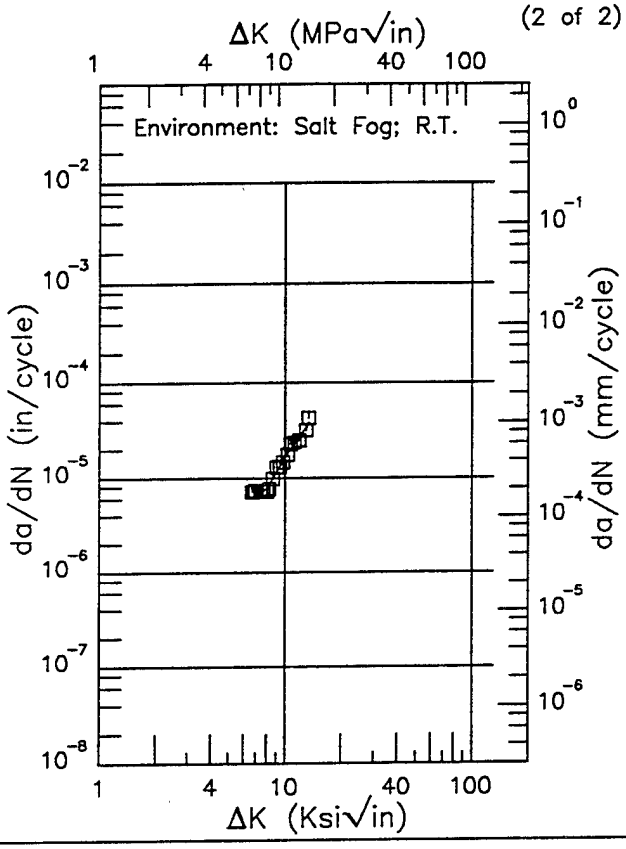

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.61 (min) | 2.38 |
| 6. | 2.81 |
| 7. | 3.70 |
| 8. | 4.27 |
| 9. | 5.26 |
| 10. | 8.55 |
| 13. | 59.0 |
| 13.38 (max) | 67.4 |

| RMS % Error |
|---|
| 5.90 |

Life Prediction Ratio Summary

0. .5 .8 1.25 2.

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.69 (min) | 7.77 |
| 7. | 6.94 |
| 8. | 7.70 |
| 9. | 11.5 |
| 10. | 16.9 |
| 13. | 34.0 |
| 13.38 (max) | 38.4 |

| RMS % Error |
|---|
| 6.87 |

Life Prediction Ratio Summary

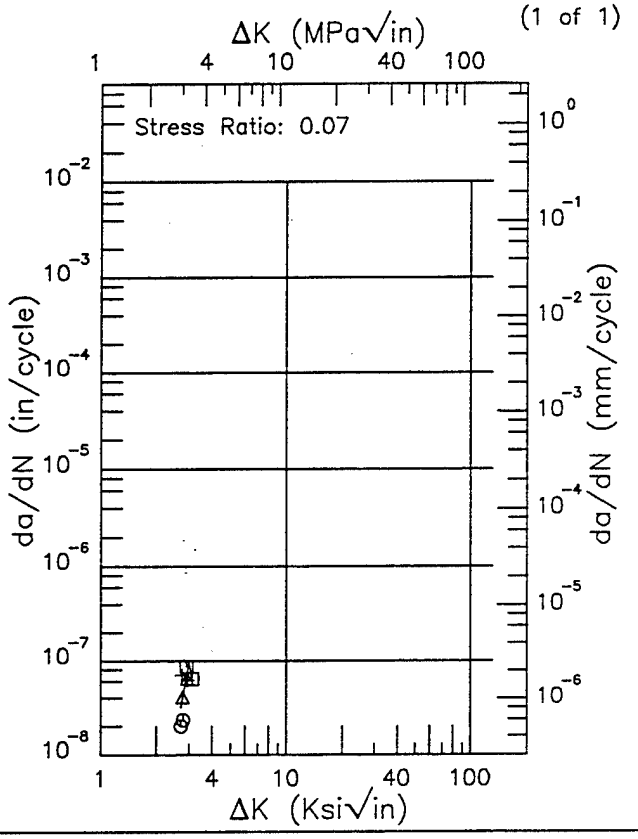
0. .5 .8 1.25 2.

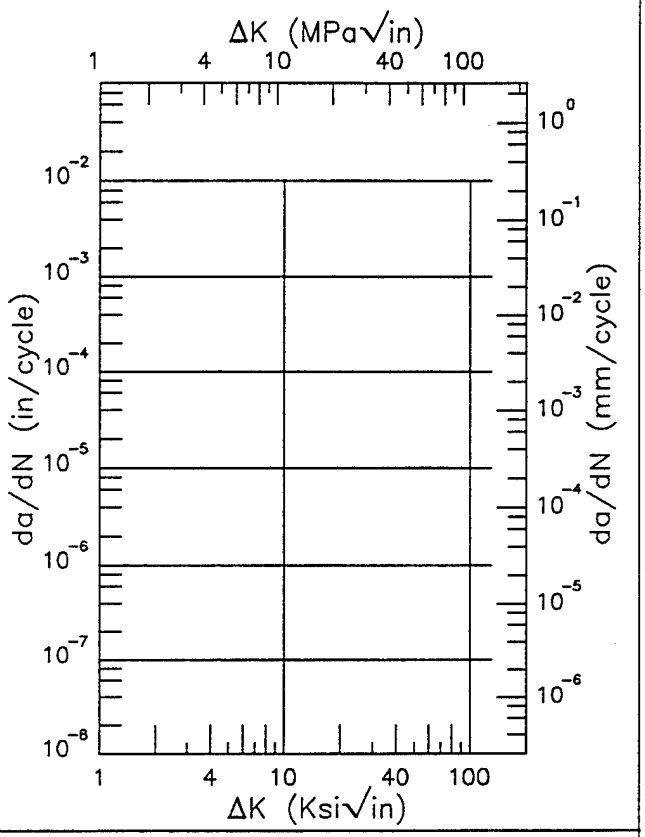
**Figure 7.9.3.1.8**

2124 R

Condition/Ht: T851
Form: 5.5 in. Plate
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency:
Environment: H.H.A.; RT

Yield Strength: 57 ksi
Ult. Strength:
Specimen Thk: 0.5 in.
Specimen Width: 6 in.
Ref: BL002




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.71 (min) | 0.0317 |
| 3. | 0.0952 |
| 3.12 (max) | 0.0627 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 41.62 | 0. .5 .8 1.25 2. |

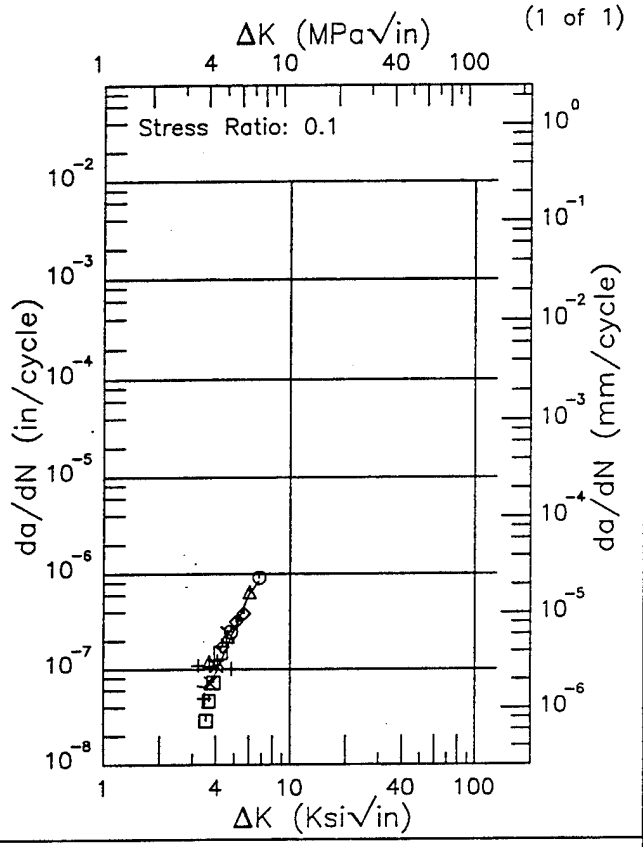
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

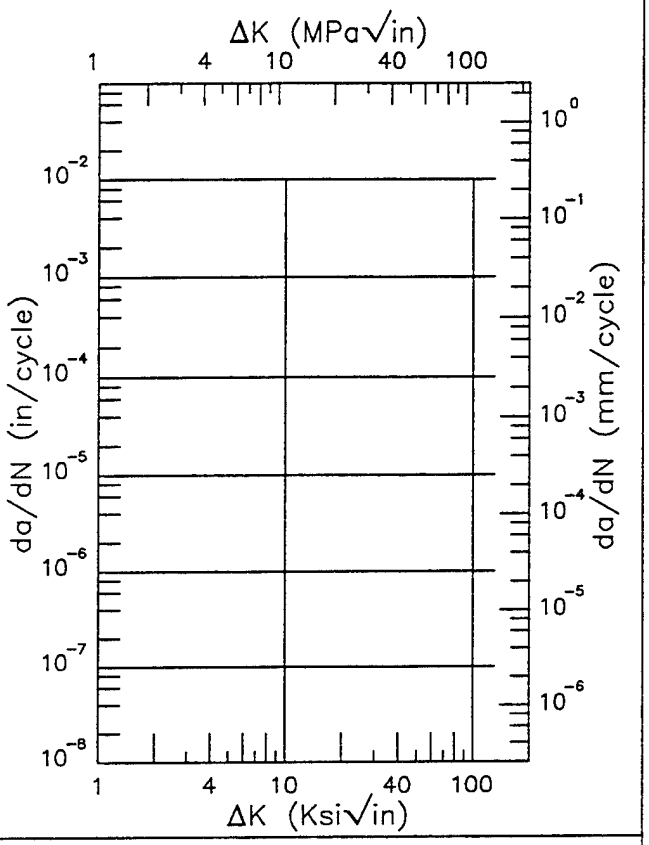
**Figure 7.9.3.1.9**

R 2124

Condition/Ht: T851
Form: 5.5 in. Plate
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 10 – 33 Hz
Environment: H.H.A.; RT

Yield Strength: 63.2 ksi
Ult. Strength:
Specimen Thk: 0.5 in.
Specimen Width: 6 in.
Ref: BL002




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.20 (min) | 0.0668 |
| 3.5 | 0.0648 |
| 4. | 0.0891 |
| 5. | 0.258 |
| 6. | 0.610 |
| 6.78 (max) | 0.847 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

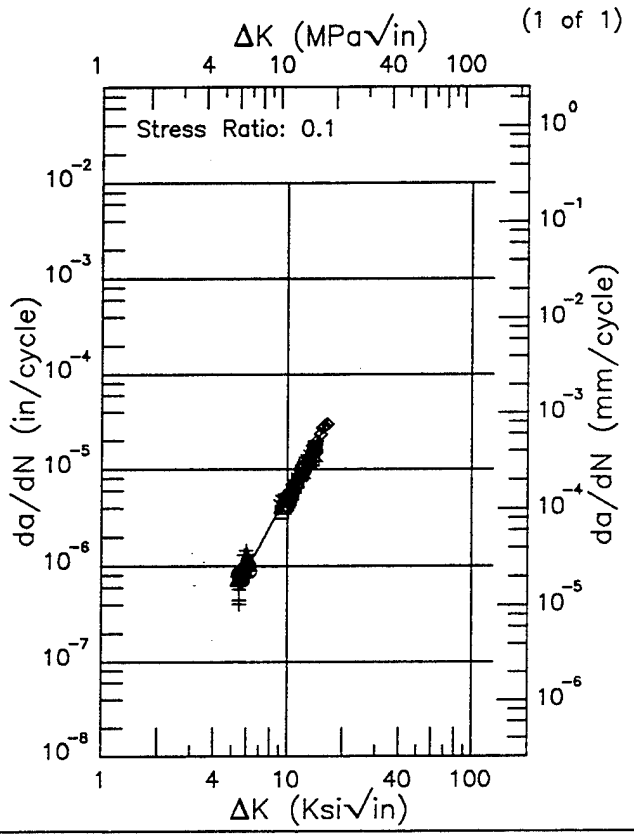
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 33.02 | 0. .5 .8 1.25 2. |

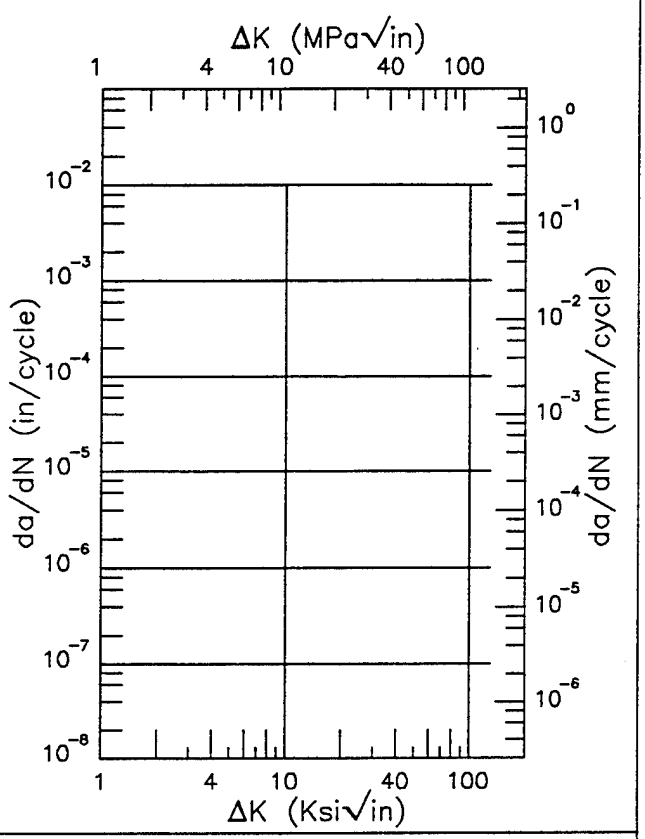
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.9.3.1.10**

Condition/Ht: T851
Form: 5.5 in. Plate
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 10 – 33 Hz
Environment: H.H.A.; RT

Yield Strength: 63.2 ksi
Ult. Strength:
Specimen Thk: 0.5 in.
Specimen Width: 4 in.
Ref: BL002




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.32 (min) | 0.693 |
| 6. | 0.927 |
| 7. | 1.55 |
| 8. | 2.53 |
| 9. | 3.80 |
| 10. | 5.21 |
| 13. | 12.3 |
| 16. | 29.1 |
| 16.24 (max) | 30.7 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 13.85 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

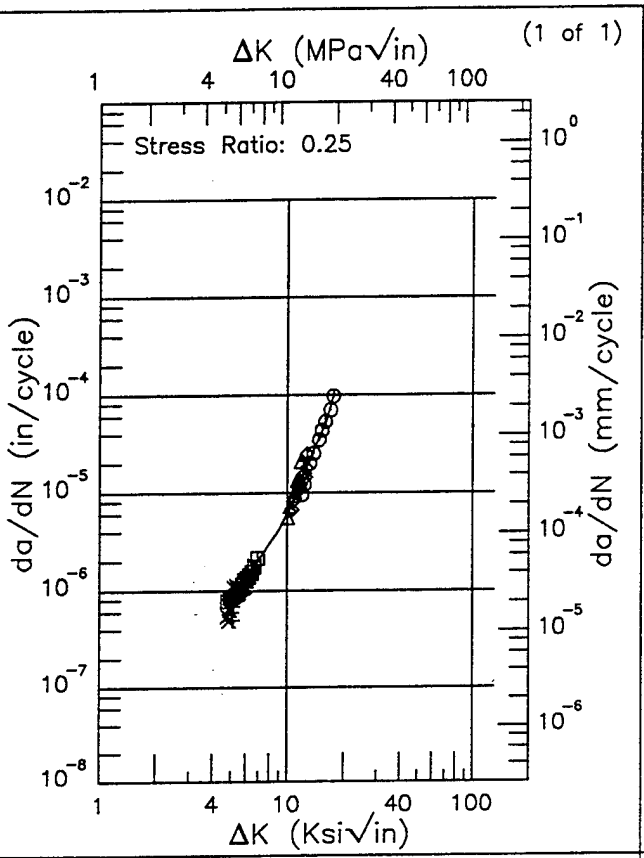
**Figure 7.9.3.1.11**

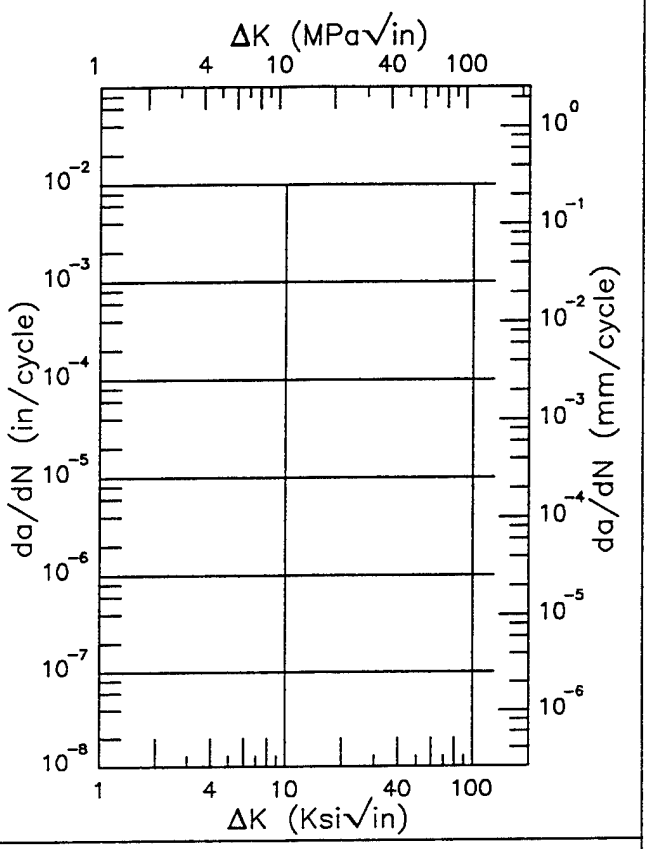
2124

R

Condition/Ht: T851
Form: 5.5 in. Plate
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 6 – 33 Hz
Environment: H.H.A.; RT

Yield Strength: 63.2 ksi
Ult. Strength:
Specimen Thk: 0.5 in.
Specimen Width: 4 in.
Ref: BL002




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.79 (min) | 0.611 |
| 5. | 0.713 |
| 6. | 1.30 |
| 7. | 2.06 |
| 8. | 3.01 |
| 9. | 4.24 |
| 10. | 6.03 |
| 13. | 20.7 |
| 16. | 52.6 |
| 17.43 (max) | 94.8 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 16.99 | 0. .5 .8 1.25 2. |

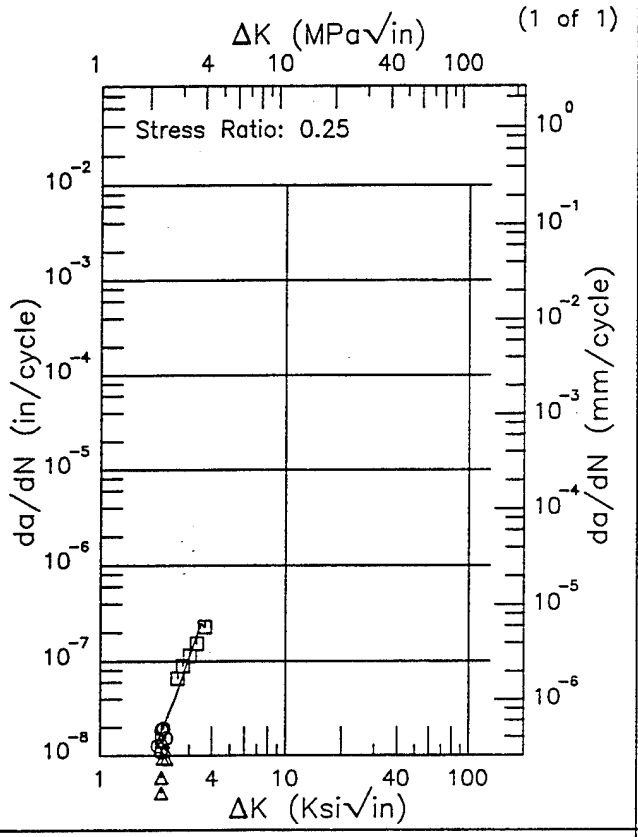
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

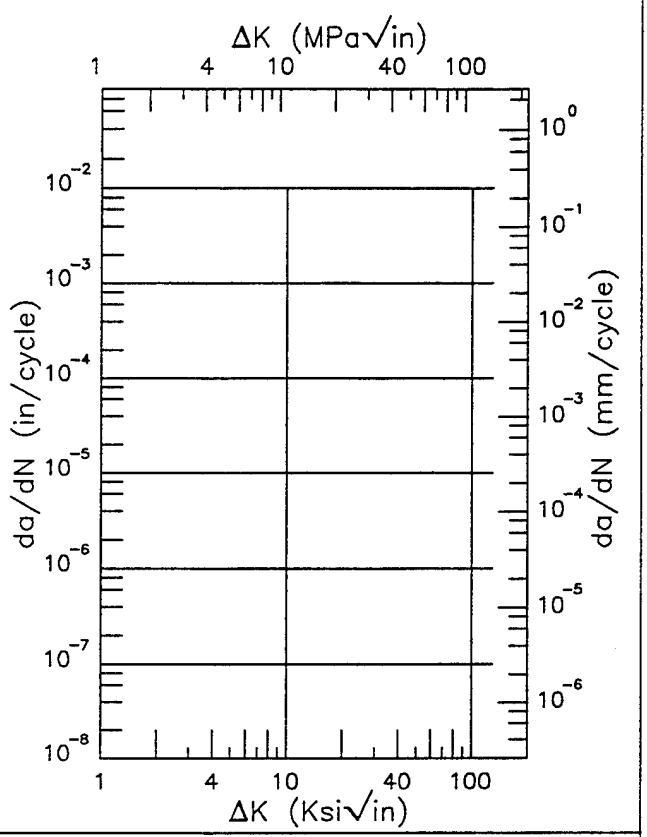
**Figure 7.9.3.1.12**

2124 R

Condition/Ht: T851
Form: 5.5 in. Plate
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 6 – 33 Hz
Environment: H.H.A.; RT

Yield Strength: 63.2 ksi
Ult. Strength:
Specimen Thk: 0.5 in.
Specimen Width: 6 in.
Ref: BL002




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.03 (min) | 0.0140 |
| 2.5 | 0.0393 |
| 3. | 0.111 |
| 3.5 | 0.252 |
| 3.64 (max) | 0.228 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 40.13 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

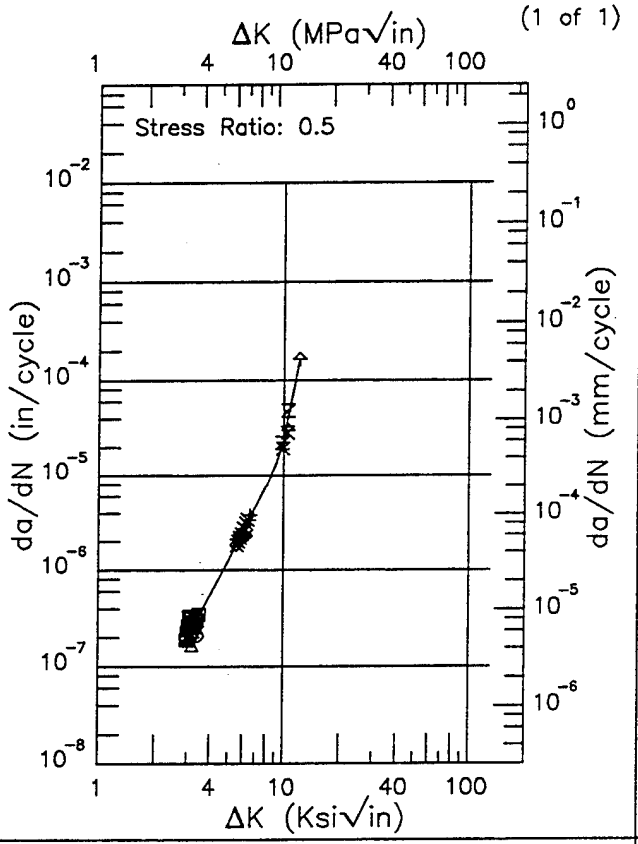
**Figure 7.9.3.1.13**

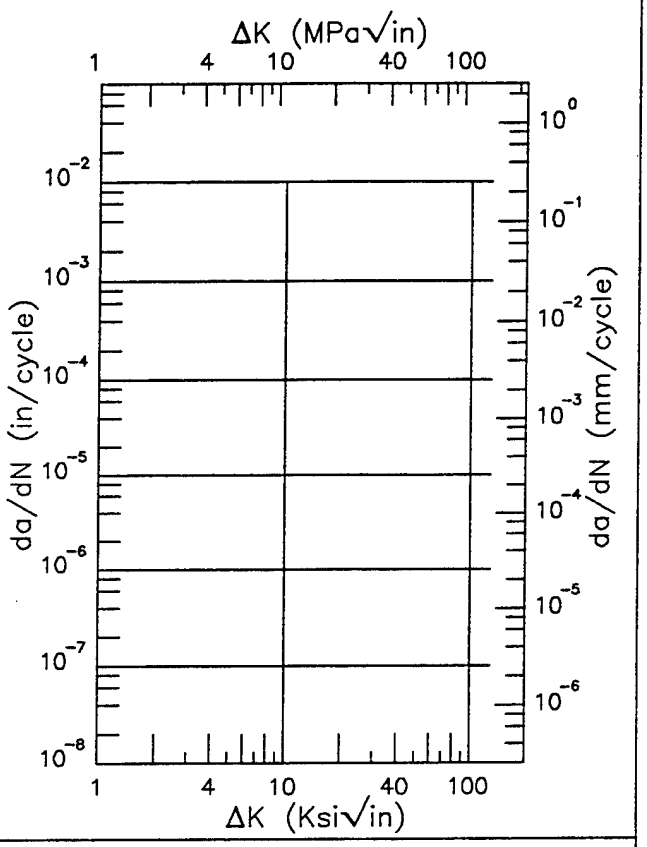
2124

R

Condition/Ht: T851
Form: 5.5 in. Plate
Specimen Type: CCP (max load specified)
Orientation: T-L
Frequency: 8 - 33 Hz
Environment: H.H.A.; RT

Yield Strength: 63.2 - 67.2 ksi
Ult. Strength:
Specimen Thk: 0.5 in.
Specimen Width: 4 in.
Ref: BL002




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.94 (min) | 0.205 |
| 3. | 0.217 |
| 3.5 | 0.343 |
| 4. | 0.541 |
| 5. | 1.25 |
| 6. | 2.55 |
| 7. | 4.65 |
| 8. | 7.71 |
| 9. | 12.8 |
| 10. | 23.9 |
| 12.09 (max) | 157. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

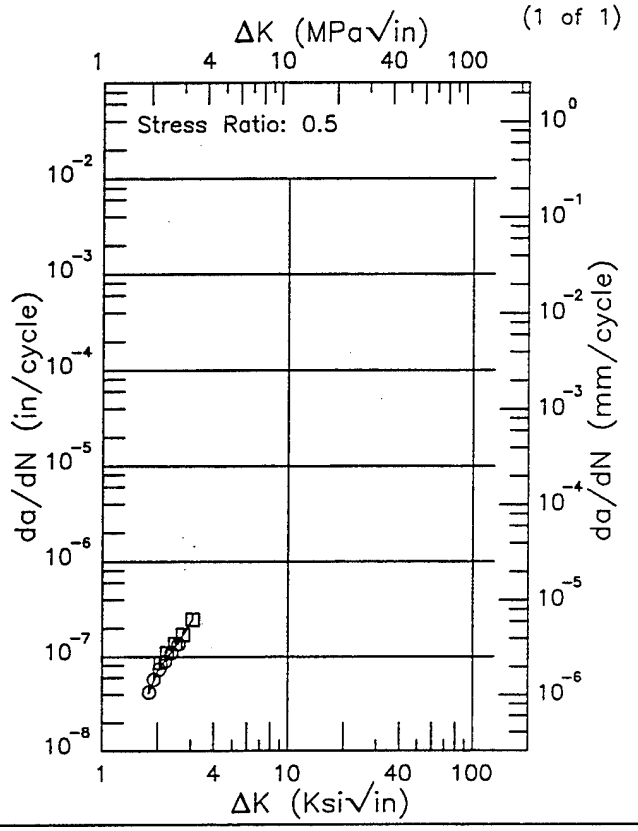
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 14.40 | 0. .5 .8 1.25 2. |

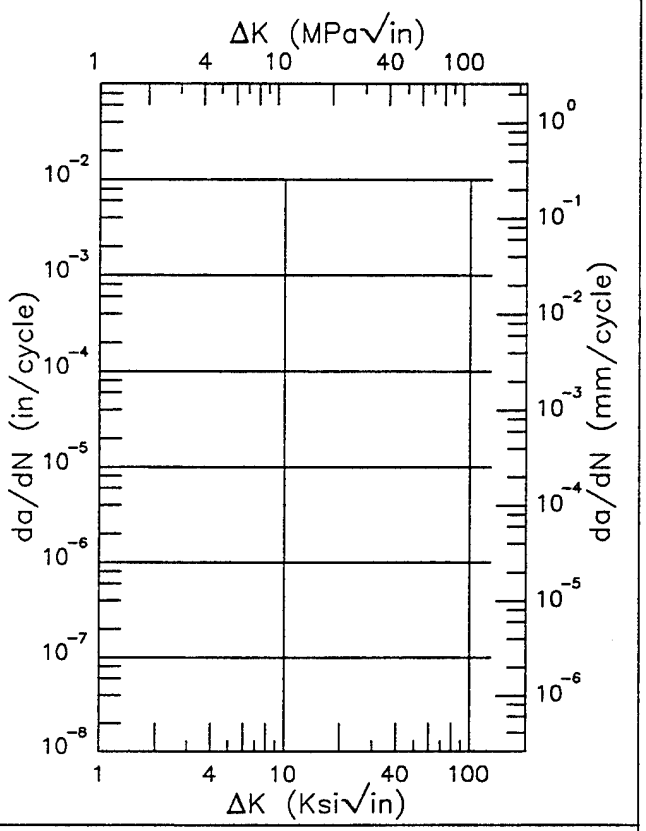
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.9.3.1.14**

Condition/Ht: T851
Form: 5.5 in. Plate
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 8 – 33 Hz
Environment: H.H.A.; RT

Yield Strength: 63.2 ksi
Ult. Strength:
Specimen Thk: 0.5 in.
Specimen Width: 6 in.
Ref: BL002




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 1.79 (min) | 0.0413 |
| 2. | 0.0718 |
| 2.5 | 0.131 |
| 3. | 0.231 |
| 3.05 (max) | 0.246 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 5.74 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

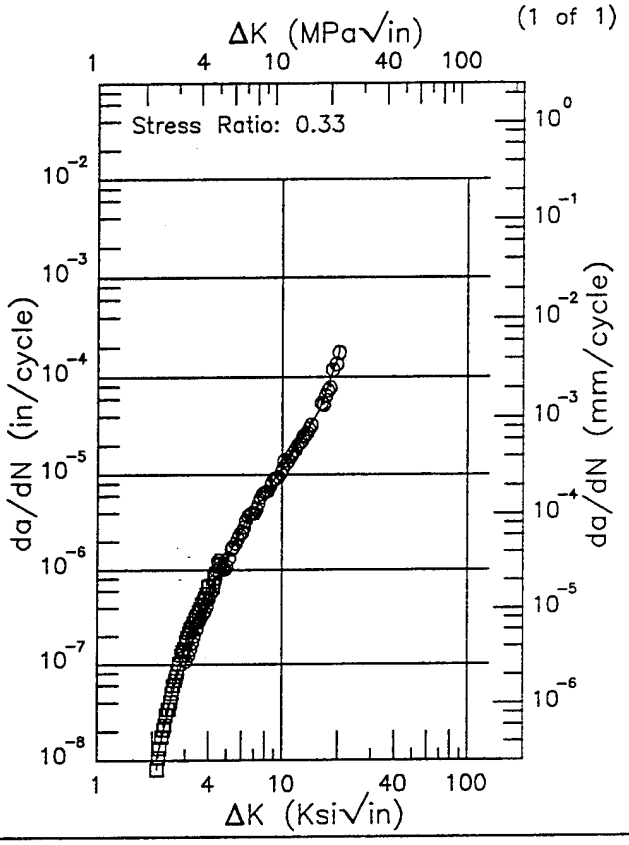
**Figure 7.9.3.1.15**

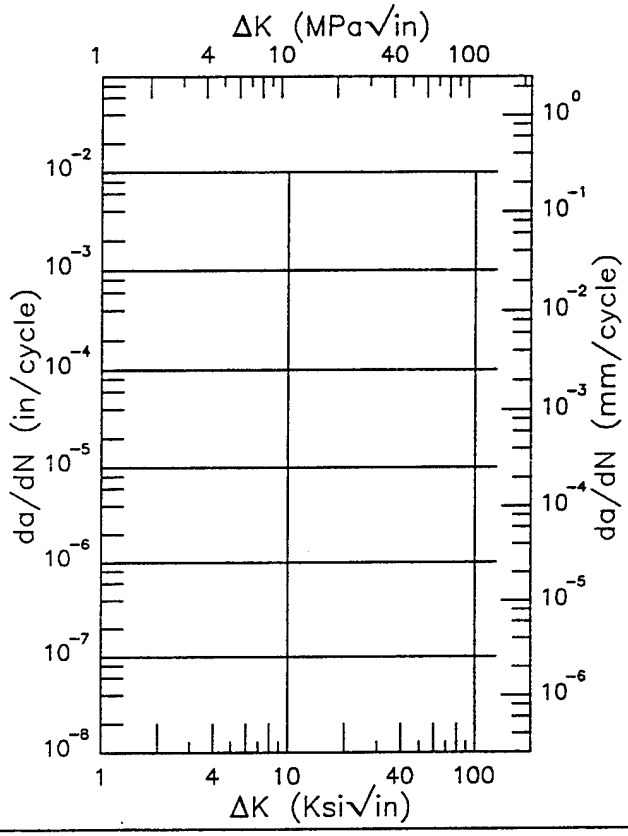
2124

R

Condition/Ht: T851
Form: 1.5 in. Plate
Specimen Type: WOL
Orientation: L–T
Frequency: 25 Hz
Environment: H.H.A.; RT

Yield Strength: 66 ksi
Ult. Strength: 71 ksi
Specimen Thk: 0.25 in.
Specimen Width: 2.55 in.
Ref: NC003




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.11 (min) | 0.0104 |
| 2.5 | 0.0419 |
| 3. | 0.140 |
| 3.5 | 0.322 |
| 4. | 0.589 |
| 5. | 1.37 |
| 6. | 2.48 |
| 7. | 4.02 |
| 8. | 6.13 |
| 9. | 8.81 |
| 10. | 12.0 |
| 13. | 24.0 |
| 16. | 48.1 |
| 20. | 163. |
| 20.19 (max) | 173. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 12.83 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.9.3.1.16**

## TABLE 7.9.3.3



## $K_{Iscc}$ SUMMARY FOR ALUMINUM ALLOY 2124

| Condition/Ht | Prod Form | Test Temp (°F) | Spec Or. | Yield Str (Ksi) | Envir. | Specimen | | | Prod Thk (in) | Crack (in) | $K_Q$ (Ksi√in) | $K_{Iscc}$ (Ksi√in) | Test Time (min) | Test Date | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Thick (in) | Design | Width (in) | | | | | | | |
| T851 | P | R.T. | L-T | 65 | S.T.W. | 1 | DCB | 5.5 | 3 | --- | 41 | 27.8 | 70320 | 1976 | RI006 |
| | | | | | | 1 | DCB | 5.5 | 3 | --- | 41 | 26.7 | 70320 | 1976 | RI006 |
| | | | | | | 1 | DCB | 5.5 | 3 | --- | 41 | >26 | 60300 | 1976 | RI006 |
| | | | | | | 1 | DCB | 5.5 | 3 | --- | 41 | 25.2 | 54360 | 1976 | RI006 |
| | | | S-L | 63 | S.T.W. | 1 | DCB | 5.5 | 3 | --- | 40 | >25 | 51720 | 1976 | RI006 |
| | | | | | | 1 | DCB | 5.5 | 3 | --- | 40 | 21 | 54360 | 1976 | RI006 |
| | | | | | | 1 | DCB | 5.5 | 3 | --- | 40 | 26 | 130620 | 1976 | RI006 |
| | | | | | | 1 | DCB | 5.5 | 3 | --- | 40 | 21 | 54360 | 1976 | RI006 |

# TABLE 7.10.1.1



## MEAN PLANE STRAIN FRACTURE TOUGHNESS FOR ALUMINUM 2000/6000 SERIES ALLOY 2214 AT ROOM TEMPERATURE

| Product Form | Condition/Heat Treatment | $K_{Ic}$ ($ksi\sqrt{in}$) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Specimen Orientation | | | | | | | | |
| | | L-T | | | T-L | | | S-L | | |
| | | Mean $K_{Ic}$ | Std Dev | n | Mean $K_{Ic}$ | Std Dev | n | Mean $K_{Ic}$ | Std Dev | n |
| Plate | T651 | 35.3 | 2.7 | 11 | 31.8 | 0.9 | 10 | --- | --- | --- |
| | T651 (417) | 36. | 3.4 | 10 | 29.4 | 1.8 | 15 | 26.6 | 1.8 | 2 |

# TABLE 7.10.2.1



## ALUMINUM 2214 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ Ksi√in.) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T651 | Plate | 1.75 | R.T. | L-T | 64.1 | 2.000 | 1.002 | NB | 0.963 | 0.75 | 35.10 | 35.3 | 2.7 | 1973 | 86213 |
| | | 1.75 | | | 64.1 | 2.000 | 1.002 | NB | 1.007 | 0.70 | 33.90 | | | 1973 | 86213 |
| | | 1.75 | | | 64.1 | 2.000 | 1.001 | NB | 0.955 | 0.70 | 34.00 | | | 1973 | 86213 |
| | | 1.75 | | | 64.3 | 2.000 | 1.002 | NB | 0.935 | 0.65 | 32.80 | | | 1973 | 86213 |
| | | 1.75 | | | 64.3 | 2.000 | 1.002 | NB | 0.955 | 0.63 | 32.40 | | | 1973 | 86213 |
| | | 1.75 | | | 64.3 | 2.000 | 1.002 | NB | 0.942 | 0.60 | 31.50 | | | 1973 | 86213 |
| | | 1.50 | | | 66.0 | 3.000 | 1.500 | CT | 1.638 | 0.80 | 37.30 | | | 1973 | 86213 |
| | | 1.50 | | | 66.0 | 3.000 | 1.500 | CT | 1.606 | 0.83 | 38.00 | | | 1973 | 86213 |
| | | 2.37 | | | 66.2 | 4.000 | 1.999 | CT | 1.977 | 0.70 | 35.00 | | | 1973 | 86213 |
| | | 1.50 | | | 66.4 | 3.000 | 1.499 | CT | 1.628 | 0.84 | 38.50 | | | 1973 | 86213 |
| | | 1.50 | | | 66.4 | 3.000 | 1.500 | CT | 1.602 | 0.90 | 39.90 | | | 1973 | 86213 |
| T651 | Plate | 1.75 | R.T. | T-L | 63.1 | 2.000 | 1.002 | NB | 0.985 | 0.67 | 32.70 | 31.8 | 0.9 | 1973 | 86213 |
| | | 1.75 | | | 63.1 | 2.000 | 1.001 | NB | 0.955 | 0.65 | 32.20 | | | 1973 | 86213 |
| | | 1.75 | | | 63.1 | 2.000 | 1.001 | NB | 1.048 | 0.67 | 32.60 | | | 1973 | 86213 |
| | | 1.75 | | | 63.2 | 2.000 | 1.001 | NB | 0.957 | 0.57 | 30.30 | | | 1973 | 86213 |
| | | 1.75 | | | 63.2 | 2.000 | 1.002 | NB | 1.033 | 0.64 | 32.00 | | | 1973 | 86213 |
| | | 1.75 | | | 63.2 | 2.000 | 1.001 | NB | 1.035 | 0.62 | 31.40 | | | 1973 | 86213 |
| | | 1.50 | | | 64.9 | 3.000 | 1.500 | CT | 1.576 | 0.58 | 31.20 | | | 1973 | 86213 |
| | | 1.50 | | | 64.9 | 3.000 | 1.499 | CT | 1.567 | 0.56 | 30.60 | | | 1973 | 86213 |
| | | 1.50 | | | 65.2 | 3.000 | 1.500 | CT | 1.597 | 0.64 | 32.90 | | | 1973 | 86213 |
| | | 1.50 | | | 65.2 | 3.000 | 1.500 | CT | 1.589 | 0.60 | 31.90 | | | 1973 | 86213 |

# TABLE 7.10.2.1 (CONTINUED)



## ALUMINUM 2214 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T651 | Plate | 1.50 | 84 | S-L | 62.7 | 1.000 | 0.500 | CT | 0.483 | 0.33 | 22.90 | 24.0 | 1.1 | 1973 | 86213 |
| | | 1.50 | | | 62.7 | 1.000 | 0.500 | CT | 0.495 | 0.39 | 24.90 | | | 1973 | 86213 |
| | | 1.50 | | | 64.6 | 0.990 | 0.500 | CT | 0.492 | 0.33 | 23.30 | | | 1973 | 86213 |
| | | 1.50 | | | 64.6 | 1.000 | 0.500 | CT | 0.485 | 0.37 | 25.00 | | | 1973 | 86213 |
| T651 (417) | Plate | 2.00 | R.T. | L-T | 63.9 | 3.000 | 1.500 | CT | 1.560 | 0.85 | 37.20 | 36.0 | 3.4 | 1973 | 86213 |
| | | 2.00 | | | 63.9 | 3.000 | 1.500 | CT | 1.586 | 0.89 | 38.20 | | | 1973 | 86213 |
| | | 3.00 | | | 64.8 | 3.000 | 1.500 | CT | 1.584 | 0.79 | 36.50 | | | 1973 | 86213 |
| | | 1.75 | | | 64.9 | 3.000 | 1.501 | CT | 1.533 | 1.15 | 44.10 | | | 1973 | 86213 |
| | | 2.37 | | | 66.2 | 4.000 | 1.998 | CT | 2.046 | 0.71 | 35.30 | | | 1973 | 86213 |
| | | 2.25 | | | 66.3 | 4.000 | 1.998 | CT | 2.123 | 0.68 | 34.70 | | | 1973 | 86213 |
| | | 3.93 | | | 66.3 | 3.000 | 1.500 | CT | 1.464 | 0.65 | 33.80 | | | 1973 | 86213 |
| | | 2.25 | | | 66.3 | 4.000 | 1.998 | CT | 2.021 | 0.67 | 34.40 | | | 1973 | 86213 |
| | | 3.93 | | | 66.3 | 3.000 | 1.501 | CT | 1.444 | 0.60 | 32.60 | | | 1973 | 86213 |
| | | 2.25 | | | 66.5 | 4.000 | 1.998 | CT | 2.047 | 0.62 | 33.00 | | | 1973 | 86213 |
| T651 (417) | Plate | 3.00 | R.T. | T-L | 62.6 | 3.000 | 1.500 | CT | 1.540 | 0.49 | 27.70 | 29.4 | 1.8 | 1973 | 86213 |
| | | 3.00 | | | 62.6 | 3.000 | 1.501 | CT | 1.549 | 0.53 | 28.90 | | | 1973 | 86213 |
| | | 2.00 | | | 63.2 | 3.000 | 1.501 | CT | 1.592 | 0.57 | 30.10 | | | 1973 | 86213 |
| | | 2.00 | | | 63.2 | 3.000 | 1.501 | CT | 1.568 | 0.55 | 29.60 | | | 1973 | 86213 |
| | | 1.50 | | | 63.6 | 3.000 | 1.501 | CT | 1.598 | 0.58 | 30.60 | | | 1973 | 86213 |
| | | 1.50 | | | 63.6 | 3.000 | 1.491 | CT | 1.606 | 0.62 | 31.60 | | | 1973 | 86213 |
| | | 2.25 | | | 64.2 | 4.010 | 1.999 | CT | 2.122 | 0.47 | 27.90 | | | 1973 | 86213 |
| | | 1.75 | | | 64.2 | 3.000 | 1.500 | CT | 1.623 | 0.63 | 32.30 | | | 1973 | 86213 |
| | | 2.25 | | | 64.2 | 4.000 | 1.999 | CT | 2.141 | 0.43 | 26.60 | | | 1973 | 86213 |

# TABLE 7.10.2.1 (CONTINUED)



## ALUMINUM 2214 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T651 (417) Cont'd | Plate Cont'd | 2.25 | R.T. Cont'd | T-L Cont'd | 64.2 | 4.000 | 1.999 | CT | 2.126 | 0.46 | 27.40 | Cont'd | Cont'd | 1973 | 86213 |
| | | 2.25 | | | 64.2 | 4.000 | 1.998 | CT | 2.179 | 0.48 | 28.00 | | | 1973 | 86213 |
| | | 2.37 | | | 64.7 | 4.000 | 1.999 | CT | 2.093 | 0.48 | 28.40 | | | 1973 | 86213 |
| | | 2.37 | | | 64.7 | 4.000 | 1.998 | CT | 2.150 | 0.48 | 28.40 | | | 1973 | 86213 |
| | | 3.93 | | | 64.9 | 3.000 | 1.501 | CT | 1.484 | 0.58 | 31.30 | | | 1973 | 86213 |
| | | 3.93 | | | 64.9 | 3.000 | 1.500 | CT | 1.484 | 0.60 | 31.70 | | | 1973 | 86213 |
| T651 (417) | Plate | 3.00 | R.T. | S-L | 59.8 | 2.000 | 1.001 | CT | 0.962 | 0.45 | 25.30 | 26.6 | 1.8 | 1973 | 86213 |
| | | 3.93 | | | 61.0 | 3.000 | 1.500 | CT | 1.532 | 0.52 | 27.90 | | | 1973 | 86213 |
| T651 (417) | Plate | 1.50 | 82 | S-L | 59.2 | 1.000 | 0.499 | CT | 0.486 | 0.41 | 24.00 | 22.8 | 1.3 | 1973 | 86213 |
| | | 1.50 | | | 59.2 | 1.000 | 0.500 | CT | 0.486 | 0.39 | 23.30 | | | 1973 | 86213 |
| | | 3.00 | | | 59.8 | 1.000 | 0.500 | CT | 0.490 | 0.32 | 21.30 | | | 1973 | 86213 |
| | | 3.00 | | | 59.8 | 1.000 | 0.498 | CT | 0.491 | 0.32 | 21.30 | | | 1973 | 86213 |
| | | 1.50 | | | 60.0 | 1.000 | 0.500 | CT | 0.479 | 0.35 | 22.60 | | | 1973 | 86213 |
| | | 2.00 | | | 60.0 | 1.000 | 0.501 | CT | 0.474 | 0.29 | 20.50 | | | 1973 | 86213 |
| | | 1.75 | | | 60.0 | 1.000 | 0.499 | CT | 0.480 | 0.34 | 22.00 | | | 1973 | 86213 |
| | | 1.50 | | | 60.0 | 1.000 | 0.500 | CT | 0.490 | 0.38 | 23.50 | | | 1973 | 86213 |
| | | 2.00 | | | 60.0 | 1.000 | 0.501 | CT | 0.477 | 0.38 | 23.40 | | | 1973 | 86213 |
| | | 2.00 | | | 60.2 | 1.000 | 0.500 | CT | 0.479 | 0.39 | 23.70 | | | 1973 | 86213 |
| | | 1.75 | | | 61.1 | 1.000 | 0.501 | CT | 0.475 | 0.39 | 24.00 | | | 1973 | 86213 |
| | | 1.75 | | | 61.1 | 1.000 | 0.499 | CT | 0.471 | 0.40 | 24.50 | | | 1973 | 86213 |

# TABLE 7.10.2.1 (CONCLUDED)



| ALUMINUM 2214 $K_{Ic}$ | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ MEAN | STAN DEV | | |
| T651 (417) | Plate | 2.25 | 84 | S-L | 63.4 | 1.500 | 0.749 | CT | 0.757 | 0.37 | 24.40 | 23.7 | 1.5 | 1973 | 86213 |
| | | 2.25 | | | 63.4 | 1.500 | 0.749 | CT | 0.770 | 0.37 | 24.30 | | | 1973 | 86213 |
| | | 2.37 | | | 64.5 | 1.500 | 0.750 | CT | 0.782 | 0.29 | 22.00 | | | 1973 | 86213 |
| | | 2.37 | | | 64.5 | 1.500 | 0.749 | CT | 0.734 | 0.41 | 26.00 | | | 1973 | 86213 |
| | | 2.25 | | | 65.3 | 1.500 | 0.750 | CT | 0.739 | 0.29 | 22.30 | | | 1973 | 86213 |
| | | 2.25 | | | 65.3 | 1.500 | 0.750 | CT | 0.799 | 0.31 | 23.00 | | | 1973 | 86213 |

# TABLE 7.11.1.1

## MEAN PLANE STRAIN FRACTURE TOUGHNESS FOR ALUMINUM 2000/6000 SERIES ALLOY 2219 AT ROOM TEMPERATURE

| Product Form | Condition/Heat Treatment | $K_{Ic}$ ($ksi\sqrt{in}$) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Specimen Orientation | | | | | | | | |
| | | L-T | | | T-L | | | S-L | | |
| | | Mean $K_{Ic}$ | Std Dev | n | Mean $K_{Ic}$ | Std Dev | n | Mean $K_{Ic}$ | Std Dev | n |
| Plate | T851 | 33.4 | 2.3 | 48 | 29.7 | 3.2 | 78 | 23. | 2.4 | 14 |
| | T87 | 28. | 3. | 6 | 22. | 0.4 | 2 | --- | --- | --- |
| | T87-300F 100HRS | 34.8 | 0.4 | 2 | --- | --- | --- | --- | --- | --- |
| Forging | T851 | --- | --- | --- | --- | --- | --- | 25.6 | 3.1 | 85 |
| | T852 | 39.2 | 3.2 | 25 | 27.1 | 2.2 | 24 | 25.3 | 3.1 | 60 |

## TABLE 7.11.1.2.1



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2219 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: Distilled Water**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* ($Ksi\sqrt{in}$) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.08 | 1 | | | 8.09 | 56.79 | | |

## TABLE 7.11.1.2.2

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2219 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: Dry Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level ($Ksi\sqrt{in}$) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.08 | 0.1 | | | 7.1 | | | |
| | | 0.08 | 1 | | | 8.48 | | | |
| | | 0.08 | 1 | | | 7.62 | 55.01 | | |
| | | 0.08 | 6 | | | 3.44 | 25.65 | | |
| | | 0.08 | 6 | | | 7.72 | 57.01 | | |
| | | 0.08 | 6 | | 0.48 | 4.35 | 27.56 | | |
| | | 0.08 | 6 | | | 2.98 | 30.89 | | |
| | | 0.08 | 63.3 | | 0.28 | 4.67 | | | |
| | | 0.3 | 6 | | 0.9 | | | | |
| | | 0.5 | 6 | | 0.73 | 8.26 | | | |
| T8511 | EXTRUDED BAR | 0.08 | 6 | | 0.22 | 2.19 | | | |
| | | 0.3 | 6 | | | 6.57 | | | |
| T852 | FORGING | 0.33 | 2-20 | | | 4.28 | 37.62 | | |
| | BILLET | 0.08 | 6 | | | 2.35 | | | |

## TABLE 7.11.1.2.3



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2219 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: F.C.S.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* ($Ksi\sqrt{in}$) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.08 | 1 | | | 7.06 | 51.16 | | |

## TABLE 7.11.1.2.4

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2219 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level (Ksi√in) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | -1 | 6 | | | 6.96 | | | |
| | | -1 | 1-20 | | | 5.68 | 48.49 | | |
| | | -0.5 | 5.2 | | | 6.89 | | | |
| | | -0.3 | 6 | | | 7.01 | 51.71 | | |
| | | -0.1 | 6 | | | 6.87 | 43.87 | | |
| | | 0. | 5.2 | | | 8.31 | 53.58 | | |
| | | 0. | 6 | | | 4.29 | 33.74 | | |
| | | 0.01 | 3 | | | | 43.24 | | |
| | | 0.01 | 6 | | | | 46.17 | | |
| | | 0.04 | 1-20 | | | 4.05 | | | |
| | | 0.05 | 1-20 | | | 5.18 | 48.49 | | |
| | | 0.05 | 1-20 | | | 3.58 | | | |
| | | 0.05 | 1-20 | | | 2.47 | 33.87 | | |
| | | 0.08 | 6 | | | 5.19 | | | |
| | | 0.1 | 1-20 | | | | 44.89 | | |

## TABLE 7.11.1.2.4 (CONCLUDED)



### FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2219 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.6 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.2 | 6 | | | | 91.24 | | |
| | | 0.3 | 6 | | 0.7 | 7.7 | 75.84 | | |
| | | 0.5 | 1-20 | | | 10.13 | | | |
| | | 0.6 | 1-20 | | | 12.81 | | | |
| | | 0.7 | 6 | | 1.37 | 17.57 | | | |

## TABLE 7.11.1.2.5

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2219 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: S.C.S.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* ($Ksi\sqrt{in}$) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.08 | 1 | | | 7.13 | | | |

## TABLE 7.11.1.2.6



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2219 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: S.T.W.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.08 | 0.1 | | | | 58.37 | | |
| | | 0.08 | 1 | | 0.63 | 7.5 | 65.76 | | |
| | | 0.08 | 6 | | | 9.94 | 53 | | |
| | | 0.3 | 1 | | | 8.63 | 62.98 | | |
| | | 0.5 | 1 | | 0.78 | 11.62 | | | |
| T8511 | EXTRUDED BAR | 0.08 | 1 | | | 7.25 | | | |
| T852 | FORGING | 0.33 | 20 | | | 6.28 | | | |
| | | 0.33 | 20 | | | 10.16 | | | |

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2219 AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: Dry Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.08 | 6 | | | 6.7 | 79.78 | | |
| T8511 | EXTRUDED BAR | 0.08 | 6 | | | 4.09 | | | |
| T852 | FORGING | 0.33 | 2-20 | | | 6.72 | 644.02 | | |
| | | 0.33 | 40 | | 0.36 | 3.72 | | | |

## TABLE 7.11.1.2.8



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2219 AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: H.H.A.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T852 | FORGING | 0.33 | 2-20 | | | 10.68 | | | |

## TABLE 7.11.1.2.9



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2219 AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: S.T.W.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.08 | 1 | | 0.95 | 11.78 | 72.45 | | |
| T8511 | EXTRUDED BAR | 0.08 | 1 | | 0.64 | 7.29 | | | |
| T852 | FORGING | 0.33 | 2-20 | | | 12.75 | 202.23 | | |
| | | 0.33 | 20 | | | 10.31 | | | |

## TABLE 7.11.1.2.10



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2219 AT ROOM TEMPERATURE

**ORIENTATION: S-L** **ENVIRONMENT: Dry Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level ($Ksi\sqrt{in}$) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T852 | FORGING | 0.33 | 2-20 | | | 8.09 | | | |

## TABLE 7.11.1.2.11



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2219 AT ROOM TEMPERATURE

**ORIENTATION: S-L** **ENVIRONMENT: H.H.A.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T852 | FORGING | 0.33 | 2-20 | | | 14.67 | | | |

## TABLE 7.11.1.2.12



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2219 AT ROOM TEMPERATURE

**ORIENTATION: S-L** **ENVIRONMENT: S.T.W.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* ($Ksi\sqrt{in}$) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T852 | FORGING | 0.33 | 2-20 | | | 19.63 | | | |

## TABLE 7.11.1.2.13



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2219 AT ROOM TEMPERATURE

**ORIENTATION: Unspecified** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 60.0 | 100.0 |
| T851 | Unspecified | -1 | 5 | | | 4.31 | 29.14 | | |
| | | 0.1 | 5 | | 0.48 | 7.07 | | | |
| | | 0.3 | 30 | | 0.7 | 6.81 | | | |
| | | 0.5 | 30 | | | 8.29 | | | |
| | | 0.8 | 5 | 0.12 | 3.08 | | | | |

# TABLE 7.11.2.1



## ALUMINUM 2219 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ Ksi√in.) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 | Plate | 1.37 | -112 | T-L | 55.0 | 3.000 | 1.405 | NB | 1.612 | 1.00 | 34.70 | --- | --- | 1973 | 86213 |
| T851 | Plate | 3.00 | R.T. | L-T | 50.0 | 8.000 | 2.000 | CT | --- | 1.22 | 35.00 | 33.4 | 2.3 | 1974 | 90011 |
| | | 3.00 | | | 50.1 | 5.044 | 1.503 | CT | 2.623 | 1.29 | 36.50 | | | 1978 | MPC01 |
| | | 3.00 | | | 50.1 | 4.019 | 1.999 | CT | 2.090 | 1.33 | 36.90 | | | 1978 | MPC01 |
| | | 3.00 | | | 50.1 | 6.016 | 1.998 | CT | 3.068 | 1.36 | 37.10 | | | 1978 | MPC01 |
| | | 3.00 | | | 50.1 | 5.010 | 1.987 | CT | 2.703 | 1.28 | 35.90 | | | 1973 | 86213 |
| | | 3.00 | | | 50.1 | 5.010 | 1.503 | CT | 2.623 | 1.33 | 36.50 | | | 1973 | 86213 |
| | | 3.00 | | | 50.1 | 4.000 | 1.999 | CT | 2.090 | 1.28 | 35.90 | | | 1973 | 86213 |
| | | 3.00 | | | 50.1 | 6.000 | 1.999 | CT | 3.137 | 1.45 | 38.10 | | | 1973 | 86213 |
| | | 3.00 | | | 50.1 | 5.010 | 2.000 | CT | 2.680 | 1.28 | 35.90 | | | 1973 | 86213 |
| | | 3.00 | | | 50.1 | 4.000 | 1.998 | CT | 2.095 | 1.28 | 35.80 | | | 1973 | 86213 |
| | | 1.37 | | | 51.0 | 2.977 | 1.374 | CT | 1.518 | 0.93 | 31.30 | | | 1978 | MPC01 |
| | | 1.37 | | | 51.0 | 2.982 | 1.374 | CT | 1.521 | 0.93 | 31.30 | | | 1978 | MPC01 |
| | | 1.37 | | | 51.0 | 3.000 | 1.420 | NB | 1.600 | 1.40 | 38.10 | | | 1973 | 86213 |
| | | 1.37 | | | 51.0 | 3.000 | 1.420 | NB | 1.520 | 1.14 | 34.50 | | | 1973 | 86213 |
| | | 1.37 | | | 51.0 | 2.978 | 1.374 | CT | 1.519 | 0.87 | 30.40 | | | 1978 | MPC01 |
| | | 1.37 | | | 51.0 | 3.000 | 1.420 | NB | 1.550 | 1.16 | 34.80 | | | 1973 | 86213 |
| | | 2.62 | | | 51.6 | 3.004 | 1.500 | CT | 1.562 | 0.87 | 30.90 | | | 1978 | MPC01 |
| | | 2.62 | | | 51.6 | 3.027 | 1.500 | CT | 1.574 | 0.93 | 31.80 | | | 1978 | MPC01 |
| | | 3.25 | | | 51.7 | 4.989 | 1.750 | CT | 2.594 | 1.12 | 34.90 | | | 1978 | MPC01 |
| | | 1.37 | | | 52.0 | 3.022 | 1.376 | CT | 1.481 | 0.87 | 30.70 | | | 1978 | MPC01 |
| | | 1.37 | | | 52.0 | 2.975 | 1.376 | CT | 1.547 | 0.90 | 31.20 | | | 1978 | MPC01 |
| | | 3.00 | | | 52.0 | 5.000 | 1.498 | CT | 2.567 | 1.08 | 34.20 | | | 1973 | 86213 |

# TABLE 7.11.2.1 (CONTINUED)



## ALUMINUM 2219 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 3.00 | R.T. Cont'd | L-T Cont'd | 52.0 | 5.000 | 1.498 | CT | 2.566 | 1.20 | 36.00 | Cont'd | Cont'd | 1973 | 86213 |
| | | 3.00 | | | 52.4 | 3.026 | 1.499 | CT | 1.543 | 0.99 | 33.20 | | | 1978 | MPC01 |
| | | 3.00 | | | 52.4 | 2.996 | 1.499 | CT | 1.558 | 0.96 | 32.80 | | | 1978 | MPC01 |
| | | 2.90 | | | 52.4 | 3.022 | 1.500 | CT | 1.632 | 0.96 | 32.80 | | | 1978 | MPC01 |
| | | 3.00 | | | 52.5 | 2.977 | 1.499 | CT | 1.548 | 1.02 | 33.80 | | | 1978 | MPC01 |
| | | 3.00 | | | 52.5 | 2.987 | 1.499 | CT | 1.553 | 1.02 | 33.80 | | | 1978 | MPC01 |
| | | 2.90 | | | 52.5 | 4.987 | 2.503 | CT | 2.743 | 1.02 | 33.60 | | | 1978 | MPC01 |
| | | 2.90 | | | 52.5 | 4.973 | 2.000 | CT | 2.586 | 0.99 | 33.40 | | | 1978 | MPC01 |
| | | 1.75 | | | 52.6 | 4.962 | 1.751 | CT | 2.630 | 0.84 | 30.80 | | | 1978 | MPC01 |
| | | 2.90 | | | 52.8 | 4.987 | 2.001 | CT | 2.593 | 0.90 | 31.80 | | | 1978 | MPC01 |
| | | 2.90 | | | 53.0 | 5.045 | 2.000 | CT | 2.573 | 0.90 | 32.20 | | | 1978 | MPC01 |
| | | 2.90 | | | 53.0 | 3.027 | 1.503 | CT | 1.665 | 0.81 | 30.70 | | | 1978 | MPC01 |
| | | 3.00 | | | 53.4 | 5.010 | 1.997 | CT | 2.672 | 0.87 | 31.50 | | | 1973 | 86213 |
| | | 2.90 | | | 53.5 | 4.965 | 2.002 | CT | 2.582 | 0.87 | 31.60 | | | 1978 | MPC01 |
| | | 2.90 | | | 53.5 | 5.018 | 2.002 | CT | 2.559 | 0.90 | 32.20 | | | 1978 | MPC01 |
| | | 2.90 | | | 53.5 | 4.967 | 2.501 | CT | 2.682 | 0.93 | 32.90 | | | 1978 | MPC01 |
| | | 2.90 | | | 53.6 | 4.989 | 2.501 | CT | 2.644 | 0.99 | 33.80 | | | 1978 | MPC01 |
| | | 2.90 | | | 53.6 | 4.954 | 2.002 | CT | 2.576 | 0.96 | 33.60 | | | 1978 | MPC01 |
| | | 3.00 | | | 53.7 | 4.010 | 1.998 | CT | 2.043 | 0.79 | 30.10 | | | 1973 | 86213 |
| | | 1.00 | | | 53.8 | 1.990 | 0.965 | CT | 1.035 | 0.81 | 30.90 | | | 1978 | MPC01 |
| | | 1.00 | | | 53.8 | 1.990 | 0.965 | CT | 1.015 | 0.78 | 30.60 | | | 1978 | MPC01 |
| | | 1.00 | | | 53.8 | 2.016 | 0.965 | CT | 1.008 | 0.78 | 30.60 | | | 1978 | MPC01 |

# TABLE 7.11.2.1 (CONTINUED)



## ALUMINUM 2219 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 3.00 | R.T. Cont'd | L-T Cont'd | 54.0 | 8.000 | 1.996 | CT | 3.991 | 1.03 | 34.70 | Cont'd | Cont'd | 1973 | 85836 |
| | | 2.90 | | | 54.3 | 4.969 | 2.002 | CT | 2.584 | 0.81 | 31.20 | | | 1978 | MPC01 |
| | | 2.90 | | | 54.3 | 5.006 | 2.501 | CT | 2.703 | 0.81 | 31.00 | | | 1978 | MPC01 |
| | | 2.50 | | | 55.7 | 4.968 | 1.753 | CT | 2.633 | 0.96 | 34.60 | | | 1978 | MPC01 |
| T851 | Plate | 1.37 | R.T. | T-L | 46.2 | 3.000 | 1.402 | NB | 1.524 | 1.10 | 32.60 | 29.7 | 3.2 | 1973 | 86213 |
| | | 1.37 | | | 47.4 | 1.994 | 1.000 | CT | 1.017 | 0.93 | 29.20 | | | 1978 | MPC01 |
| | | 1.75 | | | 48.0 | 3.000 | 1.508 | CT | 1.611 | 1.28 | 34.40 | | | 1972 | 84306 |
| | | 1.75 | | | 48.0 | 5.000 | 1.504 | CT | 2.615 | 1.48 | 37.00 | | | 1972 | 84306 |
| | | 1.75 | | | 48.0 | 5.000 | 1.504 | CT | 2.609 | 1.48 | 37.00 | | | 1972 | 84306 |
| | | 1.75 | | | 48.0 | 2.990 | 1.508 | CT | 1.573 | 1.24 | 33.90 | | | 1972 | 84306 |
| | | 1.37 | | | 49.2 | 2.985 | 1.405 | NB | 1.582 | 0.81 | 28.20 | | | 1978 | MPC01 |
| | | 1.37 | | | 49.2 | 3.016 | 1.402 | NB | 1.538 | 0.99 | 31.10 | | | 1978 | MPC01 |
| | | 1.37 | | | 49.2 | 2.974 | 1.402 | NB | 1.487 | 0.99 | 31.30 | | | 1978 | MPC01 |
| | | 1.37 | | | 49.2 | 2.974 | 1.405 | NB | 1.487 | 0.84 | 28.70 | | | 1978 | MPC01 |
| | | 1.37 | | | 49.2 | 3.000 | 1.403 | NB | 1.526 | 1.09 | 32.50 | | | 1973 | 86213 |
| | | 1.37 | | | 49.2 | 3.008 | 1.403 | NB | 1.534 | 1.08 | 32.80 | | | 1978 | MPC01 |
| | | 1.37 | | | 49.2 | 2.991 | 1.402 | NB | 1.585 | 1.08 | 32.80 | | | 1978 | MPC01 |
| | | 1.37 | | | 49.2 | 3.000 | 1.405 | NB | 1.535 | 0.94 | 30.20 | | | 1973 | 86213 |
| | | 3.25 | | | 49.2 | 4.977 | 1.750 | CT | 2.638 | 0.84 | 28.90 | | | 1978 | MPC01 |
| | | 1.37 | | | 49.2 | 3.000 | 1.405 | NB | 1.634 | 0.92 | 29.90 | | | 1973 | 86213 |
| | | 1.37 | | | 49.2 | 3.000 | 1.402 | NB | 1.584 | 1.10 | 32.70 | | | 1973 | 86213 |
| | | 1.37 | | | 49.2 | 3.000 | 1.402 | NB | 1.605 | 1.16 | 33.50 | | | 1973 | 86213 |

# TABLE 7.11.2.1 (CONTINUED)



## ALUMINUM 2219 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 1.37 | R.T. Cont'd | T-L Cont'd | 49.3 | 2.973 | 1.000 | CT | 1.546 | 0.90 | 29.70 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 1.38 | | | 49.3 | 3.000 | 1.380 | CT | 1.538 | 0.88 | 29.30 | | | 1972 | 82880 |
| | | 1.37 | | | 49.3 | 2.990 | 1.000 | CT | 1.555 | 0.96 | 30.80 | | | 1978 | MPC01 |
| | | 1.37 | | | 49.3 | 3.002 | 1.000 | CT | 1.561 | 0.90 | 29.80 | | | 1978 | MPC01 |
| | | 1.37 | | | 49.3 | 2.000 | 0.875 | CT | 1.020 | 0.81 | 28.30 | | | 1978 | MPC01 |
| | | 1.37 | | | 49.3 | 2.014 | 0.875 | CT | 1.007 | 0.78 | 27.90 | | | 1978 | MPC01 |
| | | 1.37 | | | 49.3 | 2.975 | 1.125 | CT | 1.547 | 0.87 | 29.50 | | | 1978 | MPC01 |
| | | 1.38 | | | 49.3 | 2.000 | 1.000 | CT | 1.057 | 0.79 | 27.70 | | | 1972 | 82880 |
| | | 1.37 | | | 49.3 | 3.025 | 1.125 | CT | 1.573 | 0.87 | 29.30 | | | 1978 | MPC01 |
| | | 1.38 | | | 49.3 | 2.000 | 1.000 | CT | 1.082 | 0.77 | 27.40 | | | 1972 | 82880 |
| | | 1.38 | | | 49.3 | 3.000 | 1.380 | CT | 1.557 | 0.86 | 28.90 | | | 1972 | 82880 |
| | | 1.37 | | | 49.3 | 2.012 | 0.875 | CT | 1.026 | 0.84 | 28.70 | | | 1978 | MPC01 |
| | | 3.00 | | | 49.3 | 4.000 | 2.001 | CT | 2.077 | 1.07 | 32.30 | | | 1973 | 86213 |
| | | 1.38 | | | 49.3 | 3.000 | 1.380 | CT | 1.555 | 0.86 | 28.90 | | | 1972 | 82880 |
| | | 1.37 | | | 49.3 | 1.494 | 0.750 | CT | 0.792 | 0.67 | 25.80 | | | 1978 | MPC01 |
| | | 1.37 | | | 49.3 | 3.006 | 1.125 | CT | 1.563 | 0.90 | 29.70 | | | 1978 | MPC01 |
| | | 1.38 | | | 49.3 | 2.000 | 1.000 | CT | 1.069 | 0.77 | 27.40 | | | 1972 | 82880 |
| | | 3.00 | | | 49.3 | 4.000 | 1.999 | CT | 2.085 | 1.05 | 32.00 | | | 1973 | 86213 |
| | | 1.37 | | | 49.7 | 2.004 | 1.000 | CT | 1.042 | 0.75 | 27.40 | | | 1978 | MPC01 |
| | | 1.37 | | | 49.7 | 2.010 | 1.000 | CT | 1.045 | 0.84 | 29.10 | | | 1978 | MPC01 |
| | | 1.37 | | | 49.7 | 2.004 | 0.999 | CT | 1.042 | 0.81 | 28.60 | | | 1978 | MPC01 |
| | | 2.00 | | | 50.0 | 5.000 | 1.500 | CT | --- | 1.30 | 36.00 | | | 1974 | 90011 |

# TABLE 7.11.2.1 (CONTINUED)



## ALUMINUM 2219 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ Ksi√in.) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 3.00 | R.T. Cont'd | T-L Cont'd | 50.0 | 8.000 | 2.000 | CT | --- | 1.15 | 34.00 | Cont'd | Cont'd | 1974 | 90011 |
| | | 2.00 | | | 50.0 | 5.000 | 1.500 | CT | --- | 1.15 | 34.00 | | | 1974 | 90011 |
| | | 3.25 | | | 50.1 | 4.959 | 1.750 | CT | 2.628 | 0.81 | 28.80 | | | 1978 | MPC01 |
| | | 3.00 | | | 50.6 | 3.000 | 1.498 | CT | 1.550 | 0.72 | 27.20 | | | 1973 | 86213 |
| | | 3.00 | | | 50.6 | 5.000 | 1.497 | CT | 2.582 | 0.82 | 28.90 | | | 1973 | 86213 |
| | | 3.00 | | | 50.6 | 3.000 | 1.498 | CT | 1.550 | 0.71 | 26.90 | | | 1973 | 86213 |
| | | 3.00 | | | 50.6 | 5.000 | 1.497 | CT | 2.575 | 0.80 | 28.60 | | | 1973 | 86213 |
| | | 1.37 | | | 50.8 | 3.026 | 1.375 | CT | 1.543 | 0.78 | 28.80 | | | 1978 | MPC01 |
| | | 1.37 | | | 50.8 | 3.000 | 1.420 | NB | 1.500 | 0.81 | 29.00 | | | 1978 | MPC01 |
| | | 1.37 | | | 50.8 | 2.980 | 1.420 | NB | 1.520 | 0.93 | 31.40 | | | 1978 | MPC01 |
| | | 1.37 | | | 50.8 | 2.981 | 1.420 | NB | 1.550 | 1.29 | 36.60 | | | 1978 | MPC01 |
| | | 1.37 | | | 50.8 | 2.973 | 1.375 | CT | 1.546 | 0.72 | 27.50 | | | 1978 | MPC01 |
| | | 1.37 | | | 50.8 | 3.000 | 1.420 | NB | 1.560 | 1.05 | 33.30 | | | 1978 | MPC01 |
| | | 1.00 | | | 51.2 | 1.993 | 0.965 | CT | 1.096 | 0.75 | 28.40 | | | 1978 | MPC01 |
| | | 1.00 | | | 51.2 | 2.013 | 0.963 | CT | 1.067 | 0.78 | 28.90 | | | 1978 | MPC01 |
| | | 1.00 | | | 51.2 | 1.986 | 0.964 | CT | 1.013 | 0.72 | 28.00 | | | 1978 | MPC01 |
| | | 2.90 | | | 51.6 | 2.991 | 1.249 | CT | 1.645 | 0.78 | 29.40 | | | 1978 | MPC01 |
| | | 2.90 | | | 51.8 | 4.993 | 2.501 | CT | 2.696 | 0.70 | 27.90 | | | 1978 | MPC01 |
| | | 2.90 | | | 51.8 | 4.975 | 2.002 | CT | 2.587 | 0.62 | 26.20 | | | 1978 | MPC01 |
| | | 2.90 | | | 51.9 | 3.030 | 1.504 | CT | 1.697 | 0.65 | 26.80 | | | 1978 | MPC01 |
| | | 2.90 | | | 51.9 | 5.017 | 2.002 | CT | 2.609 | 0.70 | 27.60 | | | 1978 | MPC01 |
| | | 2.90 | | | 52.0 | 4.996 | 2.002 | CT | 2.598 | 0.72 | 28.20 | | | 1978 | MPC01 |

# TABLE 7.11.2.1 (CONTINUED)



| ALUMINUM 2219 $K_{Ic}$ | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ MEAN | STAN DEV | | |
| T851 Cont'd | Plate Cont'd | 2.90 | R.T. Cont'd | T-L Cont'd | 52.0 | 5.033 | 2.002 | CT | 2.617 | 0.65 | 27.00 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 2.90 | | | 52.0 | 5.013 | 2.501 | CT | 2.657 | 0.70 | 28.00 | | | 1978 | MPC01 |
| | | --- | | | 52.0 | 7.990 | 1.992 | CT | 4.067 | 1.05 | 33.70 | | | 1973 | 85836 |
| | | 2.90 | | | 52.2 | 5.008 | 2.002 | CT | 2.604 | 0.75 | 28.90 | | | 1978 | MPC01 |
| | | 3.00 | | | 52.5 | 4.010 | 1.998 | CT | 2.083 | 0.81 | 29.90 | | | 1973 | 86213 |
| | | 3.00 | | | 52.7 | 5.000 | 1.999 | CT | 2.672 | 0.90 | 31.70 | | | 1973 | 86213 |
| | | 2.90 | | | 52.8 | 4.985 | 2.500 | CT | 2.692 | 0.60 | 26.00 | | | 1978 | MPC01 |
| | | 2.90 | | | 52.8 | 5.006 | 2.002 | CT | 2.603 | 0.67 | 27.50 | | | 1978 | MPC01 |
| | | 2.90 | | | 53.1 | 5.000 | 2.001 | CT | 2.650 | 0.67 | 28.00 | | | 1978 | MPC01 |
| | | 2.90 | | | 53.1 | 5.029 | 2.504 | CT | 2.766 | 0.70 | 28.30 | | | 1978 | MPC01 |
| | | 2.50 | | | 55.6 | 4.987 | 1.751 | CT | 2.643 | 0.60 | 27.30 | | | 1978 | MPC01 |
| | | 1.37 | | | 56.0 | 2.004 | 1.000 | CT | 1.042 | 0.93 | 34.30 | | | 1978 | MPC01 |
| | | 1.37 | | | 56.0 | 1.998 | 0.999 | CT | 1.039 | 0.93 | 34.50 | | | 1978 | MPC01 |
| | | 3.00 | | | 60.0 | 2.000 | 1.000 | CT | 1.024 | 0.32 | 21.40 | | | 1973 | 85836 |
| | | 3.00 | | | 60.0 | 2.000 | 1.002 | CT | 1.013 | 0.29 | 20.40 | | | 1973 | 85836 |
| | | 3.00 | | | 60.0 | 2.000 | 1.001 | CT | 0.993 | 0.30 | 20.70 | | | 1973 | 85836 |
| T851 | Plate | 3.00 | R.T. | S-T | 50.0 | 2.000 | 0.870 | CT | --- | 0.62 | 25.00 | 21.7 | 2.3 | 1974 | 90011 |
| | | 2.90 | | | 52.3 | 1.982 | 1.001 | CT | 0.991 | 0.38 | 20.70 | | | 1978 | MPC01 |
| | | 2.90 | | | 52.8 | 2.014 | 1.002 | CT | 1.047 | 0.38 | 21.00 | | | 1978 | MPC01 |
| | | 2.90 | | | 53.3 | 1.996 | 1.001 | CT | 1.018 | 0.34 | 20.00 | | | 1978 | MPC01 |

# TABLE 7.11.2.1 (CONTINUED)



## ALUMINUM 2219 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 | Plate | --- | R.T. | S-L | 50.2 | 2.999 | 1.500 | CT | 1.590 | 0.67 | 26.12 | 23.0 | 2.4 | 1977 | MD001 |
| | | 2.62 | | | 50.5 | 2.016 | 1.000 | CT | 1.028 | 0.46 | 22.00 | | | 1978 | MPC01 |
| | | 2.62 | | | 50.5 | 2.002 | 1.000 | CT | 1.041 | 0.44 | 21.70 | | | 1978 | MPC01 |
| | | 1.37 | | | 50.6 | 0.996 | 0.500 | CT | 0.508 | 0.38 | 19.80 | | | 1978 | MPC01 |
| | | 1.37 | | | 50.6 | 1.000 | 0.500 | CT | 0.520 | 0.38 | 20.20 | | | 1978 | MPC01 |
| | | 3.00 | | | 51.8 | 2.012 | 1.000 | CT | 1.026 | 0.52 | 24.00 | | | 1978 | MPC01 |
| | | 3.00 | | | 51.8 | 2.002 | 1.000 | CT | 1.021 | 0.65 | 26.60 | | | 1978 | MPC01 |
| | | 3.00 | | | 51.9 | 2.000 | 0.998 | CT | 0.979 | 0.47 | 22.60 | | | 1973 | 86213 |
| | | 3.00 | | | 52.0 | 2.004 | 1.000 | CT | 1.022 | 0.65 | 26.60 | | | 1978 | MPC01 |
| | | 3.00 | | | 52.0 | 2.018 | 1.000 | CT | 1.029 | 0.57 | 25.40 | | | 1978 | MPC01 |
| | | 1.37 | | | 52.3 | 1.008 | 0.500 | CT | 0.504 | 0.44 | 22.10 | | | 1978 | MPC01 |
| | | 1.37 | | | 52.3 | 1.010 | 0.500 | CT | 0.505 | 0.38 | 20.80 | | | 1978 | MPC01 |
| | | 3.00 | | | 52.6 | 2.000 | 0.999 | CT | 0.979 | 0.38 | 20.40 | | | 1973 | 86213 |
| | | 3.00 | | | 52.6 | 2.000 | 0.999 | CT | 0.960 | 0.51 | 23.70 | | | 1973 | 86213 |
| T851 | Plate | 2.00 | 84 | S-T | 50.0 | 1.490 | 0.745 | CT | 0.965 | 0.62 | 24.80 | 23.0 | 2.5 | 1972 | 84306 |
| | | 2.00 | | | 50.0 | 1.570 | 0.746 | CT | 0.895 | 0.45 | 21.20 | | | 1972 | 84306 |
| T851 | Plate | 1.37 | 88 | S-L | 50.6 | 1.000 | 0.500 | CT | 0.508 | 0.40 | 20.20 | 21.2 | 1.0 | 1973 | 86213 |
| | | 1.37 | | | 52.3 | 1.000 | 0.500 | CT | 0.504 | 0.46 | 22.40 | | | 1973 | 86213 |
| | | 1.37 | | | 52.3 | 1.000 | 0.500 | CT | 0.505 | 0.42 | 21.50 | | | 1973 | 86213 |
| | | 1.37 | | | 52.3 | 1.000 | 0.500 | CT | 0.496 | 0.39 | 20.60 | | | 1973 | 86213 |
| T851 | Forging | --- | R.T. | L-S | 41.9 | 3.001 | 1.501 | CT | 1.563 | 1.16 | 28.58 | 30.3 | 3.0 | 1976 | MD001 |
| | | --- | | | 41.9 | 3.001 | 1.499 | CT | 1.542 | 1.16 | 28.64 | | | 1976 | MD001 |
| | | --- | | | 41.9 | 3.001 | 1.499 | CT | 1.584 | 1.37 | 31.03 | | | 1976 | MD001 |

# TABLE 7.11.2.1 (CONTINUED)



## ALUMINUM 2219 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Forging Cont'd | --- | R.T. Cont'd | L-S Cont'd | 46.1 | 3.003 | 1.500 | CT | 1.566 | 1.02 | 29.59 | Cont'd | Cont'd | 1976 | MD001 |
| | | --- | | | 46.4 | 3.001 | 1.500 | CT | 1.580 | 1.15 | 31.58 | | | 1976 | MD001 |
| | | --- | | | 46.4 | 3.003 | 1.499 | CT | 1.569 | 1.08 | 30.60 | | | 1976 | MD001 |
| | | --- | | | 50.1 | 3.005 | 1.500 | CT | 1.418 | 1.13 | 33.71 | | | 1976 | MD001 |
| | | --- | | | 50.1 | 3.005 | 1.500 | CT | 1.444 | 1.18 | 34.55 | | | 1976 | MD001 |
| | | --- | | | 50.9 | 1.998 | 1.001 | CT | 0.995 | 0.57 | 24.49 | | | 1976 | MD001 |
| T851 | Forging | --- | R.T. | T-S | 45.2 | 2.997 | 1.495 | CT | 1.589 | 0.64 | 22.91 | 25.3 | 2.3 | 1977 | MD001 |
| | | --- | | | 47.5 | 1.998 | 1.001 | CT | 1.000 | 0.63 | 23.96 | | | 1976 | MD001 |
| | | --- | | | 47.5 | 3.001 | 1.502 | CT | 1.619 | 0.50 | 21.42 | | | 1976 | MD001 |
| | | --- | | | 47.7 | 1.999 | 1.000 | CT | 1.003 | 0.71 | 25.50 | | | 1976 | MD001 |
| | | --- | | | 47.9 | 2.998 | 1.502 | CT | 1.607 | 0.92 | 29.13 | | | 1977 | MD001 |
| | | --- | | | 48.1 | 2.000 | 1.001 | CT | 1.059 | 0.73 | 26.01 | | | 1977 | MD001 |
| | | --- | | | 48.1 | 2.996 | 1.496 | CT | 1.615 | 0.79 | 27.04 | | | 1977 | MD001 |
| | | --- | | | 48.2 | 3.001 | 1.501 | CT | 1.555 | 0.51 | 21.78 | | | 1976 | MD001 |
| | | --- | | | 48.3 | 3.001 | 1.501 | CT | 1.531 | 0.67 | 25.13 | | | 1976 | MD001 |
| | | --- | | | 48.4 | 3.000 | 1.501 | CT | 1.621 | 0.52 | 22.14 | | | 1976 | MD001 |
| | | --- | | | 48.5 | 1.998 | 1.001 | CT | 1.047 | 0.86 | 28.50 | | | 1976 | MD001 |
| | | --- | | | 48.7 | 1.995 | 1.001 | CT | 1.033 | 0.75 | 26.67 | | | 1976 | MD001 |
| | | --- | | | 49.0 | 2.997 | 1.495 | CT | 1.596 | 0.64 | 24.84 | | | 1977 | MD001 |
| | | --- | | | 49.2 | 1.996 | 1.001 | CT | 0.999 | 0.66 | 25.29 | | | 1976 | MD001 |
| | | --- | | | 49.2 | 1.997 | 1.000 | CT | 1.031 | 0.56 | 23.35 | | | 1976 | MD001 |
| | | --- | | | 50.1 | 1.999 | 0.997 | CT | 1.033 | 0.69 | 26.35 | | | 1977 | MD001 |

# TABLE 7.11.2.1 (CONTINUED)



## ALUMINUM 2219 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ Ksi√in.) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Forging Cont'd | --- | R.T. Cont'd | T-S Cont'd | 50.4 | 3.000 | 1.501 | CT | 1.562 | 0.76 | 27.86 | Cont'd | Cont'd | 1976 | MD001 |
| | | --- | | | 51.9 | 3.000 | 1.501 | CT | 1.563 | 0.71 | 27.77 | | | 1976 | MD001 |
| T851 | Forging | --- | R.T. | S-L | 46.2 | 2.997 | 1.495 | CT | 1.643 | 0.67 | 24.00 | 25.6 | 3.1 | 1977 | MD001 |
| | | --- | | | 46.2 | 2.996 | 1.495 | CT | 1.661 | 0.67 | 24.08 | | | 1977 | MD001 |
| | | --- | | | 46.2 | 2.996 | 1.496 | CT | 1.616 | 0.68 | 24.13 | | | 1977 | MD001 |
| | | --- | | | 46.2 | 2.996 | 1.495 | CT | 1.614 | 0.61 | 22.84 | | | 1977 | MD001 |
| | | --- | | | 46.8 | 3.003 | 1.502 | CT | 1.556 | 0.62 | 23.40 | | | 1976 | MD001 |
| | | --- | | | 46.8 | 3.001 | 1.501 | CT | 1.569 | 0.62 | 23.47 | | | 1976 | MD001 |
| | | --- | | | 47.1 | 3.007 | 1.504 | CT | 1.700 | 0.69 | 24.75 | | | 1979 | MD001 |
| | | --- | | | 47.7 | 1.999 | 1.001 | CT | 1.047 | 0.65 | 24.45 | | | 1977 | MD001 |
| | | --- | | | 47.7 | 1.998 | 1.001 | CT | 1.070 | 0.67 | 24.72 | | | 1977 | MD001 |
| | | --- | | | 47.8 | 3.001 | 1.501 | CT | 1.542 | 0.52 | 21.89 | | | 1976 | MD001 |
| | | --- | | | 47.8 | 3.003 | 1.501 | CT | 1.532 | 0.64 | 24.27 | | | 1976 | MD001 |
| | | --- | | | 47.9 | 2.997 | 1.501 | CT | 1.584 | 0.80 | 27.12 | | | 1977 | MD001 |
| | | --- | | | 48.6 | 2.999 | 1.502 | CT | 1.617 | 0.77 | 27.14 | | | 1977 | MD001 |
| | | --- | | | 48.7 | 1.997 | 1.001 | CT | 1.083 | 0.52 | 22.29 | | | 1976 | MD001 |
| | | --- | | | 49.0 | 1.997 | 1.001 | CT | 1.026 | 0.74 | 26.83 | | | 1976 | MD001 |
| | | --- | | | 49.0 | 1.998 | 1.001 | CT | 1.040 | 0.69 | 25.79 | | | 1976 | MD001 |
| | | --- | | | 49.1 | 3.001 | 1.499 | CT | 1.575 | 0.77 | 27.41 | | | 1977 | MD001 |
| | | --- | | | 49.1 | 1.998 | 1.000 | CT | 1.038 | 0.60 | 24.23 | | | 1976 | MD001 |
| | | --- | | | 49.1 | 1.998 | 1.000 | CT | 1.039 | 0.63 | 24.70 | | | 1976 | MD001 |
| | | --- | | | 49.1 | 2.999 | 1.502 | CT | 1.552 | 1.19 | 33.88 | | | 1977 | MD001 |

# TABLE 7.11.2.1 (CONTINUED)



## ALUMINUM 2219 $K_{Ic}$

| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ MEAN | STAN DEV | | |
| T851 Cont'd | Forging Cont'd | --- | R.T. Cont'd | S-L Cont'd | 49.1 | 1.998 | 1.001 | CT | 1.050 | 0.58 | 23.79 | Cont'd | Cont'd | 1976 | MD001 |
| | | --- | | | 49.1 | 2.000 | 1.001 | CT | 1.080 | 0.74 | 26.73 | | | 1977 | MD001 |
| | | --- | | | 49.1 | 1.998 | 0.999 | CT | 1.033 | 0.64 | 24.89 | | | 1976 | MD001 |
| | | --- | | | 49.1 | 3.001 | 1.501 | CT | 1.586 | 0.58 | 23.84 | | | 1976 | MD001 |
| | | --- | | | 49.1 | 3.003 | 1.501 | CT | 1.572 | 0.62 | 24.50 | | | 1976 | MD001 |
| | | --- | | | 49.1 | 1.997 | 1.000 | CT | 1.057 | 0.64 | 25.00 | | | 1976 | MD001 |
| | | --- | | | 49.1 | 1.998 | 1.000 | CT | 1.035 | 0.62 | 24.51 | | | 1976 | MD001 |
| | | --- | | | 49.1 | 3.001 | 1.502 | CT | 1.531 | 0.82 | 28.16 | | | 1977 | MD001 |
| | | --- | | | 49.1 | 3.000 | 1.500 | CT | 1.636 | 0.58 | 23.85 | | | 1977 | MD001 |
| | | --- | | | 49.1 | 1.998 | 1.001 | CT | 1.044 | 0.68 | 25.64 | | | 1977 | MD001 |
| | | --- | | | 49.2 | 2.999 | 1.502 | CT | 1.602 | 0.46 | 21.19 | | | 1976 | MD001 |
| | | --- | | | 49.2 | 3.003 | 1.501 | CT | 1.608 | 0.45 | 20.97 | | | 1976 | MD001 |
| | | --- | | | 49.3 | 2.997 | 1.496 | CT | 1.592 | 0.92 | 29.96 | | | 1977 | MD001 |
| | | --- | | | 49.3 | 2.996 | 1.496 | CT | 1.633 | 0.83 | 28.54 | | | 1977 | MD001 |
| | | --- | | | 49.4 | 3.007 | 1.502 | CT | 1.516 | 0.94 | 30.42 | | | 1977 | MD001 |
| | | --- | | | 49.5 | 3.001 | 1.501 | CT | 1.535 | 0.58 | 24.00 | | | 1976 | MD001 |
| | | --- | | | 49.5 | 3.002 | 1.500 | CT | 1.528 | 0.77 | 27.60 | | | 1976 | MD001 |
| | | --- | | | 49.7 | 2.999 | 1.500 | CT | 1.595 | 0.80 | 28.16 | | | 1977 | MD001 |
| | | --- | | | 49.7 | 3.000 | 1.500 | CT | 1.634 | 0.79 | 28.03 | | | 1977 | MD001 |
| | | --- | | | 49.7 | 3.000 | 1.504 | CT | 1.641 | 0.57 | 23.89 | | | 1978 | MD001 |
| | | --- | | | 49.7 | 3.000 | 1.499 | CT | 1.626 | 0.82 | 28.62 | | | 1977 | MD001 |
| | | --- | | | 49.7 | 3.000 | 1.501 | CT | 1.586 | 0.63 | 25.12 | | | 1978 | MD001 |

# TABLE 7.11.2.1 (CONTINUED)



## ALUMINUM 2219 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Forging Cont'd | --- | R.T. Cont'd | S-L Cont'd | 49.8 | 1.996 | 1.001 | CT | 1.010 | 0.38 | 19.50 | Cont'd | Cont'd | 1976 | MD001 |
| | | --- | | | 49.8 | 1.996 | 1.001 | CT | 1.040 | 0.43 | 20.75 | | | 1976 | MD001 |
| | | --- | | | 49.9 | 1.996 | 1.002 | CT | 1.071 | 0.71 | 26.69 | | | 1976 | MD001 |
| | | --- | | | 49.9 | 2.000 | 1.001 | CT | 1.053 | 0.51 | 22.66 | | | 1977 | MD001 |
| | | --- | | | 49.9 | 1.997 | 1.002 | CT | 1.065 | 0.66 | 25.79 | | | 1976 | MD001 |
| | | --- | | | 49.9 | 1.999 | 1.001 | CT | 1.069 | 0.52 | 22.84 | | | 1977 | MD001 |
| | | --- | | | 50.1 | 3.000 | 1.490 | CT | 1.604 | 1.17 | 34.31 | | | 1979 | MD001 |
| | | --- | | | 50.1 | 3.000 | 1.499 | CT | 1.528 | 0.81 | 28.60 | | | 1978 | MD001 |
| | | --- | | | 50.2 | 3.000 | 1.500 | CT | 1.578 | 0.57 | 24.15 | | | 1977 | MD001 |
| | | --- | | | 50.2 | 2.001 | 1.004 | CT | 1.008 | 0.55 | 23.66 | | | 1978 | MD001 |
| | | --- | | | 50.2 | 1.995 | 1.005 | CT | 1.038 | 0.48 | 22.17 | | | 1978 | MD001 |
| | | --- | | | 50.2 | 3.000 | 1.500 | CT | 1.603 | 0.94 | 30.85 | | | 1978 | MD001 |
| | | --- | | | 50.2 | 2.998 | 1.499 | CT | 1.605 | 0.90 | 30.25 | | | 1978 | MD001 |
| | | --- | | | 50.3 | 1.997 | 1.000 | CT | 1.091 | 0.59 | 24.51 | | | 1976 | MD001 |
| | | --- | | | 50.3 | 3.000 | 1.501 | CT | 1.581 | 0.96 | 31.30 | | | 1976 | MD001 |
| | | --- | | | 50.3 | 3.001 | 1.502 | CT | 1.520 | 1.02 | 32.18 | | | 1976 | MD001 |
| | | --- | | | 50.3 | 1.998 | 1.001 | CT | 1.079 | 0.56 | 23.90 | | | 1976 | MD001 |
| | | --- | | | 50.3 | 1.997 | 0.999 | CT | 1.080 | 0.45 | 21.46 | | | 1976 | MD001 |
| | | --- | | | 50.3 | 1.998 | 1.000 | CT | 1.046 | 0.46 | 21.62 | | | 1976 | MD001 |
| | | --- | | | 50.3 | 2.999 | 1.497 | CT | 1.584 | 1.04 | 32.52 | | | 1976 | MD001 |
| | | --- | | | 50.4 | 3.000 | 1.501 | CT | 1.556 | 0.88 | 29.91 | | | 1976 | MD001 |
| | | --- | | | 50.4 | 3.000 | 1.501 | CT | 1.586 | 0.98 | 31.60 | | | 1976 | MD001 |

# TABLE 7.11.2.1 (CONTINUED)



## ALUMINUM 2219 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ Ksi√in.) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | --- | R.T. Cont'd | S-L Cont'd | 50.5 | 1.997 | 1.000 | CT | 1.083 | 0.81 | 28.80 | Cont'd | Cont'd | 1976 | MD001 |
| | | --- | | | 50.5 | 1.997 | 1.000 | CT | 1.037 | 0.89 | 30.27 | | | 1976 | MD001 |
| | | --- | | | 50.5 | 1.997 | 1.000 | CT | 1.089 | 0.52 | 23.17 | | | 1976 | MD001 |
| | | --- | | | 50.5 | 1.998 | 1.000 | CT | 1.057 | 0.49 | 22.48 | | | 1976 | MD001 |
| | | --- | | | 50.7 | 1.995 | 1.002 | CT | 1.041 | 0.55 | 23.83 | | | 1976 | MD001 |
| | | --- | | | 50.7 | 1.995 | 1.002 | CT | 1.030 | 0.66 | 26.20 | | | 1976 | MD001 |
| | | --- | | | 50.8 | 1.997 | 0.996 | CT | 1.053 | 0.55 | 23.86 | | | 1977 | MD001 |
| | | --- | | | 50.9 | 2.000 | 1.000 | CT | 1.066 | 0.64 | 25.95 | | | 1978 | MD001 |
| | | --- | | | 50.9 | 1.997 | 1.001 | CT | 1.052 | 0.57 | 24.44 | | | 1976 | MD001 |
| | | --- | | | 50.9 | 1.998 | 1.000 | CT | 1.047 | 0.51 | 23.19 | | | 1976 | MD001 |
| | | --- | | | 51.1 | 3.001 | 1.501 | CT | 1.591 | 0.58 | 24.82 | | | 1976 | MD001 |
| | | --- | | | 51.1 | 3.001 | 1.502 | CT | 1.594 | 0.60 | 25.17 | | | 1976 | MD001 |
| | | --- | | | 51.3 | 1.997 | 1.000 | CT | 1.055 | 0.60 | 25.33 | | | 1976 | MD001 |
| | | --- | | | 51.3 | 2.000 | 1.000 | CT | 1.075 | 0.50 | 23.06 | | | 1976 | MD001 |
| | | --- | | | 51.3 | 1.996 | 1.001 | CT | 1.024 | 0.61 | 25.54 | | | 1976 | MD001 |
| | | --- | | | 51.3 | 1.997 | 1.001 | CT | 1.068 | 0.55 | 24.21 | | | 1976 | MD001 |
| | | --- | | | 51.5 | 1.995 | 0.996 | CT | 1.040 | 0.54 | 24.06 | | | 1978 | MD001 |
| | | --- | | | 51.5 | 1.997 | 1.000 | CT | 1.087 | 0.58 | 24.91 | | | 1978 | MD001 |
| | | --- | | | 51.5 | 2.000 | 0.999 | CT | 1.045 | 0.67 | 26.70 | | | 1978 | MD001 |
| | | --- | | | 51.5 | 1.997 | 1.005 | CT | 1.020 | 0.48 | 22.76 | | | 1978 | MD001 |
| | | --- | | | 52.2 | 2.001 | 1.000 | CT | 1.033 | 0.54 | 24.30 | | | 1978 | MD001 |

# TABLE 7.11.2.1 (CONTINUED)



## ALUMINUM 2219 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T852 | Forging | --- | R.T. | L-S | 43.4 | 2.999 | 1.499 | CT | 1.539 | 0.89 | 25.92 | 28.3 | 3.9 | 1977 | MD001 |
| | | --- | | | 43.4 | 2.999 | 1.499 | CT | 1.507 | 0.91 | 26.22 | | | 1977 | MD001 |
| | | --- | | | 48.5 | 3.001 | 1.502 | CT | 1.548 | 1.14 | 32.82 | | | 1976 | MD001 |
| T852 | Forging | 7.50 | R.T. | L-T | 41.9 | 5.000 | 2.500 | CT | 2.580 | 1.72 | 34.80 | 39.2 | 3.2 | 1977 | AL001 |
| | | 7.50 | | | 41.9 | 5.000 | 2.500 | CT | 2.550 | 1.65 | 33.00 | | | 1977 | AL001 |
| | | 7.50 | | | 41.9 | 5.000 | 2.500 | CT | 2.570 | 1.79 | 35.50 | | | 1977 | AL001 |
| | | 7.50 | | | 43.4 | 5.000 | 2.500 | CT | 2.560 | 1.98 | 38.60 | | | 1977 | AL001 |
| | | 5.50 | | | 44.6 | 5.000 | 2.500 | CT | 2.520 | 1.91 | 39.00 | | | 1977 | AL001 |
| | | 5.50 | | | 44.6 | 5.000 | 2.500 | CT | 2.550 | 2.08 | 40.70 | | | 1977 | AL001 |
| | | 5.50 | | | 44.6 | 5.000 | 2.500 | CT | 2.520 | 1.81 | 38.00 | | | 1977 | AL001 |
| | | 4.50 | | | 45.2 | 5.000 | 2.500 | CT | 2.550 | 1.51 | 35.10 | | | 1977 | AL001 |
| | | 4.50 | | | 45.2 | 5.000 | 2.500 | CT | 2.580 | 1.68 | 37.00 | | | 1977 | AL001 |
| | | 4.50 | | | 45.2 | 5.000 | 2.500 | CT | 2.560 | 1.63 | 36.50 | | | 1977 | AL001 |
| | | 5.50 | | | 49.2 | 5.000 | 2.500 | CT | 2.610 | 1.56 | 38.90 | | | 1977 | AL001 |
| | | 5.50 | | | 49.2 | 5.000 | 2.500 | CT | 2.550 | 1.58 | 39.10 | | | 1977 | AL001 |
| | | 5.50 | | | 49.2 | 5.000 | 2.500 | CT | 2.530 | 1.83 | 42.10 | | | 1977 | AL001 |
| | | 4.50 | | | 50.2 | 5.000 | 2.500 | CT | 2.600 | 1.69 | 41.30 | | | 1977 | AL001 |
| | | 4.50 | | | 50.2 | 5.000 | 2.500 | CT | 2.560 | 2.16 | 46.70 | | | 1977 | AL001 |
| | | 3.50 | | | 50.3 | 5.000 | 2.500 | CT | 2.570 | 1.67 | 41.10 | | | 1977 | AL001 |
| | | 3.50 | | | 50.3 | 5.000 | 2.500 | CT | 2.650 | 1.97 | 44.70 | | | 1977 | AL001 |
| | | 3.50 | | | 50.3 | 5.000 | 2.500 | CT | 2.560 | 1.78 | 42.40 | | | 1977 | AL001 |
| | | 2.50 | | | 50.4 | 5.000 | 2.490 | CT | 2.530 | 1.49 | 38.90 | | | 1977 | AL001 |
| | | 2.50 | | | 50.4 | 5.000 | 2.500 | CT | 2.450 | 1.35 | 37.00 | | | 1977 | AL001 |

# TABLE 7.11.2.1 (CONTINUED)



## ALUMINUM 2219 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T852 Cont'd | Forging Cont'd | 2.50 | R.T. Cont'd | L-T Cont'd | 50.4 | 5.000 | 2.490 | CT | 2.540 | 1.33 | 36.80 | Cont'd | Cont'd | 1977 | AL001 |
| | | 2.00 | | | 50.7 | 3.000 | 1.500 | CT | 1.570 | 1.48 | 39.00 | | | 1977 | AL001 |
| | | 3.50 | | | 51.2 | 5.000 | 2.500 | CT | 2.620 | 1.59 | 40.80 | | | 1977 | AL001 |
| | | 3.50 | | | 51.2 | 5.000 | 2.500 | CT | 2.580 | 1.69 | 42.10 | | | 1977 | AL001 |
| | | 3.50 | | | 51.2 | 5.000 | 2.500 | CT | 2.510 | 1.56 | 40.40 | | | 1977 | AL001 |
| T852 | Forging | --- | R.T. | T-S | 43.8 | 3.000 | 1.502 | CT | 1.617 | 1.06 | 28.53 | 29.1 | 2.9 | 1976 | MD001 |
| | | --- | | | 45.7 | 2.998 | 1.500 | CT | 1.569 | 0.81 | 26.04 | | | 1976 | MD001 |
| | | --- | | | 47.1 | 3.000 | 1.501 | CT | 1.566 | 1.30 | 34.08 | | | 1976 | MD001 |
| | | --- | | | 47.2 | 3.000 | 1.500 | CT | 1.574 | 1.12 | 31.70 | | | 1976 | MD001 |
| | | --- | | | 47.8 | 3.000 | 1.502 | CT | 1.562 | 0.77 | 26.66 | | | 1976 | MD001 |
| | | --- | | | 47.9 | 2.999 | 1.501 | CT | 1.578 | 0.81 | 27.33 | | | 1976 | MD001 |
| | | --- | | | 48.0 | 3.000 | 1.502 | CT | 1.549 | 0.91 | 29.10 | | | 1976 | MD001 |
| T852 | Forging | 5.50 | R.T. | T-L | 43.1 | 5.000 | 2.500 | CT | 2.620 | 1.07 | 28.20 | 27.1 | 2.2 | 1977 | AL001 |
| | | 5.50 | | | 43.1 | 5.000 | 2.500 | CT | 2.570 | 1.10 | 28.60 | | | 1977 | AL001 |
| | | --- | | | 44.0 | 5.000 | 1.984 | CT | 2.502 | 0.75 | 24.10 | | | 1973 | 85836 |
| | | --- | | | 44.0 | 5.000 | 1.998 | CT | 2.271 | 0.63 | 22.20 | | | 1973 | 85836 |
| | | 7.50 | | | 44.2 | 3.000 | 1.500 | CT | 1.540 | 0.81 | 25.10 | | | 1977 | AL001 |
| | | 7.50 | | | 44.2 | 3.000 | 1.500 | CT | 1.530 | 0.69 | 23.30 | | | 1977 | AL001 |
| | | 4.50 | | | 45.7 | 5.000 | 2.500 | CT | 2.540 | 0.95 | 28.10 | | | 1977 | AL001 |
| | | 4.50 | | | 45.7 | 5.000 | 2.500 | CT | 2.530 | 0.97 | 28.40 | | | 1977 | AL001 |
| | | 5.50 | | | 46.4 | 5.000 | 2.500 | CT | 2.520 | 0.74 | 25.20 | | | 1977 | AL001 |
| | | 3.50 | | | 49.8 | 5.000 | 2.500 | CT | 2.560 | 0.80 | 28.10 | | | 1977 | AL001 |

# TABLE 7.11.2.1 (CONTINUED)



## ALUMINUM 2219 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ (Ksi√in.)) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T852 Cont'd | Forging Cont'd | 3.50 | R.T. Cont'd | T-L Cont'd | 49.8 | 5.000 | 2.500 | CT | 2.560 | 0.83 | 28.70 | Cont'd | Cont'd | 1977 | AL001 |
| | | 3.50 | | | 49.8 | 5.000 | 2.500 | CT | 2.580 | 0.80 | 28.20 | | | 1977 | AL001 |
| | | 2.50 | | | 49.9 | 5.000 | 2.490 | CT | 2.570 | 0.68 | 26.00 | | | 1977 | AL001 |
| | | 2.50 | | | 49.9 | 5.000 | 2.500 | CT | 2.560 | 0.94 | 30.60 | | | 1977 | AL001 |
| | | 2.50 | | | 49.9 | 5.000 | 2.490 | CT | 2.510 | 0.68 | 26.10 | | | 1977 | AL001 |
| | | 3.50 | | | 50.2 | 5.000 | 2.500 | CT | 2.530 | 0.68 | 26.20 | | | 1977 | AL001 |
| | | 3.50 | | | 50.2 | 5.000 | 2.500 | CT | 2.520 | 0.67 | 26.00 | | | 1977 | AL001 |
| | | 3.50 | | | 50.2 | 5.000 | 2.500 | CT | 2.500 | 0.62 | 24.90 | | | 1977 | AL001 |
| | | 2.00 | | | 50.6 | 3.000 | 1.500 | CT | 1.560 | 0.79 | 28.50 | | | 1977 | AL001 |
| | | 4.50 | | | 50.6 | 5.000 | 2.500 | CT | 2.510 | 0.74 | 27.50 | | | 1977 | AL001 |
| | | 2.00 | | | 50.6 | 3.000 | 1.500 | CT | 1.510 | 0.84 | 29.40 | | | 1977 | AL001 |
| | | 4.50 | | | 50.6 | 5.000 | 2.500 | CT | 2.570 | 0.83 | 29.10 | | | 1977 | AL001 |
| | | 4.50 | | | 50.6 | 5.000 | 2.500 | CT | 2.510 | 0.87 | 29.80 | | | 1977 | AL001 |
| | | 2.00 | | | 50.6 | 3.000 | 1.500 | CT | 1.560 | 0.83 | 29.20 | | | 1977 | AL001 |
| T852 | Forging | --- | R.T. | S-T | 43.0 | 3.000 | 1.502 | CT | 1.565 | 1.20 | 29.88 | 28.5 | 2.3 | 1976 | MD001 |
| | | --- | | | 44.7 | 2.999 | 1.501 | CT | 1.564 | 0.98 | 28.00 | | | 1976 | MD001 |
| | | --- | | | 45.2 | 2.999 | 1.500 | CT | 1.562 | 0.82 | 25.89 | | | 1976 | MD001 |
| | | --- | | | 48.8 | 3.000 | 1.502 | CT | 1.573 | 0.76 | 26.97 | | | 1976 | MD001 |
| | | --- | | | 49.1 | 3.000 | 1.501 | CT | 1.546 | 1.03 | 31.64 | | | 1976 | MD001 |
| T852 | Forging | --- | R.T. | S-L | 42.6 | 3.000 | 1.500 | CT | 1.594 | 0.59 | 20.72 | 25.3 | 3.1 | 1977 | MD001 |
| | | --- | | | 42.9 | 1.997 | 0.999 | CT | 1.077 | 0.72 | 23.09 | | | 1976 | MD001 |
| | | --- | | | 42.9 | 1.997 | 0.999 | CT | 1.047 | 0.69 | 22.65 | | | 1976 | MD001 |

# TABLE 7.11.2.1 (CONTINUED)



## ALUMINUM 2219 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ Ksi√in.) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T852 Cont'd | Forging Cont'd | --- | R.T. Cont'd | S-L Cont'd | 43.2 | 3.001 | 1.502 | CT | 1.632 | 0.92 | 26.28 | Cont'd | Cont'd | 1977 | MD001 |
| | | --- | | | 43.2 | 3.001 | 1.501 | CT | 1.666 | 0.77 | 24.02 | | | 1977 | MD001 |
| | | --- | | | 43.6 | 1.999 | 0.999 | CT | 1.077 | 0.67 | 22.73 | | | 1976 | MD001 |
| | | --- | | | 44.0 | 2.998 | 1.500 | CT | 1.596 | 0.88 | 26.25 | | | 1976 | MD001 |
| | | --- | | | 44.0 | 3.001 | 1.501 | CT | 1.586 | 0.65 | 22.46 | | | 1976 | MD001 |
| | | --- | | | 44.0 | 3.009 | 1.500 | CT | 1.570 | 0.66 | 22.66 | | | 1976 | MD001 |
| | | --- | | | 44.0 | 2.999 | 1.500 | CT | 1.570 | 0.83 | 25.39 | | | 1976 | MD001 |
| | | --- | | | 44.0 | 3.009 | 1.502 | CT | 1.586 | 0.68 | 22.96 | | | 1976 | MD001 |
| | | 7.50 | | | 44.1 | 4.000 | 2.000 | CT | 2.050 | 0.88 | 26.10 | | | 1977 | AL001 |
| | | 7.50 | | | 44.1 | 4.000 | 2.000 | CT | 2.020 | 0.87 | 26.00 | | | 1977 | AL001 |
| | | --- | | | 44.2 | 2.999 | 1.500 | CT | 1.614 | 0.88 | 26.37 | | | 1976 | MD001 |
| | | --- | | | 44.2 | 3.000 | 1.499 | CT | 1.594 | 1.36 | 32.71 | | | 1976 | MD001 |
| | | --- | | | 44.2 | 2.999 | 1.500 | CT | 1.598 | 0.81 | 25.17 | | | 1976 | MD001 |
| | | --- | | | 44.2 | 3.000 | 1.500 | CT | 1.590 | 1.20 | 30.73 | | | 1976 | MD001 |
| | | --- | | | 44.2 | 3.000 | 1.500 | CT | 1.603 | 1.41 | 33.20 | | | 1976 | MD001 |
| | | --- | | | 44.2 | 3.000 | 1.502 | CT | 1.566 | 0.90 | 26.65 | | | 1976 | MD001 |
| | | --- | | | 44.2 | 3.000 | 1.500 | CT | 1.572 | 1.19 | 30.55 | | | 1976 | MD001 |
| | | --- | | | 44.2 | 3.000 | 1.502 | CT | 1.568 | 0.91 | 26.71 | | | 1976 | MD001 |
| | | --- | | | 44.5 | 3.001 | 1.499 | CT | 1.597 | 0.54 | 20.84 | | | 1976 | MD001 |
| | | --- | | | 44.5 | 3.007 | 1.501 | CT | 1.607 | 0.60 | 21.91 | | | 1976 | MD001 |
| | | --- | | | 44.5 | 3.001 | 1.502 | CT | 1.468 | 1.07 | 29.23 | | | 1976 | MD001 |
| | | --- | | | 44.5 | 3.005 | 1.501 | CT | 1.586 | 0.62 | 22.32 | | | 1976 | MD001 |

# TABLE 7.11.2.1 (CONTINUED)



## ALUMINUM 2219 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ Ksi√in.) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T852 Cont'd | Forging Cont'd | --- | R.T. Cont'd | S-L Cont'd | 44.5 | 3.000 | 1.500 | CT | 1.591 | 0.62 | 22.23 | Cont'd | Cont'd | 1976 | MD001 |
| | | --- | | | 44.7 | 1.998 | 0.999 | CT | 1.079 | 0.64 | 22.75 | | | 1976 | MD001 |
| | | --- | | | 45.3 | 1.997 | 0.998 | CT | 1.097 | 0.68 | 23.66 | | | 1976 | MD001 |
| | | --- | | | 45.4 | 3.001 | 1.501 | CT | 1.582 | 0.95 | 28.07 | | | 1976 | MD001 |
| | | --- | | | 45.4 | 3.000 | 1.501 | CT | 1.571 | 1.01 | 28.90 | | | 1976 | MD001 |
| | | --- | | | 45.6 | 3.001 | 1.501 | CT | 1.478 | 1.01 | 28.99 | | | 1976 | MD001 |
| | | --- | | | 46.7 | 2.996 | 1.502 | CT | 1.486 | 1.43 | 35.32 | | | 1977 | MD001 |
| | | --- | | | 46.8 | 1.995 | 1.000 | CT | 1.063 | 0.63 | 23.61 | | | 1976 | MD001 |
| | | 4.50 | | | 47.0 | 3.000 | 1.500 | CT | 1.510 | 0.56 | 22.20 | | | 1977 | AL001 |
| | | 4.50 | | | 47.0 | 3.000 | 1.500 | CT | 1.530 | 0.67 | 24.30 | | | 1977 | AL001 |
| | | 4.50 | | | 47.0 | 3.000 | 1.500 | CT | 1.550 | 0.67 | 24.40 | | | 1977 | AL001 |
| | | --- | | | 47.2 | 3.001 | 1.502 | CT | 1.514 | 0.90 | 28.45 | | | 1976 | MD001 |
| | | 5.50 | | | 47.2 | 2.000 | 1.000 | CT | 1.030 | 0.63 | 23.60 | | | 1977 | AL001 |
| | | 5.50 | | | 47.2 | 2.000 | 1.000 | CT | 1.030 | 0.61 | 23.40 | | | 1977 | AL001 |
| | | --- | | | 48.9 | 1.997 | 0.999 | CT | 1.051 | 0.58 | 23.67 | | | 1976 | MD001 |
| | | --- | | | 49.1 | 3.000 | 1.501 | CT | 1.616 | 0.67 | 25.44 | | | 1977 | MD001 |
| | | --- | | | 49.3 | 3.003 | 1.501 | CT | 1.586 | 0.81 | 28.09 | | | 1976 | MD001 |
| | | --- | | | 49.6 | 3.003 | 1.502 | CT | 1.628 | 0.54 | 23.07 | | | 1977 | MD001 |
| | | 3.50 | | | 49.7 | 2.000 | 1.000 | CT | 1.040 | 0.64 | 25.10 | | | 1977 | AL001 |
| | | 3.50 | | | 49.7 | 2.000 | 1.000 | CT | 1.030 | 0.65 | 25.30 | | | 1977 | AL001 |
| | | 3.50 | | | 49.7 | 2.000 | 1.000 | CT | 1.020 | 0.67 | 25.80 | | | 1977 | AL001 |
| | | 5.50 | | | 50.8 | 4.000 | 2.000 | CT | 2.050 | 0.69 | 26.60 | | | 1977 | AL001 |

# TABLE 7.11.2.1 (CONTINUED)



## ALUMINUM 2219 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ Ksi√in.) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T852 Cont'd | Forging Cont'd | 5.50 | R.T. Cont'd | S-L Cont'd | 50.8 | 4.000 | 2.000 | CT | 2.040 | 0.60 | 24.90 | Cont'd | Cont'd | 1977 | AL001 |
| | | 5.50 | | | 50.8 | 4.000 | 2.000 | CT | 2.040 | 0.59 | 24.70 | | | 1977 | AL001 |
| | | 3.50 | | | 51.1 | 2.000 | 1.000 | CT | 1.020 | 0.61 | 25.20 | | | 1977 | AL001 |
| | | 3.50 | | | 51.1 | 2.000 | 1.000 | CT | 1.040 | 0.62 | 25.50 | | | 1977 | AL001 |
| | | 2.50 | | | 51.1 | 2.000 | 1.000 | CT | 1.010 | 0.43 | 21.20 | | | 1977 | AL001 |
| | | 2.50 | | | 51.1 | 2.000 | 1.000 | CT | 1.010 | 0.44 | 21.40 | | | 1977 | AL001 |
| | | 3.50 | | | 51.1 | 2.000 | 1.000 | CT | 1.010 | 0.54 | 23.80 | | | 1977 | AL001 |
| | | 2.50 | | | 51.1 | 2.000 | 1.000 | CT | 1.010 | 0.49 | 22.60 | | | 1977 | AL001 |
| | | 4.50 | | | 51.2 | 3.000 | 1.500 | CT | 1.570 | 0.63 | 25.70 | | | 1977 | AL001 |
| | | 4.50 | | | 51.2 | 3.000 | 1.500 | CT | 1.570 | 0.52 | 23.40 | | | 1977 | AL001 |
| | | 4.50 | | | 51.2 | 3.000 | 1.500 | CT | 1.530 | 0.68 | 26.70 | | | 1977 | AL001 |
| | | 2.00 | | | 51.5 | 1.500 | 0.750 | CT | 0.800 | 0.62 | 25.60 | | | 1977 | AL001 |
| | | --- | | | 52.3 | 1.997 | 1.001 | CT | 1.044 | 0.60 | 25.63 | | | 1976 | MD001 |
| T852 | Forging | 3.00 | 82 | L-T | 53.0 | 4.000 | 1.502 | CT | 2.055 | 0.99 | 33.30 | --- | --- | 1973 | 86213 |
| T852 | Forging | 3.00 | 82 | T-L | 53.3 | 4.000 | 1.501 | CT | 2.037 | 0.43 | 22.00 | --- | --- | 1973 | 86213 |
| T852 | Forging | 3.00 | 82 | S-T | 52.7 | 2.500 | 0.748 | CT | 1.244 | 0.46 | 22.60 | --- | --- | 1973 | 86213 |
| T852 | Forging | 3.50 | 84 | T-L | 48.0 | 3.990 | 1.686 | CT | 2.077 | 0.87 | 28.30 | --- | --- | 1973 | 86213 |
| T852 | Forging | 3.50 | 84 | S-T | 50.0 | 2.500 | 1.000 | CT | 1.231 | 0.73 | 27.10 | --- | --- | 1973 | 86213 |
| T852 | Forging | 6.75 | 85 | L-T | 46.0 | 3.990 | 1.998 | CT | 1.985 | 1.41 | 34.60 | 35.1 | 0.5 | 1973 | 86213 |
| | | 6.75 | | | 49.4 | 4.000 | 1.996 | CT | 1.970 | 1.27 | 35.20 | | | 1973 | 86213 |
| | | 6.75 | | | 51.2 | 4.000 | 1.997 | CT | 1.978 | 1.20 | 35.50 | | | 1973 | 86213 |

# TABLE 7.11.2.1 (CONTINUED)



## ALUMINUM 2219 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T852 | Forging | 6.75 | 85 | T-L | 46.2 | 3.990 | 1.997 | CT | 2.067 | 0.89 | 27.50 | 25.3 | 2.7 | 1973 | 86213 |
| | | 6.75 | | | 46.5 | 3.990 | 1.997 | CT | 2.127 | 0.95 | 28.70 | | | 1973 | 86213 |
| | | 6.75 | | | 49.2 | 4.000 | 1.997 | CT | 2.080 | 0.56 | 23.30 | | | 1973 | 86213 |
| | | 6.75 | | | 49.7 | 4.000 | 1.997 | CT | 2.019 | 0.51 | 22.50 | | | 1973 | 86213 |
| | | 6.75 | | | 49.7 | 3.990 | 1.997 | CT | 1.987 | 0.62 | 24.70 | | | 1973 | 86213 |
| T852 | Forging | 6.75 | 85 | S-T | 44.9 | 2.500 | 1.249 | CT | 1.233 | 0.67 | 23.30 | 23.5 | 0.8 | 1973 | 86213 |
| | | 6.75 | | | 46.7 | 2.500 | 1.249 | CT | 1.234 | 0.62 | 23.30 | | | 1973 | 86213 |
| | | 6.75 | | | 46.7 | 2.500 | 1.249 | CT | 1.243 | 0.69 | 24.60 | | | 1973 | 86213 |
| | | 6.75 | | | 48.7 | 2.500 | 0.998 | CT | 1.267 | 0.60 | 23.80 | | | 1973 | 86213 |
| | | 6.75 | | | 49.7 | 2.500 | 0.998 | CT | 1.185 | 0.51 | 22.50 | | | 1973 | 86213 |
| T87 | Plate | 2.50 | -423 | T-S | --- | 2.000 | 1.252 | CT | 1.100 | 0.58 | 35.00 | 41.0 | 8.2 | 1972 | 84319 |
| | | 2.50 | | | --- | 2.500 | 1.255 | NB | 1.220 | 1.00 | 47.20 | | | 1972 | 84319 |
| | | 2.50 | | | 73.0 | 2.500 | 1.253 | NB | 1.240 | 1.10 | 48.80 | | | 1972 | 84319 |
| | | 2.50 | | | 73.0 | 2.000 | 1.251 | CT | 1.110 | 0.51 | 33.00 | | | 1972 | 84319 |
| T87 | Plate | 2.50 | -320 | T-S | --- | 2.000 | 1.249 | CT | 1.120 | 0.55 | 31.30 | 36.9 | 6.4 | 1972 | 84319 |
| | | 2.50 | | | --- | 2.500 | 1.249 | NB | 1.220 | 1.00 | 43.30 | | | 1972 | 84319 |
| | | 2.50 | | | 67.0 | 2.000 | 1.251 | CT | 1.140 | 0.55 | 31.40 | | | 1972 | 84319 |
| | | 2.50 | | | 67.0 | 2.500 | 1.254 | NB | 1.230 | 1.00 | 41.60 | | | 1972 | 84319 |
| T87 | Plate | 1.50 | -300 | L-T | 67.0 | 5.000 | 1.468 | CT | 2.528 | 0.95 | 41.30 | 40.9 | 0.6 | 1972 | 85631 |
| | | 1.50 | | | 67.0 | 5.000 | 1.470 | CT | 2.593 | 0.92 | 40.50 | | | 1972 | 85631 |
| T87 | Plate | 1.50 | -300 | T-L | 67.0 | 5.000 | 1.466 | CT | 2.671 | --- | 32.50 | --- | --- | 1972 | 85631 |

# TABLE 7.11.2.1 (CONCLUDED)



## ALUMINUM 2219 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T87 | Plate | 2.00 | R.T. | L-T | 56.7 | 2.000 | 1.000 | CT | 1.003 | 0.54 | 26.30 | 28.0 | 3.0 | 1973 | 86213 |
| | | 2.00 | | | 56.7 | 4.000 | 2.000 | CT | 1.998 | 0.58 | 27.40 | | | 1973 | 86688 |
| | | 2.00 | | | 56.7 | 4.000 | 2.000 | CT | 2.039 | 0.59 | 27.50 | | | 1973 | 86688 |
| | | 2.00 | | | 56.7 | 2.000 | 0.999 | CT | 1.012 | 0.50 | 25.40 | | | 1973 | 86213 |
| | | 2.00 | | | 56.7 | 4.000 | 2.000 | CT | 2.044 | 0.60 | 27.70 | | | 1973 | 86688 |
| | | 1.50 | | | 59.4 | 5.000 | 1.467 | CT | 2.570 | 0.82 | 33.90 | | | 1972 | 85631 |
| T87 | Plate | 2.50 | R.T. | T-S | --- | 2.000 | 1.252 | CT | 1.110 | 0.57 | 26.10 | 31.3 | 5.8 | 1972 | 84319 |
| | | 2.50 | | | --- | 2.500 | 1.253 | NB | 1.240 | 1.10 | 36.40 | | | 1972 | 84319 |
| | | 2.50 | | | 55.0 | 2.000 | 1.252 | CT | 1.140 | 0.58 | 26.40 | | | 1972 | 84319 |
| | | 2.50 | | | 55.0 | 2.500 | 1.250 | NB | 1.270 | 1.10 | 36.20 | | | 1972 | 84319 |
| T87 | Plate | 1.00 | R.T. | T-L | 57.1 | 2.000 | 0.970 | CT | 1.050 | 0.36 | 21.70 | 22.0 | 0.4 | 1973 | 86213 |
| | | 1.00 | | | 57.1 | 2.000 | 0.970 | CT | 1.059 | 0.38 | 22.20 | | | 1973 | 86213 |
| T87 | Plate | 1.00 | 82 | T-L | 57.1 | 2.000 | 0.971 | CT | 1.034 | 0.40 | 22.70 | --- | --- | 1973 | 86213 |
| T87 | Plate | 1.00 | 84 | T-L | 57.1 | 2.000 | 0.970 | CT | 1.072 | 0.36 | 21.70 | 21.8 | 0.1 | 1973 | 86213 |
| | | 1.00 | | | 57.1 | 2.000 | 0.970 | CT | 1.052 | 0.36 | 21.80 | | | 1973 | 86213 |
| | | 1.00 | | | 57.1 | 2.000 | 0.971 | CT | 1.051 | 0.37 | 21.90 | | | 1973 | 86213 |
| T87 | Plate | 1.50 | 300 | L-T | --- | 5.000 | 1.466 | CT | 2.573 | --- | 34.40 | 29.9 | 6.4 | 1972 | 85631 |
| | | 1.50 | | | --- | 5.000 | 1.466 | CT | 2.581 | --- | 25.40 | | | 1972 | 85631 |
| T87-300F 100HRS | Plate | 1.50 | R.T. | L-T | --- | 5.000 | 1.467 | CT | 2.560 | --- | 34.50 | 34.8 | 0.4 | 1972 | 85631 |
| | | 1.50 | | | --- | 5.000 | 1.467 | CT | 2.572 | --- | 35.10 | | | 1972 | 85631 |

# TABLE 7.11.2.2



## ALUMINUM 2219 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($Ksi\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($Ksi\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T81 | Sheet | 0.06 | R.T. | L-T | 53.0 | 2.000 | 0.062 | 0.627 | 1.034 | 34.70 | 36.60 | 38.65* | --- | --- | 56.24* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 53.0 | 2.000 | 0.062 | 0.627 | 0.875 | 34.60 | 36.30 | 38.34* | | | 48.36* | | | 1973 | 86213 |
| T81 | Sheet | 0.06 | R.T. | T-L | 53.0 | 2.000 | 0.062 | 0.626 | 0.863 | 34.50 | 35.80 | 37.81* | --- | --- | 47.19* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 53.0 | 2.000 | 0.062 | 0.628 | 0.899 | 34.20 | 35.50 | 37.57* | | | 48.32* | | | 1973 | 86213 |
| T851 | Sheet | 0.12 | R.T. | L-T | 50.6 | 3.000 | 0.123 | 1.090 | 1.700 | --- | 33.00 | 47.07* | --- | --- | 67.98* | --- | --- | 1973 | 86213 |
| | | 0.12 | | | 51.1 | 3.000 | 0.126 | 1.100 | 1.930 | --- | 31.90 | 45.79* | | | 76.19* | | | 1973 | 86213 |
| | | 0.12 | | | 52.0 | 3.000 | 0.126 | 1.080 | 1.740 | --- | 31.50 | 44.65* | | | 66.52* | | | 1973 | 86213 |
| | | 0.12 | | | 50.6 | 3.000 | 0.127 | 1.090 | 1.820 | --- | 32.10 | 45.79* | | | 71.31* | | | 1973 | 86213 |
| | | 0.12 | | | 50.6 | 3.000 | 0.127 | 1.090 | 1.720 | --- | 32.10 | 45.79* | | | 66.95* | | | 1973 | 86213 |
| | | 0.12 | | | 50.6 | 3.000 | 0.127 | 1.070 | 1.860 | --- | 32.50 | 45.78* | | | 74.10* | | | 1973 | 86213 |
| | | 0.12 | | | 51.1 | 3.000 | 0.127 | 1.110 | 1.760 | --- | 31.60 | 45.64* | | | 67.57* | | | 1973 | 86213 |
| | | 0.12 | | | 51.1 | 3.000 | 0.127 | 1.100 | 1.670 | --- | 31.70 | 45.50* | | | 64.11* | | | 1973 | 86213 |
| | | 0.12 | | | 52.0 | 3.000 | 0.127 | 1.080 | 1.740 | --- | 32.10 | 45.50* | | | 67.79* | | | 1973 | 86213 |
| | | 0.12 | | | 52.0 | 3.000 | 0.127 | 1.130 | --- | --- | 31.00 | 45.33* | | | --- | | | 1973 | 86213 |
| | | 0.12 | | | 52.0 | 3.000 | 0.127 | 1.100 | 2.000 | --- | 31.40 | 45.07* | | | 78.71* | | | 1973 | 86213 |
| T851 | Plate | 1.00 | R.T. | L-T | 50.6 | 20.000 | 1.000 | 7.000 | 10.500 | --- | 18.30 | 65.72 | 64.2 | 5.3 | 90.21 | 84.7 | 9.0 | 1973 | 86213 |
| | | 1.00 | | | 50.6 | 20.000 | 1.000 | 7.000 | 10.350 | --- | 19.60 | 70.39 | | | 95.32* | | | 1973 | 86213 |
| | | 1.00 | | | 50.6 | 20.000 | 1.000 | 7.000 | 9.770 | --- | 19.30 | 69.31 | | | 89.12 | | | 1973 | 86213 |
| | | 1.00 | | | 50.6 | 20.000 | 1.000 | 7.000 | 10.200 | --- | 19.60 | 70.39 | | | 94.05 | | | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.11.2.2 (CONTINUED)



| ALUMINUM 2219 $K_C$ | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (In.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (In.) W | SPECIMEN THICK (In.) B | CRACK LENGTH INIT (In.) $2a_o$ | CRACK LENGTH FINAL (In.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{Max}$ | $K_{app}$ ($K_{ap}\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($K_C\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | |
| T851 Cont'd | Plate Cont'd | 1.00 | R.T. Cont'd | L-T Cont'd | 51.1 | 20.000 | 1.000 | 7.000 | 10.050 | --- | 16.00 | 57.46 | Cont'd | Cont'd | 75.75 | Cont'd | Cont'd | 1973 | 86213 |
| | | 1.00 | | | 51.1 | 20.000 | 1.000 | 7.000 | 10.100 | --- | 16.30 | 58.53 | | | 77.51 | | | 1973 | 86213 |
| | | 1.00 | | | 51.1 | 20.000 | 1.000 | 7.000 | 9.450 | --- | 16.00 | 57.46 | | | 71.81 | | | 1973 | 86213 |
| | | 1.00 | | | 51.1 | 20.000 | 1.000 | 7.000 | 9.750 | --- | 15.80 | 56.74 | | | 72.83 | | | 1973 | 86213 |
| | | 1.00 | | | 52.0 | 20.000 | 1.000 | 7.000 | 10.400 | --- | 18.60 | 66.79 | | | 90.86 | | | 1973 | 86213 |
| | | 1.00 | | | 52.0 | 20.000 | 1.000 | 7.000 | 10.500 | --- | 18.80 | 67.51 | | | 92.67 | | | 1973 | 86213 |
| | | 1.00 | | | 52.0 | 20.000 | 1.000 | 7.000 | 10.870 | --- | 18.00 | 64.64 | | | 91.75 | | | 1973 | 86213 |
| | | 1.00 | | | 52.0 | 20.000 | 1.000 | 7.000 | 12.000 | --- | 18.30 | 65.72 | | | 103.63* | | | 1973 | 86213 |
| T851 | Sheet | 0.12 | R.T. | T-L | 49.3 | 3.000 | 0.126 | 1.100 | 1.680 | --- | 30.10 | 43.20* | --- | --- | 61.24* | --- | --- | 1973 | 86213 |
| | | 0.12 | | | 49.3 | 3.000 | 0.126 | 1.100 | 1.740 | --- | 29.80 | 42.77* | | | 62.93* | | | 1973 | 86213 |
| | | 0.12 | | | 49.3 | 3.000 | 0.127 | 1.090 | 1.560 | --- | 29.20 | 41.65* | | | 55.25* | | | 1973 | 86213 |
| | | 0.12 | | | 49.3 | 3.000 | 0.127 | 1.100 | 1.560 | --- | 29.50 | 42.34* | | | 55.81* | | | 1973 | 86213 |
| | | 0.12 | | | 50.8 | 3.000 | 0.127 | 1.080 | 1.600 | --- | 28.80 | 40.82* | | | 55.82* | | | 1973 | 86213 |
| | | 0.12 | | | 50.8 | 3.000 | 0.127 | 1.100 | 1.620 | --- | 30.00 | 43.06* | | | 58.85* | | | 1973 | 86213 |
| | | 0.12 | | | 50.8 | 3.000 | 0.127 | 1.090 | 1.590 | --- | 28.30 | 40.37* | | | 54.52* | | | 1973 | 86213 |
| | | 0.12 | | | 50.8 | 3.000 | 0.127 | 1.080 | 1.560 | --- | 30.40 | 43.09* | | | 57.52* | | | 1973 | 86213 |
| | | 0.12 | | | 51.2 | 3.000 | 0.127 | 1.100 | 1.580 | --- | 30.30 | 43.49* | | | 58.02* | | | 1973 | 86213 |
| | | 0.12 | | | 51.2 | 3.000 | 0.127 | 1.080 | 1.590 | --- | 30.30 | 42.95* | | | 58.37* | | | 1973 | 86213 |
| | | 0.12 | | | 51.2 | 3.000 | 0.127 | 1.100 | 1.480 | --- | 29.20 | 41.91* | | | 52.67* | | | 1973 | 86213 |
| | | 0.12 | | | 51.2 | 3.000 | 0.127 | 1.120 | 1.600 | --- | 29.20 | 42.44* | | | 56.59* | | | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.11.2.2 (CONTINUED)



## ALUMINUM 2219 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($K_{si}\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($K_{si}\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BUCKLING OF CRACK EDGES NOT RESTRAINED** | | | | | | | | | | | | | | | | | | | |
| T851 | Plate | 1.00 | R.T. | T-L | 49.3 | 20.000 | 1.000 | 7.000 | 9.500 | --- | 14.90 | 53.51 | 51.4 | 2.8 | 67.17 | 66.3 | 4.2 | 1973 | 86213 |
| | | 1.00 | | | 49.3 | 20.000 | 1.000 | 7.000 | 10.100 | --- | 15.10 | 54.23 | | | 71.81 | | | 1973 | 86213 |
| | | 1.00 | | | 49.3 | 20.000 | 1.000 | 7.000 | 10.000 | --- | 14.70 | 52.79 | | | 69.28 | | | 1973 | 86213 |
| | | 1.00 | | | 49.3 | 20.000 | 1.000 | 7.000 | 9.300 | --- | 14.80 | 53.15 | | | 65.54 | | | 1973 | 86213 |
| | | 1.00 | | | 50.2 | 20.000 | 1.000 | 7.000 | 10.050 | --- | 13.00 | 46.68 | | | 61.55 | | | 1973 | 86213 |
| | | 1.00 | | | 50.2 | 20.000 | 1.000 | 7.000 | 9.200 | --- | 13.50 | 48.48 | | | 59.25 | | | 1973 | 86213 |
| | | 1.00 | | | 50.2 | 20.000 | 1.000 | 7.000 | 9.990 | --- | 13.40 | 48.12 | | | 63.10 | | | 1973 | 86213 |
| | | 1.00 | | | 50.2 | 20.000 | 1.000 | 7.000 | 9.850 | --- | 13.40 | 48.12 | | | 62.32 | | | 1973 | 86213 |
| | | 1.00 | | | 51.2 | 20.000 | 1.000 | 7.000 | 9.650 | --- | 14.10 | 50.63 | | | 64.42 | | | 1973 | 86213 |
| | | 1.00 | | | 51.2 | 20.000 | 1.000 | 7.000 | 10.000 | --- | 14.80 | 53.15 | | | 69.76 | | | 1973 | 86213 |
| | | 1.00 | | | 51.2 | 20.000 | 1.000 | 7.000 | 10.000 | --- | 15.00 | 53.87 | | | 70.70 | | | 1973 | 86213 |
| | | 1.00 | | | 51.2 | 20.000 | 1.000 | 7.000 | 10.000 | --- | 15.10 | 54.23 | | | 71.17 | | | 1973 | 86213 |
| **BUCKLING OF CRACK EDGES RESTRAINED** | | | | | | | | | | | | | | | | | | | |
| T87 | Sheet | 0.06 | -423 | L-T | 70.7 | 5.500 | 0.067 | 0.610 | --- | --- | 61.50 | 60.66* | --- | --- | --- | --- | --- | 1971 | 80104 |
| | | 0.06 | | | 70.7 | 5.500 | 0.067 | 0.490 | --- | --- | 62.60 | 55.19* | | | --- | | | 1971 | 80104 |
| | | 0.06 | | | 70.7 | 5.500 | 0.068 | 0.300 | --- | --- | 66.70 | 45.87* | | | --- | | | 1971 | 80104 |
| | | 0.06 | | | 70.7 | 5.500 | 0.068 | 0.400 | --- | --- | 64.60 | 51.37* | | | --- | | | 1971 | 80104 |
| T87 | Sheet | 0.06 | -423 | L-T | 70.7 | 6.700 | 0.068 | 0.820 | --- | --- | 58.20 | 66.67* | --- | --- | --- | --- | --- | 1971 | 80104 |
| | | 0.06 | | | 70.7 | 6.700 | 0.068 | 0.890 | --- | --- | 57.50 | 68.74* | | | --- | | | 1971 | 80104 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.11.2.2 (CONTINUED)



| ALUMINUM 2219 $K_C$ | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($K_{app}\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($K_C\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
| BUCKLING OF CRACK EDGES RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T87 Cont'd | Sheet Cont'd | 0.06 | -423 Cont'd | L-T Cont'd | 70.7 | 6.700 | 0.068 | 1.180 | --- | --- | 53.60 | 74.40* | Cont'd | Cont'd | --- | Cont'd | Cont'd | 1971 | 80104 |
| | | 0.06 | | | 70.7 | 6.700 | 0.069 | 1.030 | --- | --- | 55.70 | 71.90* | | | --- | | | 1971 | 80104 |
| T87 | Sheet | 0.06 | -423 | L-T | 73.8 | 15.930 | 0.061 | 5.060 | 6.410 | --- | 26.30 | 79.13 | 78.8 | 0.5 | 92.91 | 90.6 | 3.2 | 1966 | 69759 |
| | | 0.06 | | | 73.8 | 15.990 | 0.062 | 5.000 | 5.980 | --- | 26.30 | 78.49 | | | 88.35 | | | 1966 | 69759 |
| T87 | Sheet | 0.06 | -320 | L-T | 64.5 | 5.500 | 0.068 | 0.620 | --- | --- | 57.10 | 56.80* | --- | --- | --- | --- | --- | 1971 | 80104 |
| | | 0.06 | | | 64.5 | 5.500 | 0.068 | 0.330 | --- | --- | 63.20 | 45.60* | | | --- | | | 1971 | 80104 |
| | | 0.06 | | | 64.5 | 5.500 | 0.068 | 0.480 | --- | --- | 60.20 | 52.52* | | | --- | | | 1971 | 80104 |
| | | 0.06 | | | 64.5 | 5.500 | 0.069 | 0.420 | --- | --- | 61.50 | 50.13* | | | --- | | | 1971 | 80104 |
| T87 | Sheet | 0.06 | -320 | L-T | 64.5 | 6.700 | 0.067 | 0.880 | --- | --- | 55.90 | 66.43* | --- | --- | --- | --- | --- | 1971 | 80104 |
| | | 0.06 | | | 64.5 | 6.700 | 0.068 | 1.000 | --- | --- | 54.60 | 69.39* | | | --- | | | 1971 | 80104 |
| | | 0.06 | | | 64.5 | 6.700 | 0.069 | 1.200 | --- | --- | 51.10 | 71.58* | | | --- | | | 1971 | 80104 |
| T87 | Sheet | 0.10 | R.T. | L-T | 58.5 | 3.500 | 0.100 | 0.750 | 0.980 | --- | 46.40 | 51.84* | --- | --- | 60.52* | --- | --- | 1962 | 62306 |
| T87 | Sheet | 0.06 | R.T. | L-T | 55.0 | 5.500 | 0.067 | 0.520 | --- | --- | 49.80 | 45.26* | --- | --- | --- | --- | --- | 1971 | 80104 |
| | | 0.06 | | | 55.0 | 5.500 | 0.067 | 0.400 | --- | --- | 51.30 | 40.80* | | | --- | | | 1971 | 80104 |
| | | 0.06 | | | 55.0 | 5.500 | 0.068 | 0.620 | --- | --- | 47.90 | 47.64* | | | --- | | | 1971 | 80104 |
| | | 0.06 | | | 55.0 | 5.500 | 0.068 | 0.330 | --- | --- | 52.50 | 37.88* | | | --- | | | 1971 | 80104 |
| T87 | Sheet | 0.10 | R.T. | L-T | 58.5 | 6.000 | 0.100 | 2.000 | 2.460 | --- | 34.60 | 65.90* | --- | --- | 76.06* | --- | --- | 1962 | 62306 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.11.2.2 (CONTINUED)

## ALUMINUM 2219 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($K_{si}\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($K_{si}\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T87 | Sheet | 0.06 | R.T. | L-T | 55.0 | 6.700 | 0.067 | 0.910 | --- | --- | 47.30 | 57.20* | --- | --- | --- | --- | --- | 1971 | 80104 |
| | | 0.06 | | | 55.0 | 6.700 | 0.068 | 1.000 | --- | --- | 46.10 | 58.58* | | | --- | | | 1971 | 80104 |
| | | 0.06 | | | 55.0 | 6.700 | 0.068 | 1.190 | --- | --- | 43.40 | 60.52* | | | --- | | | 1971 | 80104 |
| T87 | Sheet | 0.10 | R.T. | L-T | 58.5 | 12.000 | 0.100 | 2.000 | 2.680 | --- | 41.30 | 74.48* | --- | --- | 87.44* | --- | --- | 1962 | 62306 |
| | | 0.10 | | | 58.5 | 12.000 | 0.100 | 4.000 | 4.770 | --- | 27.90 | 75.15 | | | 84.79 | | | 1962 | 62306 |
| T87 | Sheet | 0.10 | R.T. | L-T | 58.5 | 24.000 | 0.100 | 20.00 | 20.650 | --- | 6.40 | 70.51 | 78.8 | 11.1 | 78.16 | 90.6 | 15.0 | 1962 | 62306 |
| | | 0.10 | | | 58.5 | 24.000 | 0.100 | 4.000 | 5.730 | --- | 33.90 | 86.46 | | | 105.43 | | | 1962 | 62306 |
| | | 0.10 | | | 58.5 | 24.000 | 0.100 | 8.000 | 9.580 | --- | 24.00 | 91.42 | | | 103.46 | | | 1962 | 62306 |
| | | 0.10 | | | 58.5 | 24.000 | 0.100 | 18.00 | 19.430 | --- | 7.40 | 63.61 | | | 75.31 | | | 1962 | 62306 |
| | | 0.10 | | | 58.5 | 24.000 | 0.100 | 18.00 | 18.620 | --- | 8.40 | 72.20 | | | 77.36 | | | 1962 | 62306 |
| | | 0.10 | | | 58.5 | 24.000 | 0.100 | 12.00 | 13.650 | --- | 17.80 | 91.90 | | | 104.11 | | | 1962 | 62306 |
| | | 0.10 | | | 58.5 | 24.000 | 0.100 | 2.000 | 2.590 | --- | 42.40 | 75.48 | | | 86.14* | | | 1962 | 62306 |
| | | 0.10 | | | 58.5 | 24.000 | 0.100 | 1.000 | 1.400 | --- | 48.40 | 60.73* | | | 71.93* | | | 1962 | 62306 |
| | | 0.10 | | | 58.5 | 24.000 | 0.100 | 0.500 | 0.770 | --- | 54.40 | 48.22* | | | 59.87* | | | 1962 | 62306 |
| T87 | Sheet | 0.10 | R.T. | L-T | 58.5 | 30.000 | 0.100 | 18.00 | 19.700 | --- | 12.50 | 86.70 | --- | --- | 97.03 | --- | --- | 1962 | 62306 |
| T87 | Sheet | 0.10 | R.T. | L-T | 58.5 | 36.000 | 0.100 | 4.000 | 5.450 | --- | 34.00 | 85.88 | --- | --- | 100.91 | --- | --- | 1962 | 62306 |
| T87 | Sheet | 0.10 | R.T. | L-T | 58.5 | 48.000 | 0.100 | 4.000 | 5.580 | --- | 34.90 | 87.86 | 98.8 | 12.4 | 104.19 | 109.8 | 12.1 | 1962 | 62306 |
| | | 0.10 | | | 58.5 | 48.000 | 0.100 | 12.00 | 15.050 | --- | 23.20 | 104.79 | | | 120.17 | | | 1962 | 62306 |
| | | 0.10 | | | 58.5 | 48.000 | 0.100 | 36.00 | 37.170 | --- | 7.90 | 96.03 | | | 102.47 | | | 1962 | 62306 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.11.2.2 (CONTINUED)



## ALUMINUM 2219 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($Ksi\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($Ksi\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BUCKLING OF CRACK EDGES RESTRAINED** | | | | | | | | | | | | | | | | | | | |
| T87 Cont'd | Sheet Cont'd | 0.10 | R.T. Cont'd | L-T Cont'd | 58.5 | 48.000 | 0.100 | 41.90 | 43.180 | --- | 4.30 | 78.34 | Cont'd | Cont'd | 89.35 | Cont'd | Cont'd | 1962 | 62306 |
| | | 0.10 | | | 58.5 | 48.000 | 0.100 | 24.00 | 25.720 | --- | 15.40 | 112.45 | | | 119.93 | | | 1962 | 62306 |
| | | 0.10 | | | 58.5 | 48.000 | 0.100 | 8.000 | 9.250 | --- | 28.20 | 101.71 | | | 110.02 | | | 1962 | 62306 |
| | | 0.10 | | | 58.5 | 48.000 | 0.100 | 12.00 | 14.200 | --- | 24.50 | 110.66 | | | 122.38 | | | 1962 | 62306 |
| **BUCKLING OF CRACK EDGES NOT RESTRAINED** | | | | | | | | | | | | | | | | | | | |
| T87 | Sheet | 0.03 | -423 | L-T | 74.0 | 12.000 | 0.032 | 1.210 | 2.020 | --- | 48.10 | 66.73 | --- | --- | 87.21 | --- | --- | 1966 | 66103 |
| T87 | Sheet | 0.12 | -423 | L-T | 74.0 | 12.000 | 0.125 | 1.230 | 1.940 | --- | 46.20 | 64.64 | --- | --- | 81.97 | --- | --- | 1966 | 66103 |
| T87 | Sheet | 0.03 | -423 | L-T | 74.0 | 16.000 | 0.032 | 4.240 | 7.030 | --- | 27.80 | 75.02 | --- | --- | 105.20 | --- | --- | 1966 | 66103 |
| T87 | Sheet | 0.12 | -423 | L-T | 74.0 | 16.000 | 0.125 | 4.830 | 6.310 | --- | 26.90 | 78.55 | --- | --- | 93.86 | --- | --- | 1966 | 66103 |
| T87 | Sheet | 0.06 | R.T. | L-T | 59.2 | 2.000 | 0.064 | 0.625 | 1.080 | --- | 37.80 | 39.84* | --- | --- | 60.54* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 59.2 | 2.000 | 0.064 | 0.622 | 0.810 | --- | 38.10 | 40.08* | | | 47.92* | | | 1973 | 86213 |
| | | 0.06 | | | 59.2 | 2.000 | 0.064 | 0.623 | 0.880 | --- | 37.80 | 39.76* | | | 50.63* | | | 1973 | 86213 |
| | | 0.06 | | | 59.2 | 2.000 | 0.064 | 0.609 | 0.940 | --- | 38.70 | 40.13* | | | 54.68* | | | 1973 | 86213 |
| | | 0.06 | | | 59.2 | 2.000 | 0.065 | 0.625 | 1.110 | --- | 38.10 | 40.16* | | | 62.72* | | | 1973 | 86213 |
| T87 | Sheet | 0.12 | R.T. | L-T | 58.1 | 2.990 | 0.125 | 0.993 | 1.250 | --- | 36.40 | 48.79* | --- | --- | 57.31* | --- | --- | 1973 | 86213 |
| | | 0.12 | | | 54.7 | 3.000 | 0.125 | 1.090 | 1.820 | --- | 32.50 | 46.36* | | | 72.20* | | | 1973 | 86213 |
| | | 0.12 | | | 54.7 | 3.000 | 0.125 | 1.080 | 1.800 | --- | 32.50 | 46.07* | | | 71.28* | | | 1973 | 86213 |
| | | 0.12 | | | 58.1 | 3.000 | 0.125 | 0.992 | 1.200 | --- | 36.20 | 48.50* | | | 55.26* | | | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.11.2.2 (CONTINUED)

## ALUMINUM 2219 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($K_{app}$ (Ksi$\sqrt{in}$)) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($K_C$ (Ksi$\sqrt{in}$)) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T87 Cont'd | Sheet Cont'd | 0.12 | R.T. Cont'd | L-T Cont'd | 58.1 | 2.990 | 0.126 | 0.995 | 1.300 | --- | 35.90 | 48.18* | Cont'd | Cont'd | 58.25* | Cont'd | Cont'd | 1973 | 86213 |
| | | 0.12 | | | 58.1 | 2.990 | 0.126 | 0.992 | 1.250 | --- | 36.30 | 48.66* | | | 57.15* | | | 1973 | 86213 |
| T87 | Sheet | 0.06 | R.T. | L-T | 57.7 | 15.930 | 0.061 | 5.000 | 6.280 | --- | 22.80 | 68.08 | --- | --- | 79.36 | --- | --- | 1966 | 69759 |
| T87 | Sheet | 0.06 | R.T. | L-T | 57.7 | 16.290 | 0.062 | 5.000 | 6.360 | --- | 21.50 | 64.01 | 66.3 | 3.2 | 75.15 | 75.9 | 1.1 | 1966 | 69759 |
| | | 0.06 | | | 57.7 | 16.290 | 0.062 | 4.980 | 5.910 | --- | 23.10 | 68.60 | | | 76.70 | | | 1966 | 69759 |
| T87 | Plate | 0.25 | R.T. | L-T | 57.6 | 3.000 | 0.247 | 1.000 | 1.680 | --- | 34.30 | 46.19* | --- | --- | 69.79* | --- | --- | 1973 | 86213 |
| | | 0.25 | | | 57.6 | 3.000 | 0.247 | 1.160 | 1.790 | --- | 31.40 | 46.77* | | | 68.43* | | | 1973 | 86213 |
| | | 0.25 | | | 57.6 | 3.000 | 0.247 | 1.257 | 2.060 | --- | 29.70 | 46.89* | | | 77.72* | | | 1973 | 86213 |
| | | 0.25 | | | 57.6 | 3.000 | 0.247 | 1.130 | 1.900 | --- | 32.10 | 46.94* | | | 75.14* | | | 1973 | 86213 |
| T87 | Plate | 0.25 | R.T. | L-T | 56.0 | 4.000 | 0.244 | 1.330 | 2.250 | --- | 32.40 | 50.30* | --- | --- | 76.47* | --- | --- | 1973 | 86213 |
| | | 0.25 | | | 56.0 | 4.000 | 0.245 | 1.430 | 2.570 | --- | 31.00 | 50.50* | | | 85.35* | | | 1973 | 86213 |
| | | 0.25 | | | 56.0 | 4.000 | 0.246 | 1.330 | 2.260 | --- | 32.20 | 49.99* | | | 76.35* | | | 1973 | 86213 |
| | | 0.25 | | | 57.6 | 4.000 | 0.246 | 1.330 | 2.030 | --- | 34.40 | 53.41* | | | 73.49* | | | 1973 | 86213 |
| | | 0.25 | | | 57.6 | 4.000 | 0.246 | 1.330 | 2.250 | --- | 34.10 | 52.94* | | | 80.49* | | | 1973 | 86213 |
| | | 0.25 | | | 57.6 | 4.000 | 0.247 | 1.410 | 2.310 | --- | 33.20 | 53.57* | | | 80.58* | | | 1973 | 86213 |
| T87 | Plate | 0.25 | R.T. | L-T | 56.0 | 4.000 | 0.255 | 1.330 | 2.180 | --- | 32.40 | 50.30* | --- | --- | 74.06* | --- | --- | 1973 | 86213 |
| | | 0.25 | | | 56.0 | 4.000 | 0.255 | 1.440 | 2.470 | --- | 30.90 | 50.58* | | | 80.95* | | | 1973 | 86213 |
| | | 0.25 | | | 56.0 | 4.000 | 0.256 | 1.330 | 2.160 | --- | 32.10 | 49.84* | | | 72.71* | | | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.11.2.2 (CONTINUED)

## ALUMINUM 2219 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_C$ (Ksi$\sqrt{in}$) | $K_C$ $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T87 | Sheet | 0.06 | R.T. | T-L | 59.0 | 2.000 | 0.064 | 0.623 | 0.900 | --- | 36.10 | 37.97* | --- | --- | 49.22* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 59.0 | 2.000 | 0.064 | 0.625 | 0.960 | --- | 36.70 | 38.68* | | | 52.78* | | | 1973 | 86213 |
| | | 0.06 | | | 59.0 | 2.000 | 0.064 | 0.619 | 0.880 | --- | 37.40 | 39.18* | | | 50.09* | | | 1973 | 86213 |
| | | 0.06 | | | 59.0 | 2.000 | 0.064 | 0.622 | 0.870 | --- | 36.50 | 38.39* | | | 48.45* | | | 1973 | 86213 |
| | | 0.06 | | | 59.0 | 2.000 | 0.064 | 0.625 | 0.980 | --- | 36.50 | 38.47* | | | 53.44* | | | 1973 | 86213 |
| T87 | Sheet | 0.12 | R.T. | T-L | 55.9 | 3.000 | 0.124 | 1.070 | 1.760 | --- | 30.60 | 43.10* | --- | --- | 65.43* | --- | --- | 1973 | 86213 |
| | | 0.12 | | | 55.9 | 3.000 | 0.124 | 1.080 | 1.690 | --- | 30.50 | 43.23* | | | 62.44* | | | 1973 | 86213 |
| | | 0.12 | | | 58.6 | 2.990 | 0.126 | 0.991 | 1.280 | --- | 33.90 | 45.38* | | | 54.35* | | | 1973 | 86213 |
| | | 0.12 | | | 58.6 | 2.990 | 0.126 | 0.992 | 1.350 | --- | 34.30 | 45.98* | | | 57.34* | | | 1973 | 86213 |
| | | 0.12 | | | 58.6 | 2.990 | 0.126 | 0.990 | 1.300 | --- | 33.90 | 45.38* | | | 55.00* | | | 1973 | 86213 |
| | | 0.12 | | | 58.6 | 2.990 | 0.126 | 0.994 | 1.280 | --- | 34.10 | 45.77* | | | 54.67* | | | 1973 | 86213 |
| T87 | Plate | 0.25 | R.T. | T-L | 57.2 | 3.000 | 0.247 | 1.000 | 1.530 | --- | 32.00 | 43.10* | --- | --- | 59.47* | --- | --- | 1973 | 86213 |
| | | 0.25 | | | 57.2 | 3.000 | 0.247 | 1.160 | 1.740 | --- | 29.20 | 43.50* | | | 61.66* | | | 1973 | 86213 |
| | | 0.25 | | | 57.2 | 3.000 | 0.247 | 1.120 | 1.710 | --- | 30.40 | 44.18* | | | 63.01* | | | 1973 | 86213 |
| T87 | Plate | 0.25 | R.T. | T-L | 55.9 | 4.000 | 0.245 | 1.460 | 2.310 | --- | 26.60 | 43.95 | 45.1 | 1.6 | 64.56* | --- | --- | 1973 | 86213 |
| | | 0.25 | | | 55.9 | 4.000 | 0.246 | 1.330 | 2.060 | --- | 28.70 | 44.56 | | | 62.14* | | | 1973 | 86213 |
| | | 0.25 | | | 55.9 | 4.000 | 0.246 | 1.330 | 2.120 | --- | 28.60 | 44.40 | | | 63.62* | | | 1973 | 86213 |
| | | 0.25 | | | 57.2 | 4.000 | 0.246 | 1.330 | 2.040 | --- | 30.80 | 47.82* | | | 66.09* | | | 1973 | 86213 |
| | | 0.25 | | | 57.2 | 4.000 | 0.246 | 1.440 | 2.170 | --- | 29.00 | 47.47 | | | 65.99* | | | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.11.2.2 (CONCLUDED)

| ALUMINUM 2219 $K_C$ | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ (Ksi$\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | |
| T87 | Plate | 0.25 | R.T. | T-L | 55.6 | 4.000 | 0.255 | 1.440 | 2.240 | --- | 27.80 | 45.50 | 45.1 | 0.3 | 65.32* | --- | --- | 1973 | 86213 |
| | | 0.25 | | | 55.6 | 4.000 | 0.255 | 1.330 | 2.060 | --- | 28.90 | 44.87 | | | 62.57* | | | 1973 | 86213 |
| | | 0.25 | | | 55.6 | 4.000 | 0.256 | 1.330 | 2.070 | --- | 29.00 | 45.02 | | | 63.07* | | | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

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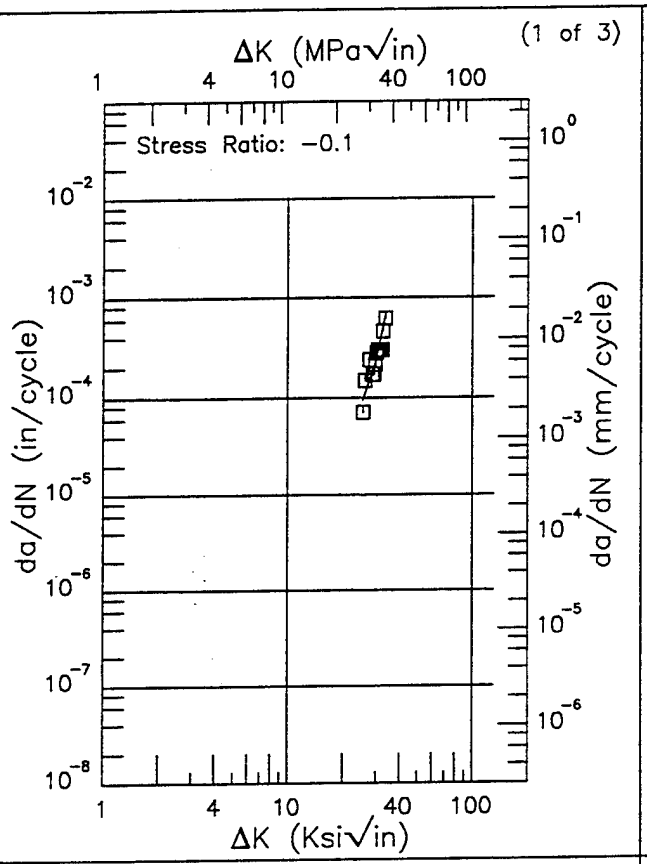
2219

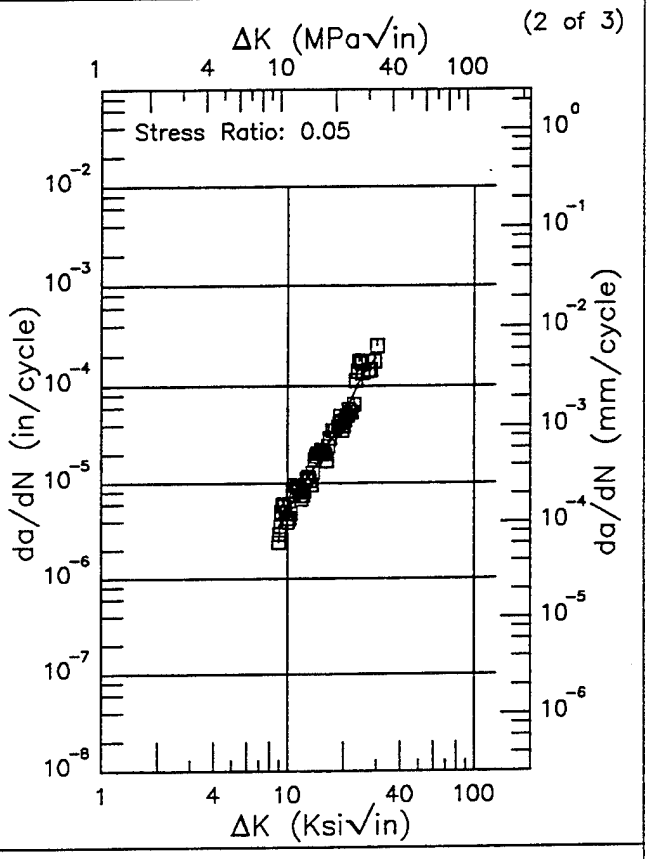
R

Condition/Ht: T851
Form: 0.63 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 1 – 20 Hz
Environment: LAB AIR; RT

Yield Strength: 54.7 ksi
Ult. Strength: 66.9 ksi
Specimen Thk: 0.25 in.
Specimen Width: 2.5 in.
Ref: 88468




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 25.44 (min) | 94.6 |
| 30. | 239. |
| 33.66 (max) | 683. |




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 8.91 (min) | 3.42 |
| 9. | 3.55 |
| 10. | 5.18 |
| 13. | 11.6 |
| 16. | 21.7 |
| 20. | 48.5 |
| 25. | 121. |
| 30. | 193. |
| 30.18 (max) | 194. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 24.47 | 0. .5 .8 1.25 2. |

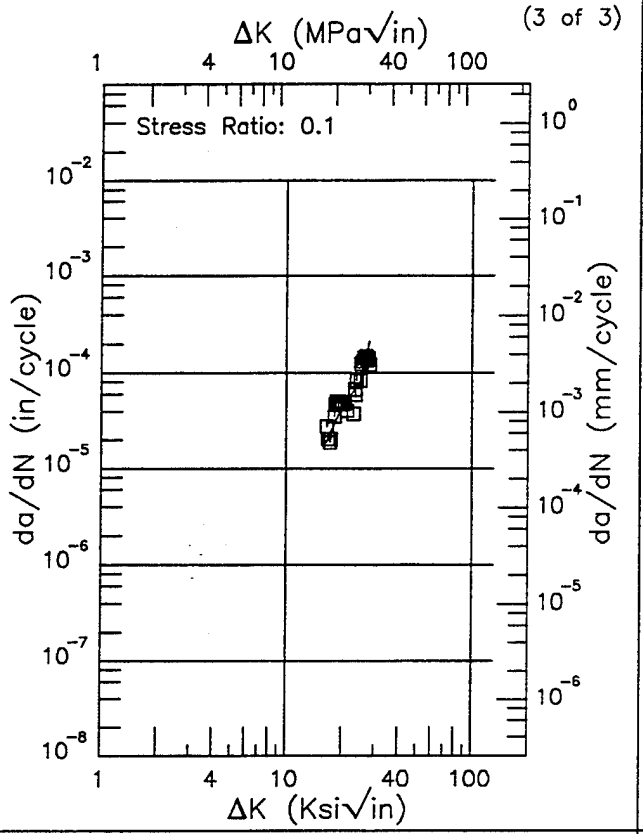
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 22.16 | 0. .5 .8 1.25 2. |

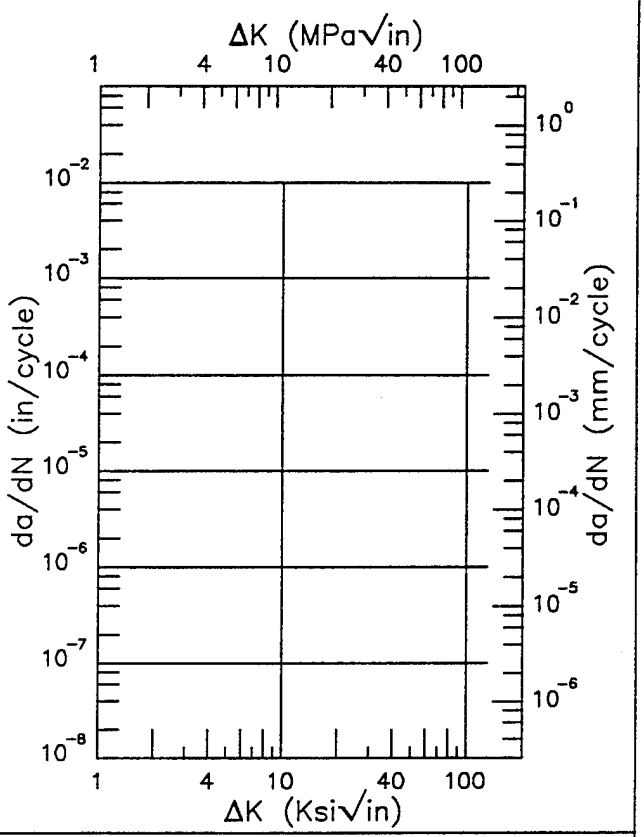
**Figure 7.11.3.1.1**

2219 R

Condition/Ht: T851
Form: 0.63 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 1 – 20 Hz
Environment: LAB AIR; RT

Yield Strength: 54.7 ksi
Ult. Strength: 66.9 ksi
Specimen Thk: 0.25 in.
Specimen Width: 2.5 in.
Ref: 88468




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 16.46 (min) | 18.8 |
| 20. | 44.9 |
| 25. | 81.0 |
| 28.06 (max) | 212. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 29.78 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

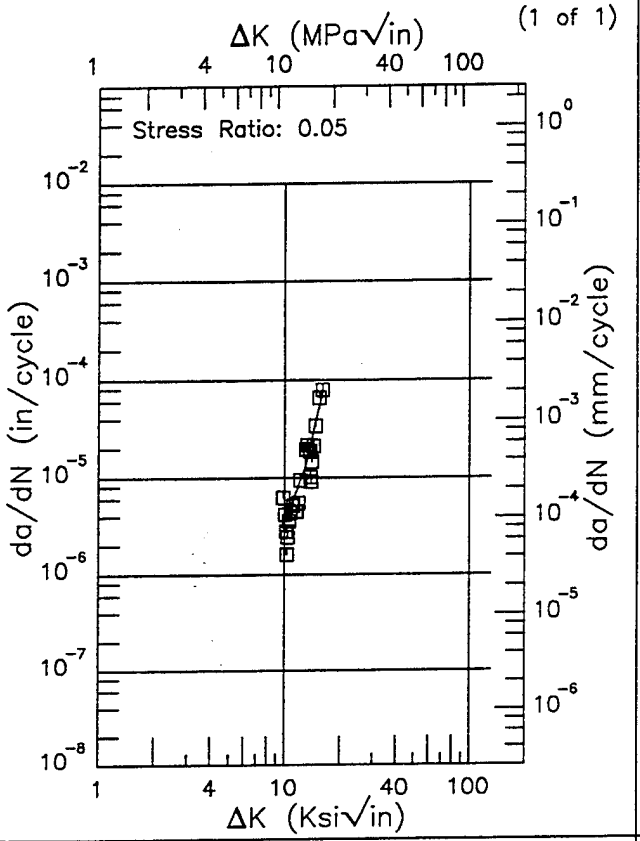
**Figure 7.11.3.1.1 (Concluded)**

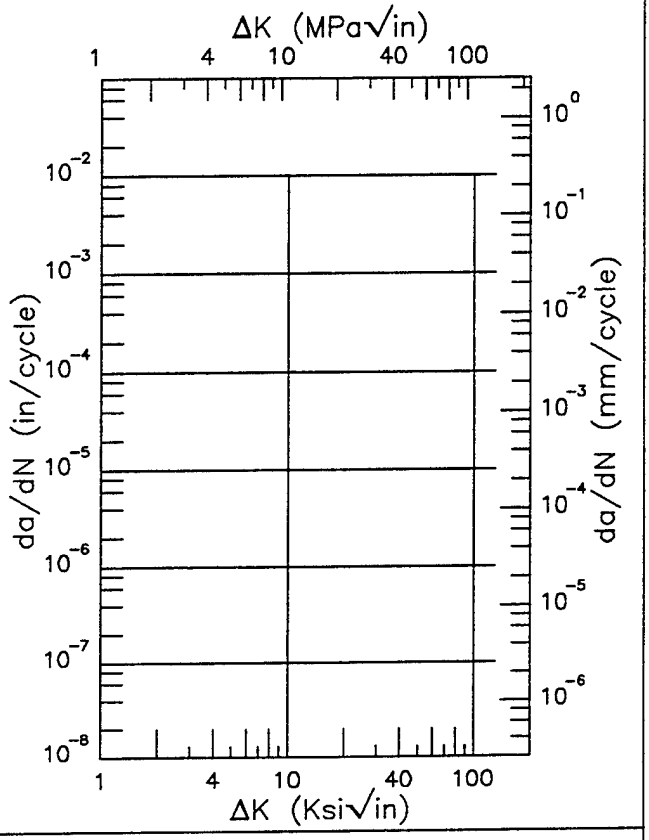
2219

R

Condition/Ht: T851
Form: 0.63 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 1 – 20 Hz
Environment: LAB AIR; RT

Yield Strength: 54.7 ksi
Ult. Strength: 66.9 ksi
Specimen Thk: 0.5 in.
Specimen Width: 2.5 in.
Ref: 88468




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 9.79 (min) | 3.55 |
| 10. | 3.58 |
| 13. | 13.2 |
| 15.96 (max) | 77.1 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

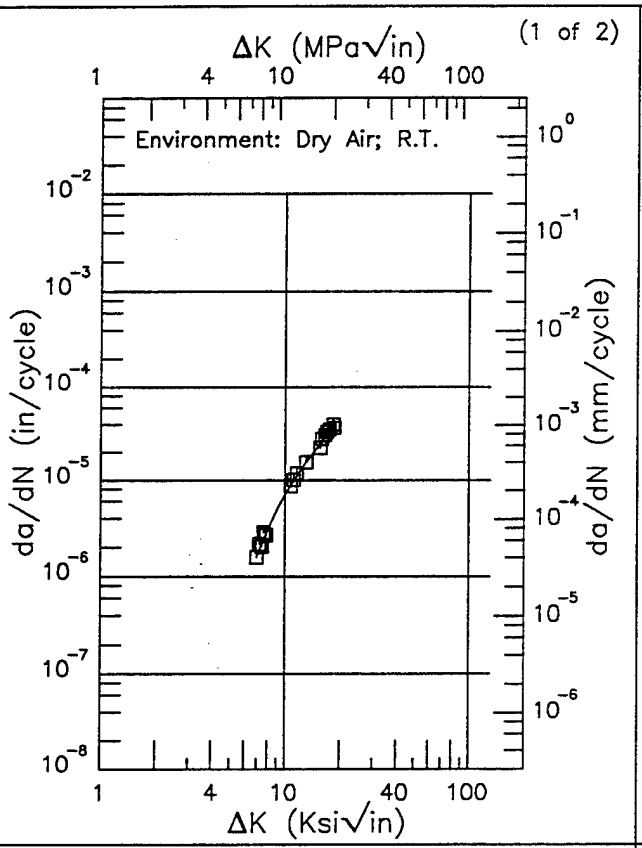
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 37.38 | 0. .5 .8 1.25 2. |

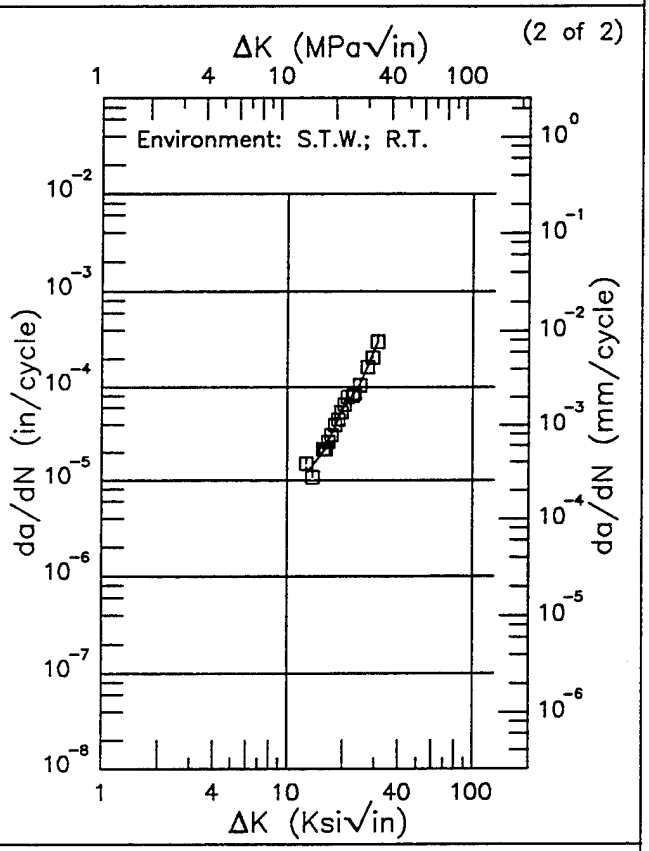
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.11.3.1.2**

Condition/Ht: T851
Form: 1.75 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.08
Frequency: 0.1 Hz

Yield Strength: 50 ksi
Ult. Strength: 66 ksi
Specimen Thk: 0.994 – 1 in.
Specimen Width: 6 – 6.01 in.
Ref: 88579




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.98 (min) | 1.58 |
| 7. | 1.60 |
| 8. | 3.03 |
| 9. | 4.89 |
| 10. | 7.10 |
| 13. | 15.5 |
| 16. | 26.9 |
| 18.26 (max) | 38.9 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 12.67 (min) | 13.8 |
| 13. | 12.4 |
| 16. | 21.2 |
| 20. | 58.4 |
| 25. | 110. |
| 30. | 252. |
| 30.86 (max) | 295. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 7.79 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 7.44 | 0. .5 .8 1.25 2. |

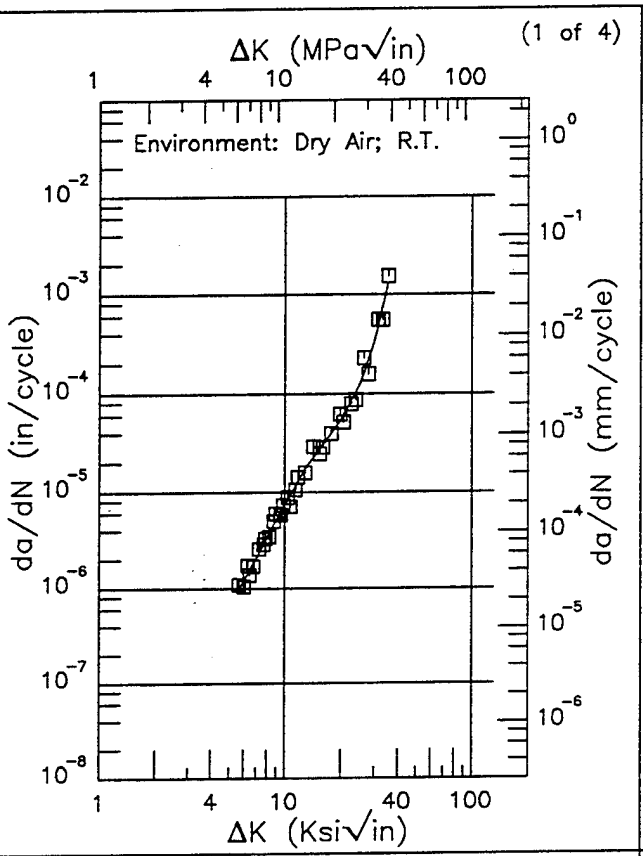
**Figure 7.11.3.1.3**

2219

E

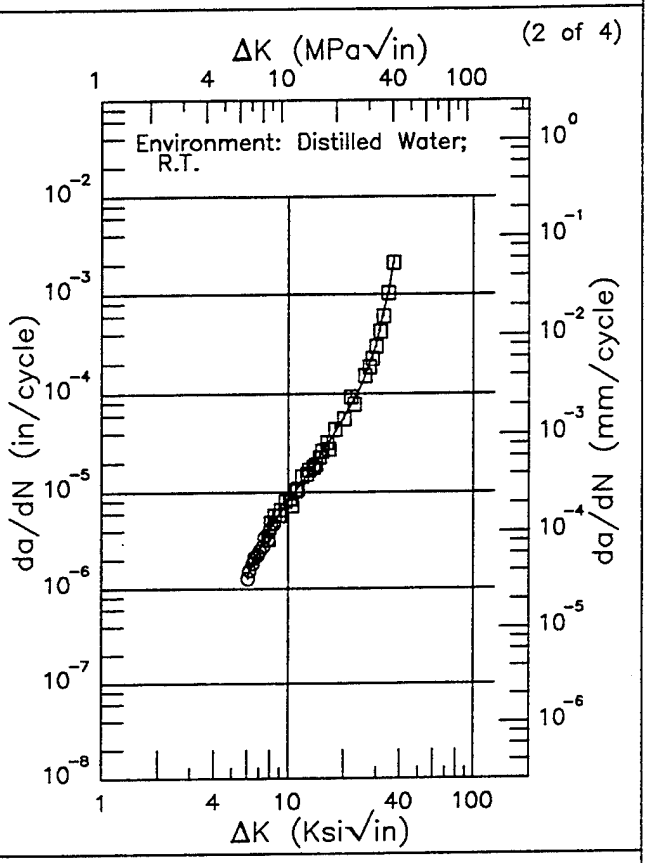
Condition/Ht: T851
Form: 1.75 – 2 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.08
Frequency: 1 Hz

Yield Strength: 50 ksi
Ult. Strength: 66 – 68 ksi
Specimen Thk: 0.99 in.
Specimen Width: 6 – 6.01 in.
Ref: 88579




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.66 (min) | 0.979 |
| 6. | 1.19 |
| 7. | 2.05 |
| 8. | 3.36 |
| 9. | 5.20 |
| 10. | 7.62 |
| 13. | 17.8 |
| 16. | 30.5 |
| 20. | 55.0 |
| 25. | 124. |
| 30. | 337. |
| 35. | 1193. |
| 35.37 (max) | 1327. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 16.07 | 0. .5 .8 1.25 2. |




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.07 (min) | 1.35 |
| 7. | 2.53 |
| 8. | 4.13 |
| 9. | 5.99 |
| 10. | 8.09 |
| 13. | 16.1 |
| 16. | 28.7 |
| 20. | 56.8 |
| 25. | 122. |
| 30. | 306. |
| 35. | 1117. |
| 36.90 (max) | 2094. |

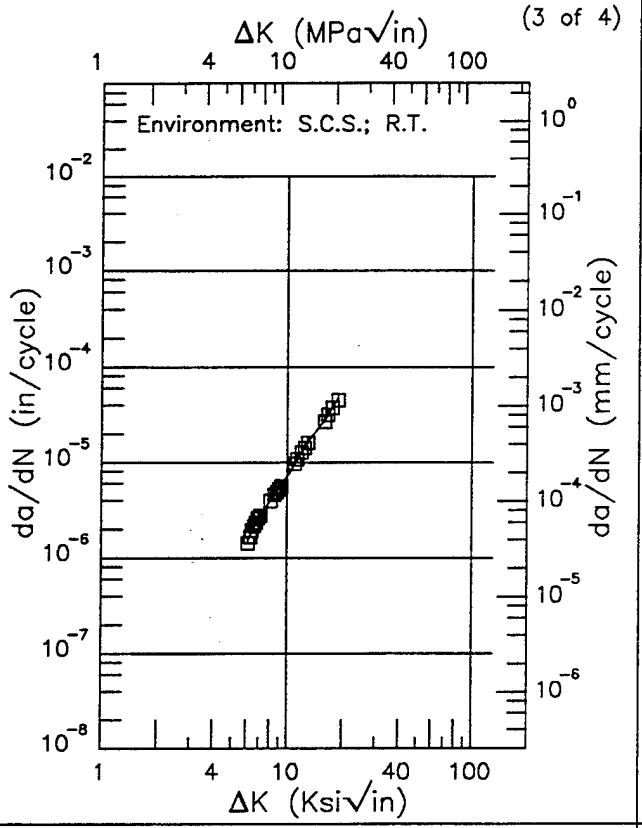
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 8.57 | 0. .5 .8 1.25 2. |

**Figure 7.11.3.1.4**

2219 E

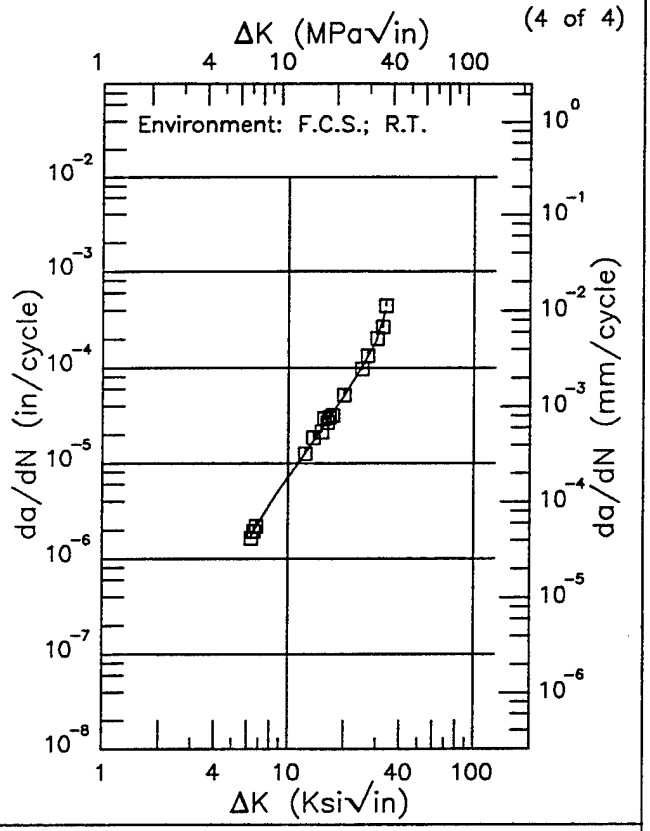
Condition/Ht: T851
Form: 1.75 – 2 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.08
Frequency: 1 Hz

Yield Strength: 50 ksi
Ult. Strength: 66 – 68 ksi
Specimen Thk: 0.99 in.
Specimen Width: 6 – 6.01 in.
Ref: 88579




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.13 (min) | 1.53 |
| 7. | 2.54 |
| 8. | 3.83 |
| 9. | 5.30 |
| 10. | 7.13 |
| 13. | 16.6 |
| 16. | 27.9 |
| 18.70 (max) | 46.1 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 2.99 | 0. .5 .8 1.25 2. |




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.31 (min) | 1.71 |
| 7. | 2.41 |
| 8. | 3.67 |
| 9. | 5.21 |
| 10. | 7.06 |
| 13. | 14.7 |
| 16. | 26.5 |
| 20. | 51.2 |
| 25. | 103. |
| 30. | 199. |
| 33.42 (max) | 394. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 7.12 | 0. .5 .8 1.25 2. |

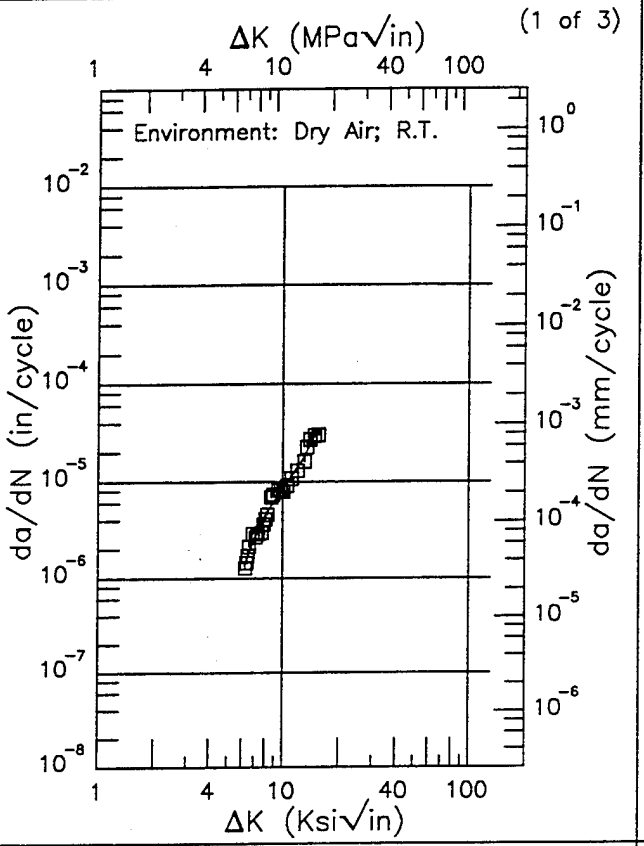
**Figure 7.11.3.1.4 (Concluded)**

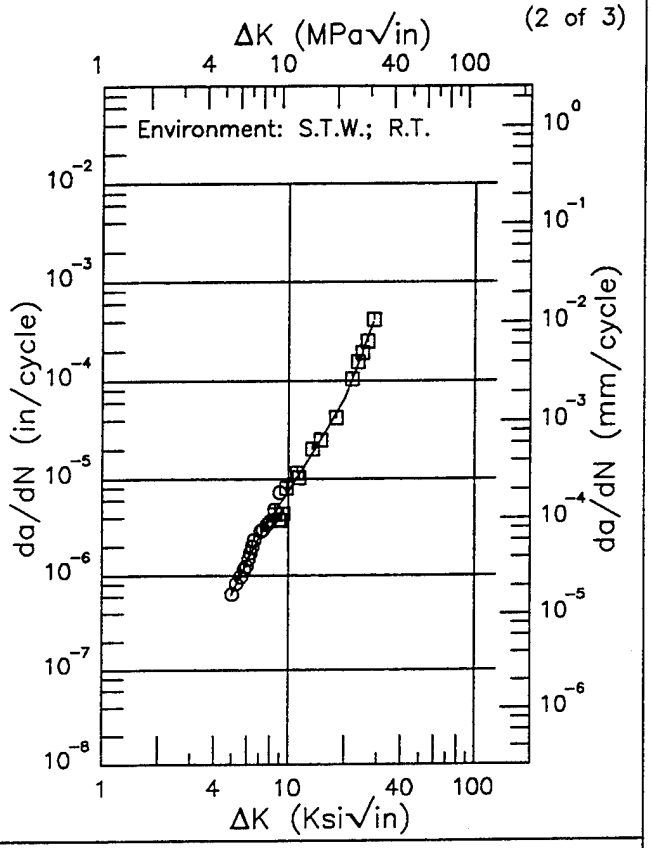
2219

E

Condition/Ht: T851
Form: 1.75 – 3 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.08
Frequency: 1 Hz

Yield Strength: 49.6 – 54 ksi
Ult. Strength: 66.2 – 69 ksi
Specimen Thk: 0.99 – 0.998 in.
Specimen Width: 7.4 in.
Ref: 85837;88579




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.23 (min) | 1.37 |
| 7. | 2.57 |
| 8. | 4.43 |
| 9. | 6.40 |
| 10. | 8.48 |
| 13. | 17.7 |
| 15.42 (max) | 35.6 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.99 (min) | 0.624 |
| 5. | 0.630 |
| 6. | 1.39 |
| 7. | 2.46 |
| 8. | 3.82 |
| 9. | 5.48 |
| 10. | 7.50 |
| 13. | 16.4 |
| 16. | 31.1 |
| 20. | 65.8 |
| 25. | 203. |
| 28.46 (max) | 393. |

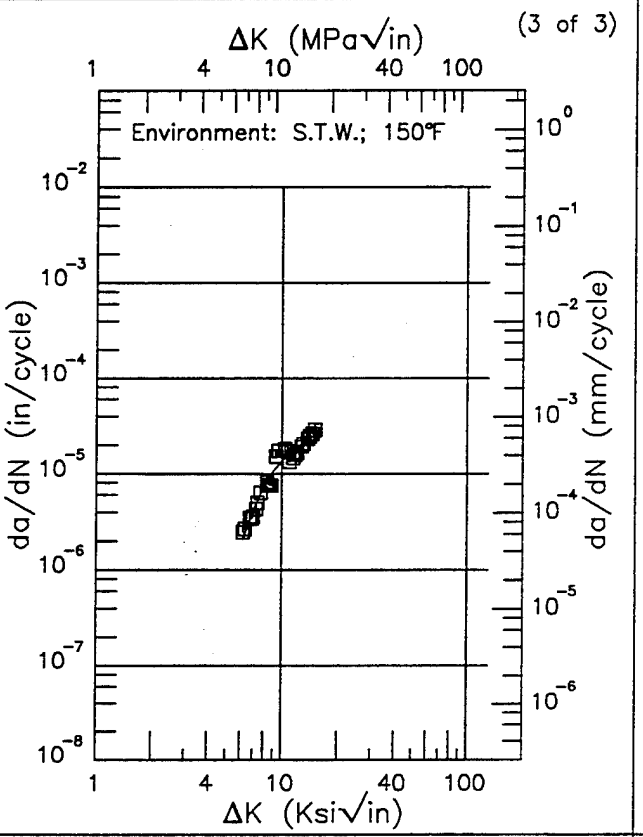
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 12.03 | 0. .5 .8 1.25 2. |

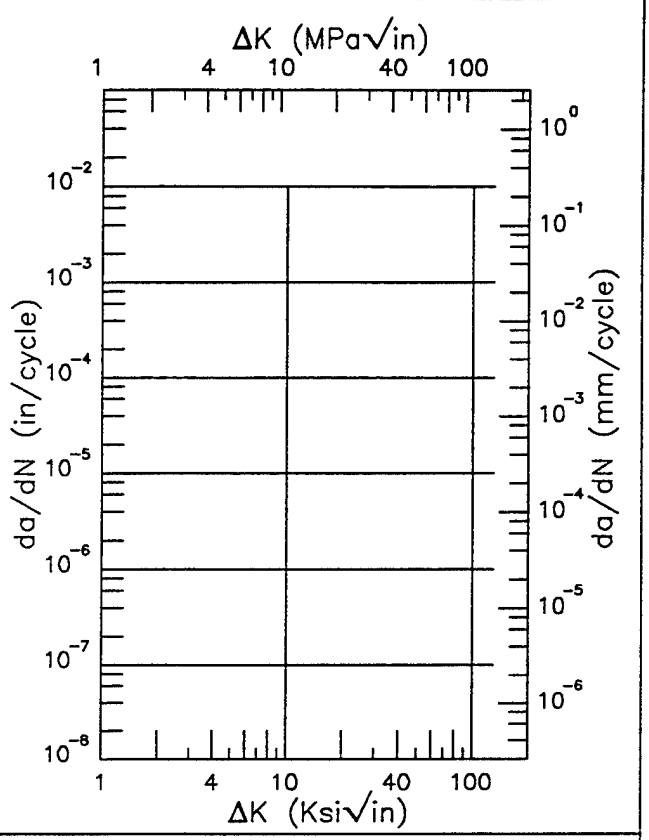
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 13.44 | 0. .5 .8 1.25 2. |

**Figure 7.11.3.1.5**

Condition/Ht: T851
Form: 1.75 – 3 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.08
Frequency: 1 Hz

Yield Strength: 49.6 – 54 ksi
Ult. Strength: 66.2 – 69 ksi
Specimen Thk: 0.99 – 0.998 in.
Specimen Width: 7.4 in.
Ref: 85837;88579




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.17 (min) | 2.08 |
| 7. | 4.15 |
| 8. | 7.26 |
| 9. | 10.5 |
| 10. | 13.6 |
| 13. | 21.1 |
| 14.97 (max) | 25.2 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 15.45 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.11.3.1.5 (Concluded)**

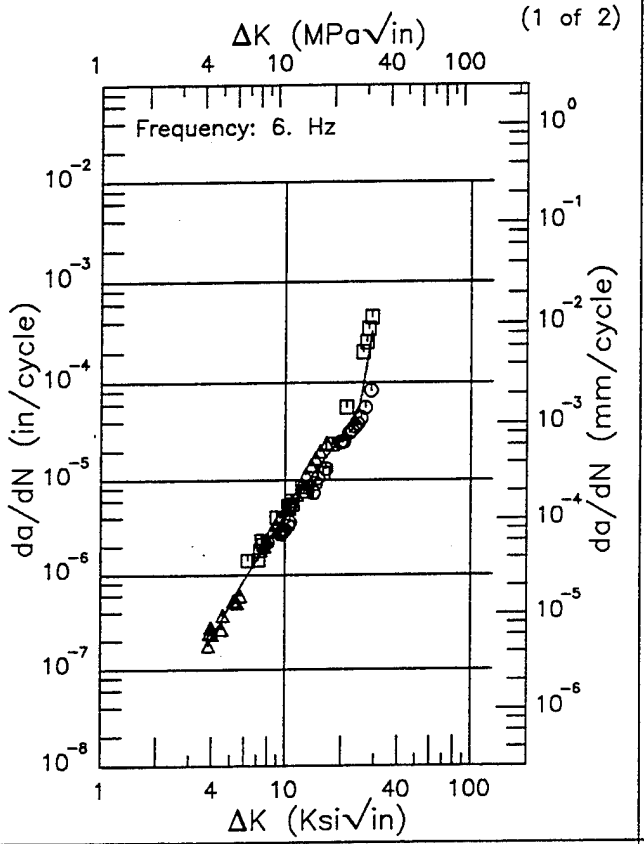
2219

F

Condition/Ht: T851
Form: 1.75 – 3 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.08
Environment: DRY AIR; RT

Yield Strength: 49.6 – 54 ksi
Ult. Strength: 66.2 – 69 ksi
Specimen Thk: 0.993 – 1 in.
Specimen Width: 7.4 in.
Ref: 88579;85837

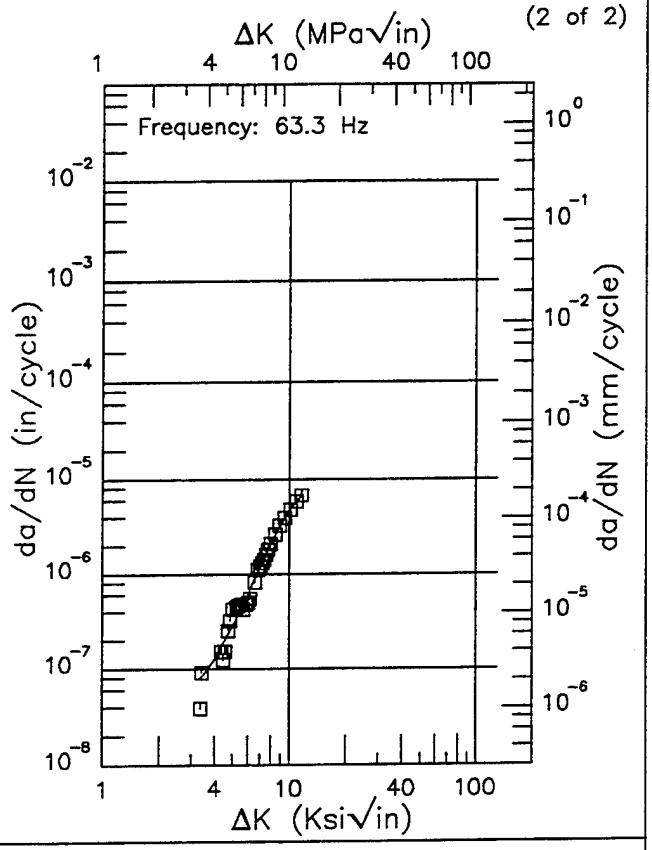
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.83 (min) | 0.188 |
| 4. | 0.220 |
| 5. | 0.479 |
| 6. | 0.882 |
| 7. | 1.45 |
| 8. | 2.21 |
| 9. | 3.17 |
| 10. | 4.35 |
| 13. | 9.21 |
| 16. | 16.1 |
| 20. | 27.6 |
| 25. | 60.3 |
| 28.98 (max) | 328. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 31.93 | 0. .5 .8 1.25 2. |

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.34 (min) | 0.0795 |
| 3.5 | 0.0876 |
| 4. | 0.125 |
| 5. | 0.278 |
| 6. | 0.599 |
| 7. | 1.18 |
| 8. | 2.08 |
| 9. | 3.29 |
| 10. | 4.67 |
| 11.59 (max) | 6.57 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 19.33 | 0. .5 .8 1.25 2. |

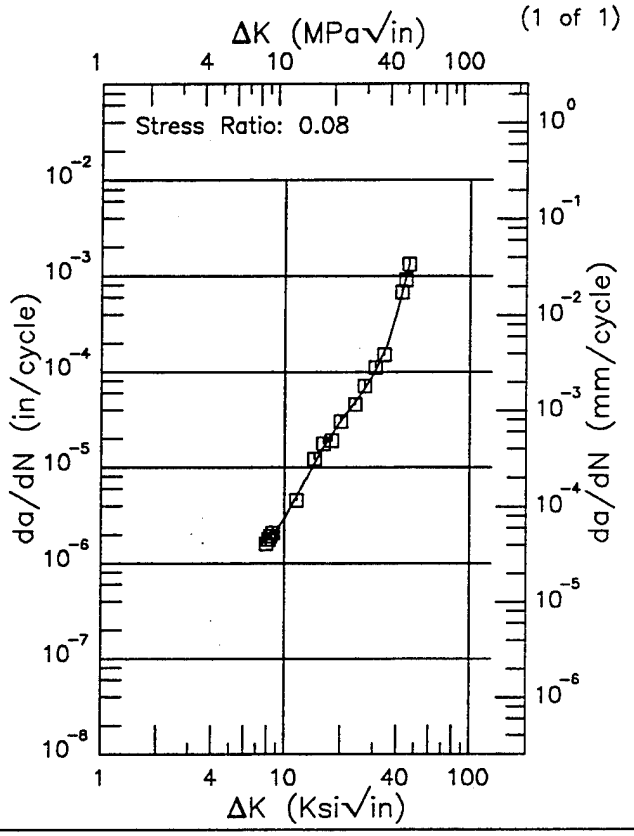
**Figure 7.11.3.1.6**

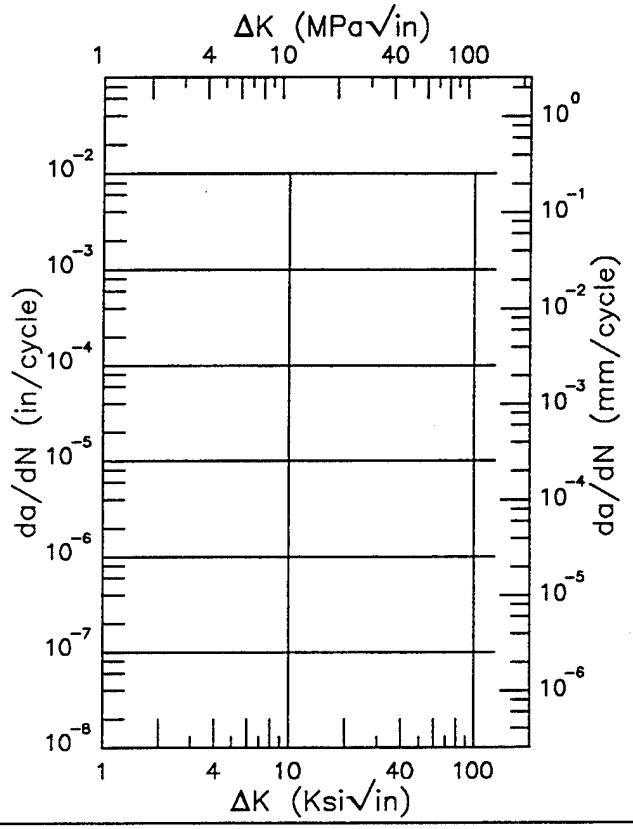
2219 R

Condition/Ht: T851
Form: 1.75 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 6 Hz
Environment: DRY AIR; RT

Yield Strength: 50 ksi
Ult. Strength: 66 ksi
Specimen Thk: 0.5 in.
Specimen Width: 5.99 in.
Ref: 88579

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 7.95 (min) | 1.74 |
| 8. | 1.75 |
| 9. | 2.23 |
| 10. | 2.98 |
| 13. | 7.42 |
| 16. | 15.8 |
| 20. | 30.9 |
| 25. | 54.7 |
| 30. | 94.3 |
| 35. | 183. |
| 40. | 427. |
| 46.44 (max) | 1301. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 6.98 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.11.3.1.7**

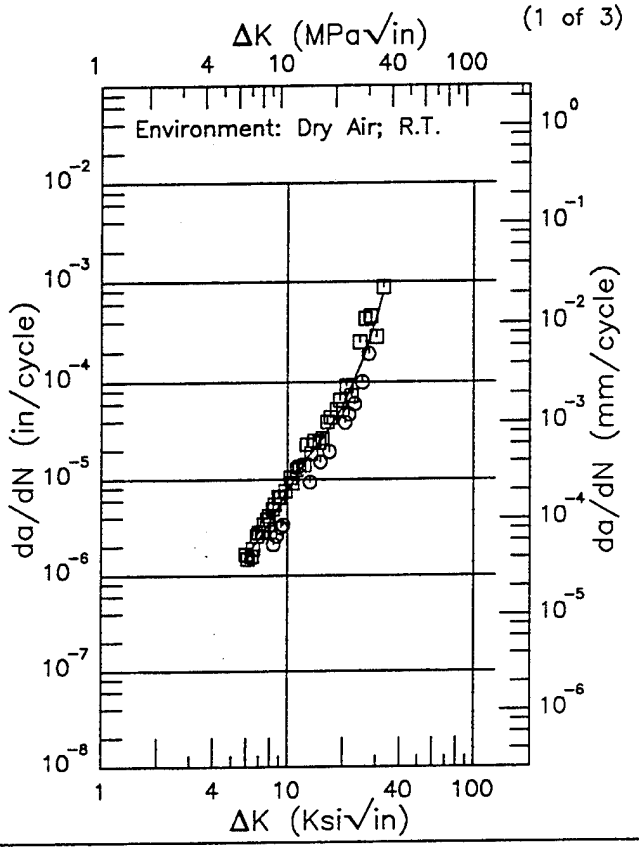
2219

E

Condition/Ht: T851
Form: 1.75 – 2 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.08
Frequency: 6 Hz

Yield Strength: 49.6 – 50 ksi
Ult. Strength: 66 – 68 ksi
Specimen Thk: 0.99 – 1 in.
Specimen Width: 6 in.
Ref: 88579;85837

(1 of 3)



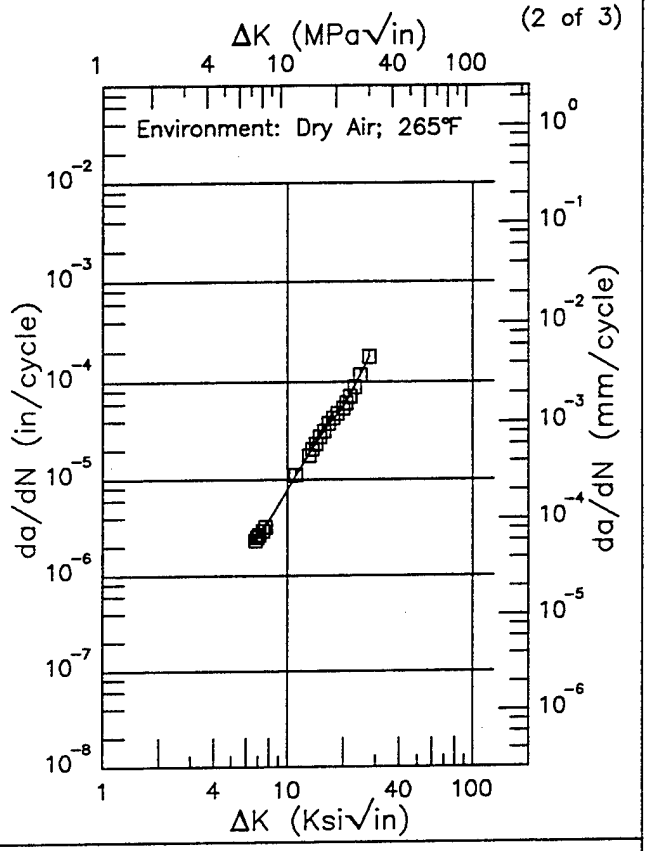

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.95 (min) | 1.57 |
| 6. | 1.60 |
| 7. | 2.39 |
| 8. | 3.64 |
| 9. | 5.40 |
| 10. | 7.72 |
| 13. | 17.2 |
| 16. | 28.8 |
| 20. | 57.0 |
| 25. | 154. |
| 30. | 414. |
| 32.68 (max) | 754. |

RMS % Error: 34.30

Life Prediction Ratio Summary

0. .5 .8 1.25 2.

(2 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.74 (min) | 2.27 |
| 7. | 2.52 |
| 8. | 3.75 |
| 9. | 5.47 |
| 10. | 7.75 |
| 13. | 18.2 |
| 16. | 32.9 |
| 20. | 56.3 |
| 25. | 122. |
| 27.51 (max) | 178. |

RMS % Error: 2.81

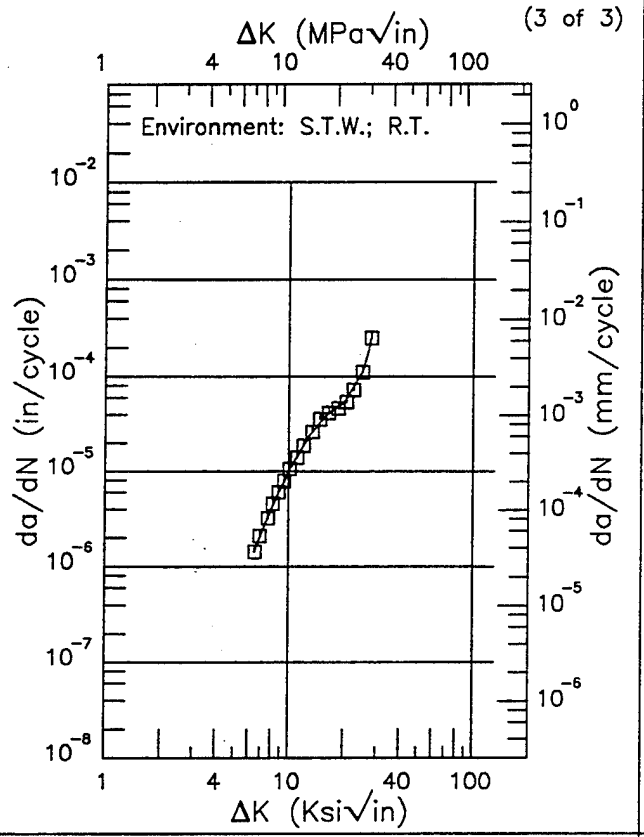
Life Prediction Ratio Summary

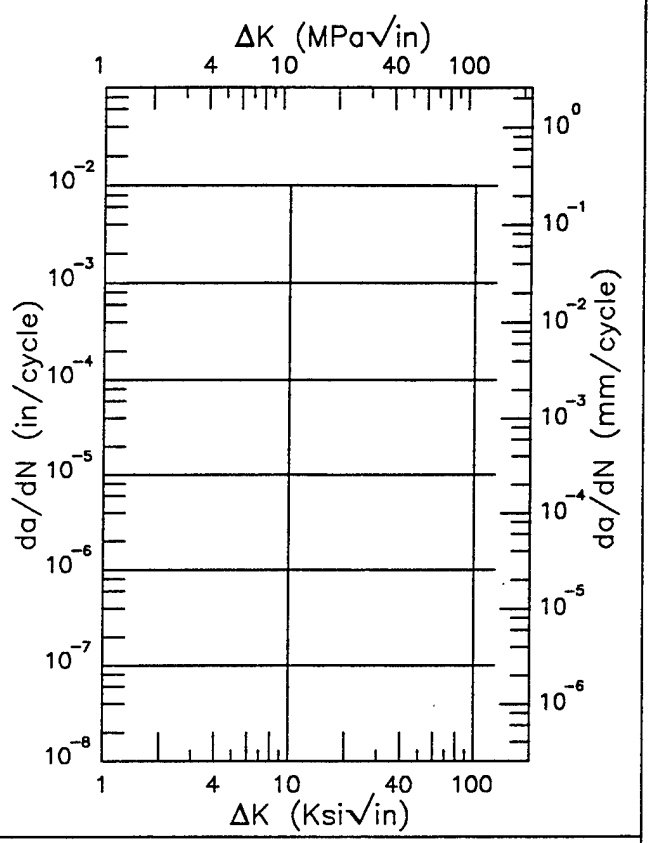
0. .5 .8 1.25 2.

**Figure 7.11.3.1.8**

Condition/Ht: T851
Form: 1.75 – 2 in. Plate
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.08
Frequency: 6 Hz

Yield Strength: 49.6 – 50 ksi
Ult. Strength: 66 – 68 ksi
Specimen Thk: 0.99 – 1 in.
Specimen Width: 6 in.
Ref: 88579;85837




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.48 (min) | 1.42 |
| 7. | 2.12 |
| 8. | 3.98 |
| 9. | 6.59 |
| 10. | 9.94 |
| 13. | 24.0 |
| 16. | 39.9 |
| 20. | 53.0 |
| 25. | 113. |
| 27.75 (max) | 247. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 3.72 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

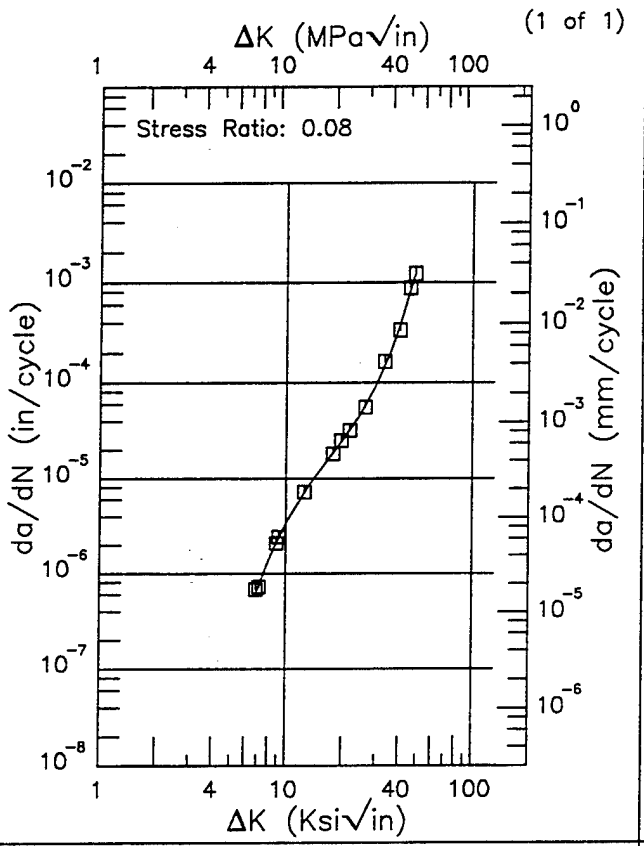
**Figure 7.11.3.1.8 (Concluded)**

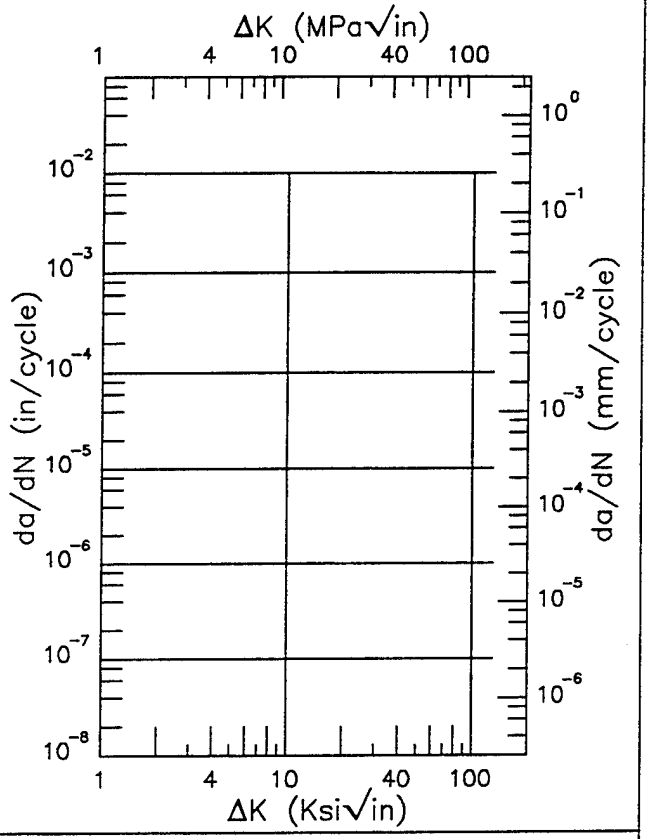
2219

R

Condition/Ht: T851
Form: 1.75 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 6 Hz
Environment: DRY AIR; RT

Yield Strength: 50 ksi
Ult. Strength: 66 ksi
Specimen Thk: 0.25 in.
Specimen Width: 6 in.
Ref: 88579




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.84 (min) | 0.586 |
| 7. | 0.669 |
| 8. | 1.34 |
| 9. | 2.27 |
| 10. | 3.44 |
| 13. | 8.05 |
| 16. | 14.2 |
| 20. | 25.6 |
| 25. | 49.5 |
| 30. | 94.6 |
| 35. | 183. |
| 40. | 363. |
| 48.41 (max) | 1192. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 6.57 | 0. .5 .8 1.25 2. |

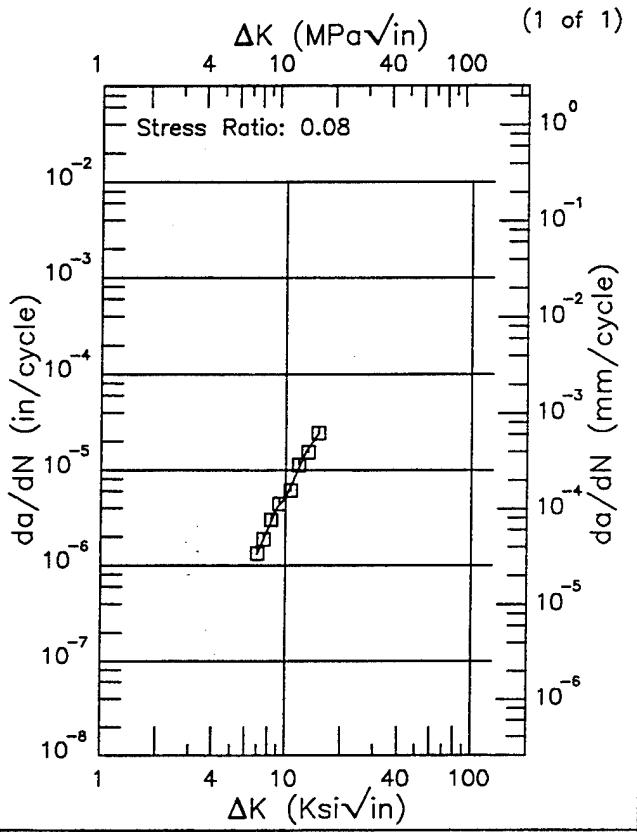
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

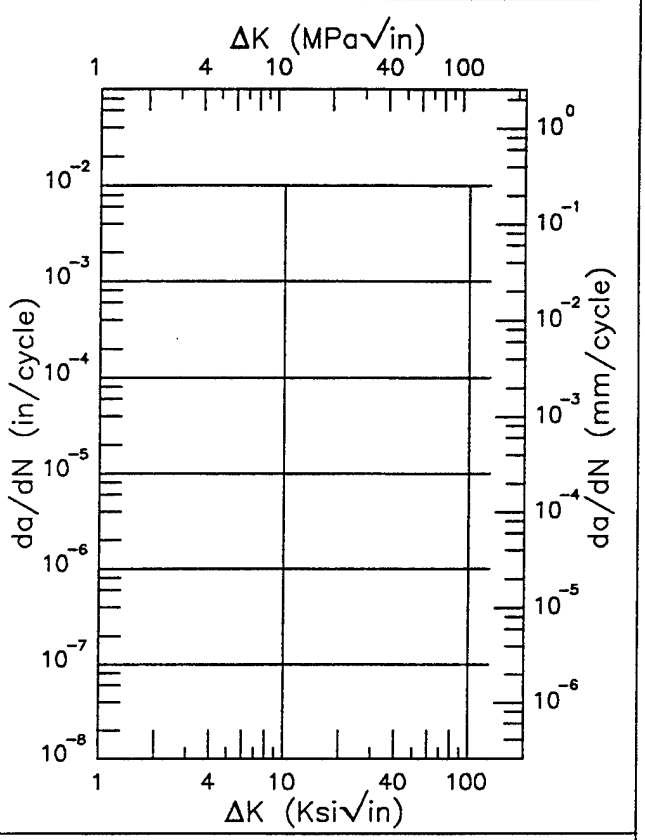
**Figure 7.11.3.1.9**

2219 R

Condition/Ht: T851
Form: 1.75 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 6 Hz
Environment: LAB AIR; RT

Yield Strength: 50 ksi
Ult. Strength: 66 ksi
Specimen Thk: 0.995 in.
Specimen Width: 2 in.
Ref: 85837




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 6.98 (min) | 1.33 |
| 7. | 1.34 |
| 8. | 2.44 |
| 9. | 4.11 |
| 10. | 5.19 |
| 13. | 15.9 |
| 15.01 (max) | 24.0 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 5.69 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

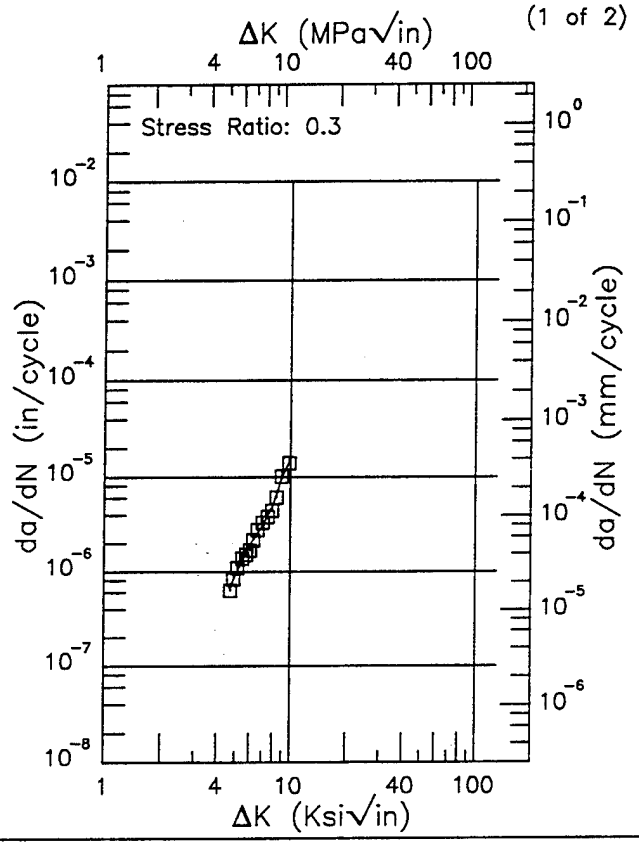
**Figure 7.11.3.1.10**

R 2219

Condition/Ht: T851
Form: 1.75 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 6 Hz
Environment: DRY AIR; RT

Yield Strength: 48 – 49.6 ksi
Ult. Strength: 65.9 – 66.2 ksi
Specimen Thk: 1 in.
Specimen Width: 6 – 6.01 in.
Ref: 85837

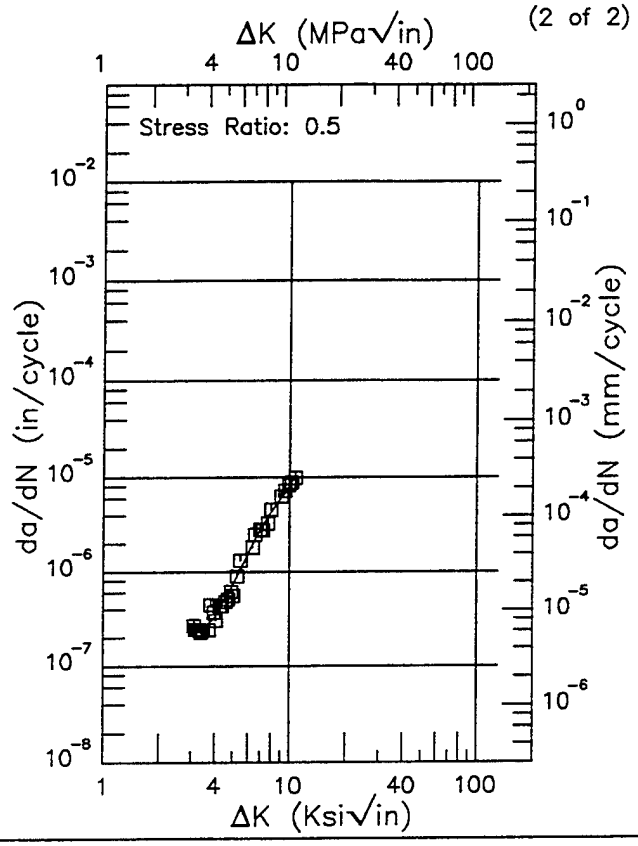
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.70 (min) | 0.668 |
| 5. | 0.895 |
| 6. | 1.89 |
| 7. | 3.01 |
| 8. | 5.00 |
| 9. | 10.2 |
| 9.78 (max) | 14.1 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 6.07 | 0. .5 .8 1.25 2. |

(2 of 2)



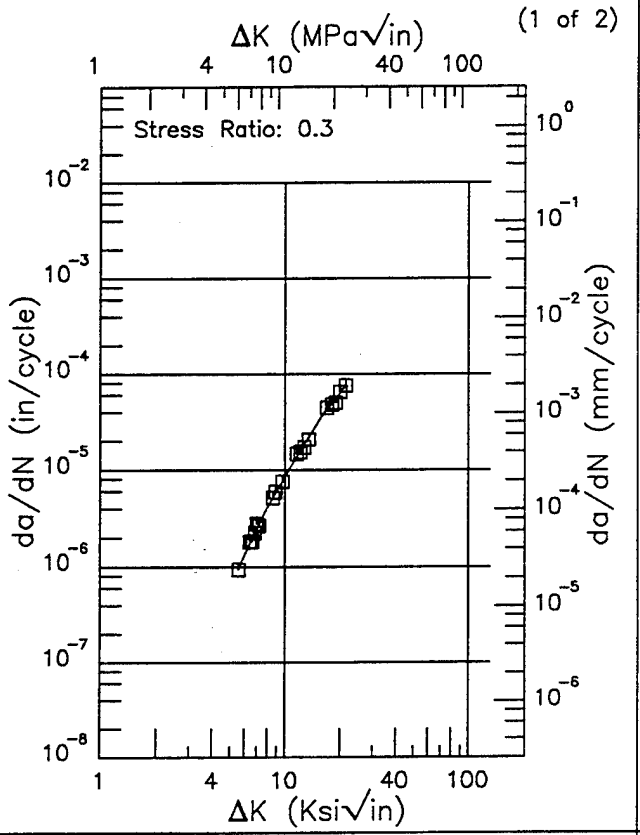

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.09 (min) | 0.239 |
| 3.5 | 0.253 |
| 4. | 0.333 |
| 5. | 0.729 |
| 6. | 1.56 |
| 7. | 2.82 |
| 8. | 4.32 |
| 9. | 6.06 |
| 10. | 8.26 |
| 10.70 (max) | 10.2 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 13.38 | 0. .5 .8 1.25 2. |

**Figure 7.11.3.1.11**

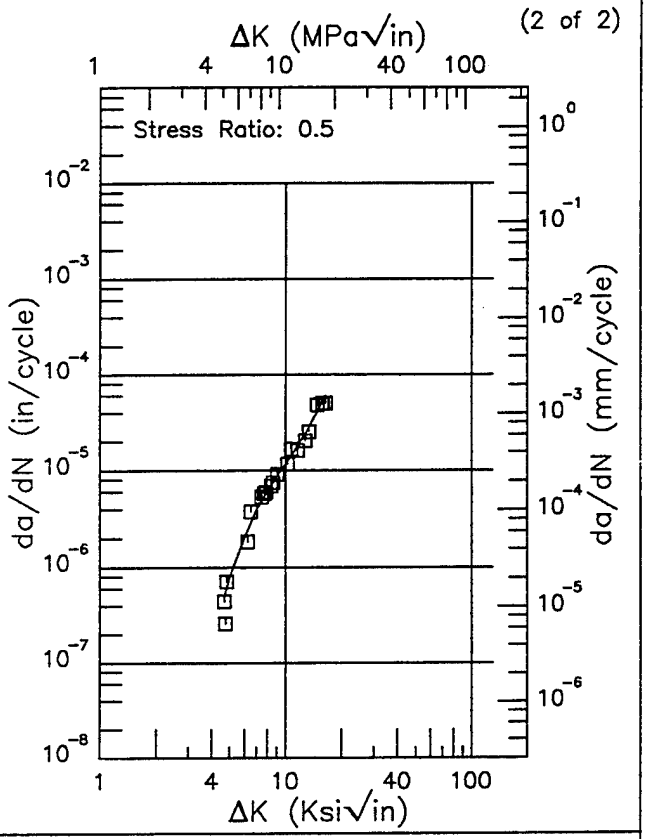
Condition/Ht: T851
Form: 1.75 in. Plate
Specimen Type: CT
Orientation: L–T
Frequency: 1 Hz
Environment: S.T.W.; RT

Yield Strength: 50 ksi
Ult. Strength: 66 ksi
Specimen Thk: 0.99 – 1 in.
Specimen Width: 6 – 6.01 in.
Ref: 88579




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.54 (min) | 0.939 |
| 6. | 1.33 |
| 7. | 2.48 |
| 8. | 4.08 |
| 9. | 6.14 |
| 10. | 8.63 |
| 13. | 19.4 |
| 16. | 37.4 |
| 20. | 63.0 |
| 21.28 (max) | 76.7 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 4.79 | 0. .5 .8 1.25 2. |




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.67 (min) | 0.503 |
| 5. | 0.782 |
| 6. | 2.06 |
| 7. | 3.89 |
| 8. | 6.10 |
| 9. | 8.65 |
| 10. | 11.6 |
| 13. | 25.0 |
| 16. | 53.9 |
| 16.41 (max) | 60.2 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 18.42 | 0. .5 .8 1.25 2. |

**Figure 7.11.3.1.12**

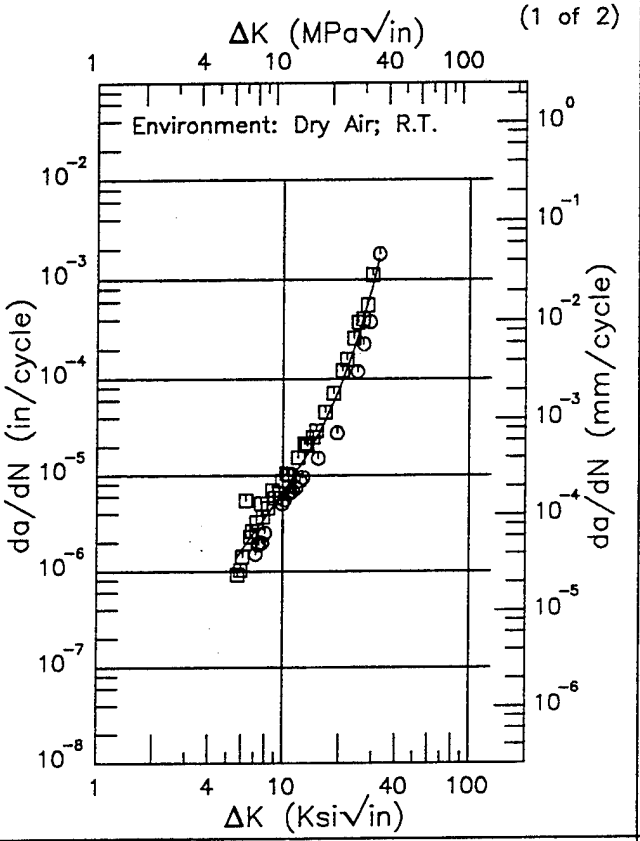
2219

E

Condition/Ht: T851
Form: 1.75 – 2 in. Plate
Specimen Type: CT
Orientation: T–L
Stress Ratio: 0.08
Frequency: 6 Hz

Yield Strength: 48 – 50 ksi
Ult. Strength: 66 – 68 ksi
Specimen Thk: 0.99 – 1 in.
Specimen Width: 5.99 – 6 in.
Ref: 88579

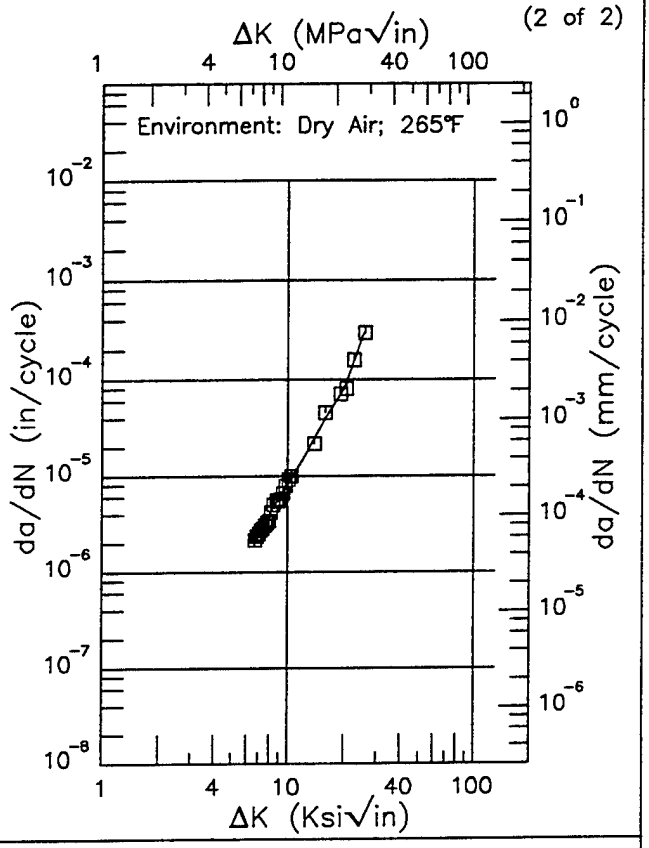
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.67 (min) | 1.41 |
| 6. | 1.67 |
| 7. | 2.55 |
| 8. | 3.65 |
| 9. | 5.01 |
| 10. | 6.70 |
| 13. | 14.7 |
| 16. | 30.7 |
| 20. | 79.8 |
| 25. | 261. |
| 30. | 873. |
| 32.50 (max) | 1609. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 40.94 | 0. .5 .8 1.25 2. |

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.69 (min) | 1.93 |
| 7. | 2.37 |
| 8. | 3.98 |
| 9. | 5.83 |
| 10. | 8.02 |
| 13. | 19.4 |
| 16. | 40.3 |
| 20. | 81.3 |
| 25. | 265. |
| 25.72 (max) | 296. |

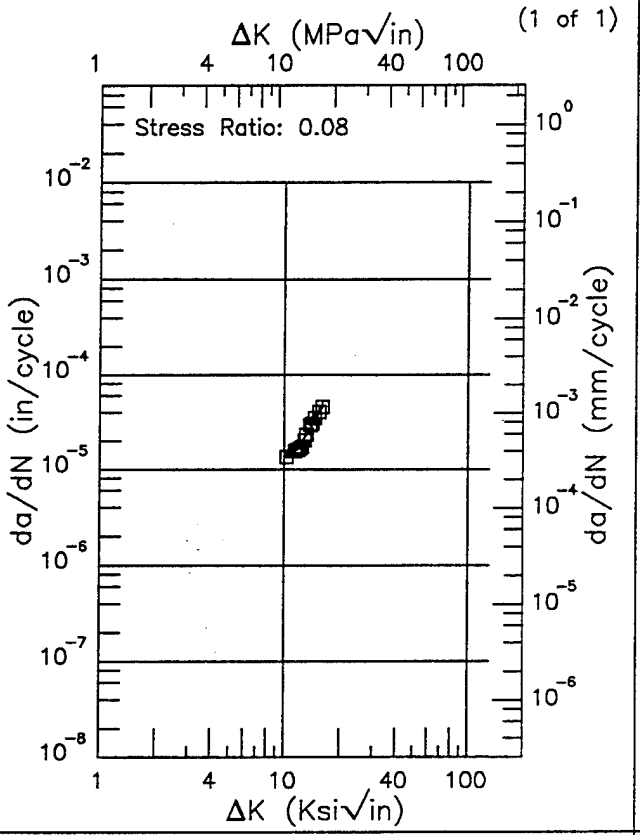
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 7.72 | 0. .5 .8 1.25 2. |

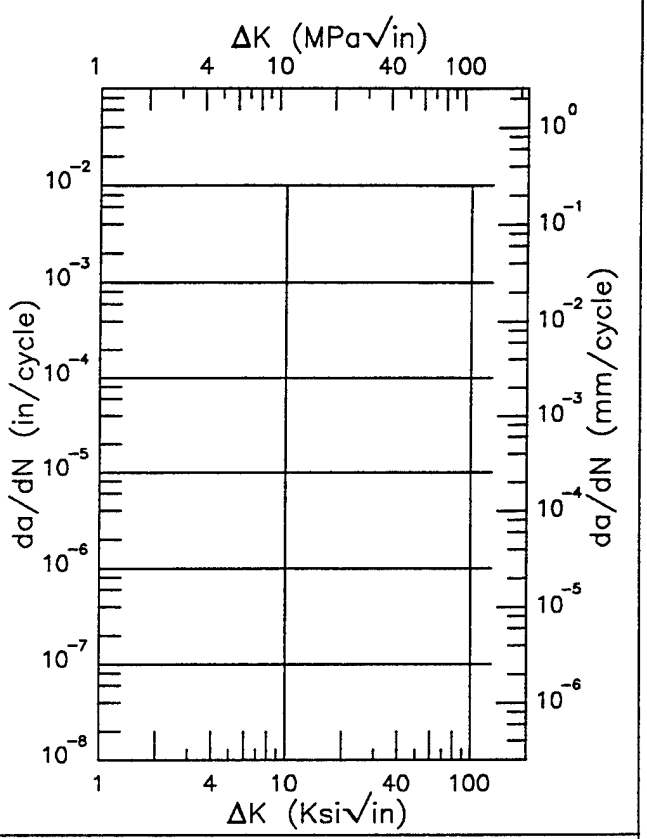
**Figure 7.11.3.1.13**

2219 R

Condition/Ht: T851
Form: 3 in. Plate
Specimen Type: CT
Orientation: T-L
Frequency: 1 Hz
Environment: S.T.W.; RT

Yield Strength: 53 ksi
Ult. Strength: 68 ksi
Specimen Thk: 1 in.
Specimen Width: 7.4 in.
Ref: 88579




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 10.27 (min) | 13.5 |
| 13. | 21.8 |
| 15.94 (max) | 45.8 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

RMS % Error: 7.51

Life Prediction Ratio Summary: 0. .5 .8 1.25 2.

RMS % Error

Life Prediction Ratio Summary: 0. .5 .8 1.25 2.

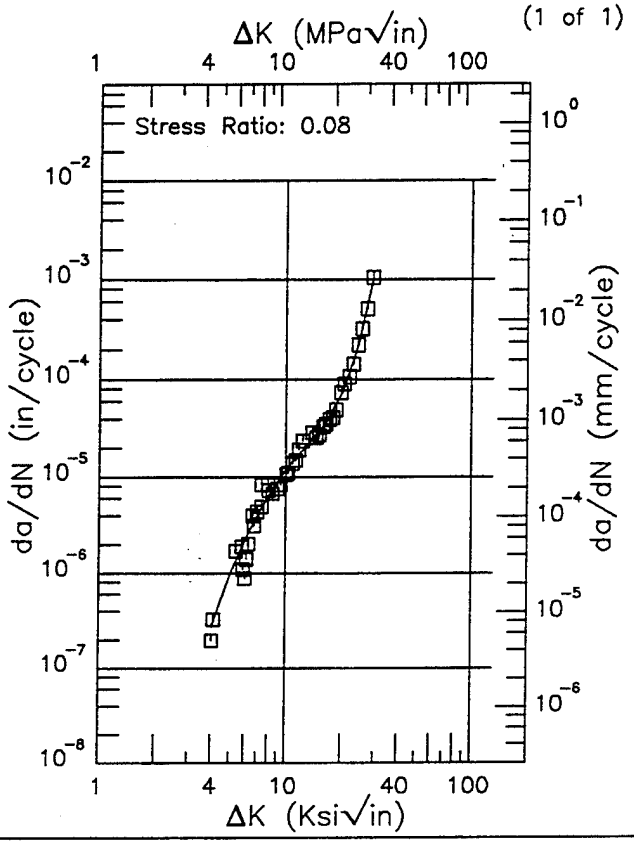
**Figure 7.11.3.1.14**

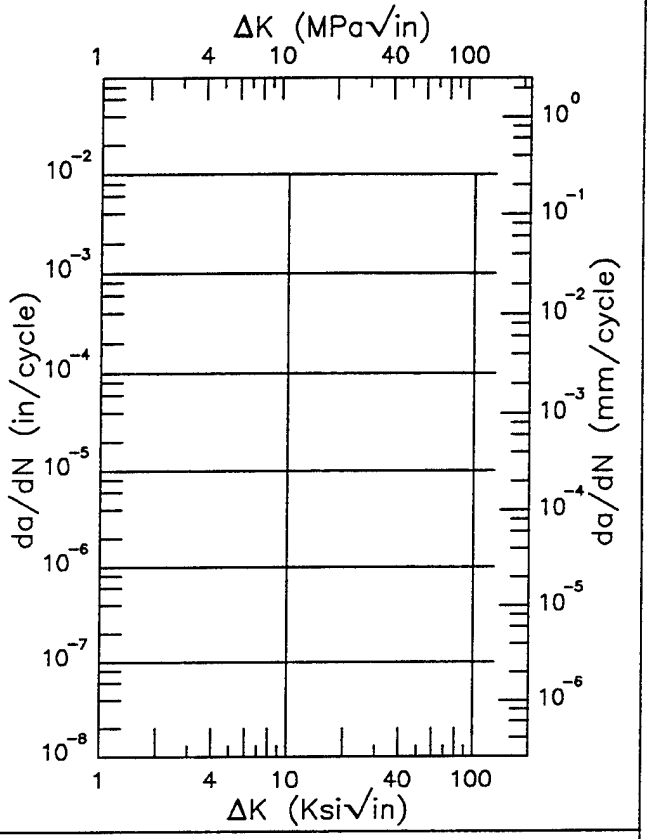
R | 2219

Condition/Ht: T851
Form: 1.75 in. Plate
Specimen Type: CT
Orientation: T–L
Frequency: 1 Hz
Environment: S.T.W.; RT

Yield Strength: 48 ksi
Ult. Strength: 65.9 ksi
Specimen Thk: 0.995 in.
Specimen Width: 6.01 in.
Ref: 85837

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.01 (min) | 0.277 |
| 5. | 0.949 |
| 6. | 2.20 |
| 7. | 4.00 |
| 8. | 6.27 |
| 9. | 8.90 |
| 10. | 11.8 |
| 13. | 21.4 |
| 16. | 34.1 |
| 20. | 72.4 |
| 25. | 265. |
| 29.24 (max) | 1020. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 22.15 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.11.3.1.15**

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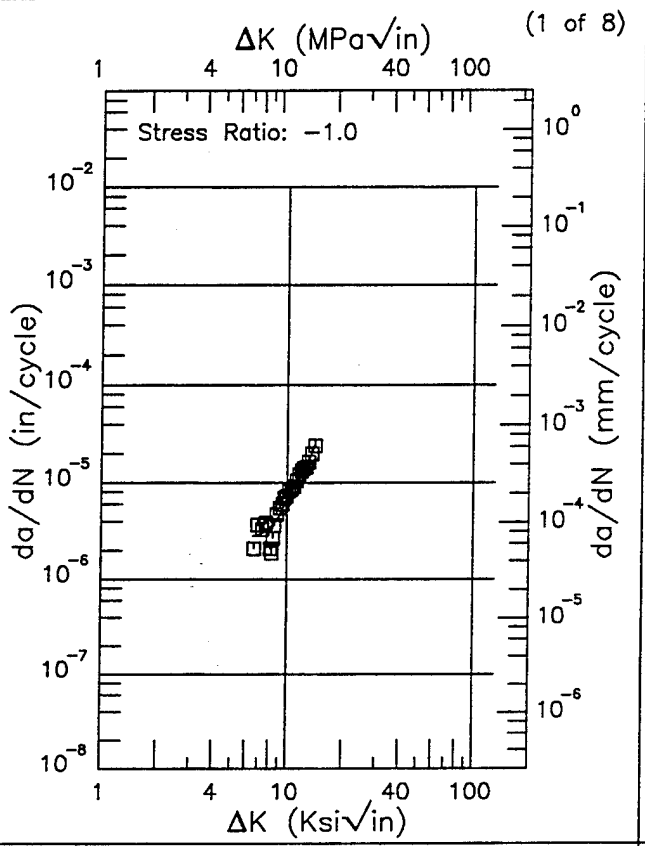
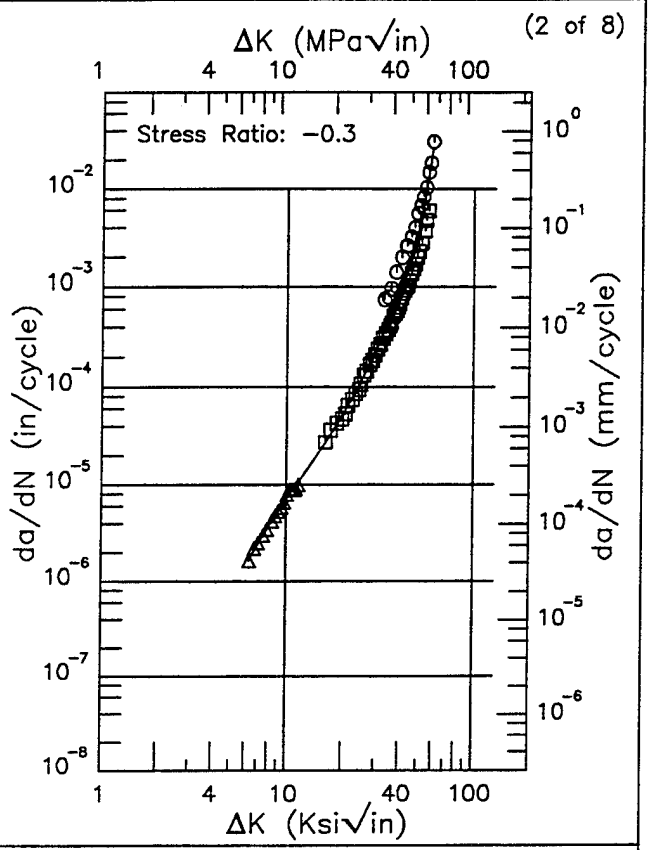
2219

R

Condition/Ht: T851
Form: 0.25 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 6 Hz
Environment: LAB AIR; RT

Yield Strength: 46 ksi
Ult. Strength: 62 ksi
Specimen Thk: 0.25 in.
Specimen Width: 6 in.
Ref: RI003




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.61 (min) | 2.86 |
| 7. | 2.92 |
| 8. | 3.29 |
| 9. | 4.40 |
| 10. | 6.96 |
| 13. | 16.0 |
| 14.09 (max) | 25.2 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.34 (min) | 1.68 |
| 7. | 2.37 |
| 8. | 3.64 |
| 9. | 5.18 |
| 10. | 7.01 |
| 13. | 14.5 |
| 16. | 26.1 |
| 20. | 51.7 |
| 25. | 113. |
| 30. | 236. |
| 35. | 461. |
| 40. | 842. |
| 50. | 2884. |
| 59.68 (max) | 26959. |

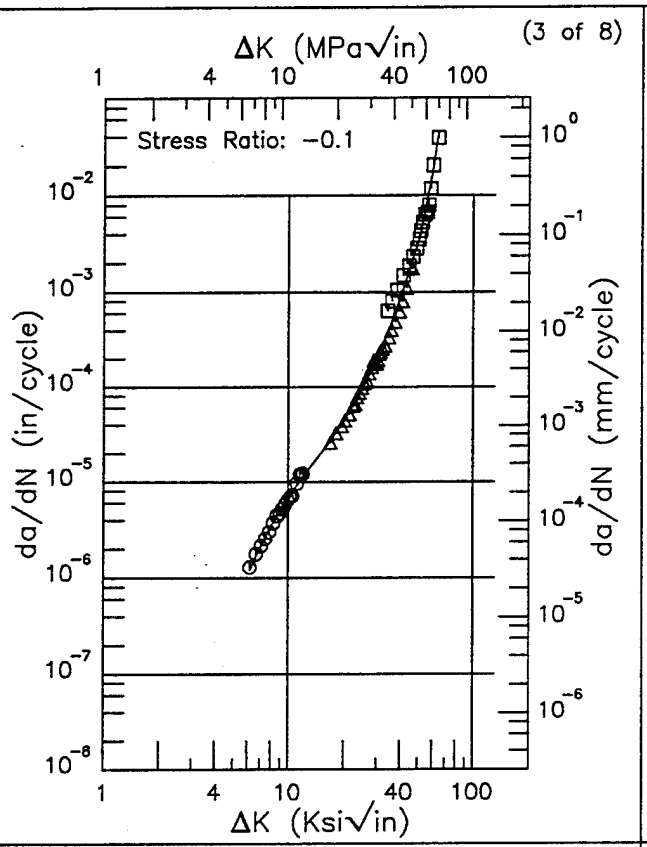
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 17.95 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 39.04 | 0. .5 .8 1.25 2. |

**Figure 7.11.3.1.16**

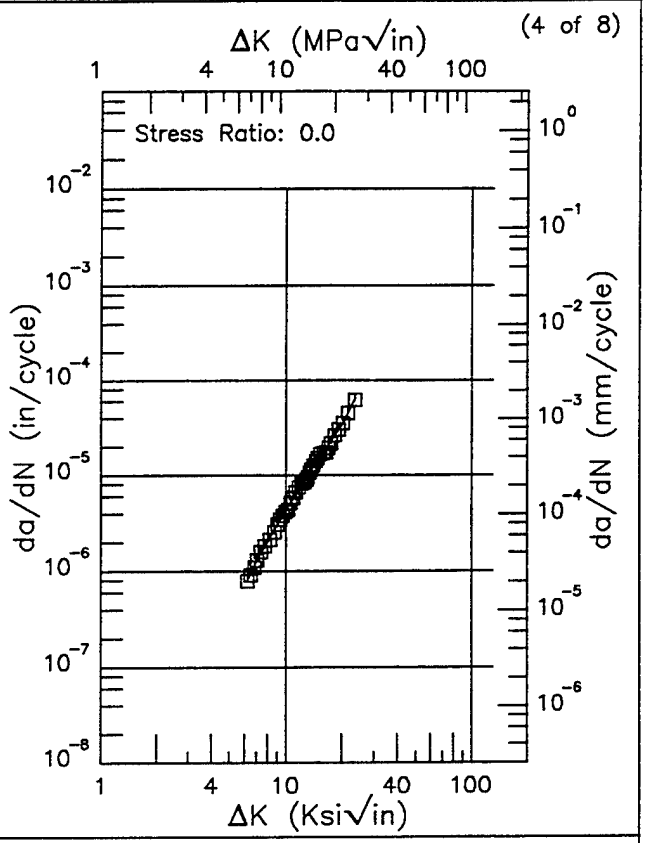
Condition/Ht: T851
Form: 0.25 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 6 Hz
Environment: LAB AIR; RT

Yield Strength: 46 ksi
Ult. Strength: 62 ksi
Specimen Thk: 0.25 in.
Specimen Width: 6 in.
Ref: RI003




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 6.17 (min) | 1.19 |
| 7. | 2.07 |
| 8. | 3.41 |
| 9. | 5.02 |
| 10. | 6.87 |
| 13. | 13.8 |
| 16. | 23.4 |
| 20. | 43.9 |
| 25. | 94.0 |
| 30. | 203. |
| 35. | 428. |
| 40. | 870. |
| 50. | 3261. |
| 60. | 17641. |
| 63.72 (max) | 40149. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 17.54 | Δ ⊡ 0. .5 .8 1.25 2. |




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 6.25 (min) | 0.812 |
| 7. | 1.25 |
| 8. | 2.03 |
| 9. | 3.03 |
| 10. | 4.29 |
| 13. | 9.89 |
| 16. | 17.6 |
| 20. | 33.7 |
| 23.46 (max) | 61.0 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 3.97 | ⊡ 0. .5 .8 1.25 2. |

**Figure 7.11.3.1.16 (Continued)**

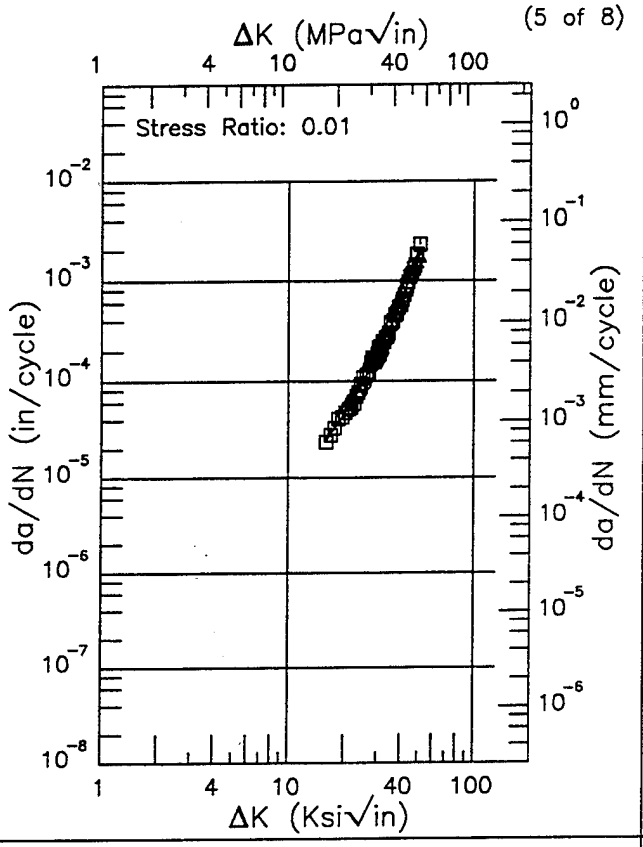
2219

R

Condition/Ht: T851
Form: 0.25 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 6 Hz
Environment: LAB AIR; RT

Yield Strength: 46 ksi
Ult. Strength: 62 ksi
Specimen Thk: 0.25 in.
Specimen Width: 6 in.
Ref: RI003

(5 of 8)



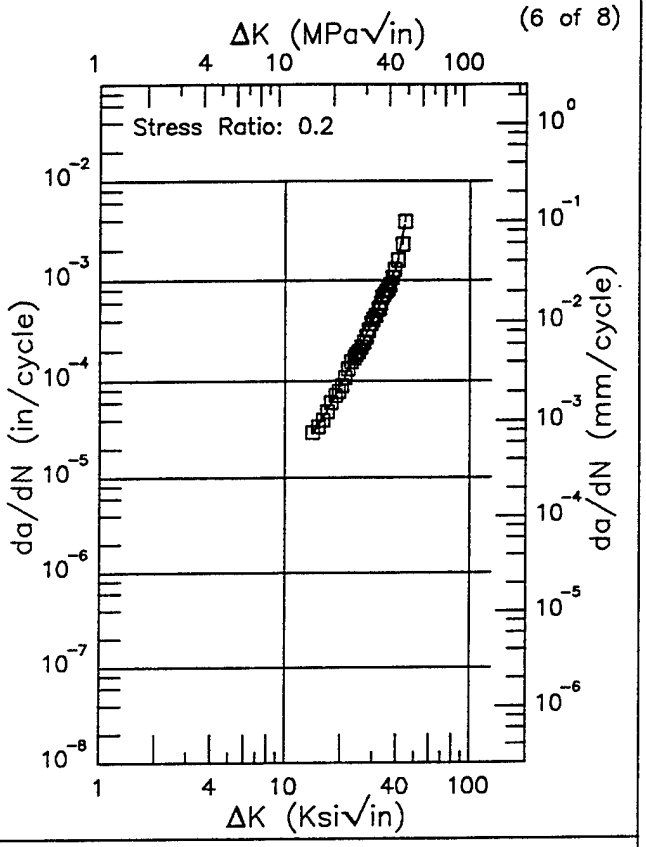

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 15.91 (min) | 24.3 |
| 16. | 24.7 |
| 20. | 46.2 |
| 25. | 95.0 |
| 30. | 185. |
| 35. | 344. |
| 40. | 614. |
| 50. | 1788. |
| 50.85 (max) | 1949. |

| RMS % Error |
|---|
| 8.67 |

Life Prediction Ratio Summary

0. .5 .8 1.25 2.

(6 of 8)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 14.07 (min) | 29.0 |
| 16. | 40.3 |
| 20. | 91.2 |
| 25. | 201. |
| 30. | 394. |
| 35. | 769. |
| 40. | 1377. |
| 44.27 (max) | 3593. |

| RMS % Error |
|---|
| 4.47 |

Life Prediction Ratio Summary

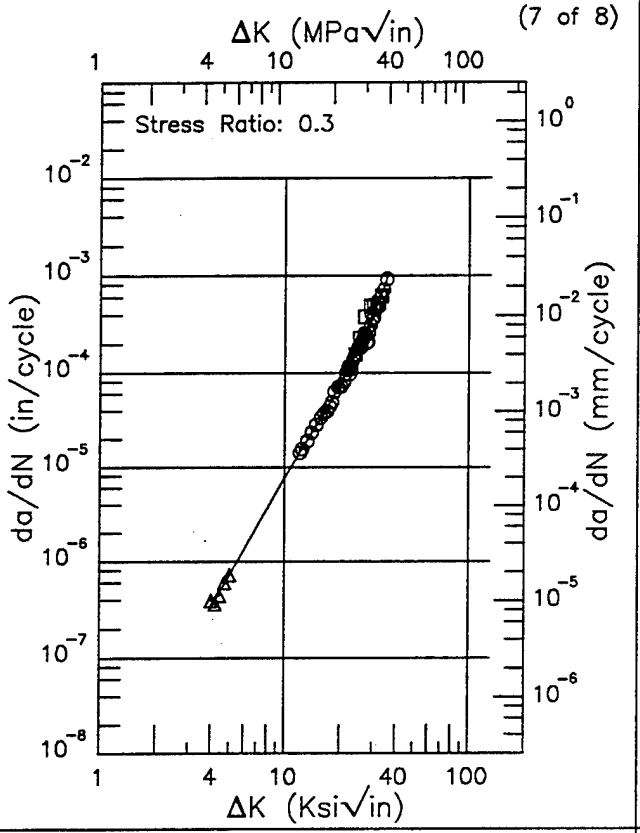
0. .5 .8 1.25 2.

**Figure 7.11.3.1.16 (Continued)**

Condition/Ht: T851
Form: 0.25 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 6 Hz
Environment: LAB AIR; RT

Yield Strength: 46 ksi
Ult. Strength: 62 ksi
Specimen Thk: 0.25 in.
Specimen Width: 6 in.
Ref: RI003

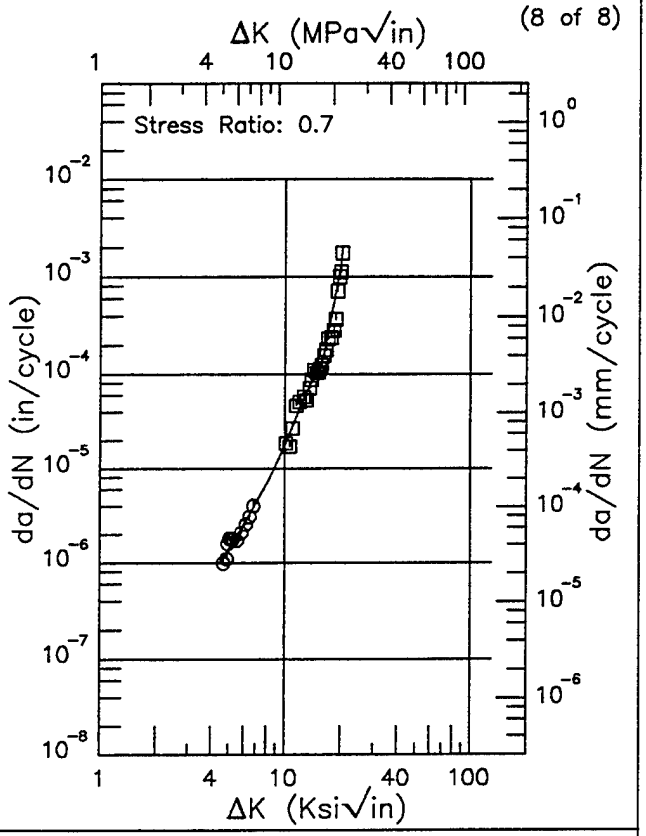
(7 of 8)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 3.99 (min) | 0.330 |
| 4. | 0.333 |
| 5. | 0.698 |
| 6. | 1.31 |
| 7. | 2.24 |
| 8. | 3.57 |
| 9. | 5.37 |
| 10. | 7.70 |
| 13. | 18.2 |
| 16. | 35.4 |
| 20. | 75.8 |
| 25. | 180. |
| 30. | 390. |
| 35. | 827. |
| 35.53 (max) | 898. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 13.00 | 0. .5 .8 1.25 2. |

(8 of 8)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.65 (min) | 1.07 |
| 5. | 1.37 |
| 6. | 2.50 |
| 7. | 4.20 |
| 8. | 6.82 |
| 9. | 10.9 |
| 10. | 17.6 |
| 13. | 63.5 |
| 16. | 141. |
| 20. | 1314. |
| 20.24 (max) | 1696. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 18.35 | 0. .5 .8 1.25 2. |

**Figure 7.11.3.1.16 (Concluded)**

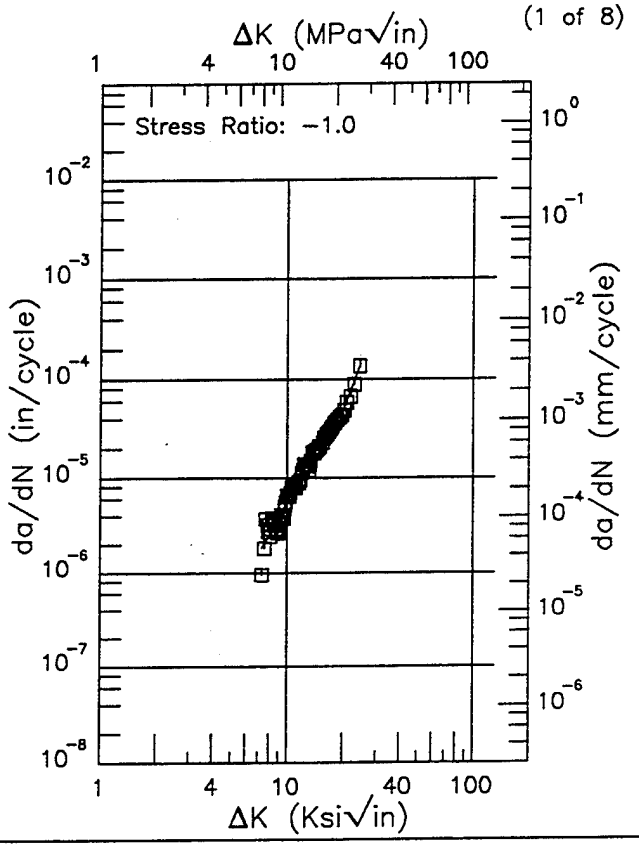
2219

R

Condition/Ht: T851
Form: 0.63 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 1 – 20 Hz
Environment: LAB AIR; RT

Yield Strength: 54.7 ksi
Ult. Strength: 66.9 ksi
Specimen Thk: 0.25 – 0.251 in.
Specimen Width: 6.005 – 6.07 in.
Ref: 88468

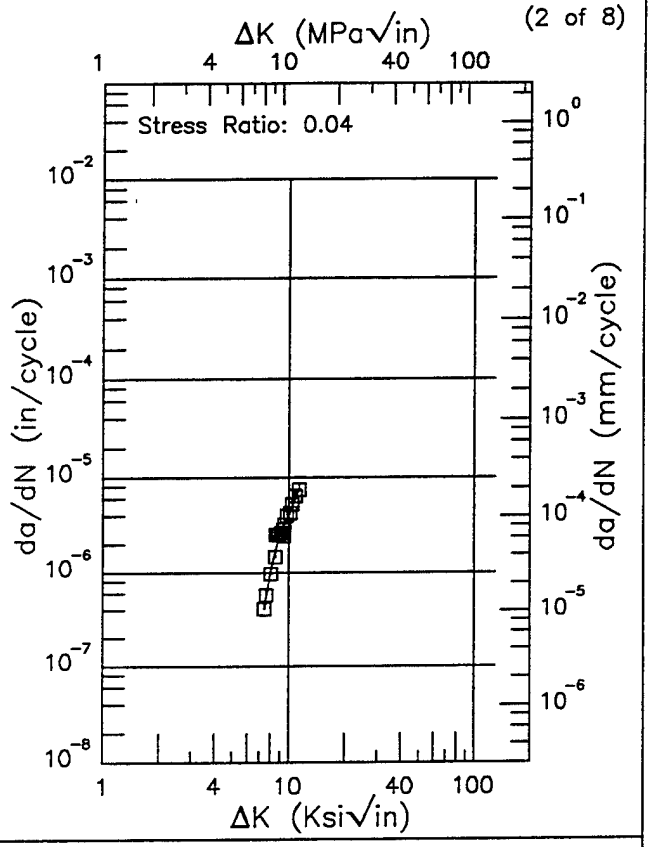
(1 of 8)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 7.34 (min) | 1.85 |
| 8. | 2.51 |
| 9. | 3.86 |
| 10. | 5.68 |
| 13. | 14.2 |
| 16. | 26.2 |
| 20. | 48.5 |
| 24.44 (max) | 134. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 15.21 | 0. .5 .8 1.25 2. |

(2 of 8)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 7.42 (min) | 0.431 |
| 8. | 0.977 |
| 9. | 2.63 |
| 10. | 4.05 |
| 11.28 (max) | 7.39 |

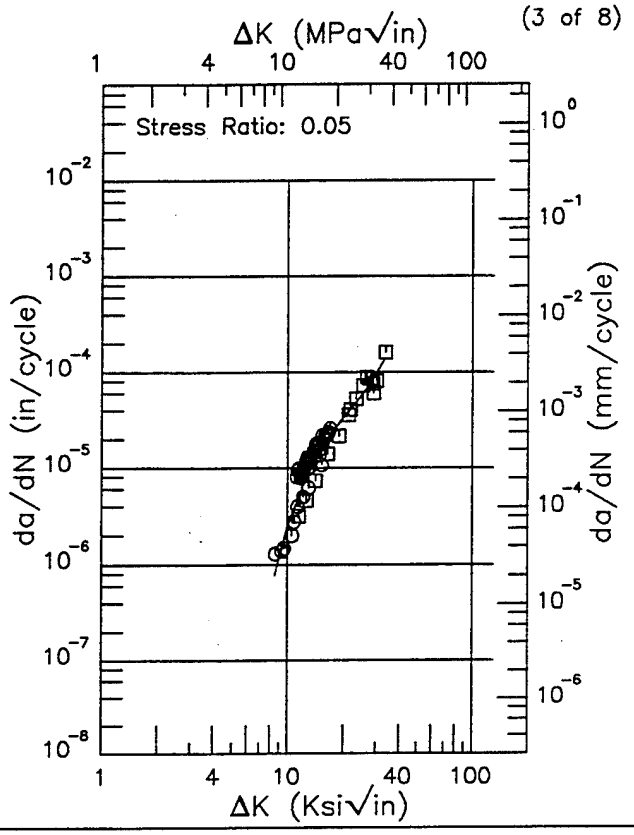
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 14.14 | 0. .5 .8 1.25 2. |

**Figure 7.11.3.1.17**

Condition/Ht: T851
Form: 0.63 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 1 – 20 Hz
Environment: LAB AIR; RT

Yield Strength: 54.7 ksi
Ult. Strength: 66.9 ksi
Specimen Thk: 0.25 – 0.251 in.
Specimen Width: 6.005 – 6.07 in.
Ref: 88468

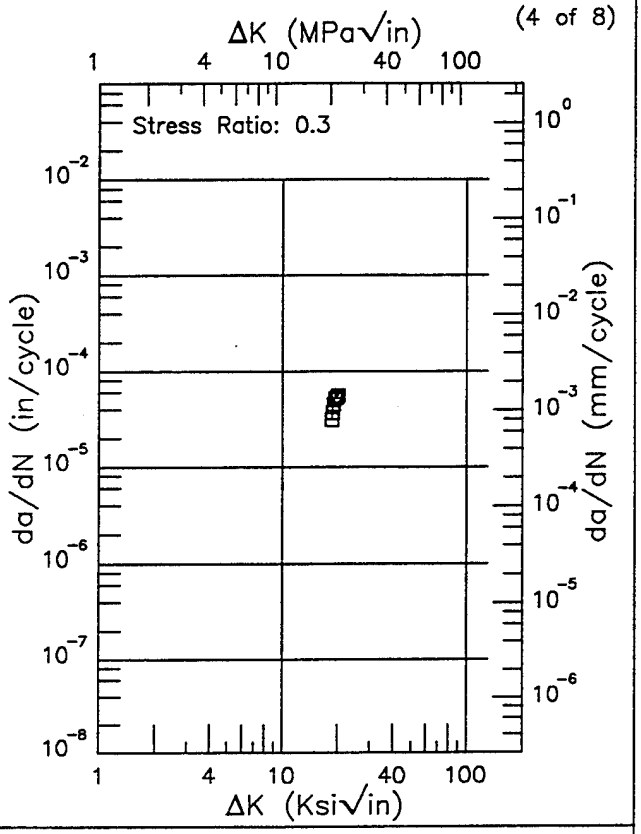
(3 of 8)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 8.55 (min) | 0.789 |
| 9. | 1.18 |
| 10. | 2.47 |
| 13. | 9.44 |
| 16. | 19.1 |
| 20. | 33.9 |
| 25. | 57.6 |
| 30. | 96.0 |
| 33.48 (max) | 140. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 35.60 | 0. .5 .8 1.25 2. |

(4 of 8)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.11.3.1.17 (Continued)**

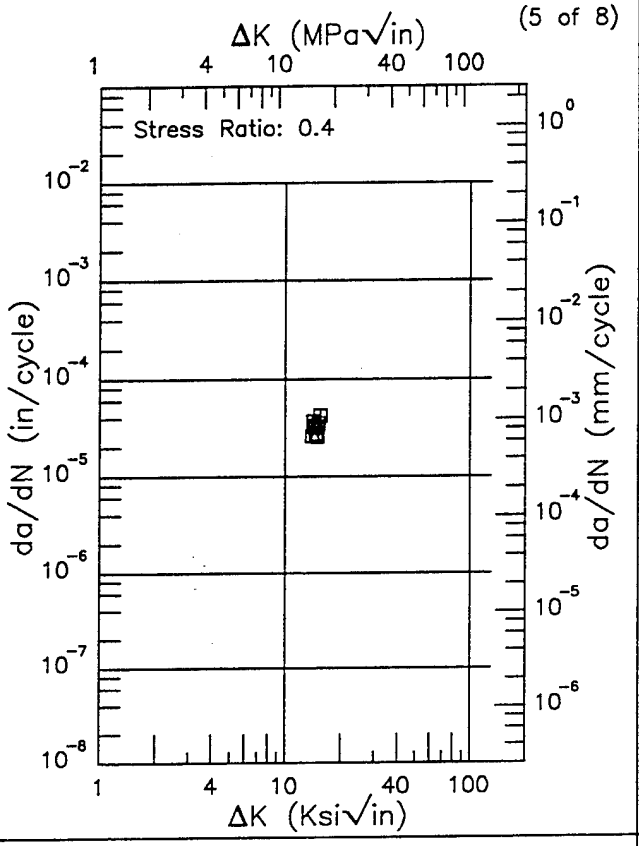
2219

R

Condition/Ht: T851
Form: 0.63 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 1 – 20 Hz
Environment: LAB AIR; RT

Yield Strength: 54.7 ksi
Ult. Strength: 66.9 ksi
Specimen Thk: 0.25 – 0.251 in.
Specimen Width: 6.005 – 6.07 in.
Ref: 88468

(5 of 8)



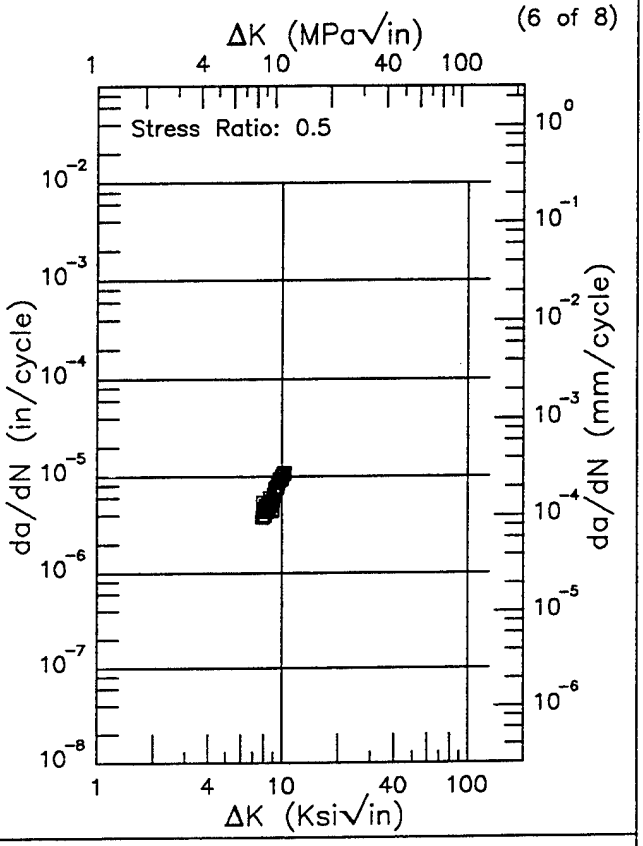

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 13.87 (min) | 28.6 |
| 15.45 (max) | 44.3 |

| RMS % Error |
|---|
| 16.55 |

Life Prediction Ratio Summary

0. .5 .8 1.25 2.

(6 of 8)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 7.82 (min) | 4.86 |
| 8. | 4.63 |
| 9. | 6.07 |
| 10. | 10.1 |
| 10.28 (max) | 10.3 |

| RMS % Error |
|---|
| 10.04 |

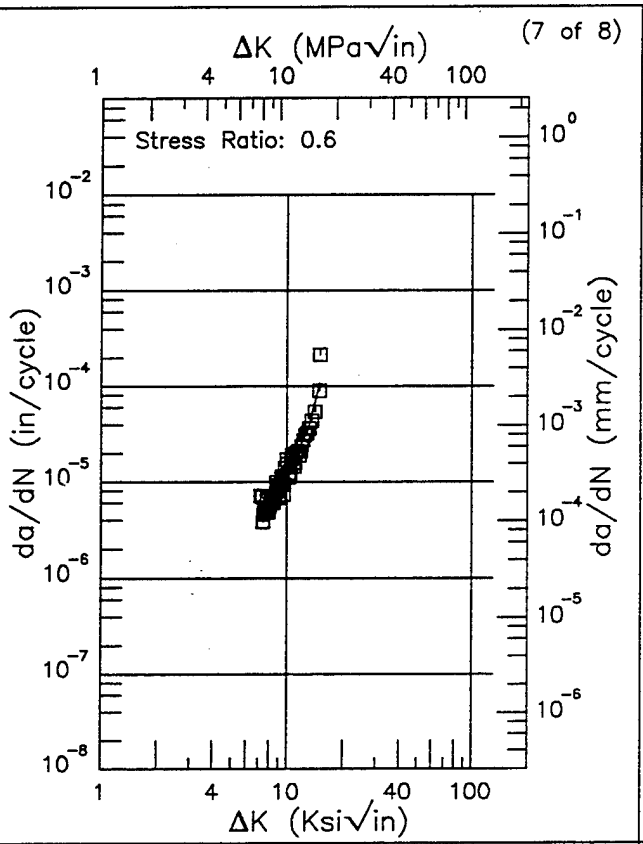
Life Prediction Ratio Summary

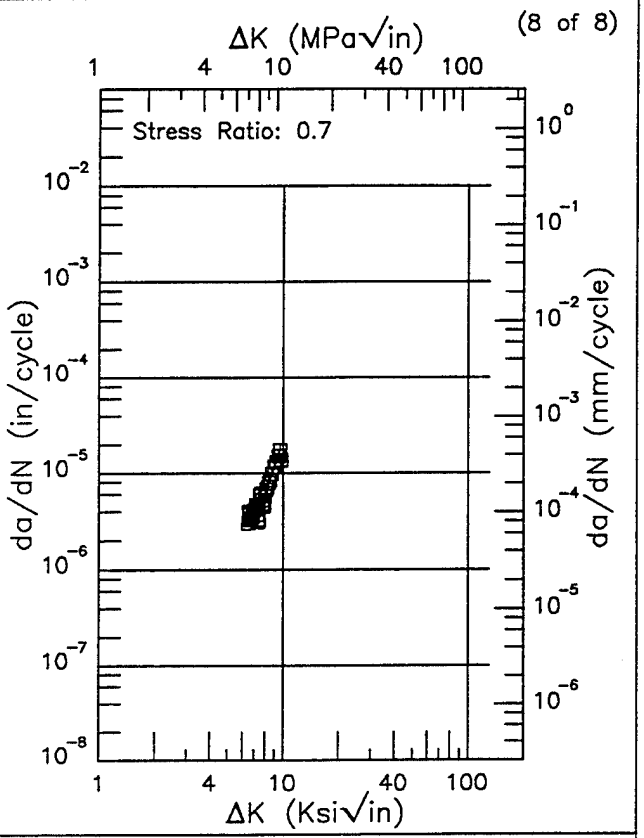
0. .5 .8 1.25 2.

**Figure 7.11.3.1.17 (Continued)**

Condition/Ht: T851
Form: 0.63 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 1 – 20 Hz
Environment: LAB AIR; RT

Yield Strength: 54.7 ksi
Ult. Strength: 66.9 ksi
Specimen Thk: 0.25 – 0.251 in.
Specimen Width: 6.005 – 6.07 in.
Ref: 88468




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 7.23 (min) | 5.37 |
| 8. | 5.57 |
| 9. | 8.76 |
| 10. | 12.8 |
| 13. | 35.5 |
| 14.98 (max) | 108. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.44 (min) | 3.29 |
| 7. | 3.93 |
| 8. | 6.05 |
| 9. | 12.1 |
| 9.77 (max) | 15.3 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 19.08 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 12.43 | 0. .5 .8 1.25 2. |

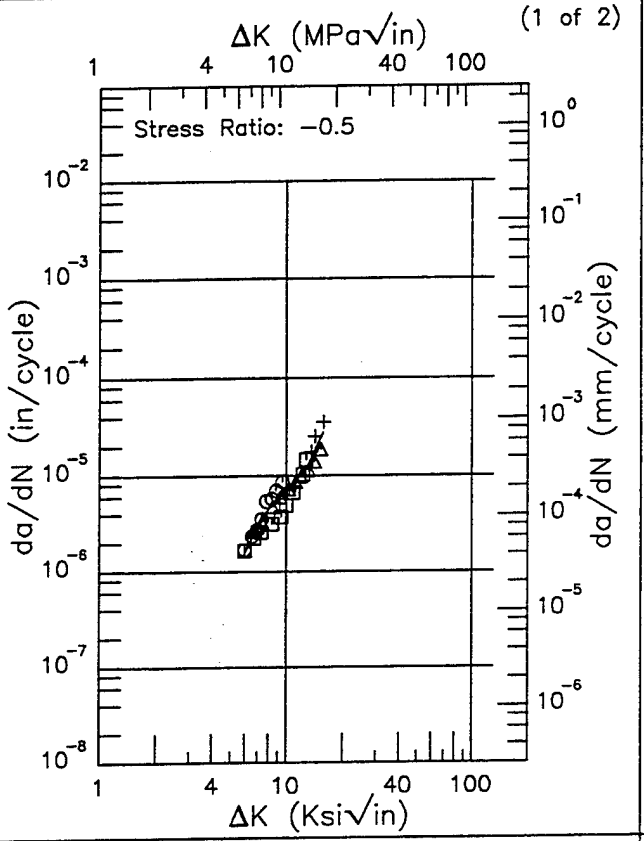
**Figure 7.11.3.1.17 (Concluded)**

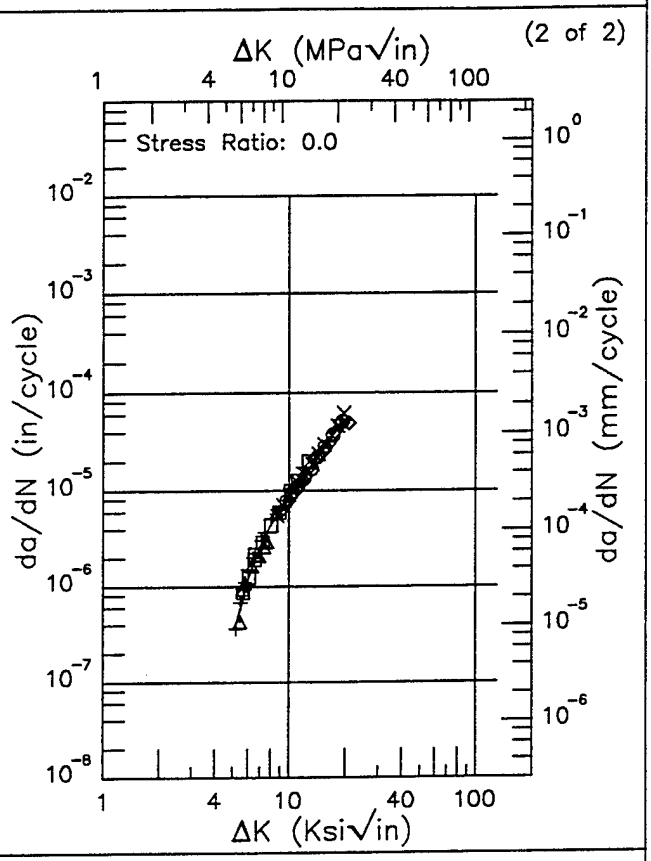
2219

R

Condition/Ht: T851
Form: 1.38 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 5.2 Hz
Environment: LAB AIR; RT

Yield Strength: 50.6 ksi
Ult. Strength: 66.4 ksi
Specimen Thk: 0.748 – 0.752 in.
Specimen Width: 2.997 – 3.003 in.
Ref: 86213




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.96 (min) | 1.51 |
| 6. | 1.56 |
| 7. | 3.07 |
| 8. | 4.49 |
| 9. | 5.72 |
| 10. | 6.89 |
| 13. | 12.6 |
| 15.70 (max) | 28.2 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.21 (min) | 0.404 |
| 6. | 1.15 |
| 7. | 2.62 |
| 8. | 4.39 |
| 9. | 6.27 |
| 10. | 8.31 |
| 13. | 16.9 |
| 16. | 31.3 |
| 20. | 53.6 |
| 20.85 (max) | 55.4 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 20.04 | 0. .5 .8 1.25 2. |

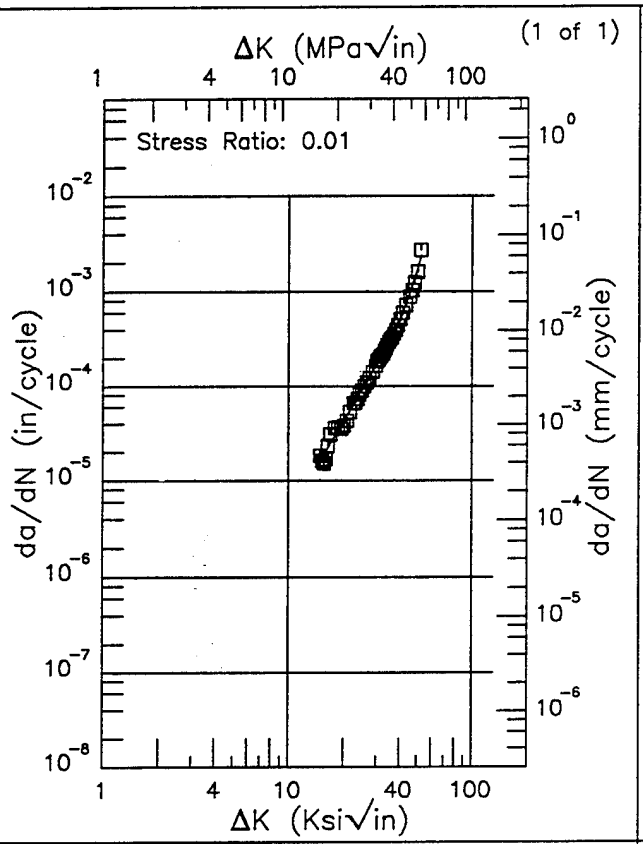
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 11.52 | 0. .5 .8 1.25 2. |

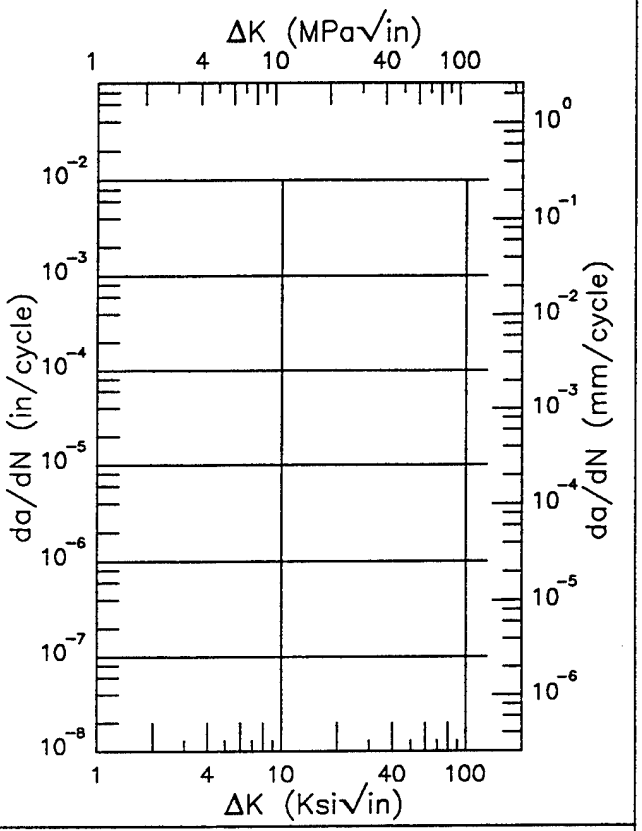
**Figure 7.11.3.1.18**

2219 R

Condition/Ht: T851
Form: 0.25 in. Plate
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 3 Hz
Environment: LAB AIR; RT

Yield Strength: 46 ksi
Ult. Strength: 62 ksi
Specimen Thk: 0.25 in.
Specimen Width: 6 in.
Ref: RI003




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 14.80 (min) | 16.0 |
| 16. | 20.7 |
| 20. | 43.2 |
| 25. | 91.1 |
| 30. | 169. |
| 35. | 290. |
| 40. | 484. |
| 50. | 1691. |
| 52.25 (max) | 2376. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 8.43 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

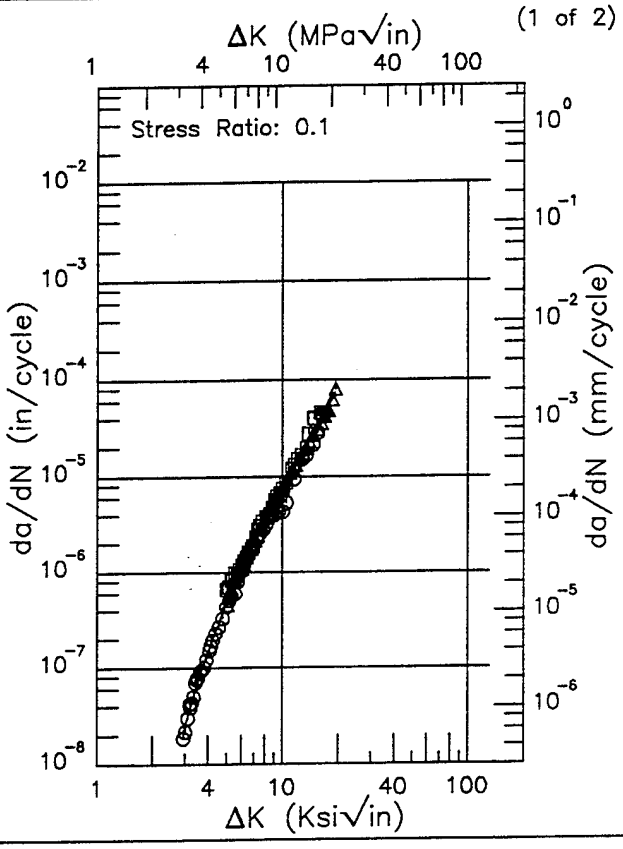
**Figure 7.11.3.1.19**

R | 2219

Condition/Ht: T851
Form:
Specimen Type: CT
Orientation:
Frequency: 5 Hz
Environment: LAB AIR; RT

Yield Strength:
Ult. Strength:
Specimen Thk: 0.25 in.
Specimen Width: 2 in.
Ref: UD010

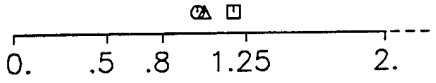
(1 of 2)



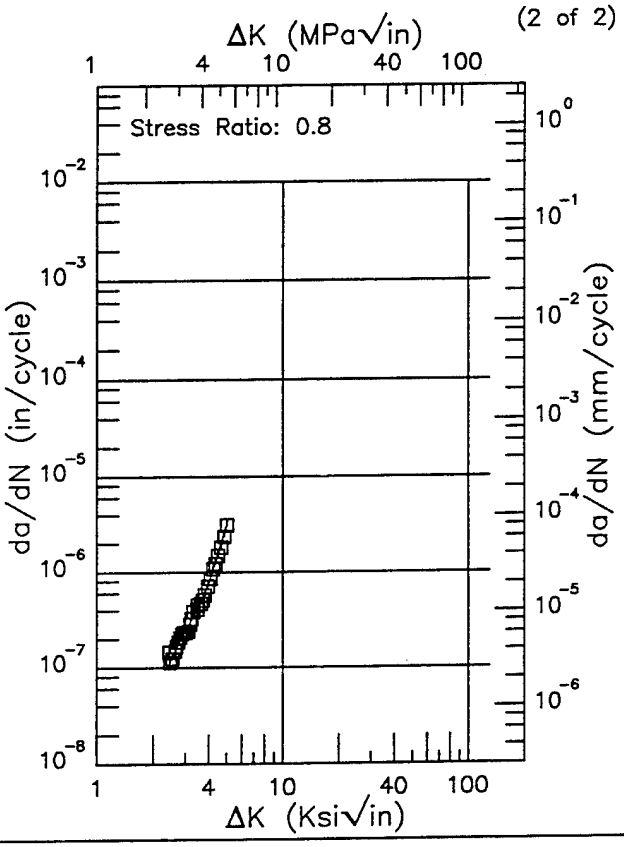

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.93 (min) | 0.0211 |
| 3. | 0.0247 |
| 3.5 | 0.0660 |
| 4. | 0.146 |
| 5. | 0.478 |
| 6. | 1.11 |
| 7. | 2.08 |
| 8. | 3.35 |
| 9. | 4.97 |
| 10. | 7.07 |
| 13. | 18.3 |
| 16. | 37.0 |
| 19.20 (max) | 75.3 |

| RMS % Error |
|---|
| 13.56 |

Life Prediction Ratio Summary




(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.45 (min) | 0.111 |
| 2.5 | 0.122 |
| 3. | 0.245 |
| 3.5 | 0.429 |
| 4. | 0.762 |
| 5. | 3.08 |
| 5.01 (max) | 3.13 |

| RMS % Error |
|---|
| 8.69 |

Life Prediction Ratio Summary

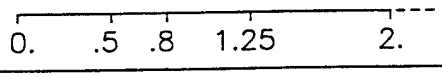
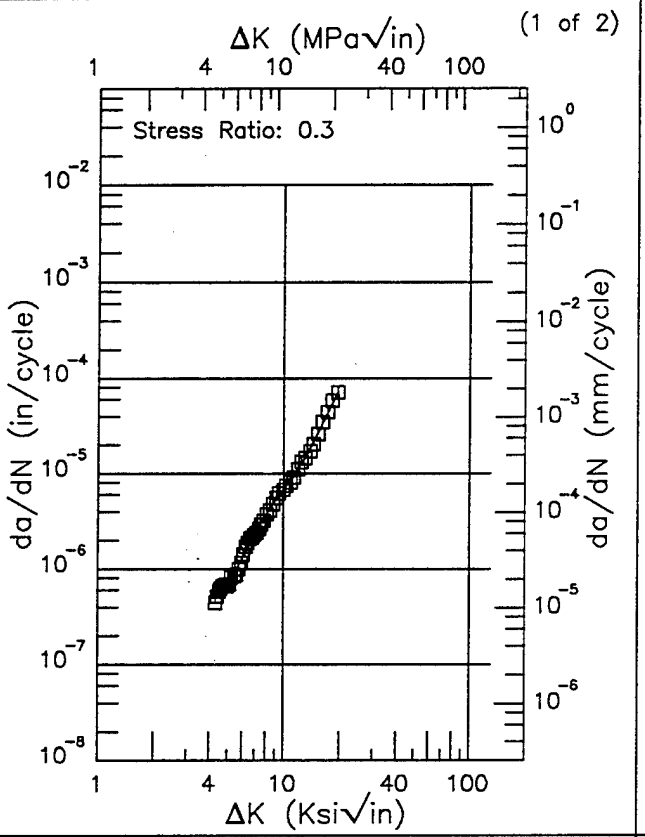



**Figure 7.11.3.1.20**

2219 R

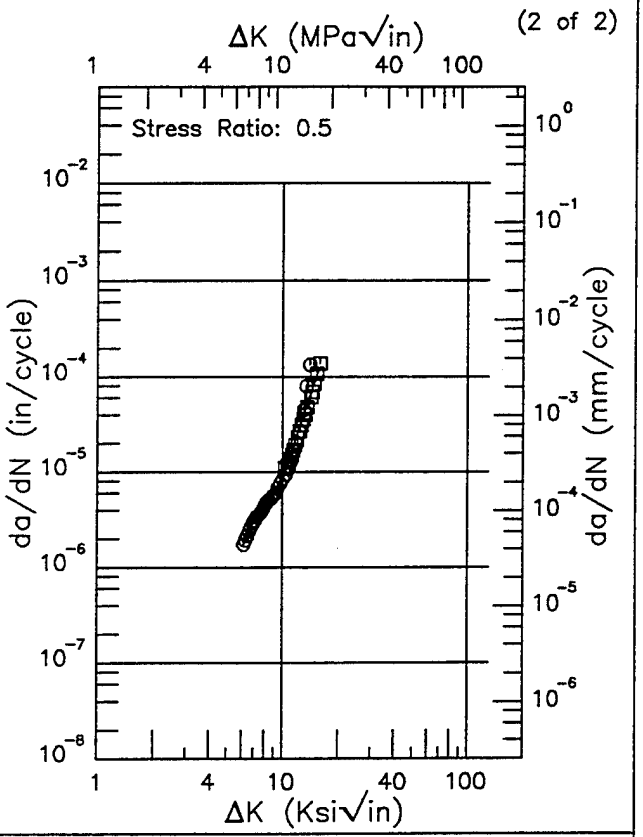
Condition/Ht: T851
Form:
Specimen Type: CT
Orientation:
Frequency: 30 Hz
Environment: LAB AIR; RT

Yield Strength:
Ult. Strength:
Specimen Thk: 0.25 in.
Specimen Width: 2 in.
Ref: UD010




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.29 (min) | 0.503 |
| 5. | 0.703 |
| 6. | 1.28 |
| 7. | 2.26 |
| 8. | 3.61 |
| 9. | 5.13 |
| 10. | 6.81 |
| 13. | 14.2 |
| 16. | 32.5 |
| 19.30 (max) | 70.1 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 6.69 | 0. .5 .8 1.25 2. |




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.14 (min) | 1.70 |
| 7. | 3.00 |
| 8. | 4.35 |
| 9. | 5.86 |
| 10. | 8.29 |
| 13. | 41.2 |
| 15.80 (max) | 124. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 20.51 | 0. .5 .8 1.25 2. |

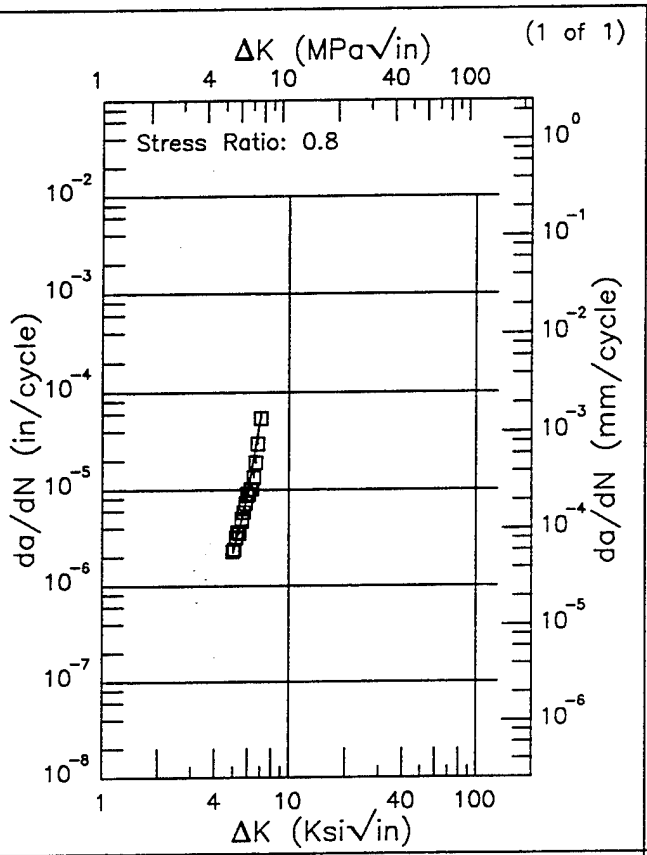
**Figure 7.11.3.1.21**

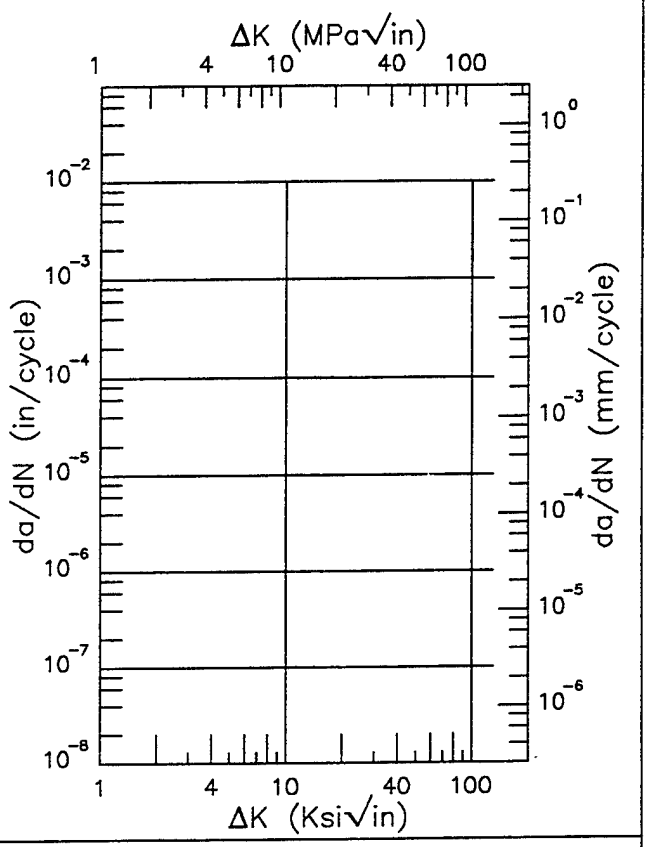
2219

R

Condition/Ht: T851
Form:
Specimen Type: CT
Orientation:
Frequency: 0.1 Hz
Environment: LAB AIR; RT

Yield Strength:
Ult. Strength:
Specimen Thk: 0.25 in.
Specimen Width: 2 in.
Ref: UD010




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.00 (min) | 2.17 |
| 6. | 8.99 |
| 7. | 52.7 |
| 7.01 (max) | 53.7 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

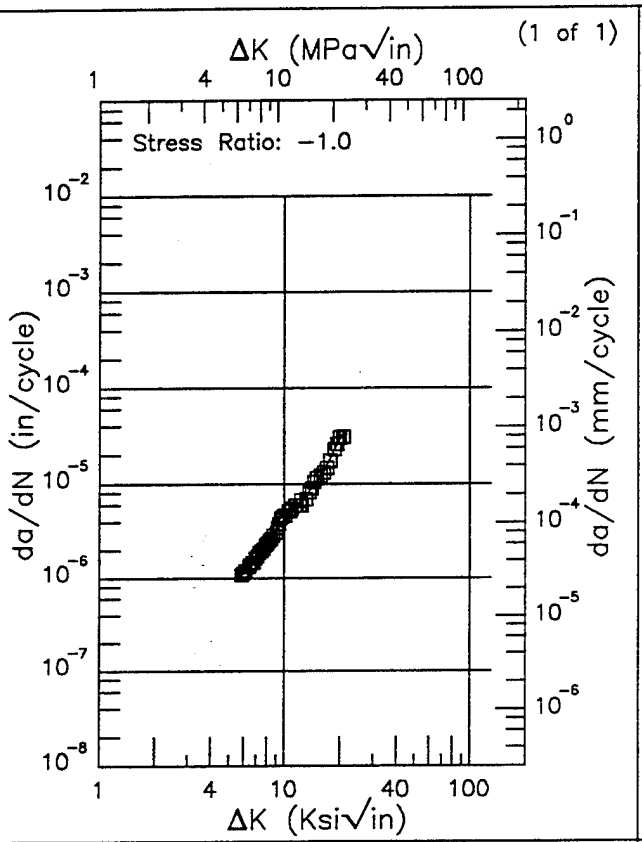
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 15.39 | 0. .5 .8 1.25 2. |

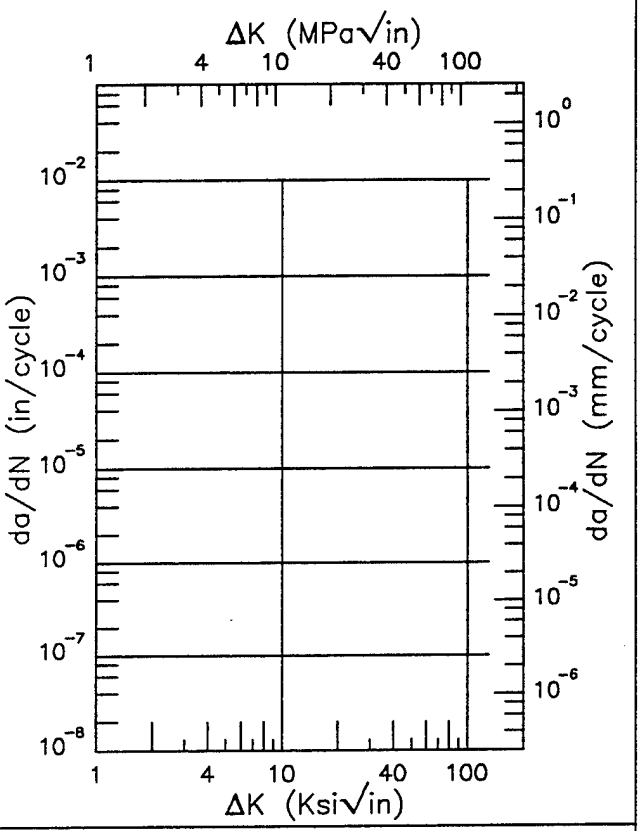
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.11.3.1.22**

Condition/Ht: T851
Form:
Specimen Type: CCP (max load specified)
Orientation:
Frequency: 5 Hz
Environment: LAB AIR; RT

Yield Strength:
Ult. Strength:
Specimen Thk: 0.25 in.
Specimen Width: 3 in.
Ref: UD010




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.84 (min) | 1.08 |
| 6. | 1.14 |
| 7. | 1.63 |
| 8. | 2.35 |
| 9. | 3.27 |
| 10. | 4.31 |
| 13. | 7.36 |
| 16. | 12.5 |
| 20. | 29.1 |
| 20.70 (max) | 32.6 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 5.04 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

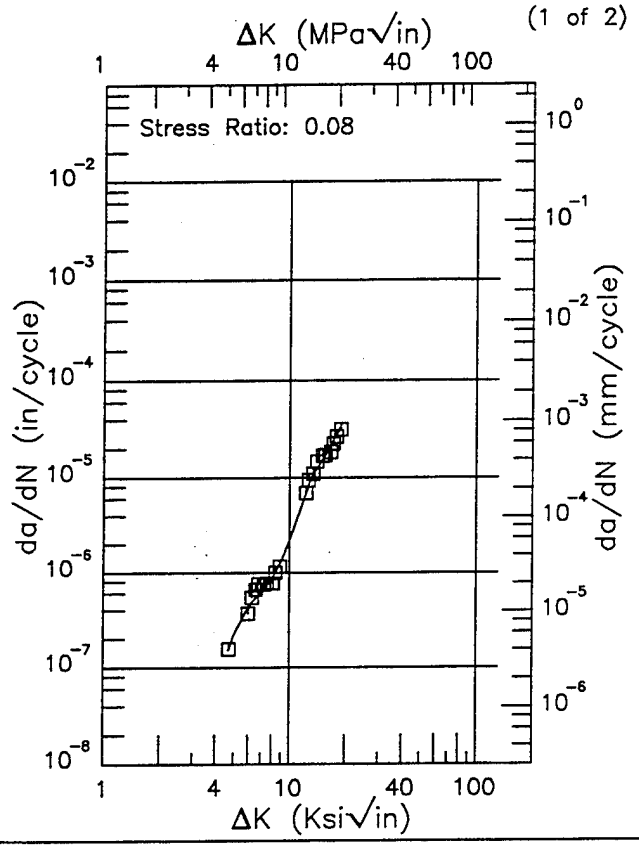
**Figure 7.11.3.1.23**

R 2219

Condition/Ht: T8511
Form: 1.75 in. Extruded Bar
Specimen Type: CT
Orientation: L–T
Frequency: 6 Hz
Environment: DRY AIR; RT

Yield Strength: 51 ksi
Ult. Strength: 66 ksi
Specimen Thk: 0.992 – 0.993 in.
Specimen Width: 6 in.
Ref: 85837

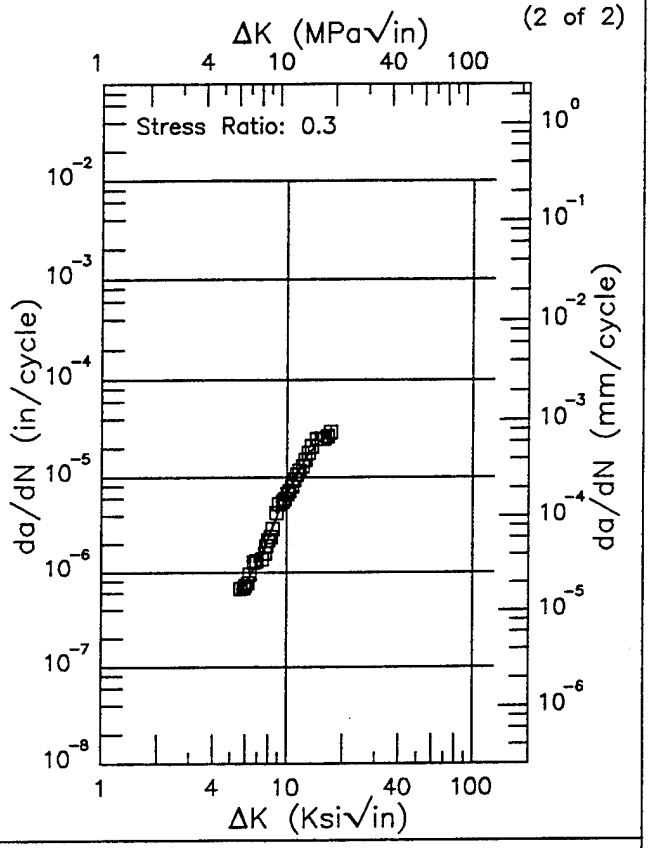
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.70 (min) | 0.151 |
| 5. | 0.219 |
| 6. | 0.436 |
| 7. | 0.617 |
| 8. | 0.856 |
| 9. | 1.32 |
| 10. | 2.19 |
| 13. | 9.75 |
| 16. | 19.0 |
| 18.71 (max) | 33.9 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 12.57 | 0. .5 .8 1.25 2. |

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.64 (min) | 0.660 |
| 6. | 0.752 |
| 7. | 1.27 |
| 8. | 2.32 |
| 9. | 4.09 |
| 10. | 6.57 |
| 13. | 17.2 |
| 16. | 27.0 |
| 17.17 (max) | 26.6 |

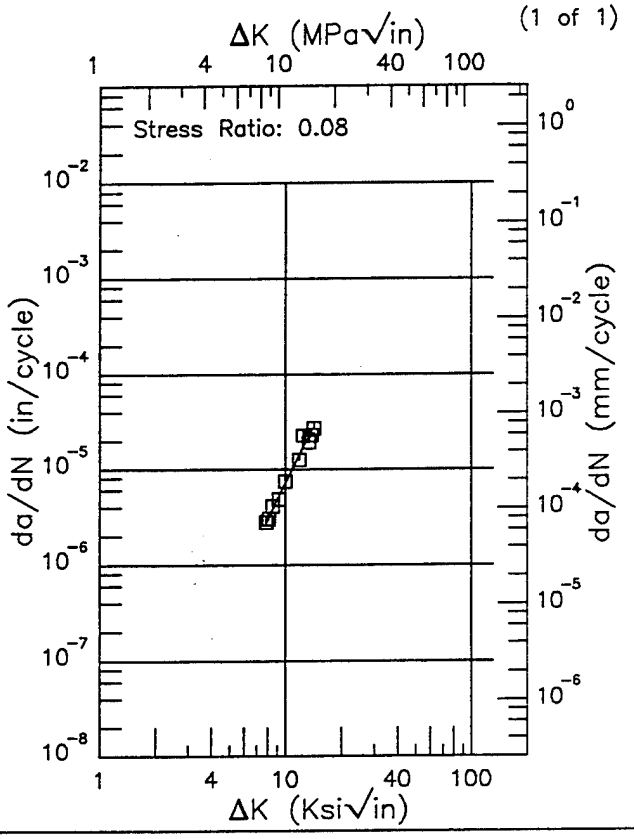
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 8.44 | 0. .5 .8 1.25 2. |

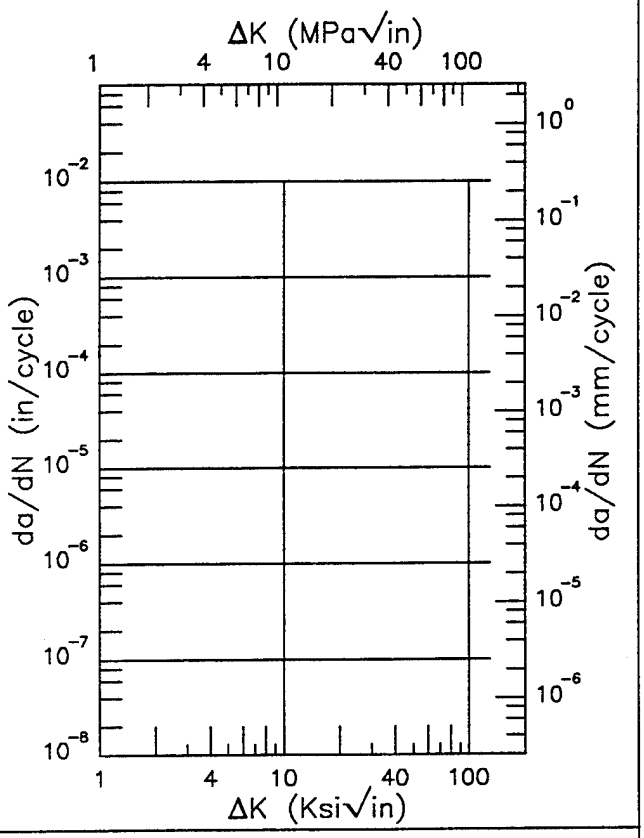
**Figure 7.11.3.1.24**

Condition/Ht: T8511
Form: 1.75 in. Extruded Bar
Specimen Type: CT
Orientation: L–T
Frequency: 1 Hz
Environment: S.T.W.; RT

Yield Strength: 51 ksi
Ult. Strength: 66 ksi
Specimen Thk: 0.992 in.
Specimen Width: 6 in.
Ref: 85837

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 7.84 (min) | 2.66 |
| 8. | 2.93 |
| 9. | 4.87 |
| 10. | 7.25 |
| 13. | 20.3 |
| 14.17 (max) | 24.2 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 12.98 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

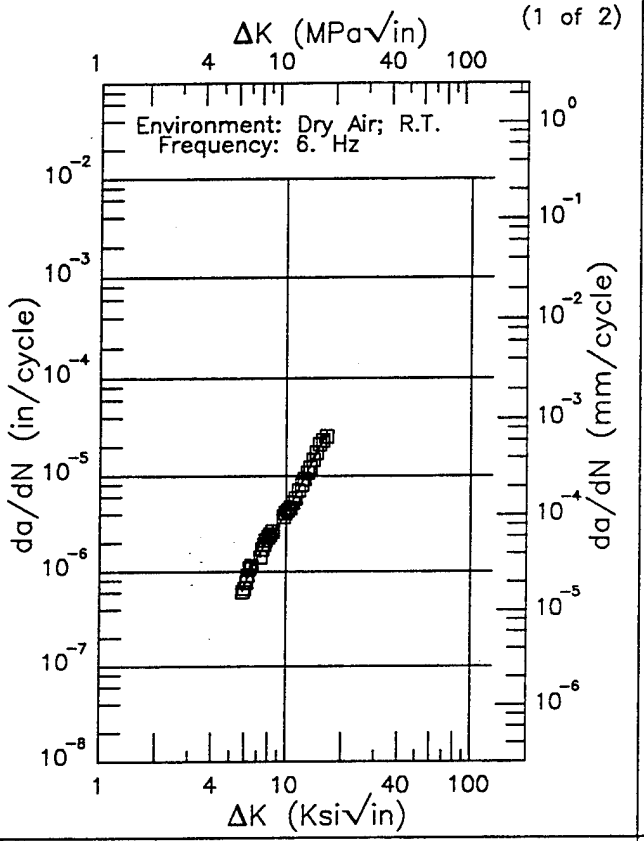
**Figure 7.11.3.1.25**

EF 2219

Condition/Ht: T8511
Form: 1.75 in. Extruded Bar
Specimen Type: CT
Orientation: T–L
Stress Ratio: 0.08

Yield Strength: 51 ksi
Ult. Strength: 66 ksi
Specimen Thk: 0.99 – 0.995 in.
Specimen Width: 6 in.
Ref: 85837

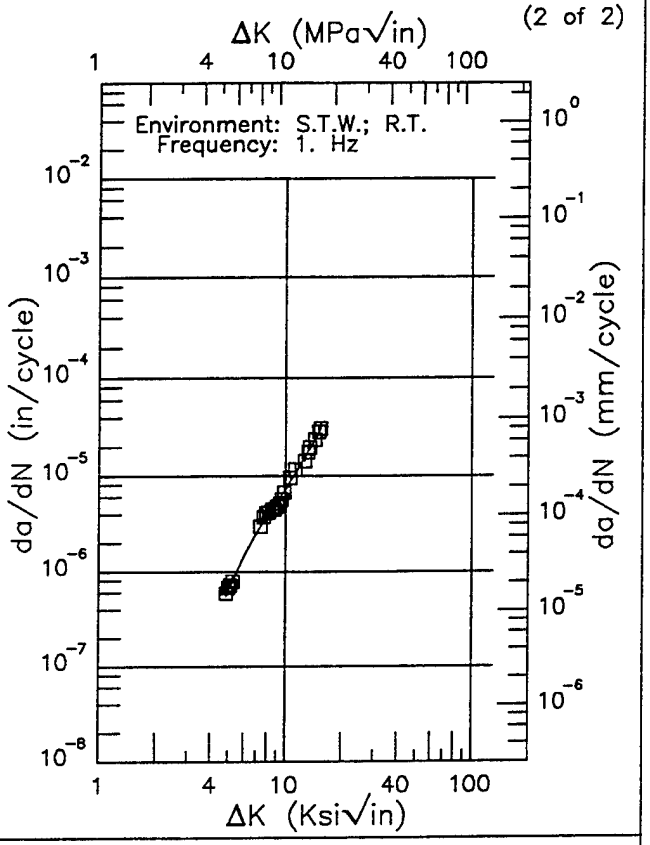
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.85 (min) | 0.640 |
| 6. | 0.732 |
| 7. | 1.42 |
| 8. | 2.18 |
| 9. | 3.03 |
| 10. | 4.09 |
| 13. | 10.9 |
| 16. | 24.7 |
| 16.35 (max) | 26.4 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 5.76 | 0. .5 .8 1.25 2. |

(2 of 2)



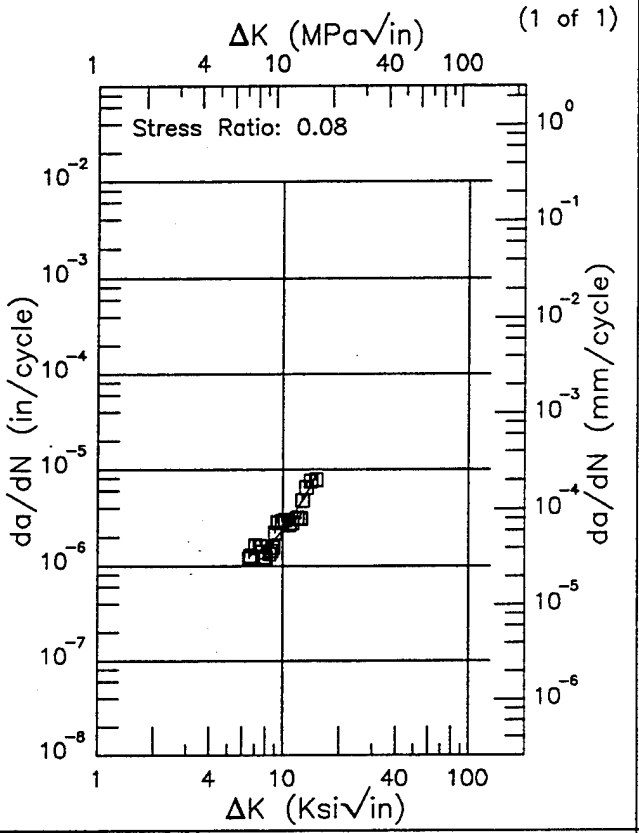

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.86 (min) | 0.551 |
| 5. | 0.639 |
| 6. | 1.44 |
| 7. | 2.50 |
| 8. | 3.78 |
| 9. | 5.34 |
| 10. | 7.29 |
| 13. | 16.9 |
| 15.36 (max) | 29.6 |

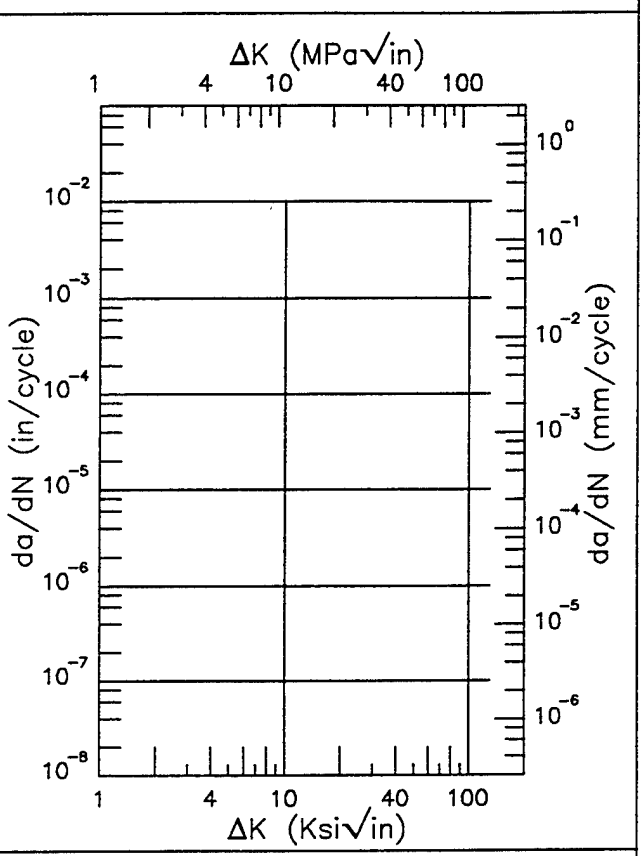
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 7.32 | 0. .5 .8 1.25 2. |

**Figure 7.11.3.1.26**

Condition/Ht: T852
Form: 6 in. Billet
Specimen Type: CT
Orientation: L–T
Frequency: 6 Hz
Environment: DRY AIR; RT

Yield Strength: 50 ksi
Ult. Strength: 65 ksi
Specimen Thk: 0.997 in.
Specimen Width: 6.19 in.
Ref: 85837




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.55 (min) | 1.29 |
| 7. | 1.36 |
| 8. | 1.58 |
| 9. | 1.90 |
| 10. | 2.35 |
| 13. | 5.00 |
| 14.88 (max) | 8.55 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 18.14 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.11.3.1.27**

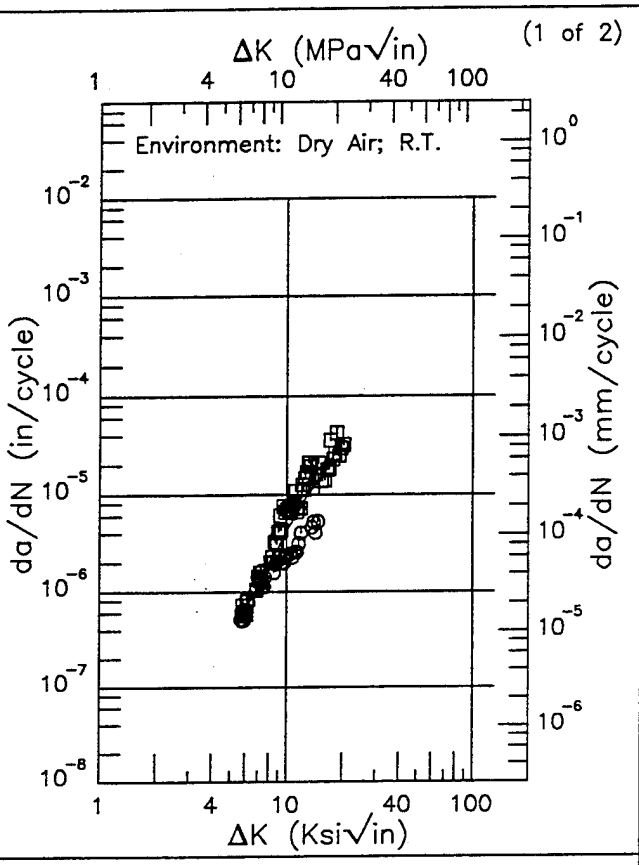
2219

E

Condition/Ht: T852
Form: 2 – 5.5 in. Forging
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.33
Frequency: 2 – 20 Hz

Yield Strength: 49.2 – 50.7 ksi
Ult. Strength: 62.5 – 65 ksi
Specimen Thk: 1 in.
Specimen Width: 3.805 in.
Ref: AL001

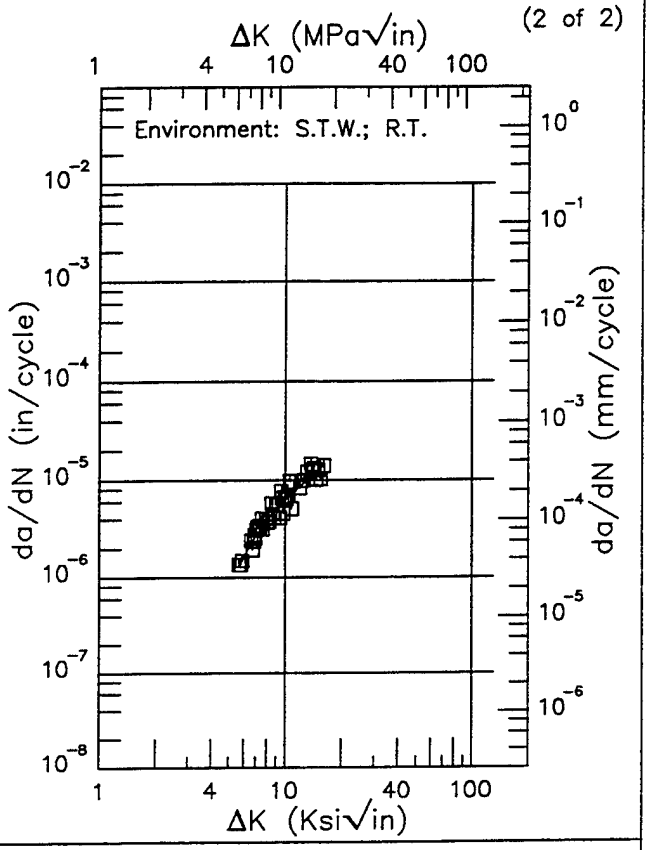
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 5.69 (min) | 0.552 |
| 6. | 0.654 |
| 7. | 1.12 |
| 8. | 1.85 |
| 9. | 2.90 |
| 10. | 4.28 |
| 13. | 9.95 |
| 16. | 16.9 |
| 20. | 37.6 |
| 20.09 (max) | 38.5 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 40.53 | 0. .5 .8 1.25 2. |

(2 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 5.69 (min) | 1.34 |
| 6. | 1.64 |
| 7. | 2.71 |
| 8. | 3.89 |
| 9. | 5.09 |
| 10. | 6.28 |
| 13. | 9.87 |
| 16.00 (max) | 13.9 |

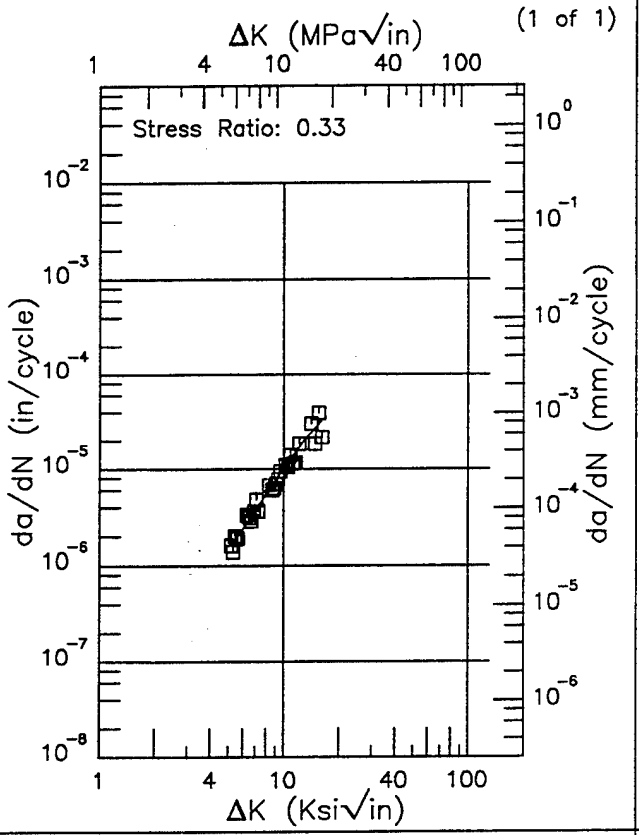
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 16.26 | 0. .5 .8 1.25 2. |

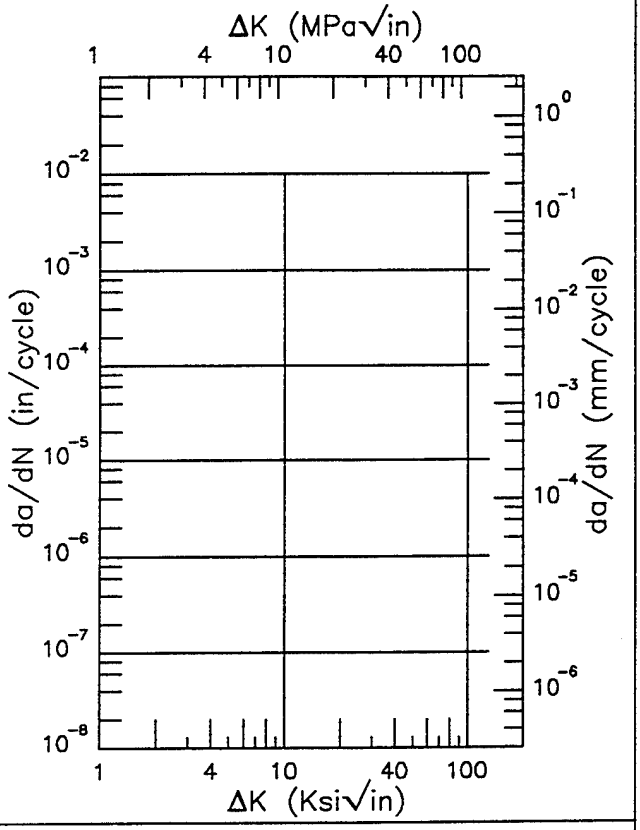
**Figure 7.11.3.1.28**

2219 R

Condition/Ht: T852
Form: 2 in. Forging
Specimen Type: CT
Orientation: L–T
Frequency: 20 Hz
Environment: S.T.W.; RT

Yield Strength: 50.7 ksi
Ult. Strength: 65 ksi
Specimen Thk: 1 in.
Specimen Width: 3.1 in.
Ref: AL001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.20 (min) | 1.60 |
| 6. | 2.38 |
| 7. | 3.70 |
| 8. | 5.42 |
| 9. | 7.58 |
| 10. | 10.2 |
| 13. | 20.1 |
| 16. | 32.2 |
| 16.06 (max) | 32.4 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 16.59 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.11.3.1.29**

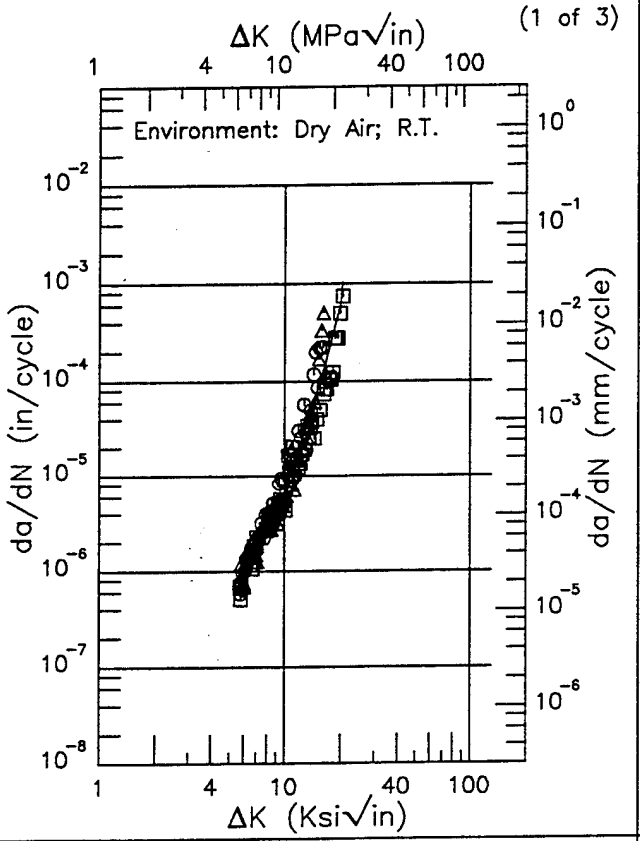
2219

E

Condition/Ht: T852
Form: 2 – 5.5 in. Forging
Specimen Type: CT
Orientation: T–L
Stress Ratio: 0.33
Frequency: 2 – 20 Hz

Yield Strength: 46.4 – 50.6 ksi
Ult. Strength: 61.6 – 66.5 ksi
Specimen Thk: 1 in.
Specimen Width: 3.805 in.
Ref: AL001

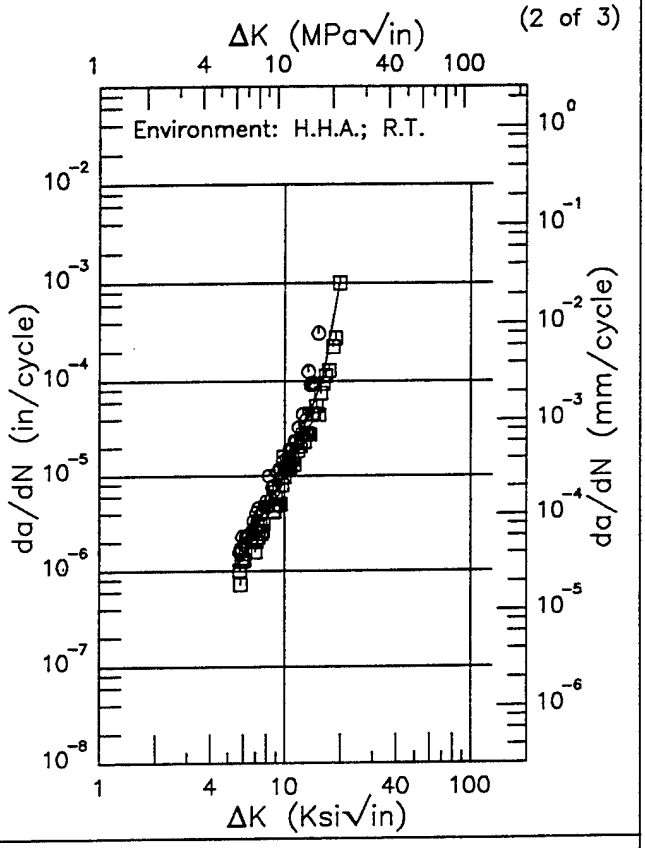
(1 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.69 (min) | 0.671 |
| 6. | 0.913 |
| 7. | 1.82 |
| 8. | 2.89 |
| 9. | 4.35 |
| 10. | 6.72 |
| 13. | 31.5 |
| 16. | 123. |
| 20. | 644. |
| 20.32 (max) | 1034. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 48.72 | 0. .5 .8 1.25 2. |

(2 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.75 (min) | 1.22 |
| 6. | 1.51 |
| 7. | 2.92 |
| 8. | 4.67 |
| 9. | 7.05 |
| 10. | 10.7 |
| 13. | 37.6 |
| 16. | 101. |
| 19.72 (max) | 991. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 47.34 | 0. .5 .8 1.25 2. |

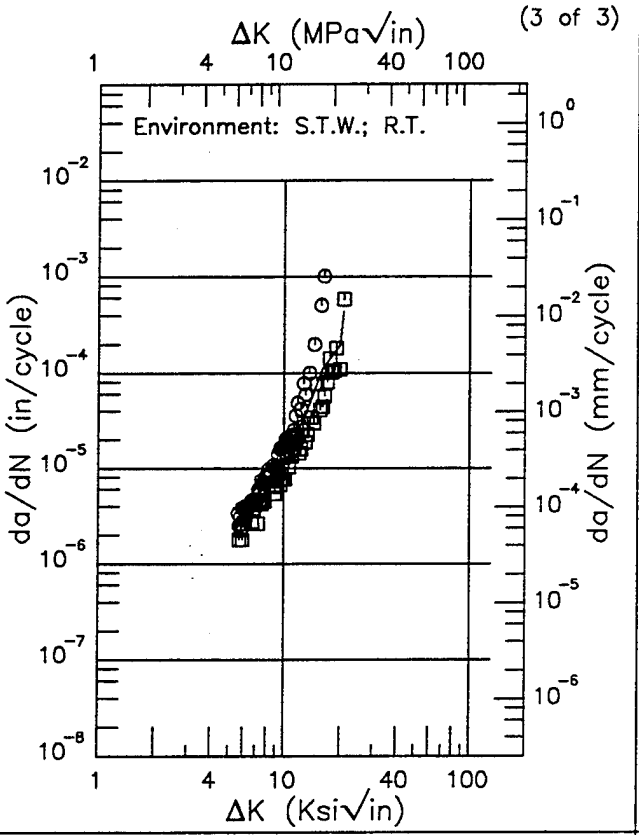
**Figure 7.11.3.1.30**

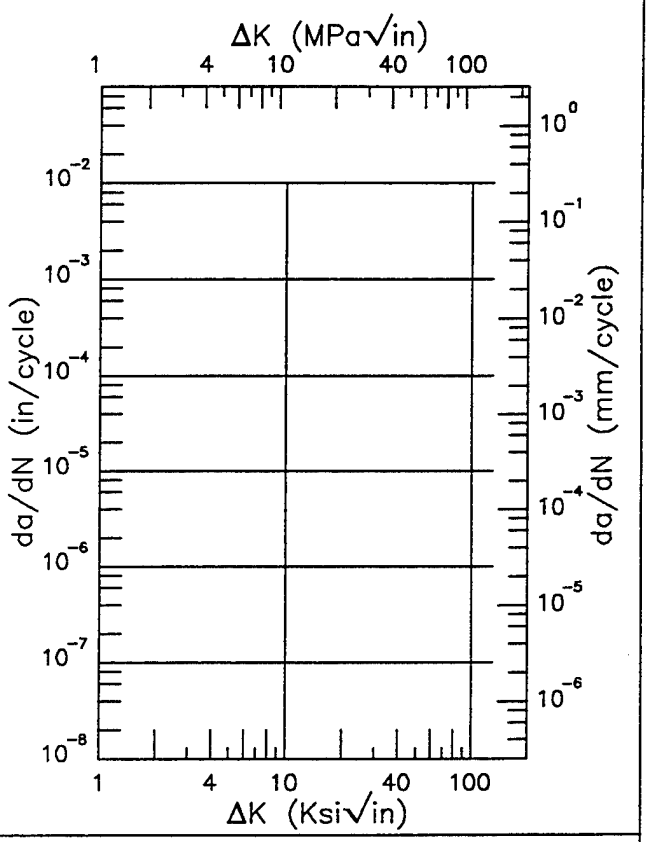
2219 E

Condition/Ht: T852
Form: 2 – 5.5 in. Forging
Specimen Type: CT
Orientation: T–L
Stress Ratio: 0.33
Frequency: 2 – 20 Hz

Yield Strength: 46.4 – 50.6 ksi
Ult. Strength: 61.6 – 66.5 ksi
Specimen Thk: 1 in.
Specimen Width: 3.805 in.
Ref: AL001

(3 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.61 (min) | 2.43 |
| 6. | 2.93 |
| 7. | 4.58 |
| 8. | 6.79 |
| 9. | 9.53 |
| 10. | 12.8 |
| 13. | 35.0 |
| 16. | 110. |
| 20. | 202. |
| 20.69 (max) | 437. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 92.89 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

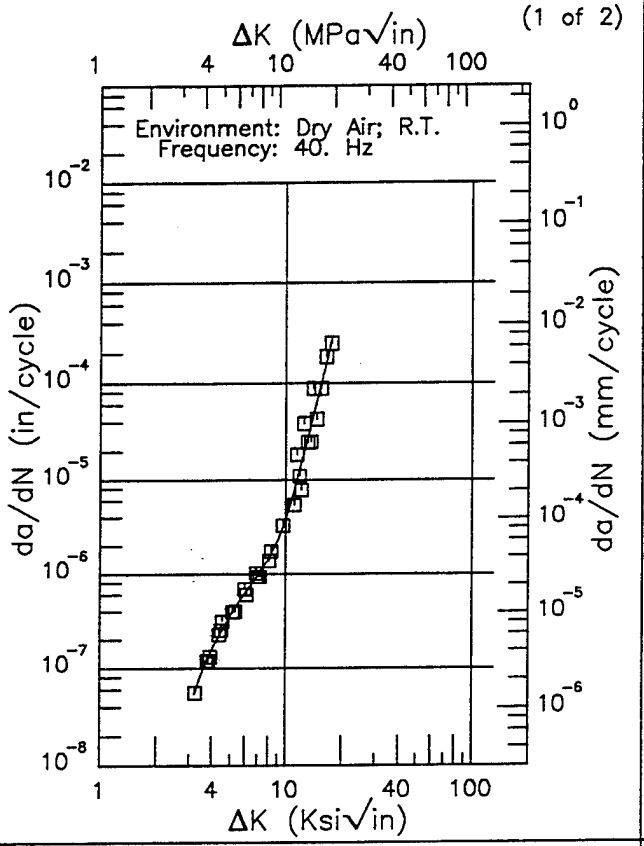
**Figure 7.11.3.1.30 (Concluded)**

2219

EF

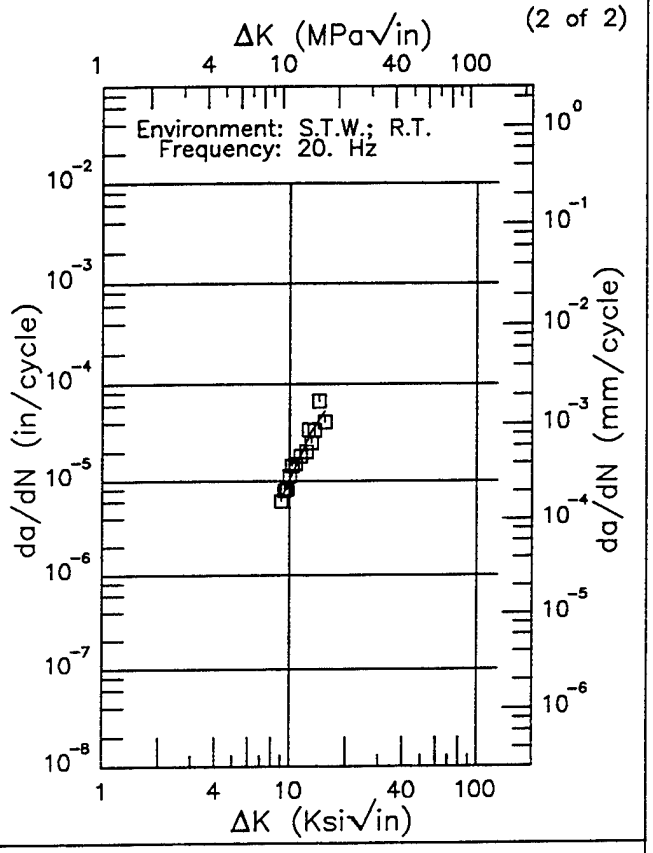
Condition/Ht: T852
Form: 5.5 in. Forging
Specimen Type: CT
Orientation: T-L
Stress Ratio: 0.33

Yield Strength: 46.4 ksi
Ult. Strength: 61.6 ksi
Specimen Thk: 0.25 in.
Specimen Width: 2.55 in.
Ref: AL001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.22 (min) | 0.0539 |
| 3.5 | 0.0852 |
| 4. | 0.159 |
| 5. | 0.363 |
| 6. | 0.624 |
| 7. | 0.955 |
| 8. | 1.42 |
| 9. | 2.21 |
| 10. | 3.72 |
| 13. | 24.9 |
| 16. | 128. |
| 17.51 (max) | 275. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 34.32 | 0. .5 .8 1.25 2. |




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 9.03 (min) | 6.82 |
| 10. | 10.3 |
| 13. | 32.2 |
| 15.40 (max) | 53.6 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 21.15 | 0. .5 .8 1.25 2. |

**Figure 7.11.3.1.31**

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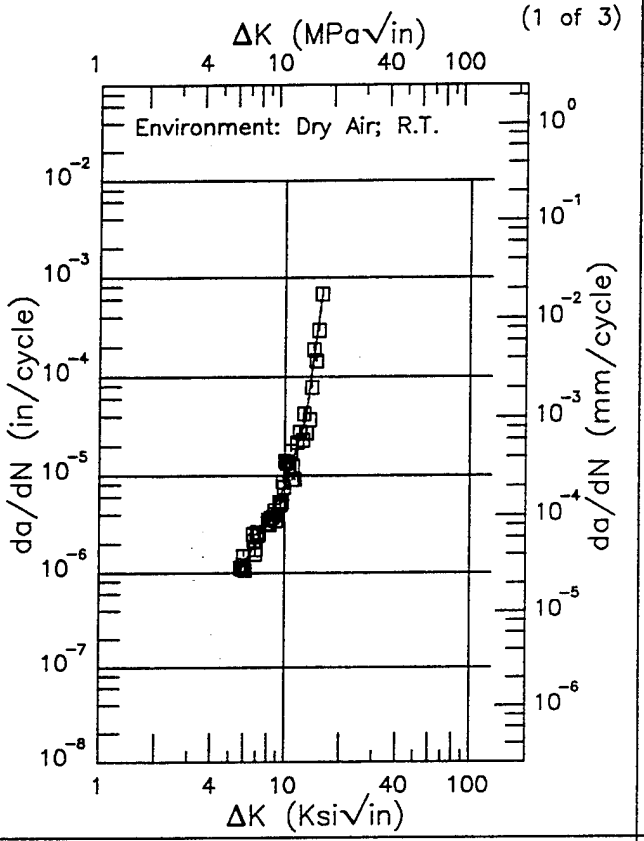
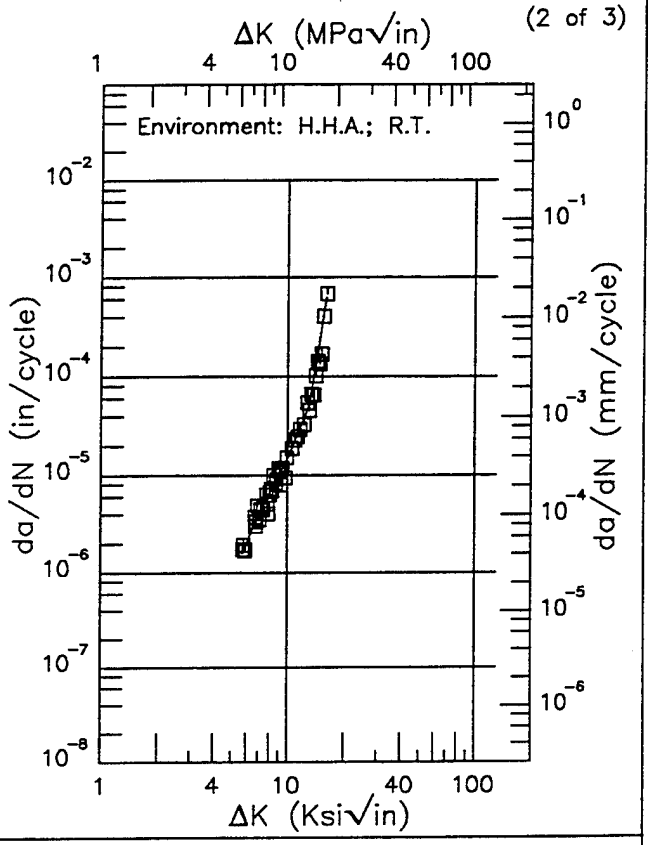
2219

E

Condition/Ht: T852
Form: 5.5 in. Forging
Specimen Type: CT
Orientation: S-L
Stress Ratio: 0.33
Frequency: 2 – 20 Hz

Yield Strength: 47.2 ksi
Ult. Strength: 62.3 ksi
Specimen Thk: 1 in.
Specimen Width: 3.805 in.
Ref: AL001




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.73 (min) | 1.07 |
| 6. | 1.25 |
| 7. | 2.11 |
| 8. | 3.36 |
| 9. | 5.24 |
| 10. | 8.09 |
| 13. | 37.2 |
| 15.83 (max) | 673. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.75 (min) | 1.57 |
| 6. | 1.96 |
| 7. | 3.91 |
| 8. | 6.55 |
| 9. | 10.0 |
| 10. | 14.7 |
| 13. | 49.8 |
| 16. | 587. |
| 16.06 (max) | 628. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 25.22 | 0. .5 .8 1.25 2. |

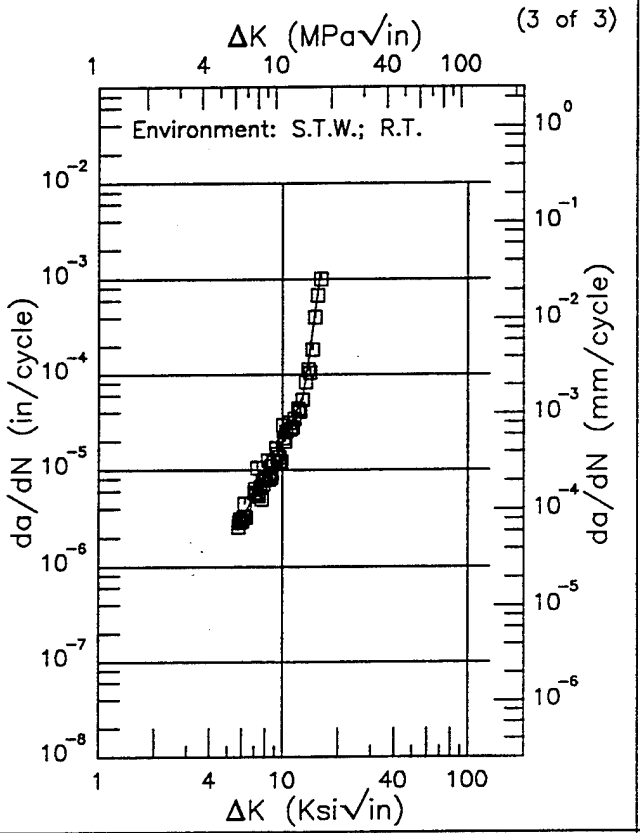
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 17.32 | 0. .5 .8 1.25 2. |

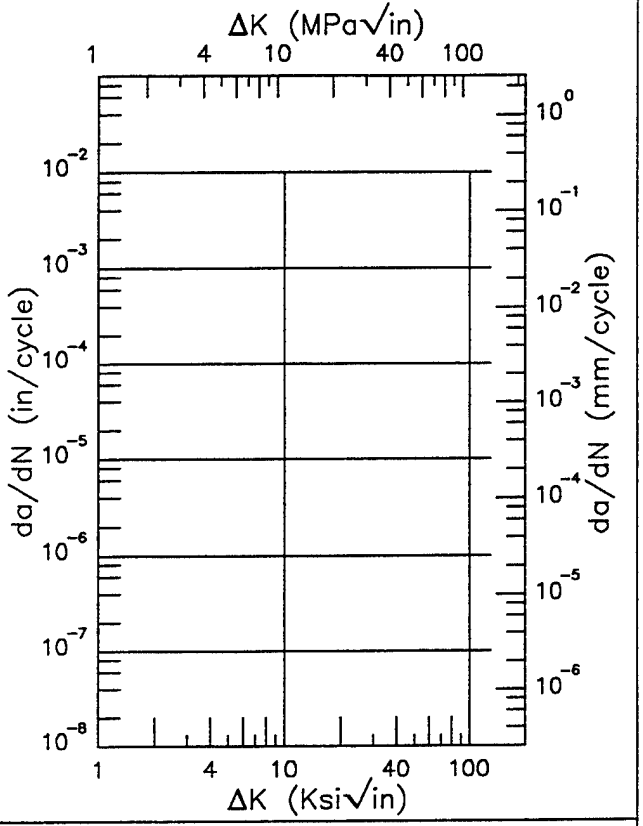
**Figure 7.11.3.1.32**

Condition/Ht: T852
Form: 5.5 in. Forging
Specimen Type: CT
Orientation: S-L
Stress Ratio: 0.33
Frequency: 2 - 20 Hz

Yield Strength: 47.2 ksi
Ult. Strength: 62.3 ksi
Specimen Thk: 1 in.
Specimen Width: 3.805 in.
Ref: AL001

(3 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.72 (min) | 2.39 |
| 6. | 3.09 |
| 7. | 5.47 |
| 8. | 8.07 |
| 9. | 12.5 |
| 10. | 19.6 |
| 13. | 61.4 |
| 15.97 (max) | 1157. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 20.24 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

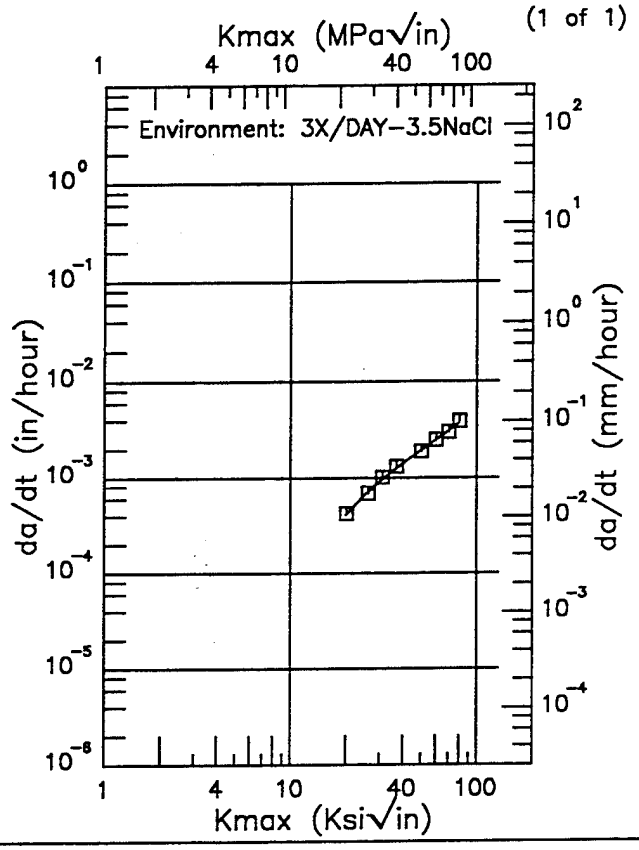
**Figure 7.11.3.1.32 (Concluded)**

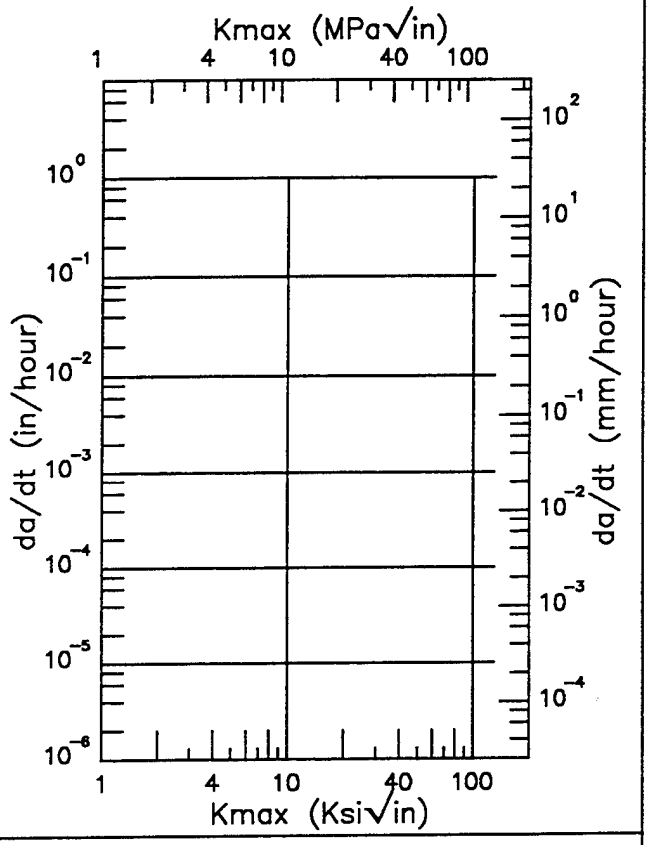
## 2219

Condition/Ht: T37
Form: 1.5 in. Plate
Specimen Type: DCB
Orientation: S–L
Yield Strength:
Ult. Strength:

Specimen Thk: 1 in.
Specimen Width: 5 in.
Ao:
$K_{Iscc}$:
Ref: 78313

(1 of 1)




| Kmax (Ksi√in) | da/dt ($10^{-3}$in/hour) |
|---|---|
| 20.00 (min) | 0.411 |
| 25. | 0.661 |
| 30. | 0.917 |
| 35. | 1.17 |
| 40. | 1.42 |
| 50. | 1.93 |
| 60. | 2.47 |
| 70. | 3.08 |
| 80.00 (max) | 3.76 |

| Kmax (Ksi√in) | da/dt ($10^{-3}$in/hour) |
|---|---|

| RMS % Error | |
|---|---|
| 2.81 | |

| RMS % Error | |
|---|---|
| | |

**Figure 7.11.3.2**

# TABLE 7.11.3.3



## $K_{Iscc}$ SUMMARY FOR ALUMINUM ALLOY 2219

| Condition/ Heat Treat | Prod Form | Test Temp (°F) | Spec Or. | Yield Str (Ksi) | Envir. | Specimen | | | Prod Thk (in) | Crack (in) | $K_Q$ (Ksi√in) | $K_{Iscc}$ (Ksi√in) | Test Time (min) | Test Date | Refer |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Thick (in) | Design | Width (in) | | | | | | | |
| T37 | P | R.T. | S-L | 42.1 | Industrial Atm | 1 | CT | 2 | 2 | --- | 27.1 | 13 | --- | 1973 | 86688 |
| | | | | | Salt-Dichromate-Acetate | 1 | CT | 2 | 2 | --- | 27.1 | 9 | --- | 1973 | 86688 |
| | | | | | Seacoast Atm | 1 | CT | 2 | 2 | --- | 27.1 | 13 | --- | 1973 | 86688 |
| T851 | P | R.T. | L-T | 50 | F.C.S. | 1 | DCB | 5.5 | 1.75 | --- | 32 | 30.5 | 75240 | 1976 | RI006 |
| | | | | | | 1 | DCB | 5.5 | 1.75 | --- | 32 | 27.5 | 75240 | 1976 | RI006 |
| | | | | | S.C.S. | 1 | DCB | 5.5 | 1.75 | --- | 32 | 27 | 75240 | 1976 | RI006 |
| | | | | | | 1 | DCB | 5.5 | 1.75 | --- | 32 | 37* | 59100 | 1976 | RI006 |
| | | | | | | 1 | DCB | 5.5 | 1.75 | --- | 32 | 39* | 61680 | 1976 | RI006 |
| | | | | | S.T.W. | 1 | DCB | 5.5 | 1.75 | --- | 32 | 33* | 51720 | 1976 | RI006 |
| | | | | | | 1 | DCB | 5.5 | 1.75 | --- | 32 | 36* | 83520 | 1976 | RI006 |
| | | | T-L | 48 | S.T.W. | 1 | DCB | 5.5 | 1.75 | --- | 30 | 27 | 51720 | 1976 | RI006 |
| | | | S-L | 58 | 3.5% NaCl | 1 | DCB | 4 | 1 | --- | 27 | 18 | --- | 1968 | 84331 |
| | | | | --- | S.T.W. | 1 | DCB | 5.5 | 1.75 | --- | 30 | 29.5 | 51720 | 1976 | RI006 |
| | | | | | | 1 | DCB | 5.5 | 1.75 | --- | 30 | 29.5 | 83520 | 1976 | RI006 |
| T87 | P | R.T. | S-L | 57.7 | Industrial Atm | 1 | CT | 2 | 2 | --- | 19.6 | 19 | --- | 1973 | 86688 |
| | | | | | Salt-Dichromate-Acetate | 1 | CT | 2 | 2 | --- | 19.6 | 19 | --- | 1973 | 86688 |
| | | | | | Seacoast Atm | 1 | CT | 2 | 2 | --- | 19.6 | 19 | --- | 1973 | 86688 |

* specimen thickness does not meet minimum requirements of $2.5 \left(\frac{K_{Iscc}}{\sigma_{ys}}\right)^2$

## TABLE 7.12.1.2



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2324 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: H.H.A.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Δ*K Level* (*Ksi*$\sqrt{in}$) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T39 | PLATE | 0.33 | 25 | | 0.56 | 10.77 | | | |

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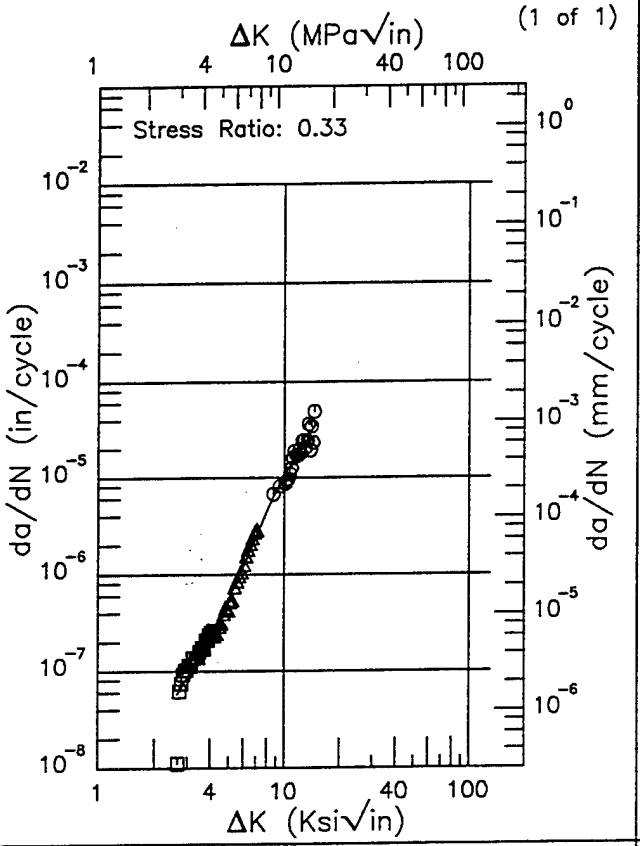
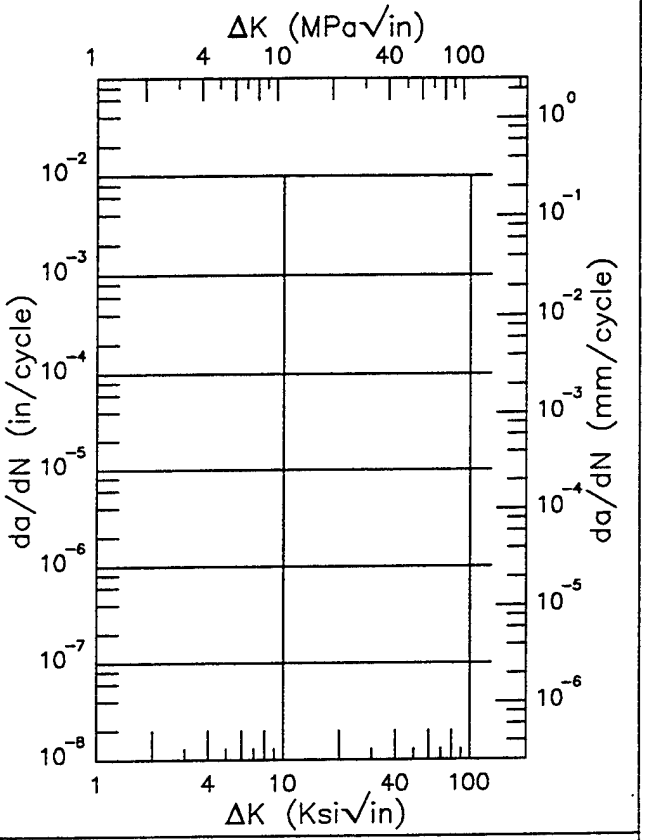
R 2324

Condition/Ht: T39
Form: 1.25 in. Plate
Specimen Type: WOL
Orientation: L–T
Frequency: 25 Hz
Environment: H.H.A.; RT

Yield Strength:
Ult. Strength:
Specimen Thk: 0.249 – 0.251 in.
Specimen Width: 2.545 – 2.547 in.
Ref: AL011




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.65 (min) | 0.0576 |
| 3. | 0.0863 |
| 3.5 | 0.146 |
| 4. | 0.236 |
| 5. | 0.557 |
| 6. | 1.19 |
| 7. | 2.39 |
| 8. | 4.40 |
| 9. | 7.28 |
| 10. | 10.8 |
| 13. | 22.4 |
| 14.47 (max) | 34.5 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 18.94 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.12.3.1**

# TABLE 7.13.1.1

## MEAN PLANE STRAIN FRACTURE TOUGHNESS FOR ALUMINUM 2000/6000 SERIES ALLOY 2419 AT ROOM TEMPERATURE

| Product Form | Condition/Heat Treatment | $K_{Ic}$ ($ksi\sqrt{in}$) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Specimen Orientation | | | | | | | | |
| | | L-T | | | T-L | | | S-L | | |
| | | Mean $K_{Ic}$ | Std Dev | n | Mean $K_{Ic}$ | Std Dev | n | Mean $K_{Ic}$ | Std Dev | n |
| Plate | T851 | 42.6 | 5.3 | 23 | 37.2 | 4.2 | 52 | 24.8 | 2.5 | 3 |

## TABLE 7.13.1.2.1



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2419 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | ΔK Level ($Ksi\sqrt{in}$) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.1 | 30 | | | 6.5 | 51.72 | | |

## TABLE 7.13.1.2.2



### FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2419 AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T851 | PLATE | 0.1 | 30 | | | 5.32 | | | |

# TABLE 7.13.2.1



## ALUMINUM 2419 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 | Plate | 2.55 | R.T. | L-T | 50.1 | 6.017 | 2.506 | CT | 3.129 | 2.40 | 49.10 | 42.6 | 5.3 | 1978 | MPC01 |
| | | 2.55 | | | 50.1 | 5.959 | 2.583 | CT | 3.158 | 1.98 | 44.60 | | | 1978 | MPC01 |
| | | 2.90 | | | 50.5 | 6.057 | 2.945 | CT | 3.089 | 2.11 | 46.50 | | | 1978 | MPC01 |
| | | 2.90 | | | 50.7 | 6.053 | 2.900 | CT | 3.087 | 1.84 | 43.90 | | | 1978 | MPC01 |
| | | 2.90 | | | 50.8 | 6.041 | 2.897 | CT | 3.081 | 1.98 | 45.50 | | | 1978 | MPC01 |
| | | 2.90 | | | 51.1 | 6.052 | 2.905 | CT | 3.026 | 1.44 | 39.20 | | | 1978 | MPC01 |
| | | 2.90 | | | 51.4 | 6.020 | 2.947 | CT | 3.070 | 1.60 | 41.30 | | | 1978 | MPC01 |
| | | 2.00 | | | 51.7 | 4.000 | 2.000 | CT | --- | 1.14 | 34.90 | | | 1975 | UD004 |
| | | 2.00 | | | 51.7 | 4.000 | 2.000 | CT | --- | 1.09 | 34.20 | | | 1975 | UD004 |
| | | 2.00 | | | 51.7 | 4.000 | 2.000 | CT | --- | 1.17 | 35.30 | | | 1975 | UD004 |
| | | 2.55 | | | 52.1 | 3.026 | 1.501 | CT | 1.513 | 1.29 | 38.00 | | | 1978 | MPC01 |
| | | 2.90 | | | 52.1 | 5.962 | 2.934 | CT | 3.100 | 2.30 | 50.20 | | | 1978 | MPC01 |
| | | 2.90 | | | 52.2 | 5.967 | 2.937 | CT | 3.103 | 2.16 | 48.90 | | | 1978 | MPC01 |
| | | 2.90 | | | 52.4 | 5.033 | 2.375 | CT | 2.567 | 1.68 | 43.00 | | | 1978 | MPC01 |
| | | 2.50 | | | 52.7 | 5.998 | 2.519 | CT | 3.059 | 1.64 | 43.00 | | | 1978 | MPC01 |
| | | 2.50 | | | 53.0 | 6.059 | 2.558 | CT | 3.090 | 2.50 | 53.00 | | | 1978 | MPC01 |
| | | 3.00 | | | 53.2 | 4.034 | 1.999 | CT | 2.017 | 1.36 | 39.70 | | | 1978 | MPC01 |
| | | 3.00 | | | 53.2 | 4.035 | 1.999 | CT | 2.058 | 1.44 | 40.70 | | | 1978 | MPC01 |
| | | 2.90 | | | 53.4 | 4.951 | 2.374 | CT | 2.624 | 1.84 | 46.40 | | | 1978 | MPC01 |
| | | 2.90 | | | 53.8 | 4.992 | 1.750 | CT | 2.596 | 1.15 | 36.90 | | | 1978 | MPC01 |
| | | 2.90 | | | 54.0 | 6.025 | 2.933 | CT | 3.193 | 1.98 | 48.50 | | | 1978 | MPC01 |
| | | 2.90 | | | 54.9 | 5.019 | 1.750 | CT | 2.610 | 1.26 | 39.00 | | | 1978 | MPC01 |
| | | 2.90 | | | 55.8 | 5.006 | 1.750 | CT | 2.603 | 1.19 | 38.60 | | | 1978 | MPC01 |

# TABLE 7.13.2.1 (CONTINUED)



## ALUMINUM 2419 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 | Plate | 1.75 | R.T. | T-L | 46.8 | 5.033 | 1.761 | CT | 2.567 | 1.48 | 36.30 | 37.2 | 4.2 | 1978 | MPC01 |
| | | 1.75 | | | 47.0 | 5.012 | 1.758 | CT | 2.556 | 1.40 | 35.70 | | | 1978 | MPC01 |
| | | 1.75 | | | 47.0 | 2.991 | 1.399 | CT | 1.585 | 1.19 | 32.80 | | | 1978 | MPC01 |
| | | 1.75 | | | 47.2 | 4.994 | 1.762 | CT | 2.597 | 1.52 | 37.10 | | | 1978 | MPC01 |
| | | 1.75 | | | 47.4 | 3.019 | 1.397 | CT | 1.570 | 1.29 | 34.20 | | | 1978 | MPC01 |
| | | 1.75 | | | 47.4 | 4.994 | 1.757 | CT | 2.597 | 1.52 | 37.10 | | | 1978 | MPC01 |
| | | 1.75 | | | 47.4 | 4.985 | 1.761 | CT | 2.592 | 1.52 | 37.00 | | | 1978 | MPC01 |
| | | 1.75 | | | 47.6 | 5.004 | 1.762 | CT | 2.602 | 1.60 | 38.10 | | | 1978 | MPC01 |
| | | 1.75 | | | 47.6 | 2.994 | 1.397 | CT | 1.587 | 1.29 | 34.70 | | | 1978 | MPC01 |
| | | 1.75 | | | 47.6 | 4.987 | 1.762 | CT | 2.593 | 1.60 | 38.20 | | | 1978 | MPC01 |
| | | 1.75 | | | 47.7 | 2.995 | 1.398 | CT | 1.587 | 1.12 | 32.10 | | | 1978 | MPC01 |
| | | 1.75 | | | 47.7 | 4.975 | 1.759 | CT | 2.587 | 1.36 | 35.70 | | | 1978 | MPC01 |
| | | 2.55 | | | 49.0 | 4.998 | 2.401 | CT | 2.649 | 2.11 | 45.30 | | | 1978 | MPC01 |
| | | 1.75 | | | 49.0 | 2.981 | 1.402 | CT | 1.550 | 1.29 | 35.30 | | | 1978 | MPC01 |
| | | 2.90 | | | 49.2 | 6.000 | 2.951 | CT | 3.180 | 1.84 | 42.40 | | | 1978 | MPC01 |
| | | 2.90 | | | 49.4 | 6.028 | 2.900 | CT | 3.195 | 1.48 | 38.20 | | | 1978 | MPC01 |
| | | 2.90 | | | 49.4 | 6.019 | 2.896 | CT | 3.130 | 2.20 | 46.50 | | | 1978 | MPC01 |
| | | 2.00 | | | 49.7 | 2.996 | 1.402 | CT | 1.558 | 0.99 | 31.80 | | | 1978 | MPC01 |
| | | 2.90 | | | 49.9 | 4.982 | 2.374 | CT | 2.690 | 1.60 | 40.40 | | | 1978 | MPC01 |
| | | 2.90 | | | 50.1 | 6.000 | 2.940 | CT | 3.180 | 1.84 | 43.30 | | | 1978 | MPC01 |
| | | 2.55 | | | 50.3 | 5.004 | 2.401 | CT | 2.652 | 1.68 | 41.50 | | | 1978 | MPC01 |
| | | 2.90 | | | 50.5 | 6.014 | 2.912 | CT | 3.067 | 1.08 | 33.70 | | | 1978 | MPC01 |
| | | 2.90 | | | 50.7 | 5.051 | 1.747 | CT | 2.576 | 1.56 | 40.30 | | | 1978 | MPC01 |

# TABLE 7.13.2.1 (CONTINUED)



## ALUMINUM 2419 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 2.90 | R.T. Cont'd | T-L Cont'd | 50.9 | 6.047 | 2.931 | CT | 3.205 | 1.56 | 40.40 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 2.90 | | | 51.0 | 5.946 | 2.937 | CT | 3.092 | 1.22 | 36.10 | | | 1978 | MPC01 |
| | | 2.90 | | | 51.0 | 4.989 | 1.747 | CT | 2.594 | 1.72 | 42.40 | | | 1978 | MPC01 |
| | | 2.55 | | | 51.1 | 3.015 | 1.500 | CT | 1.568 | 1.15 | 34.80 | | | 1978 | MPC01 |
| | | 2.90 | | | 51.1 | 4.989 | 2.375 | CT | 2.644 | 1.36 | 38.00 | | | 1978 | MPC01 |
| | | 3.00 | | | 51.2 | 4.026 | 1.996 | CT | 2.053 | 0.78 | 29.10 | | | 1978 | MPC01 |
| | | 2.50 | | | 51.2 | 6.049 | 2.511 | CT | 3.085 | 1.68 | 42.30 | | | 1978 | MPC01 |
| | | 3.00 | | | 51.2 | 4.016 | 1.999 | CT | 2.048 | 0.78 | 29.10 | | | 1978 | MPC01 |
| | | 2.90 | | | 51.4 | 5.043 | 1.746 | CT | 2.572 | 1.48 | 40.00 | | | 1978 | MPC01 |
| | | 2.50 | | | 51.4 | 5.992 | 2.534 | CT | 3.166 | 1.44 | 39.40 | | | 1978 | MPC01 |
| | | 3.00 | | | 51.6 | 3.022 | 1.403 | CT | 1.541 | 1.22 | 36.50 | | | 1978 | MPC01 |
| | | 2.90 | | | 52.1 | 5.029 | 1.747 | CT | 2.565 | 1.72 | 43.40 | | | 1978 | MPC01 |
| | | 3.00 | | | 52.3 | 3.983 | 1.999 | CT | 2.071 | 1.08 | 34.90 | | | 1978 | MPC01 |
| | | 3.00 | | | 52.3 | 3.979 | 1.999 | CT | 2.069 | 1.19 | 36.50 | | | 1978 | MPC01 |
| | | 2.55 | | | 52.3 | 5.968 | 2.501 | CT | 3.163 | 1.12 | 35.10 | | | 1978 | MPC01 |
| | | 2.00 | | | 52.5 | 4.000 | 2.000 | CT | --- | 0.85 | 30.60 | | | 1975 | UD004 |
| | | 2.00 | | | 52.5 | 4.000 | 2.000 | CT | --- | 0.89 | 31.30 | | | 1975 | UD004 |
| | | 2.90 | | | 52.5 | 5.026 | 1.746 | CT | 2.563 | 1.68 | 43.10 | | | 1978 | MPC01 |
| | | 2.00 | | | 52.5 | 4.000 | 2.000 | CT | --- | 0.95 | 32.30 | | | 1975 | UD004 |
| | | 2.90 | | | 52.6 | 5.051 | 1.748 | CT | 2.576 | 1.40 | 39.60 | | | 1978 | MPC01 |

# TABLE 7.13.2.1 (CONTINUED)



## ALUMINUM 2419 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ ($K_{Ic}$ Ksi√in.) | $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 Cont'd | Plate Cont'd | 2.90 | R.T. Cont'd | T-L Cont'd | 52.8 | 4.983 | 1.749 | CT | 2.641 | 1.12 | 35.90 | Cont'd | Cont'd | 1978 | MPC01 |
| | | 2.90 | | | 52.8 | 5.048 | 1.750 | CT | 2.625 | 0.99 | 33.40 | | | 1978 | MPC01 |
| | | 2.55 | | | 52.9 | 5.973 | 2.461 | CT | 3.046 | 1.19 | 36.60 | | | 1978 | MPC01 |
| | | 2.90 | | | 53.5 | 4.998 | 1.750 | CT | 2.649 | 1.08 | 35.80 | | | 1978 | MPC01 |
| | | 2.90 | | | 53.6 | 5.985 | 2.937 | CT | 3.172 | 1.80 | 46.00 | | | 1978 | MPC01 |
| | | 2.90 | | | 53.6 | 5.053 | 1.750 | CT | 2.577 | 1.05 | 35.00 | | | 1978 | MPC01 |
| | | 2.90 | | | 53.7 | 4.977 | 2.374 | CT | 2.638 | 1.26 | 38.60 | | | 1978 | MPC01 |
| | | 2.55 | | | 53.9 | 3.020 | 1.498 | CT | 1.510 | 0.87 | 32.10 | | | 1978 | MPC01 |
| | | 2.90 | | | 54.6 | 5.029 | 1.747 | CT | 2.565 | 1.36 | 40.70 | | | 1978 | MPC01 |
| T851 | Plate | 2.00 | R.T. | S-T | 51.7 | 4.000 | 2.000 | CT | --- | 0.49 | 22.90 | 24.0 | 1.5 | 1975 | UD004 |
| | | 2.00 | | | 51.7 | 4.000 | 2.000 | CT | --- | 0.50 | 23.20 | | | 1975 | UD004 |
| | | 2.00 | | | 51.7 | 4.000 | 2.000 | CT | --- | 0.49 | 22.90 | | | 1975 | UD004 |
| | | 2.90 | | | 52.4 | 2.006 | 1.001 | CT | 1.023 | 0.52 | 24.20 | | | 1978 | MPC01 |
| | | 2.90 | | | 53.2 | 1.981 | 1.001 | CT | 1.030 | 0.48 | 23.80 | | | 1978 | MPC01 |
| | | 2.90 | | | 54.4 | 1.994 | 1.001 | CT | 1.037 | 0.60 | 26.80 | | | 1978 | MPC01 |
| T851 | Plate | 3.00 | R.T. | S-L | 50.4 | 2.018 | 0.999 | CT | 1.029 | 0.57 | 24.40 | 24.8 | 2.5 | 1978 | MPC01 |
| | | 3.00 | | | 50.4 | 1.989 | 1.000 | CT | 1.034 | 0.48 | 22.50 | | | 1978 | MPC01 |
| | | 3.00 | | | 51.6 | 1.994 | 1.000 | CT | 0.997 | 0.70 | 27.40 | | | 1978 | MPC01 |
| T851 | Plate | 2.00 | 200 | L-T | 47.6 | 4.000 | 2.000 | CT | --- | 1.17 | 32.60 | 32.4 | 0.6 | 1975 | UD004 |
| | | 2.00 | | | 47.6 | 4.000 | 2.000 | CT | --- | 1.19 | 32.90 | | | 1975 | UD004 |
| | | 2.00 | | | 47.6 | 4.000 | 2.000 | CT | --- | 1.11 | 31.70 | | | 1975 | UD004 |

# TABLE 7.13.2.1 (CONCLUDED)



## ALUMINUM 2419 $K_{Ic}$

| CONDITION | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | SPECIMEN DESIGN | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ $K_{Ic}$ MEAN | $K_{Ic}$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T851 | Plate | 2.00 | 200 | T-L | 47.1 | 4.000 | 2.000 | CT | --- | 0.97 | 29.30 | 28.8 | 0.5 | 1975 | UD004 |
| | | 2.00 | | | 47.1 | 4.000 | 2.000 | CT | --- | 0.94 | 28.90 | | | 1975 | UD004 |
| | | 2.00 | | | 47.1 | 4.000 | 2.000 | CT | --- | 0.90 | 28.30 | | | 1975 | UD004 |
| T851 | Plate | 2.00 | 300 | L-T | 43.8 | 4.000 | 2.000 | CT | --- | 1.32 | 31.80 | 32.0 | 0.2 | 1975 | UD004 |
| | | 2.00 | | | 43.8 | 4.000 | 2.000 | CT | --- | 1.35 | 32.20 | | | 1975 | UD004 |
| | | 2.00 | | | 43.8 | 4.000 | 2.000 | CT | --- | 1.33 | 31.90 | | | 1975 | UD004 |
| T851 | Plate | 2.00 | 300 | T-L | 43.2 | 4.000 | 2.000 | CT | --- | 1.09 | 28.50 | 28.7 | 0.3 | 1975 | UD004 |
| | | 2.00 | | | 43.2 | 4.000 | 2.000 | CT | --- | 1.12 | 28.90 | | | 1975 | UD004 |

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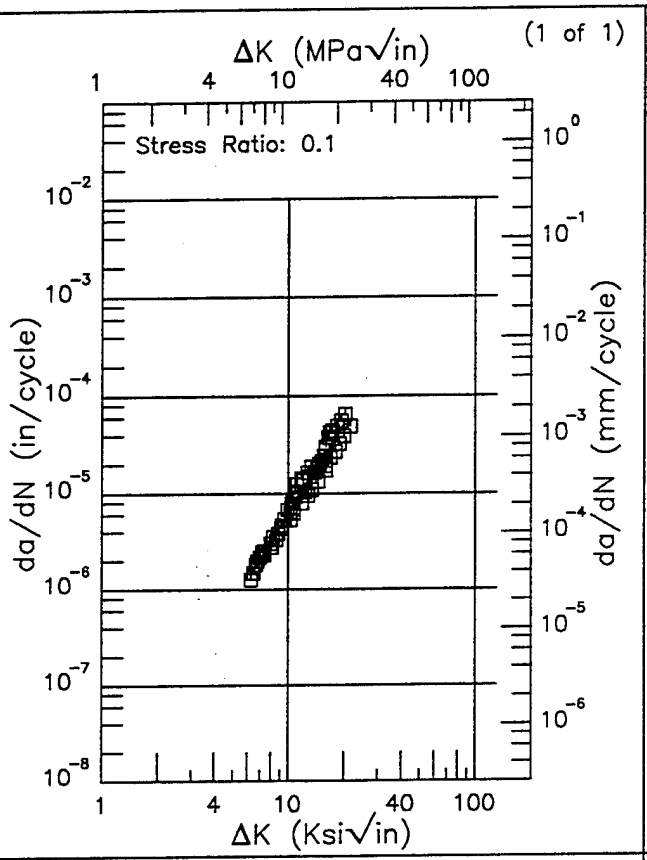
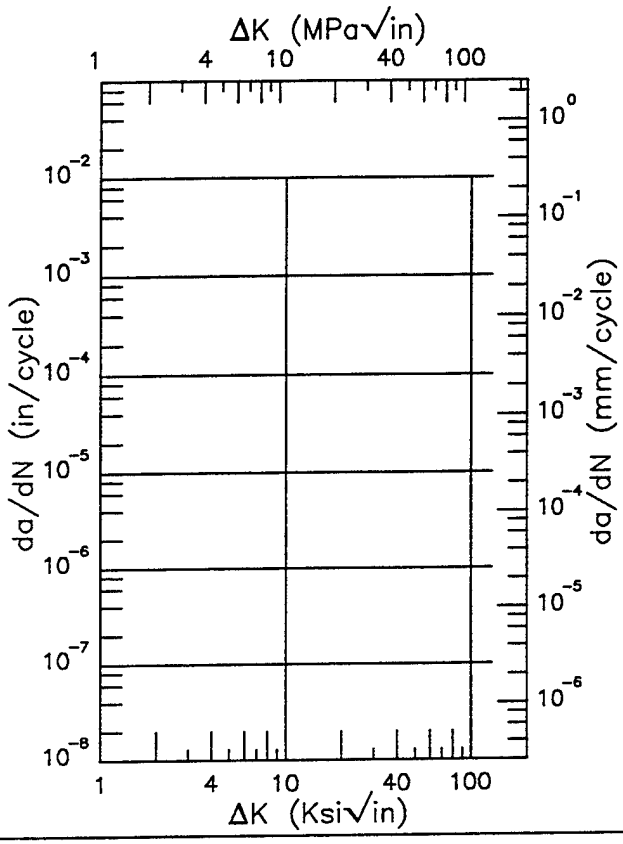
2419

R

Condition/Ht: T851
Form: 2 in. Plate
Specimen Type: WOL
Orientation: L–T
Frequency: 30 Hz
Environment: LAB AIR; RT

Yield Strength: 51.7 ksi
Ult. Strength: 66.9 ksi
Specimen Thk: 0.5 in.
Specimen Width: 1.85 in.
Ref: UD004




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.26 (min) | 1.46 |
| 7. | 1.96 |
| 8. | 3.00 |
| 9. | 4.53 |
| 10. | 6.50 |
| 13. | 14.2 |
| 16. | 25.4 |
| 20. | 51.7 |
| 21.39 (max) | 51.0 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 19.73 | 0. .5 .8 1.25 2. |

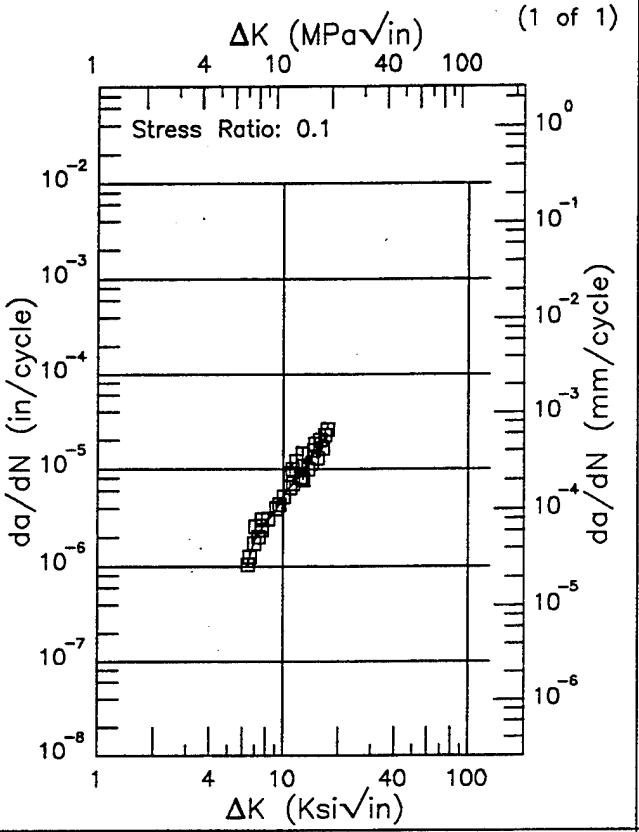
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

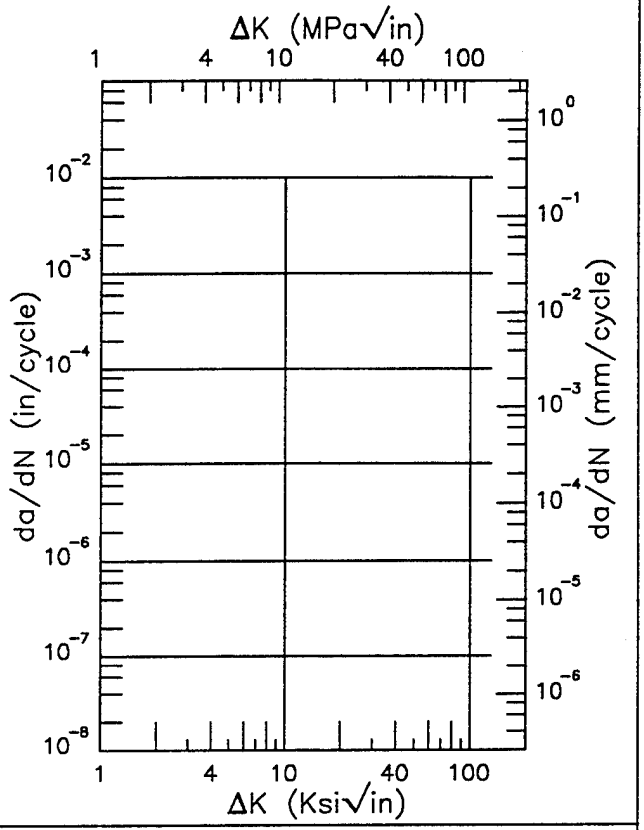
**Figure 7.13.3.1.1**

Condition/Ht: T851
Form: 2 in. Plate
Specimen Type: WOL
Orientation: T–L
Frequency: 30 Hz
Environment: LAB AIR; RT

Yield Strength: 52.5 ksi
Ult. Strength: 66.6 ksi
Specimen Thk: 0.5 in.
Specimen Width: 1.85 in.
Ref: UD004

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.39 (min) | 1.05 |
| 7. | 1.90 |
| 8. | 2.87 |
| 9. | 3.70 |
| 10. | 5.32 |
| 13. | 10.2 |
| 16. | 18.2 |
| 17.33 (max) | 23.2 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 20.29 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.13.3.1.2**

# TABLE 7.14.1.1



## MEAN PLANE STRAIN FRACTURE TOUGHNESS FOR ALUMINUM 2000/6000 SERIES ALLOY 2618 AT ROOM TEMPERATURE

| Product Form | Condition/Heat Treatment | $K_{Ic}$ ($ksi\sqrt{in}$) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Specimen Orientation | | | | | | | | |
| | | L-T | | | T-L | | | S-L | | |
| | | Mean $K_{Ic}$ | Std Dev | n | Mean $K_{Ic}$ | Std Dev | n | Mean $K_{Ic}$ | Std Dev | n |
| Plate | T651 | --- | --- | --- | --- | --- | --- | 14.9 | 1.2 | 12 |

## TABLE 7.14.1.2

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 2618 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* ($Ksi\sqrt{in}$) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T81 | SHEET | 0.4 | 2 | | | 7.77 | | | |

# TABLE 7.14.2.1



## ALUMINUM 2618 $K_{Ic}$

| CONDITION | PRODUCT | | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 * ($K_{Ic}$/TYS)$^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi√in.) | $K_{Ic}$ MEAN | STAN DEV | | |
| T651 | Plate | 3.34 | R.T. | S-L | 54.8 | 1.990 | 0.999 | CT | 1.014 | 0.21 | 15.90 | 14.9 | 1.2 | 1973 | 86213 |
| | | 3.34 | | | 54.8 | 2.000 | 0.999 | CT | 1.015 | 0.21 | 15.80 | | | 1973 | 86213 |
| | | 3.34 | | | 55.1 | 2.000 | 0.999 | CT | 1.011 | 0.23 | 16.80 | | | 1973 | 86213 |
| | | 3.34 | | | 55.1 | 2.000 | 0.999 | CT | 1.024 | 0.22 | 16.50 | | | 1973 | 86213 |
| | | 3.34 | | | 56.3 | 2.000 | 0.999 | CT | 1.028 | 0.15 | 13.60 | | | 1973 | 86213 |
| | | 3.34 | | | 56.3 | 2.000 | 0.999 | CT | 1.033 | 0.16 | 14.20 | | | 1973 | 86213 |
| | | 3.34 | | | 56.3 | 2.000 | 0.999 | CT | 1.034 | 0.16 | 14.10 | | | 1973 | 86213 |
| | | 3.34 | | | 56.8 | 2.000 | 0.999 | CT | 1.011 | 0.15 | 13.90 | | | 1973 | 86213 |
| | | 3.34 | | | 56.8 | 2.000 | 0.999 | CT | 1.018 | 0.14 | 13.20 | | | 1973 | 86213 |
| | | 3.34 | | | 57.4 | 2.000 | 0.999 | CT | 1.011 | 0.19 | 15.70 | | | 1973 | 86213 |
| | | 3.34 | | | 59.2 | 2.000 | 0.999 | CT | 1.008 | 0.15 | 14.60 | | | 1973 | 86213 |
| | | 3.34 | | | 59.2 | 2.000 | 0.999 | CT | 1.011 | 0.15 | 14.30 | | | 1973 | 86213 |
| T651 | Plate | 1.37 | 88 | S-L | 51.8 | 1.000 | 0.500 | CT | 0.488 | 0.40 | 20.70 | 22.1 | 1.2 | 1973 | 86213 |
| | | 1.37 | | | 51.8 | 1.000 | 0.500 | CT | 0.503 | 0.49 | 23.00 | | | 1973 | 86213 |
| | | 1.37 | | | 51.8 | 1.000 | 0.500 | CT | 0.499 | 0.47 | 22.50 | | | 1973 | 86213 |

# TABLE 7.14.2.2



## ALUMINUM 2618 $K_C$

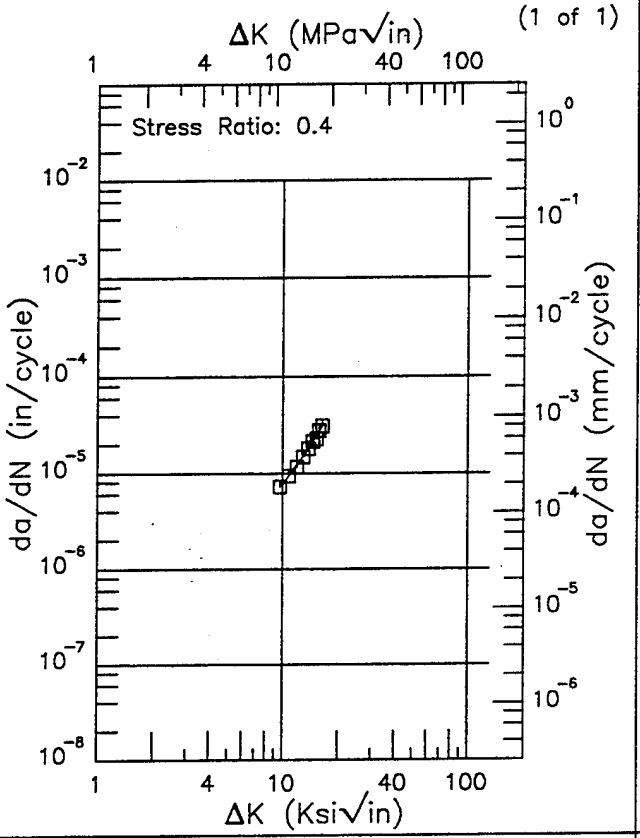
| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{net}$ | $K_{app}$ ($K_{app}$ (Ksi$\sqrt{in}$)) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($K_C$ (Ksi$\sqrt{in}$)) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T61 | Sheet | 0.06 | R.T. | L-T | 56.2 | 2.000 | 0.064 | 0.623 | 0.900 | --- | 36.00 | 37.87* | --- | --- | 49.09* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 56.2 | 2.000 | 0.064 | 0.623 | 0.970 | 34.10 | 35.70 | 37.55* | | | 51.80* | | | 1973 | 86213 |
| | | 0.06 | | | 56.2 | 2.000 | 0.064 | 0.622 | 0.890 | 32.70 | 35.70 | 37.55* | | | 48.25* | | | 1973 | 86213 |
| T61 | Sheet | 0.06 | R.T. | T-L | 54.2 | 2.000 | 0.064 | 0.621 | 1.070 | 32.80 | 34.10 | 35.80* | --- | --- | 54.12* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 54.2 | 2.000 | 0.064 | 0.622 | 0.900 | --- | 33.20 | 34.92* | | | 45.27* | | | 1973 | 86213 |
| | | 0.06 | | | 54.2 | 2.000 | 0.064 | 0.623 | 0.960 | 32.70 | 33.90 | 35.66* | | | 48.76* | | | 1973 | 86213 |

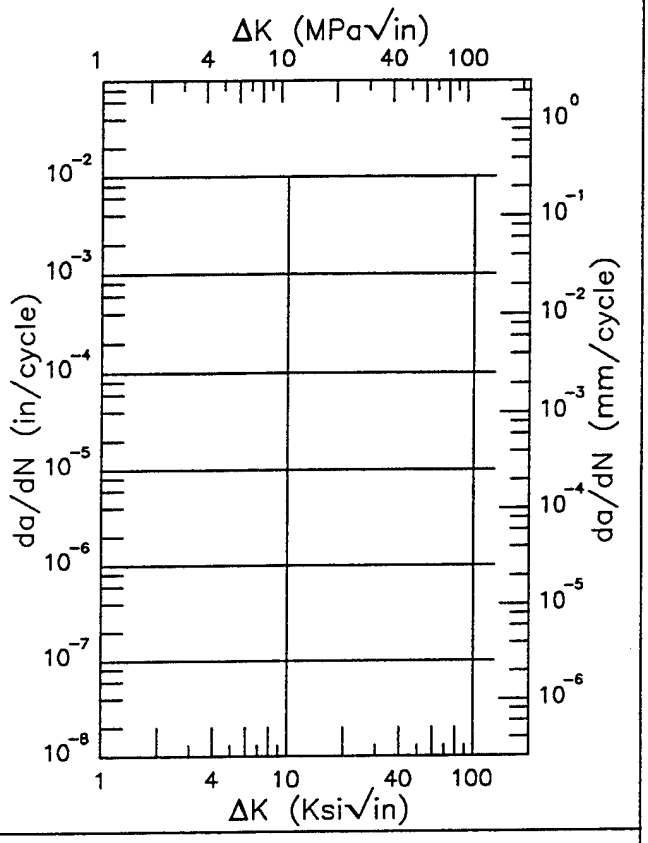
* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

R 2618

Condition/Ht: T81
Form: 0.06 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: L–T
Frequency: 2 Hz
Environment: LAB AIR; RT

Yield Strength: 57 ksi
Ult. Strength:
Specimen Thk: 0.064 in.
Specimen Width: 4 in.
Ref: 86734




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 9.66 (min) | 7.21 |
| 10. | 7.77 |
| 13. | 15.1 |
| 16. | 29.2 |
| 16.24 (max) | 30.8 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

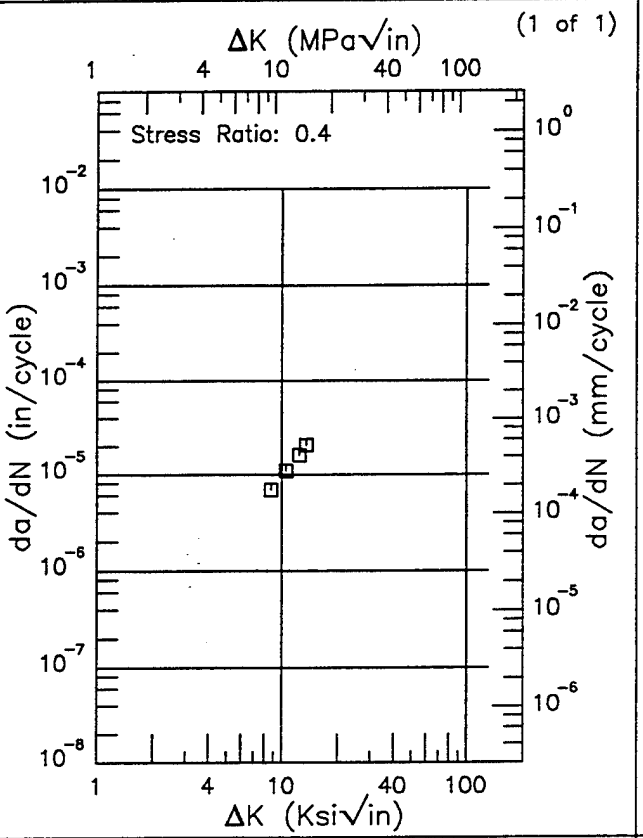
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 2.93 | 0. .5 .8 1.25 2. |

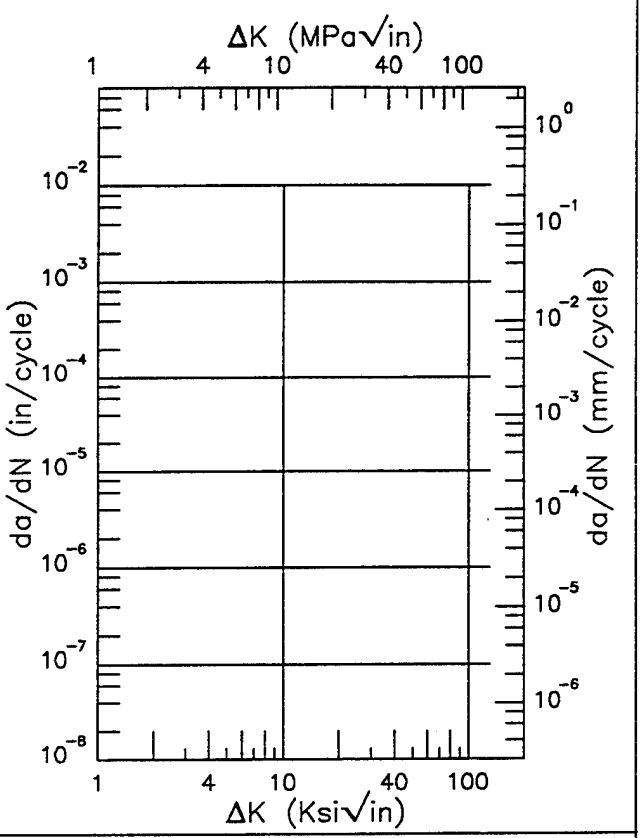
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.14.3.1.1**

Condition/Ht: T81
Form: 0.06 in. Sheet
Specimen Type: CCP (max load specified)
Orientation: T–L
Frequency: 2 Hz
Environment: LAB AIR; RT

Yield Strength: 57 ksi
Ult. Strength:
Specimen Thk: 0.064 in.
Specimen Width: 4 in.
Ref: 86734




ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

ΔK (Ksi√in) da/dN ($10^{-6}$in/cycle)

| RMS % Error | Life Prediction Ratio Summary | RMS % Error | Life Prediction Ratio Summary |
|---|---|---|---|
| | 0. .5 .8 1.25 2. | | 0. .5 .8 1.25 2. |

**Figure 7.14.3.1.2**

# TABLE 7.15.1.1



## MEAN PLANE STRAIN FRACTURE TOUGHNESS FOR ALUMINUM 2000/6000 SERIES ALLOY 6061 AT ROOM TEMPERATURE

| Product Form | Condition/Heat Treatment | $K_{Ic}$ ($ksi\sqrt{in}$) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Specimen Orientation | | | | | | | | |
| | | L-T | | | T-L | | | S-L | | |
| | | Mean $K_{Ic}$ | Std Dev | n | Mean $K_{Ic}$ | Std Dev | n | Mean $K_{Ic}$ | Std Dev | n |
| Plate | T651 | --- | --- | --- | 26.6 | 0.9 | 5 | 21.5 | 0.4 | 2 |

## TABLE 7.15.1.2

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK 6061 AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* (*Ksi√in*) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T651 | PLATE | | 0.1 | | | | 55.48 | | |

# TABLE 7.15.2.1



## ALUMINUM 6061 $K_{Ic}$

| CONDITION | PRODUCT | | TEST TEMP (F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN | | | CRACK LENGTH (in.) A | 2.5 * $(K_{Ic}/TYS)^2$ (in.) | $K_{Ic}$ | | | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FORM | THICK (in.) | | | | WIDTH (in.) W | THICK (in.) B | DESIGN | | | $K_{Ic}$ (Ksi * $\sqrt{in.}$) | $K_{Ic}$ MEAN | STAN DEV | | |
| T651 | Plate | 1.50 | -112 | T-L | 45.5 | 3.000 | 1.480 | NB | 1.500 | 0.96 | 28.20 | 30.1 | 1.9 | 1971 | 84288 |
| | | 1.50 | | | 45.5 | 3.000 | 1.480 | NB | 1.450 | 1.10 | 30.30 | | | 1971 | 84288 |
| | | 1.50 | | | 45.5 | 3.000 | 1.480 | NB | 1.510 | 1.20 | 31.90 | | | 1971 | 84288 |
| T651 | Plate | 1.50 | R.T. | T-L | 43.4 | 2.000 | 1.000 | NB | 1.025 | 0.90 | 26.00 | 26.6 | 0.9 | 1972 | 82880 |
| | | 1.50 | | | 43.4 | 2.000 | 1.000 | NB | 1.018 | 0.94 | 26.60 | | | 1972 | 82880 |
| | | 1.50 | | | 43.4 | 2.000 | 1.000 | NB | 0.995 | 0.98 | 27.20 | | | 1972 | 82880 |
| | | 1.50 | | | 43.4 | 3.000 | 1.480 | NB | 1.443 | 0.86 | 25.40 | | | 1972 | 82880 |
| | | 1.50 | | | 43.4 | 3.000 | 1.480 | NB | 1.508 | 1.01 | 27.60 | | | 1971 | 84288 |
| T651 | Plate | 2.50 | R.T. | S-L | 41.5 | 2.000 | 1.000 | CT | 0.951 | 0.68 | 21.70 | 21.5 | 0.4 | 1973 | 86688 |
| | | 2.50 | | | 41.5 | 2.000 | 1.000 | CT | 0.930 | 0.62 | 21.20 | | | 1973 | 86688 |
| T651 | Plate | 3.00 | 88 | S-L | 39.6 | 2.500 | 1.250 | CT | 1.171 | 0.72 | 21.30 | 21.3 | 0.3 | 1973 | 86213 |
| | | 3.00 | | | 39.6 | 2.500 | 1.250 | CT | 1.181 | 0.74 | 21.60 | | | 1973 | 86213 |
| | | 3.00 | | | 39.6 | 2.490 | 1.251 | CT | 1.183 | 0.71 | 21.10 | | | 1973 | 86213 |
| T651 | Forged Bar | --- | 84 | T-L | 40.3 | 3.000 | 1.500 | CT | 1.547 | 1.29 | 28.90 | --- | --- | 1973 | 86213 |
| T651 | Forged Bar | --- | 84 | S-L | 40.3 | 2.000 | 1.000 | CT | 0.987 | 0.91 | 24.30 | 24.3 | 0.0 | 1973 | 86213 |
| | | --- | | | 40.3 | 2.000 | 1.001 | CT | 0.956 | 0.91 | 24.30 | | | 1973 | 86213 |
| T652 | Forging | 9.00 | R.T. | S-T | 38.1 | 2.000 | 1.000 | NB | 1.000 | 0.95 | 23.40 | --- | --- | 1972 | 82675 |

# TABLE 7.15.2.2



## ALUMINUM 6061 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ $K_{app}$ (Ksi$\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ $K_C$ (Ksi$\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T6 | Sheet | 0.06 | R.T. | L-T | 41.9 | 2.000 | 0.062 | 0.622 | 1.240 | --- | 28.50 | 29.98* | --- | --- | 53.05* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 41.9 | 2.000 | 0.062 | 0.620 | 1.230 | --- | 28.80 | 30.23* | | | 53.09* | | | 1973 | 86213 |
| | | 0.06 | | | 41.9 | 2.000 | 0.062 | 0.619 | 1.360 | --- | 28.40 | 29.75* | | | 59.80* | | | 1973 | 86213 |
| | | 0.06 | | | 43.4 | 2.000 | 0.062 | 0.622 | 1.280 | --- | 30.10 | 31.66* | | | 58.31* | | | 1973 | 86213 |
| | | 0.06 | | | 43.4 | 2.000 | 0.062 | 0.622 | 1.300 | --- | 30.00 | 31.56* | | | 59.31* | | | 1973 | 86213 |
| | | 0.06 | | | 43.4 | 2.000 | 0.062 | 0.620 | 1.230 | --- | 30.00 | 31.49* | | | 55.30* | | | 1973 | 86213 |
| T6 | Sheet | 0.12 | R.T. | L-T | 44.1 | 4.000 | 0.127 | 1.590 | 2.864 | --- | 26.70 | 46.85* | --- | --- | 86.22* | --- | --- | 1973 | 86213 |
| | | 0.12 | | | 44.5 | 4.000 | 0.127 | 1.592 | 3.111 | --- | 26.90 | 47.24* | | | 101.60* | | | 1973 | 86213 |
| T6 | Sheet | 0.06 | R.T. | L-T | 41.4 | 15.810 | 0.062 | 4.000 | --- | --- | 28.20 | 73.61* | --- | --- | --- | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 41.4 | 15.810 | 0.062 | 3.020 | 4.230 | --- | 32.00 | 71.31* | | | 86.33* | | | 1973 | 86213 |
| | | 0.06 | | | 41.4 | 15.820 | 0.062 | 5.980 | 7.000 | --- | 21.60 | 72.72* | | | 81.73* | | | 1973 | 86213 |
| | | 0.06 | | | 41.4 | 15.820 | 0.063 | 1.000 | 1.230 | --- | 39.10 | 49.13* | | | 54.55* | | | 1973 | 86213 |
| T6 | Sheet | 0.06 | R.T. | T-L | 40.7 | 2.000 | 0.062 | 0.623 | 1.280 | --- | 28.60 | 30.08* | --- | --- | 55.40* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 41.8 | 2.000 | 0.062 | 0.617 | 1.320 | --- | 29.60 | 30.95* | | | 59.74* | | | 1973 | 86213 |
| | | 0.06 | | | 41.8 | 2.000 | 0.062 | 0.622 | 1.130 | --- | 29.80 | 31.35* | | | 49.97* | | | 1973 | 86213 |
| | | 0.06 | | | 41.8 | 2.000 | 0.062 | 0.621 | 1.100 | --- | 30.00 | 31.49* | | | 48.93* | | | 1973 | 86213 |
| | | 0.06 | | | 40.7 | 2.000 | 0.063 | 0.620 | 1.110 | --- | 28.20 | 29.60* | | | 46.42* | | | 1973 | 86213 |
| | | 0.06 | | | 40.7 | 2.000 | 0.063 | 0.619 | 0.980 | --- | 28.30 | 29.65* | | | 41.43* | | | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

# TABLE 7.15.2.2 (CONCLUDED)

## ALUMINUM 6061 $K_C$

| CONDITION HEAT TREAT | PRODUCT FORM | PRODUCT THICK (in.) | TEST TEMP (°F) | SPEC OR | YIELD STR (Ksi) | SPECIMEN WIDTH (in.) W | SPECIMEN THICK (in.) B | CRACK LENGTH INIT (in.) $2a_o$ | CRACK LENGTH FINAL (in.) $2a_f$ | GROSS STRESS ONSET (Ksi) $\sigma_o$ | GROSS STRESS MAX (Ksi) $\sigma_{max}$ | $K_{app}$ ($K_{si}\sqrt{in}$) | $K_{app}$ MEAN | $K_{app}$ STAN DEV | $K_C$ ($K_{si}\sqrt{in}$) | $K_C$ MEAN | $K_C$ STAN DEV | DATE | REFER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BUCKLING OF CRACK EDGES NOT RESTRAINED | | | | | | | | | | | | | | | | | | | |
| T6 | Sheet | 0.06 | R.T. | T-L | 40.8 | 15.810 | 0.062 | 6.010 | 7.000 | --- | 20.50 | 69.26* | --- | --- | 77.58* | --- | --- | 1973 | 86213 |
| | | 0.06 | | | 40.8 | 15.820 | 0.062 | 1.000 | 1.550 | --- | 37.40 | 46.99* | | | 58.71* | | | 1973 | 86213 |
| | | 0.06 | | | 40.8 | 15.810 | 0.063 | 3.010 | 4.040 | --- | 30.10 | 66.95* | | | 79.03* | | | 1973 | 86213 |
| | | 0.06 | | | 40.8 | 15.820 | 0.063 | 4.000 | --- | --- | 27.00 | 70.48* | | | --- | | | 1973 | 86213 |
| T651 | Plate | 0.25 | R.T. | L-T | 45.9 | 4.000 | 0.250 | 1.730 | 3.171 | --- | 25.80 | 48.22* | --- | --- | 101.74* | --- | --- | 1973 | 86213 |
| | | 0.25 | | | 45.9 | 4.000 | 0.251 | 1.577 | 2.956 | --- | 27.60 | 48.12* | | | 94.20* | | | 1973 | 86213 |
| T651 | Plate | 0.50 | R.T. | L-T | 44.1 | 4.000 | 0.503 | 1.600 | --- | 13.40 | 28.90 | 50.94* | --- | --- | --- | --- | --- | 1973 | 86213 |
| | | 0.50 | | | 46.8 | 4.000 | 0.504 | 1.760 | --- | 13.40 | 26.40 | 50.01* | | | --- | | | 1973 | 86213 |

* NOTE: NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STANDARD DEVIATION.

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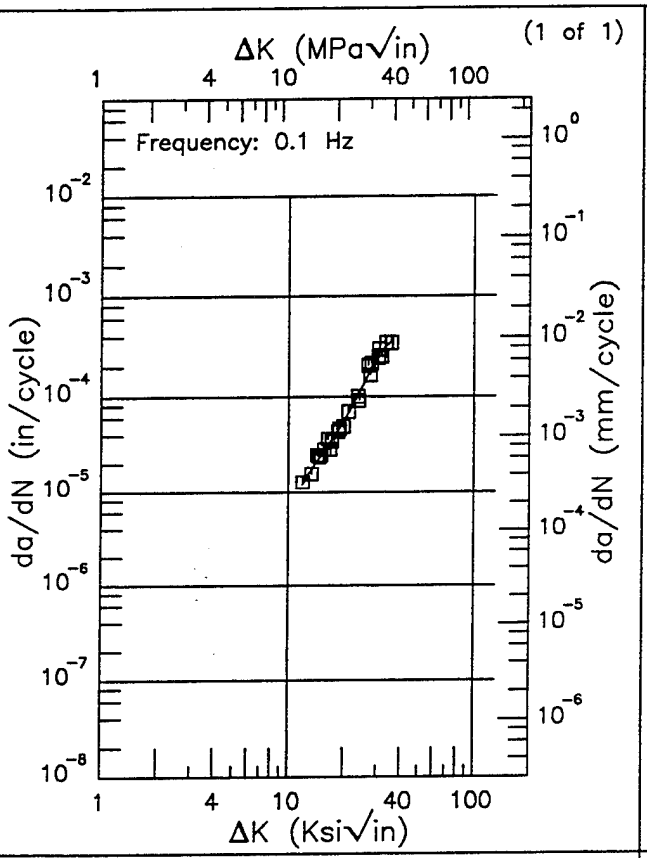
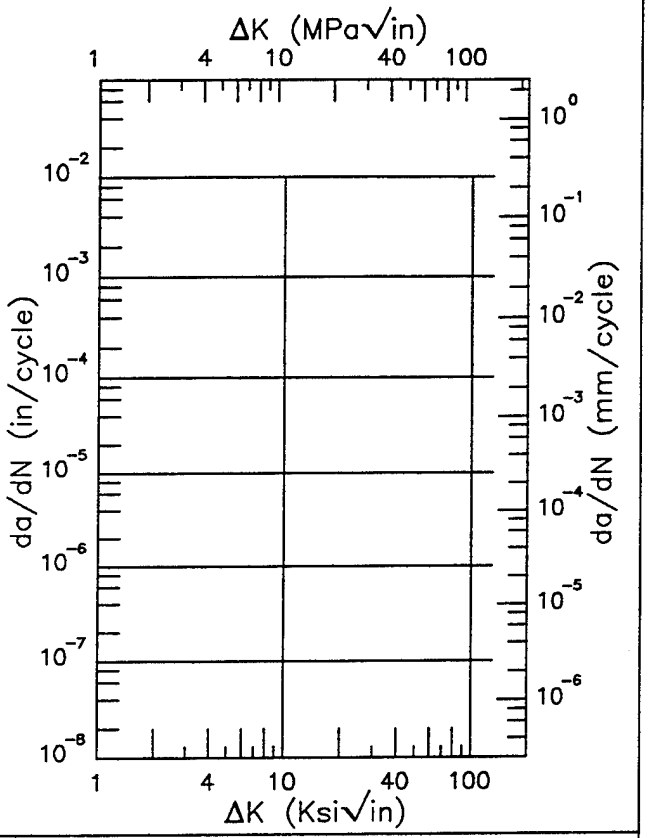
6061

F

Condition/Ht: T651
Form: 1 in. Plate
Specimen Type: NB – 3 pt
Orientation: L–T
Stress Ratio:
Environment: LAB AIR; RT

Yield Strength: 38 ksi
Ult. Strength:
Specimen Thk: 0.5 in.
Specimen Width: 2.5 in.
Ref: 81507




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 11.89 (min) | 12.1 |
| 13. | 16.0 |
| 16. | 30.0 |
| 20. | 55.5 |
| 25. | 128. |
| 30. | 262. |
| 35. | 346. |
| 35.46 (max) | 361. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 9.98 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.15.3.1**

## TABLE 7.15.3.3



## $K_{Iscc}$ SUMMARY FOR ALUMINUM ALLOY 6061

| Condition/ Heat Treat | Prod Form | Test Temp (°F) | Spec Or. | Yield Str (Ksi) | Envir. | Specimen | | | Prod Thk (in) | Crack (in) | $K_Q$ (Ksi√in) | $K_{Iscc}$ (Ksi√in) | Test Time (min) | Test Date | Refer |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Thick (in) | Design | Width (in) | | | | | | | |
| T6 | S | R.T. | S-L | --- | Aerozine 50 | 0.125 | WOL | 1.3 | 0.12 | --- | --- | 28* | --- | 1974 | 88700 |
| | | | | | Aerozine 50/1% CO2 | 0.125 | WOL | 1.3 | 0.12 | --- | --- | 19.6* | --- | 1974 | 88700 |
| | | | | | Matheson Coleman Bell 97% Hydrozine /3% H2O | 0.125 | WOL | 1.3 | 0.12 | --- | --- | 16.4* | --- | 1974 | 88700 |
| | | | | | Propellant Grade Hydrozine | 0.125 | WOL | 1.3 | 0.12 | --- | --- | 25* | --- | 1974 | 88700 |
| | | | | | Unsymmetrical Dimethyl Hydrozine | 0.125 | WOL | 1.3 | 0.12 | --- | --- | 19.7* | --- | 1974 | 88700 |
| T651 | P | R.T. | S-L | 41.6 | Industrial Atm | 1 | CT | 2 | 2.5 | --- | 21.4 | 20 | --- | 1973 | 86688 |
| | | | | | Salt-Dichromate-Acetate | 1 | CT | 2 | 2.5 | --- | 21.4 | 20 | --- | 1973 | 86688 |
| | | | | | Seacoast Atm | 1 | CT | 2 | 2.5 | --- | 21.4 | 20 | --- | 1973 | 86688 |
| T652 | F | R.T. | S-L | 35.3 | Seawater | 0.7 | CANT | 1.4 | 6 | --- | 29.6 | 26* | --- | 1972 | 82675 |
| | | | | 38.1 | Seawater | 1 | CANT | 2 | 9 | --- | 27.4 | 24 | --- | 1972 | 82675 |

* specimen thickness does not meet minimum requirements of $2.5\left(\frac{K_{Iscc}}{\sigma_{ys}}\right)^2$

## TABLE 7.16.1.2



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK A201 AT ROOM TEMPERATURE

**ORIENTATION: Unspecified** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Δ*K Level* (*Ksi*$\sqrt{in}$) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T7 | CASTING | 0.1 | 25 | | 0.31 | 2.86 | 21.26 | | |

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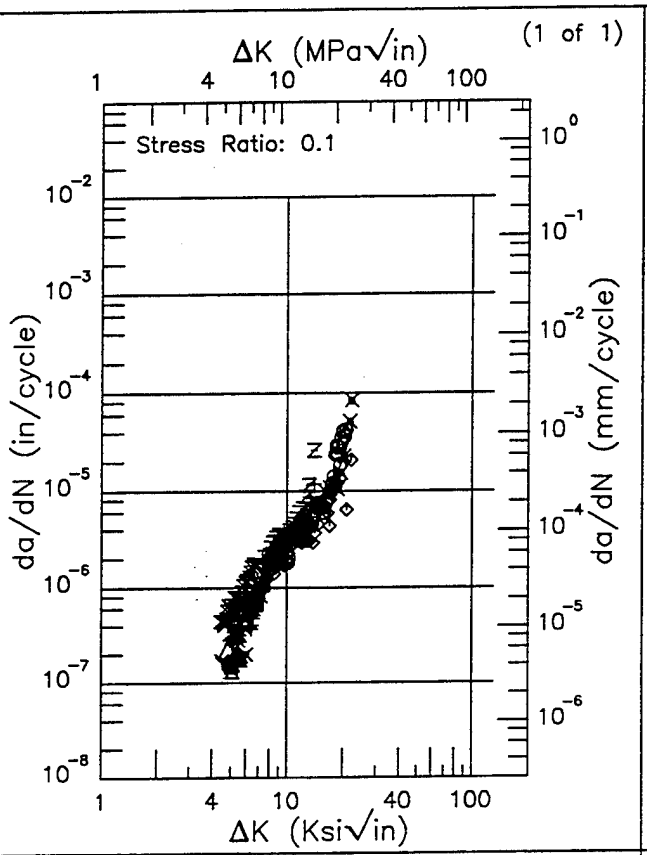
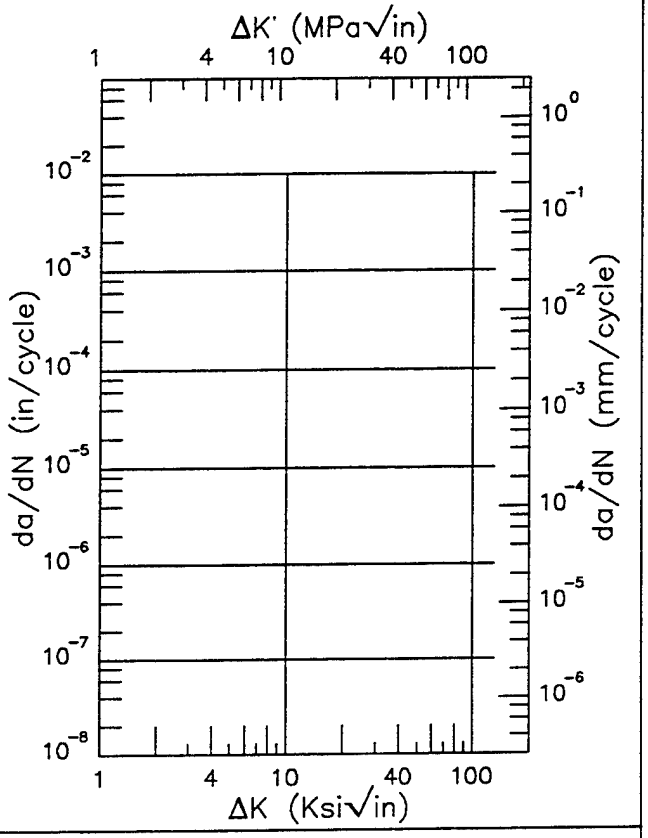
A201

R

Condition/Ht: T7
Form: Casting
Specimen Type: CT
Orientation:
Frequency: 25 Hz
Environment: LAB AIR; RT

Yield Strength: 55 ksi
Ult. Strength: 60 ksi
Specimen Thk: 0.366 – 0.374 in.
Specimen Width: 1.999 – 2.002 in.
Ref: WL007




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.42 (min) | 0.193 |
| 5. | 0.309 |
| 6. | 0.595 |
| 7. | 1.000 |
| 8. | 1.52 |
| 9. | 2.15 |
| 10. | 2.86 |
| 13. | 5.36 |
| 16. | 8.48 |
| 20. | 21.3 |
| 22.08 (max) | 43.1 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 46.17 | 0. .5 .8 1.25 2. |

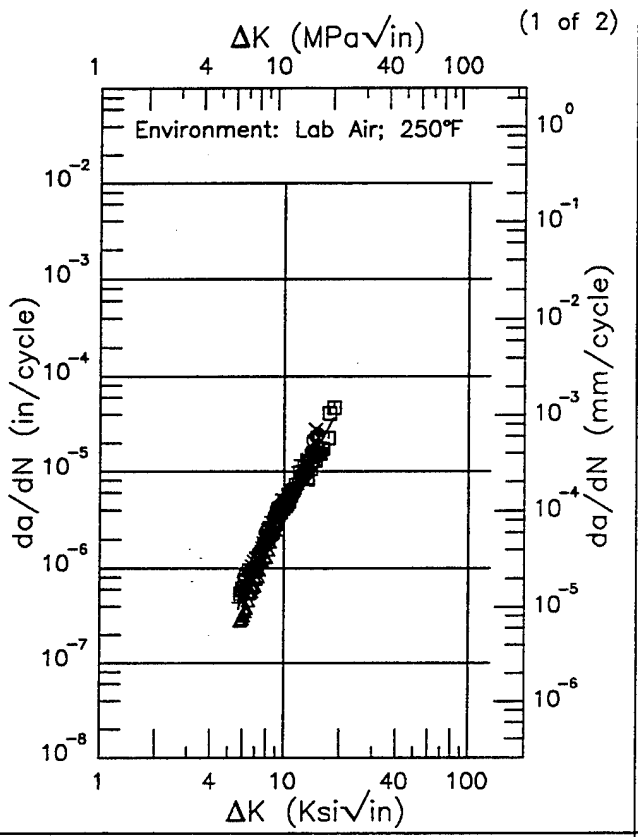
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

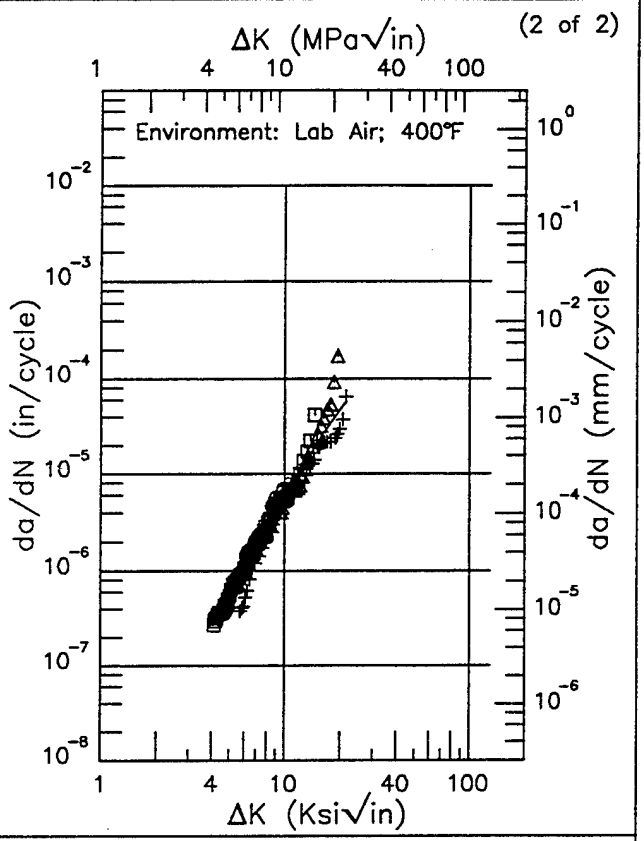
**Figure 7.16.3.1.1**

A201 E

Condition/Ht: T7
Form: Casting
Specimen Type: CT
Orientation:
Stress Ratio: 0.1
Frequency: 25 Hz

Yield Strength: 44.2 – 54.6 ksi
Ult. Strength: 47.2 – 59.1 ksi
Specimen Thk: 0.491 – 0.495 in.
Specimen Width: 1.997 – 2.053 in.
Ref: WL008




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.68 (min) | 0.375 |
| 6. | 0.508 |
| 7. | 1.09 |
| 8. | 1.95 |
| 9. | 3.08 |
| 10. | 4.51 |
| 13. | 10.8 |
| 16. | 21.8 |
| 18.50 (max) | 36.9 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.12 (min) | 0.277 |
| 5. | 0.526 |
| 6. | 0.980 |
| 7. | 1.67 |
| 8. | 2.65 |
| 9. | 3.98 |
| 10. | 5.69 |
| 13. | 13.5 |
| 16. | 25.6 |
| 20. | 48.1 |
| 21.42 (max) | 57.5 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 20.17 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 31.70 | 0. .5 .8 1.25 2. |

**Figure 7.16.3.1.2**

## TABLE 7.17.1.2



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK A357 AT ROOM TEMPERATURE

**ORIENTATION: Unspecified** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Δ*K Level* (*Ksi*$\sqrt{in}$) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| T6 | CASTING | 0.1 | 25 | | | 2.82 | 309.7 | | |
| T6; SOL. HEAT TREAT 1010F 24HRS; H2O Q AT 160F WITH 9 SEC QUENCH DELAY | CASTING | 0.2 | 25 | | | 1.09 | 158.8 | | |

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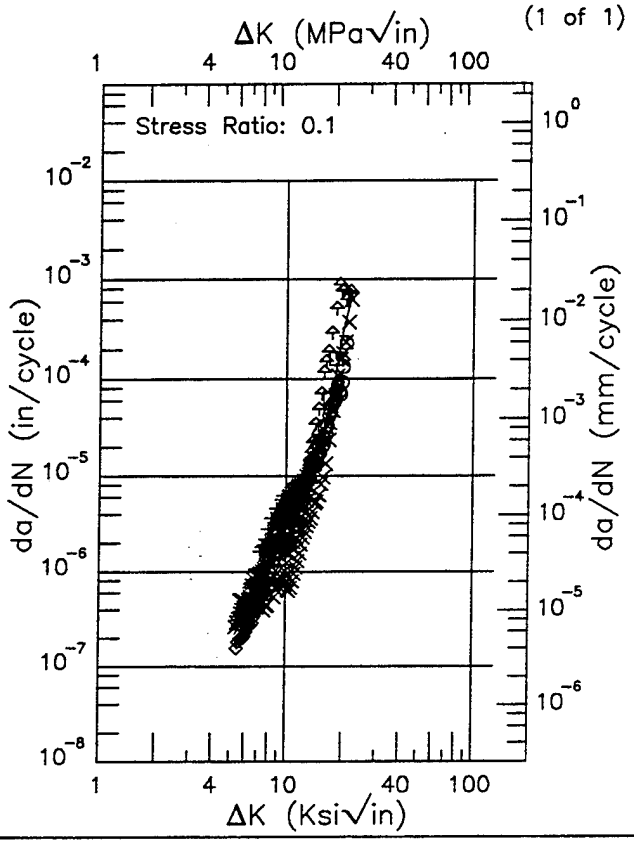
A357

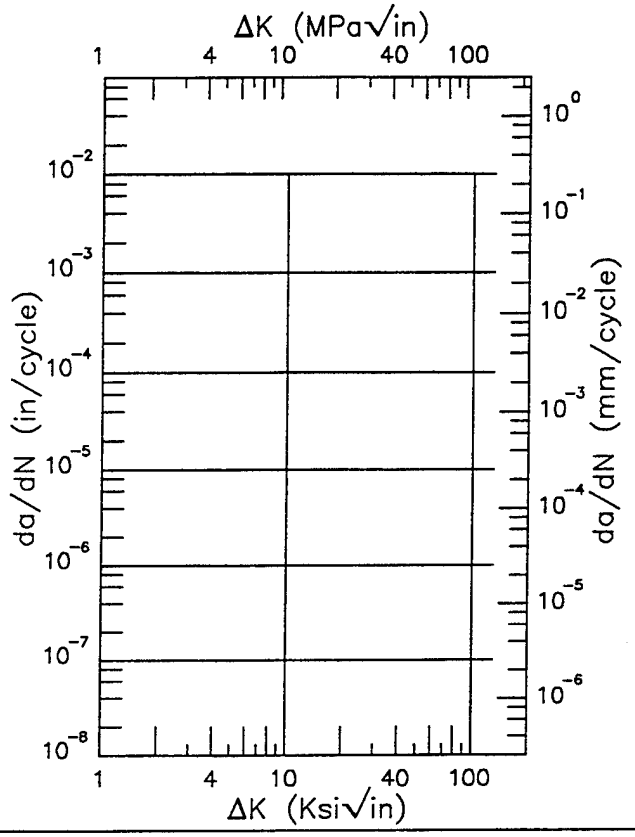
R

Condition/Ht: T6
Form: Casting
Specimen Type: CT
Orientation:
Frequency: 25 Hz
Environment: LAB AIR; RT

Yield Strength: 40 ksi
Ult. Strength: 50 ksi
Specimen Thk: 0.372 – 0.393 in.
Specimen Width: 1.997 – 2.011 in.
Ref: WL007

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.34 (min) | 0.221 |
| 6. | 0.338 |
| 7. | 0.638 |
| 8. | 1.13 |
| 9. | 1.86 |
| 10. | 2.82 |
| 13. | 8.27 |
| 16. | 30.0 |
| 20. | 310. |
| 22.02 (max) | 691. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

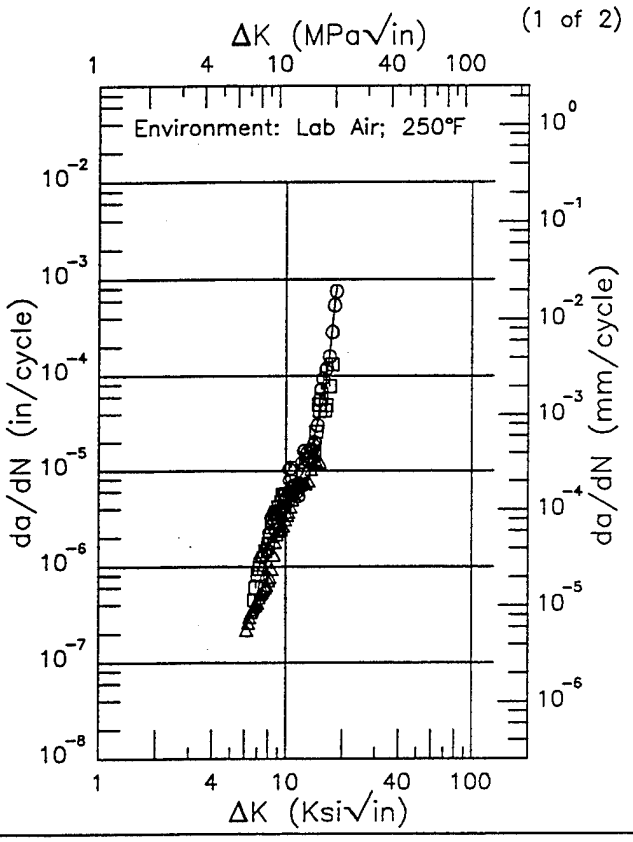
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 62.69 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.17.3.1.1**

Condition/Ht: T6
Form: Casting
Specimen Type: CT
Orientation:
Stress Ratio: 0.1
Frequency: 25 Hz

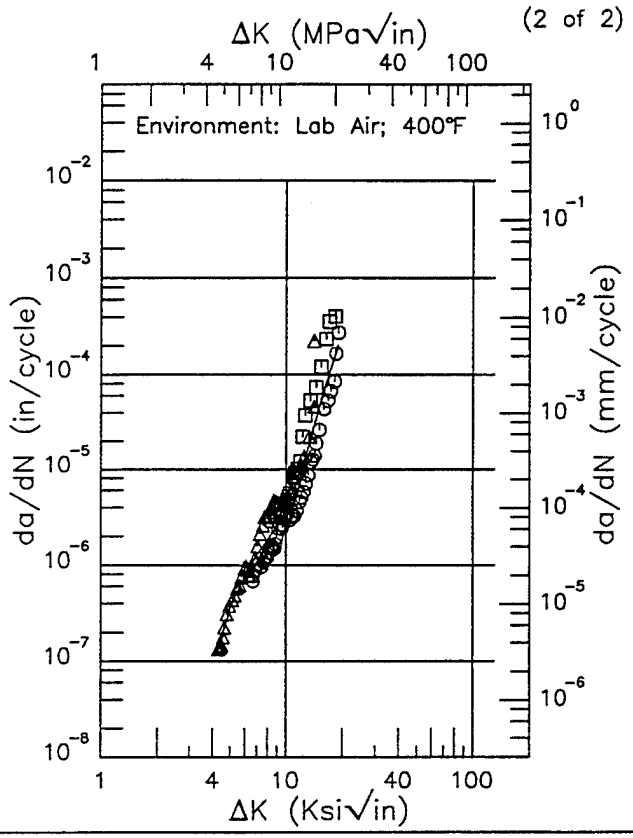
Yield Strength: 35.3 – 39.3 ksi
Ult. Strength: 35.8 – 43.3 ksi
Specimen Thk: 0.468 – 0.474 in.
Specimen Width: 2.049 – 2.052 in.
Ref: WL008




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.12 (min) | 0.245 |
| 7. | 0.533 |
| 8. | 1.51 |
| 9. | 3.30 |
| 10. | 4.85 |
| 13. | 11.7 |
| 16. | 65.2 |
| 18.40 (max) | 756. |

| RMS % Error |
|---|
| 32.54 |

Life Prediction Ratio Summary
0. .5 .8 1.25 2.




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.27 (min) | 0.128 |
| 5. | 0.356 |
| 6. | 0.787 |
| 7. | 1.27 |
| 8. | 1.84 |
| 9. | 2.61 |
| 10. | 3.80 |
| 13. | 15.6 |
| 16. | 68.1 |
| 19.00 (max) | 203. |

| RMS % Error |
|---|
| 84.69 |

Life Prediction Ratio Summary
0. .5 .8 1.25 2.

**Figure 7.17.3.1.2**

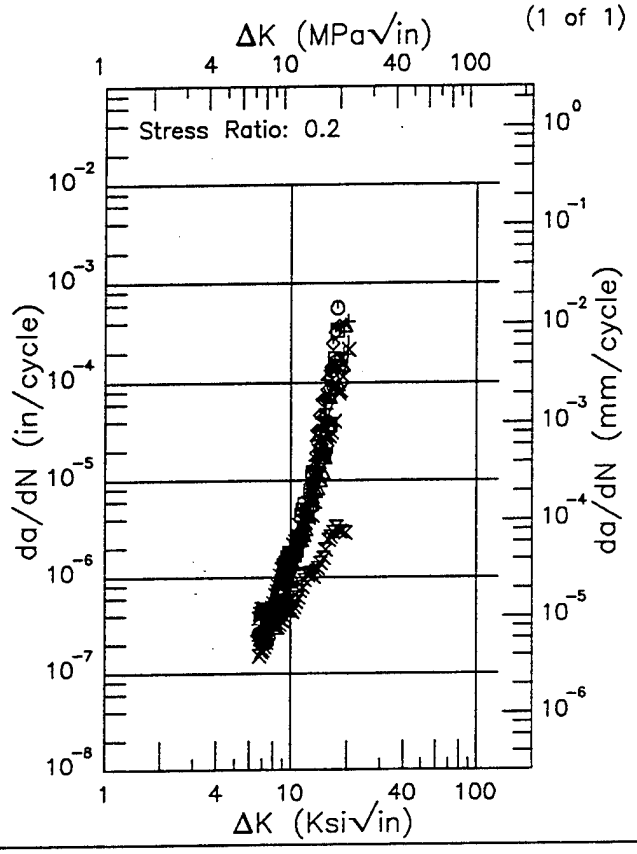
A357

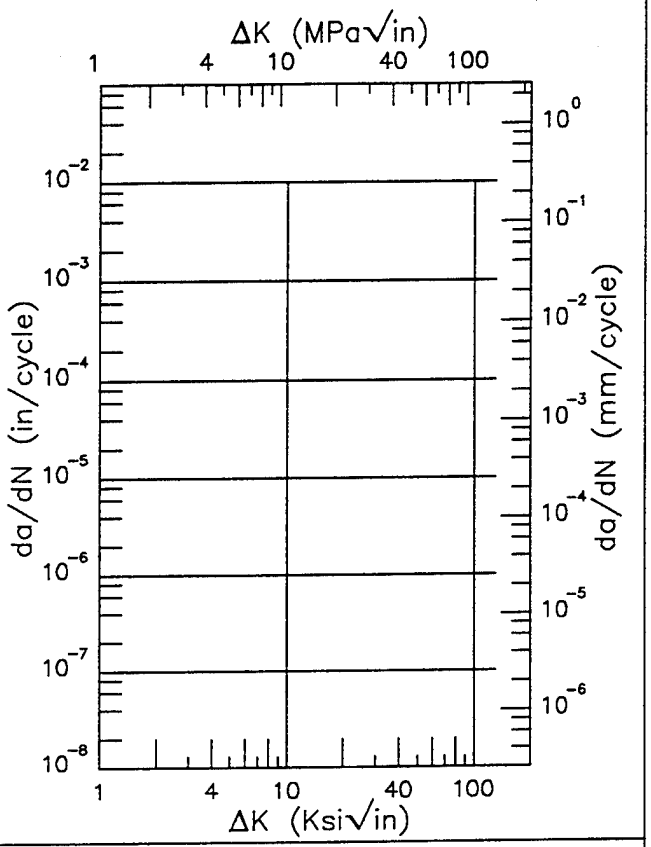
R

Condition/Ht: T6; SOL. HEAT TREAT 1010F 24HRS;
H2O Q AT 160F WITH 9 SEC QUENCH DELAY

Form: Casting
Specimen Type: CT
Orientation:
Frequency: 25 Hz
Environment: LAB AIR; RT

Yield Strength: 42.1 – 45.7 ksi
Ult. Strength: 47.6 – 51.2 ksi
Specimen Thk: 0.12 – 0.122 in.
Specimen Width: 1.991 – 2.001 in.
Ref: WL006




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 6.62 (min) | 0.248 |
| 7. | 0.257 |
| 8. | 0.372 |
| 9. | 0.640 |
| 10. | 1.09 |
| 13. | 5.59 |
| 16. | 49.1 |
| 20. | 159. |
| 20.32 (max) | 295. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 74.86 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.17.3.1.3**

## TABLE 7.18.1.2.1

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK AL905XL AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level ($Ksi\sqrt{in}$) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| Unspecified | FORGING | 0.1 | 10 | 0.3 | 2.68 | | | | |
| | | 0.1 | 25 | 0.85 | 4.15 | | | | |
| | | 0.1 | 30 | 0.33 | 4.46 | | | | |
| | | 0.1 | | | | 11.1 | 49.74 | | |

## TABLE 7.18.1.2.2



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK AL905XL AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level ($Ksi\sqrt{in}$) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| Unspecified | FORGING | 0.1 | 10 | 0.28 | 3.05 | | | | |
| | | 0.1 | 30 | 0.34 | 2.56 | | | | |
| | | 0.1 | | | 0.98 | 8.07 | 43.62 | | |
| | | 0.33 | | | 3.15 | 19.17 | | | |

## TABLE 7.18.1.2.3

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK AL905XL AT ROOM TEMPERATURE

**ORIENTATION: S-T** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* ($Ksi\sqrt{in}$) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| Unspecified | FORGING | 0.1 | 10 | 0.31 | 2.96 | | | | |
| | | 0.1 | 25 | 0.52 | 3.86 | 11.25 | | | |
| | | 0.1 | 30 | | 4.86 | | | | |
| | | 0.1 | | | 0.07 | 0.05 | 103.53 | | |
| | | 0.33 | | | 1.28 | 7.64 | | | |

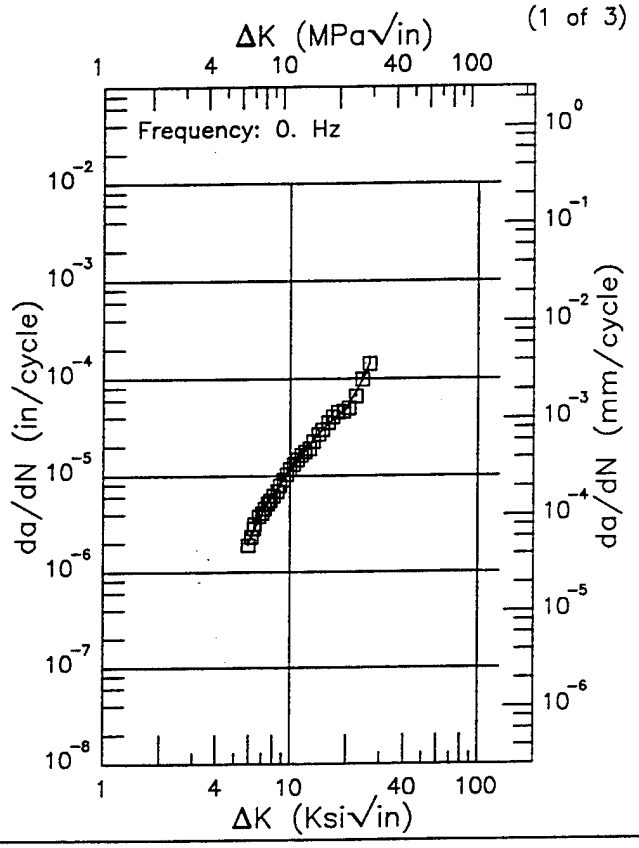
## AL905XL

F

Condition/Ht:
Form: Forging
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.1
Environment: LAB AIR; RT

Yield Strength: 60 – 60.3 ksi
Ult. Strength: 71.9 – 72.7 ksi
Specimen Thk: 0.25 in.
Specimen Width: 1.597 – 1.602 in.
Ref: WL002

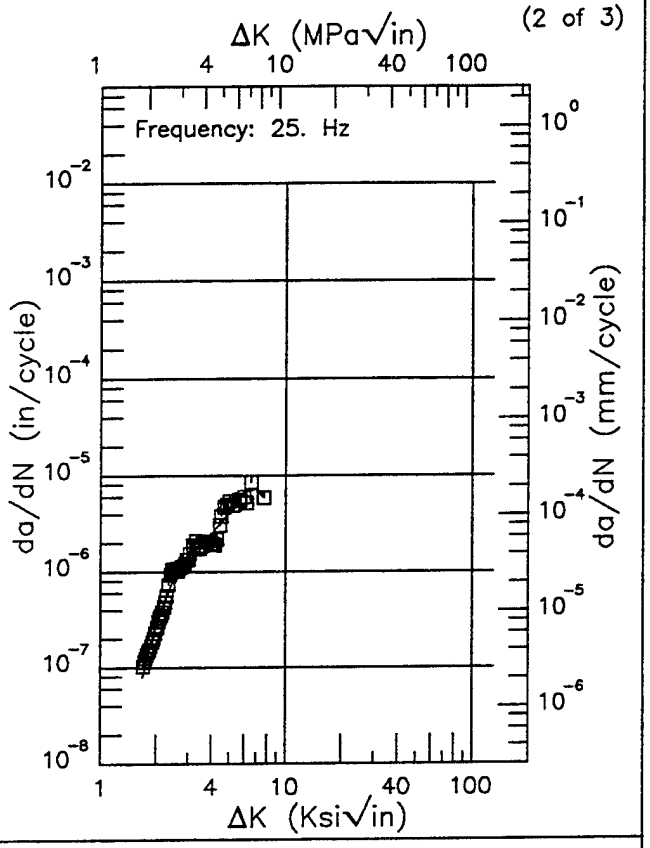
(1 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.91 (min) | 1.98 |
| 6. | 2.13 |
| 7. | 4.03 |
| 8. | 6.19 |
| 9. | 8.52 |
| 10. | 11.1 |
| 13. | 21.9 |
| 16. | 34.9 |
| 20. | 49.7 |
| 25. | 110. |
| 26.27 (max) | 142. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 4.84 | 0. .5 .8 1.25 2. |

(2 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 1.70 (min) | 0.0792 |
| 2. | 0.282 |
| 2.5 | 0.845 |
| 3. | 1.41 |
| 3.5 | 1.90 |
| 4. | 2.42 |
| 5. | 4.15 |
| 6. | 6.72 |
| 7. | 7.32 |
| 7.64 (max) | 5.96 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 16.27 | 0. .5 .8 1.25 2. |

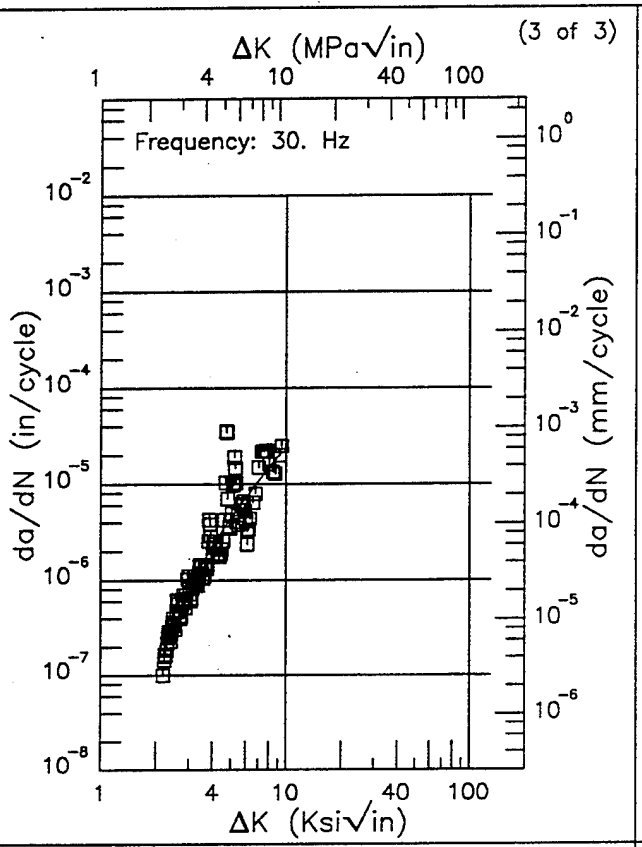
**Figure 7.18.3.1.1**

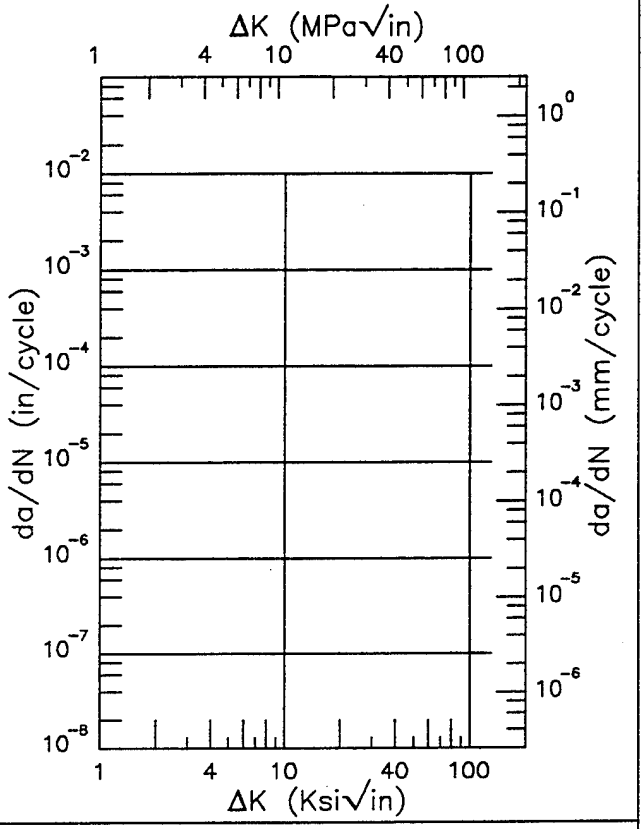
AL905XL F

Condition/Ht:
Form: Forging
Specimen Type: CT
Orientation: L–T
Stress Ratio: 0.1
Environment: LAB AIR; RT

Yield Strength: 60 – 60.3 ksi
Ult. Strength: 71.9 – 72.7 ksi
Specimen Thk: 0.25 in.
Specimen Width: 1.597 – 1.602 in.
Ref: WL002

(3 of 3)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.19 (min) | 0.165 |
| 2.5 | 0.330 |
| 3. | 0.762 |
| 3.5 | 1.40 |
| 4. | 2.25 |
| 5. | 4.46 |
| 6. | 7.27 |
| 7. | 10.7 |
| 8. | 14.6 |
| 9. | 19.3 |
| 9.44 (max) | 21.7 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| >100.0 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

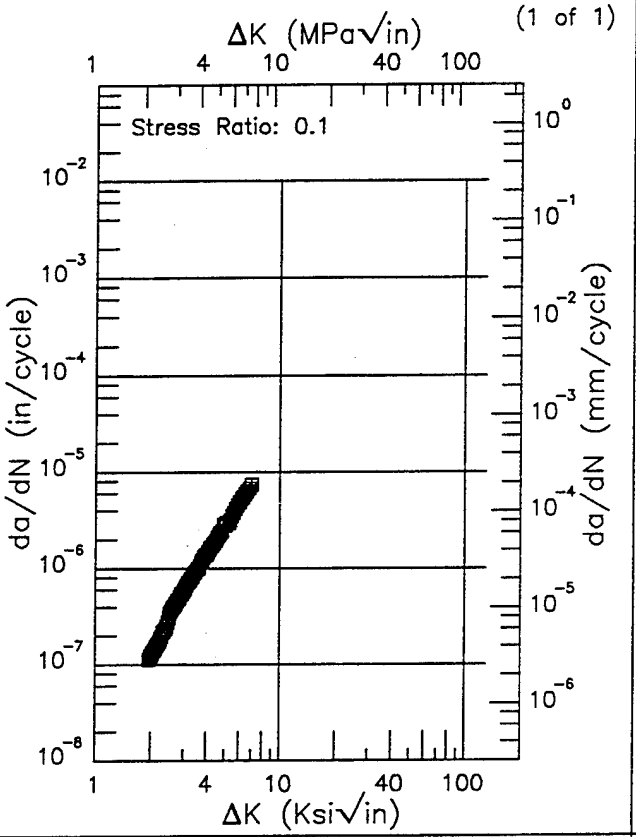
**Figure 7.18.3.1.1 (Concluded)**

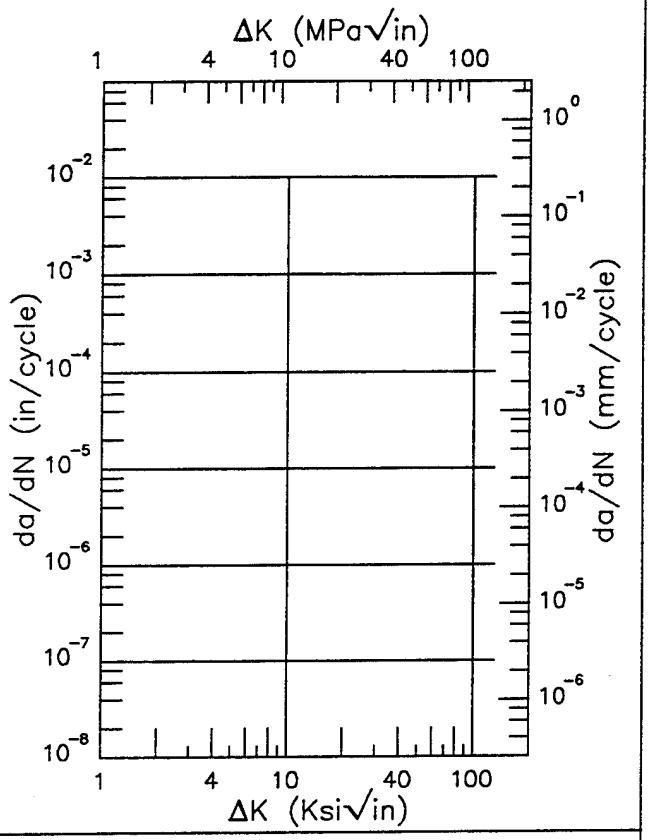
AL905XL

R

Condition/Ht:
Form: Forging
Specimen Type: CT
Orientation: L–T
Frequency: 10 Hz
Environment: LAB AIR; RT

Yield Strength: 60.1 ksi
Ult. Strength: 73.7 ksi
Specimen Thk: 0.25 in.
Specimen Width: 1.5 in.
Ref: WL002




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 1.94 (min) | 0.105 |
| 2. | 0.120 |
| 2.5 | 0.300 |
| 3. | 0.590 |
| 3.5 | 0.967 |
| 4. | 1.42 |
| 5. | 2.68 |
| 6. | 4.69 |
| 6.99 (max) | 7.23 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

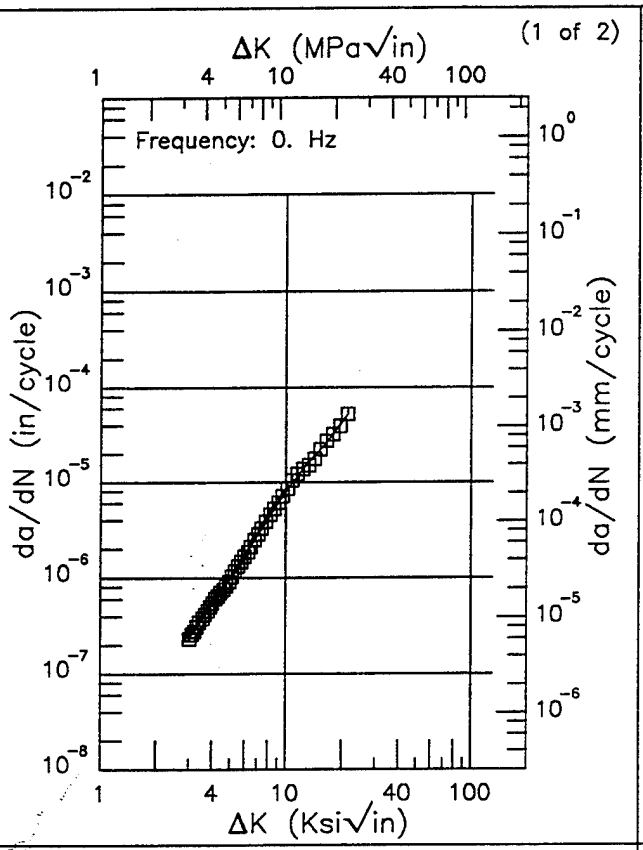
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 3.59 | 0. .5 .8 1.25 2. |

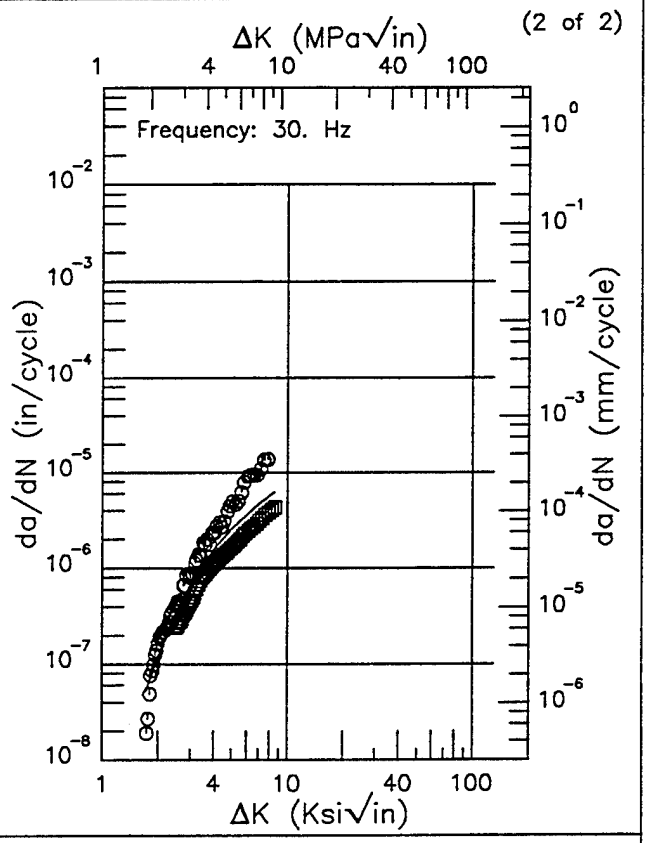
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.18.3.1.2**

Condition/Ht:
Form: Forging
Specimen Type: CT
Orientation: T-L
Stress Ratio: 0.1
Environment: LAB AIR; RT

Yield Strength: 66 - 70.1 ksi
Ult. Strength: 75.2 - 77.7 ksi
Specimen Thk: 0.249 - 0.251 in.
Specimen Width: 1.598 - 1.602 in.
Ref: WL002




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.00 (min) | 0.237 |
| 3. | 0.237 |
| 3.5 | 0.359 |
| 4. | 0.520 |
| 5. | 0.982 |
| 6. | 1.68 |
| 7. | 2.69 |
| 8. | 4.08 |
| 9. | 5.89 |
| 10. | 8.07 |
| 13. | 15.6 |
| 16. | 24.2 |
| 20. | 43.6 |
| 21.21 (max) | 51.1 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 1.73 (min) | 0.0523 |
| 2. | 0.119 |
| 2.5 | 0.339 |
| 3. | 0.674 |
| 3.5 | 1.09 |
| 4. | 1.56 |
| 5. | 2.56 |
| 6. | 3.58 |
| 7. | 4.61 |
| 8. | 5.66 |
| 8.51 (max) | 6.22 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 2.90 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 53.88 | 0. .5 .8 1.25 2. |

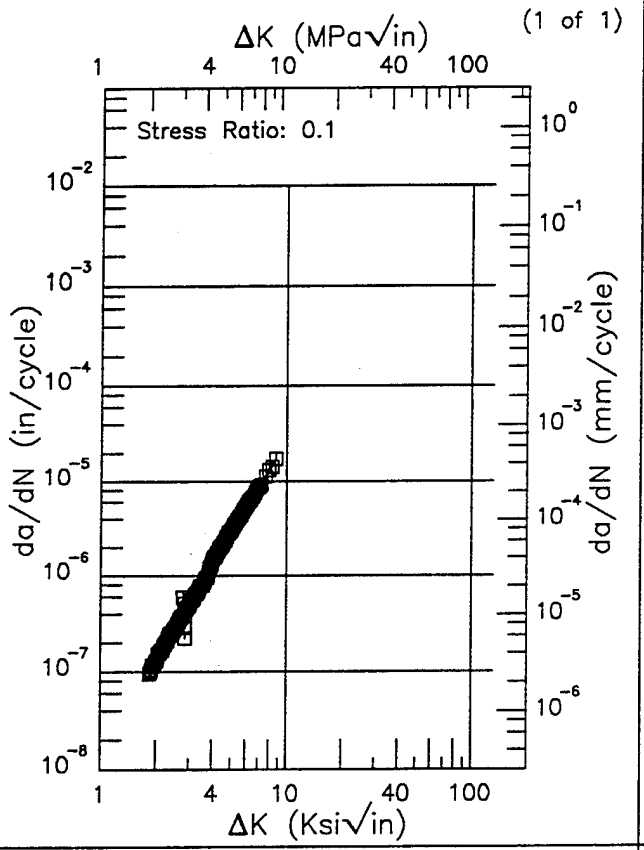
**Figure 7.18.3.1.3**

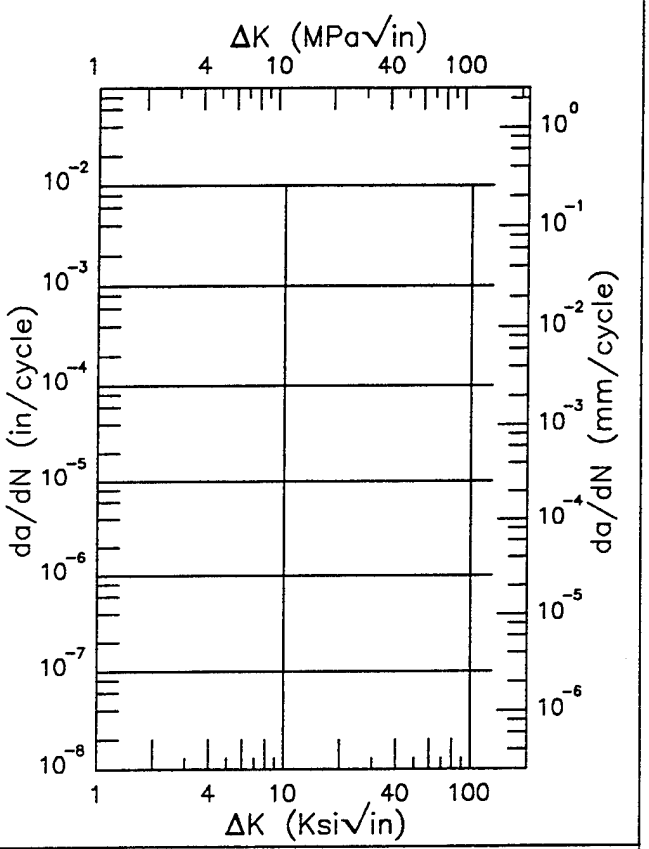
AL905XL

R

Condition/Ht:
Form: Forging
Specimen Type: CT
Orientation: T–L
Frequency: 10 Hz
Environment: LAB AIR; RT

Yield Strength: 66.9 ksi
Ult. Strength: 76.1 ksi
Specimen Thk: 0.25 in.
Specimen Width: 1.5 in.
Ref: WL002




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 1.84 (min) | 0.0968 |
| 2. | 0.132 |
| 2.5 | 0.277 |
| 3. | 0.488 |
| 3.5 | 0.813 |
| 4. | 1.33 |
| 5. | 3.05 |
| 6. | 5.35 |
| 7. | 8.32 |
| 8. | 12.8 |
| 8.69 (max) | 16.8 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 7.07 | 0. .5 .8 1.25 2. |

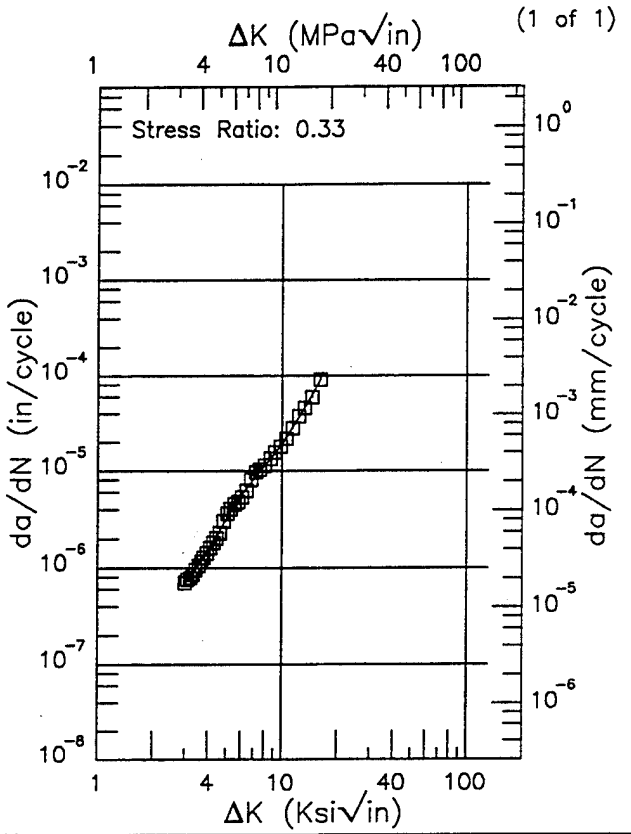
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

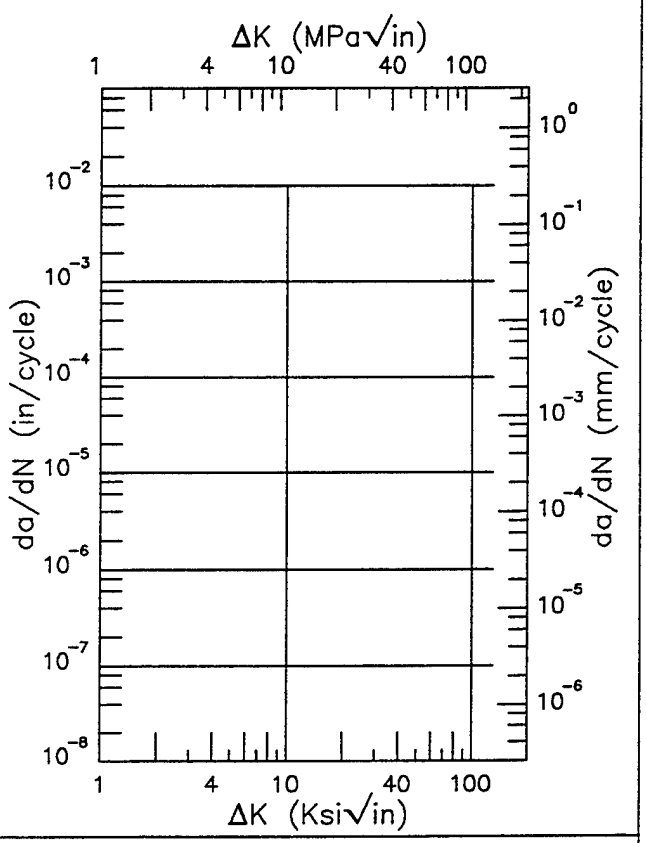
**Figure 7.18.3.1.4**

AL905XL R

Condition/Ht:
Form: Forging
Specimen Type: CT
Orientation: T–L
Frequency:
Environment: LAB AIR; RT

Yield Strength: 66 ksi
Ult. Strength: 75.2 ksi
Specimen Thk: 0.25 in.
Specimen Width: 1.6 in.
Ref: WL002




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.98 (min) | 0.692 |
| 3. | 0.699 |
| 3.5 | 1.00 |
| 4. | 1.49 |
| 5. | 3.15 |
| 6. | 5.60 |
| 7. | 8.32 |
| 8. | 11.2 |
| 9. | 14.6 |
| 10. | 19.2 |
| 13. | 42.5 |
| 16. | 88.6 |
| 16.06 (max) | 89.9 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 4.32 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

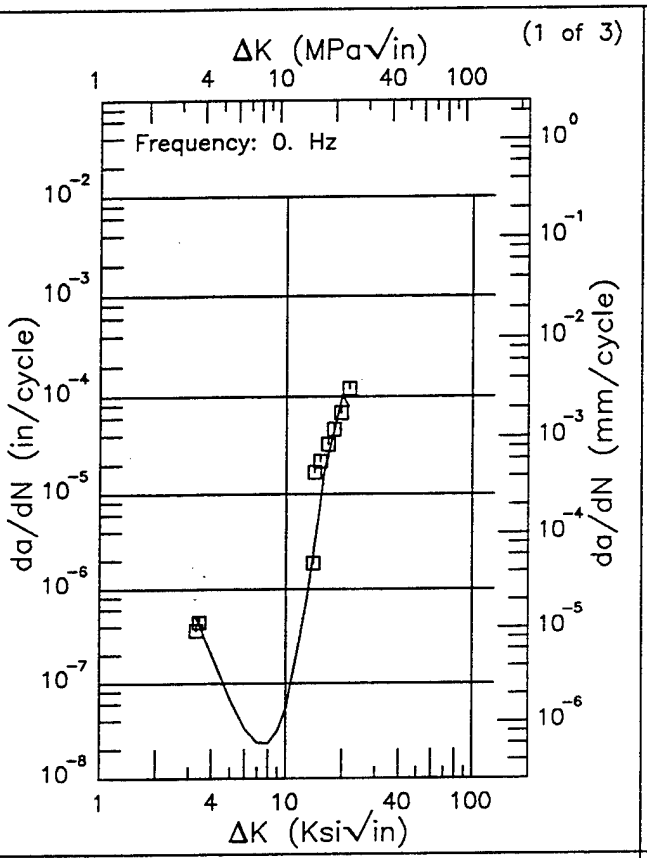
**Figure 7.18.3.1.5**

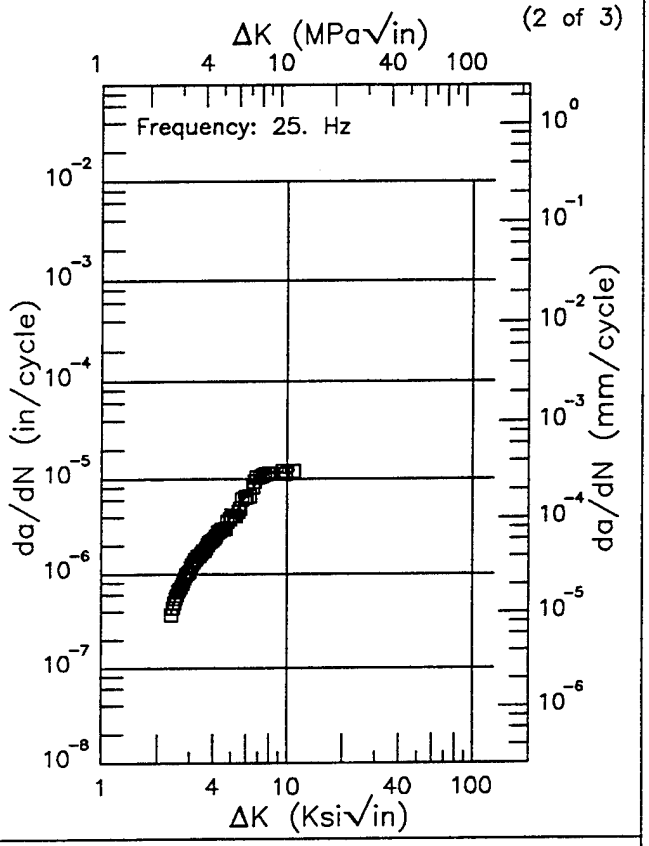
AL905XL

F

Condition/Ht:
Form: Forging
Specimen Type: CT
Orientation: S-T
Stress Ratio: 0.1
Environment: LAB AIR; RT

Yield Strength: 59.2 - 59.7 ksi
Ult. Strength: 71.2 - 72.5 ksi
Specimen Thk: 0.25 - 0.251 in.
Specimen Width: 1.598 - 1.602 in.
Ref: WL002




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.28 (min) | 0.516 |
| 3.5 | 0.392 |
| 4. | 0.206 |
| 5. | 0.0683 |
| 6. | 0.0330 |
| 7. | 0.0234 |
| 8. | 0.0234 |
| 9. | 0.0313 |
| 10. | 0.0534 |
| 13. | 0.794 |
| 16. | 17.3 |
| 20. | 104. |
| 21.66 (max) | 79.3 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.38 (min) | 0.388 |
| 2.5 | 0.519 |
| 3. | 1.14 |
| 3.5 | 1.72 |
| 4. | 2.27 |
| 5. | 3.86 |
| 6. | 6.48 |
| 7. | 9.46 |
| 8. | 11.6 |
| 9. | 11.8 |
| 10. | 11.2 |
| 10.77 (max) | 11.8 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| >100.0 | 0. .5 .8 1.25 2. |

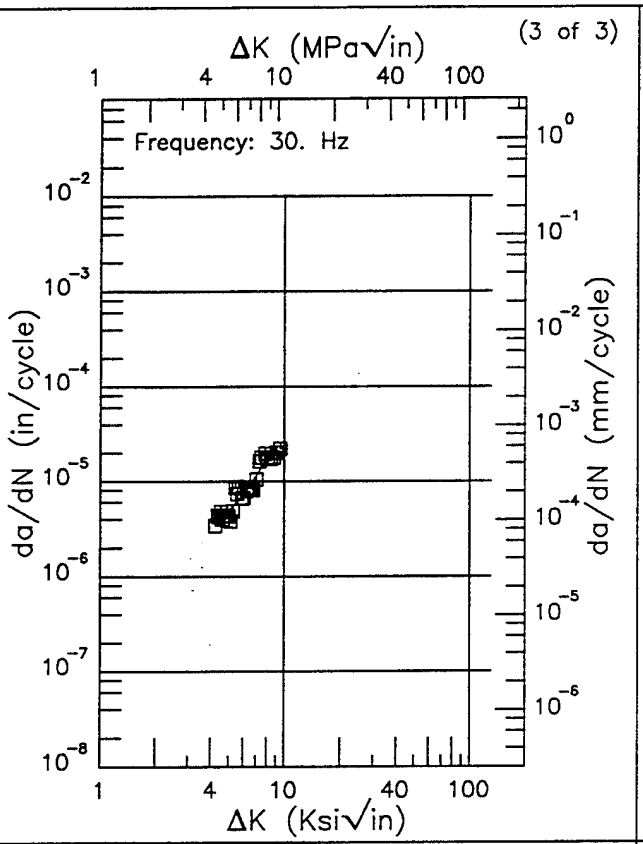
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 4.62 | 0. .5 .8 1.25 2. |

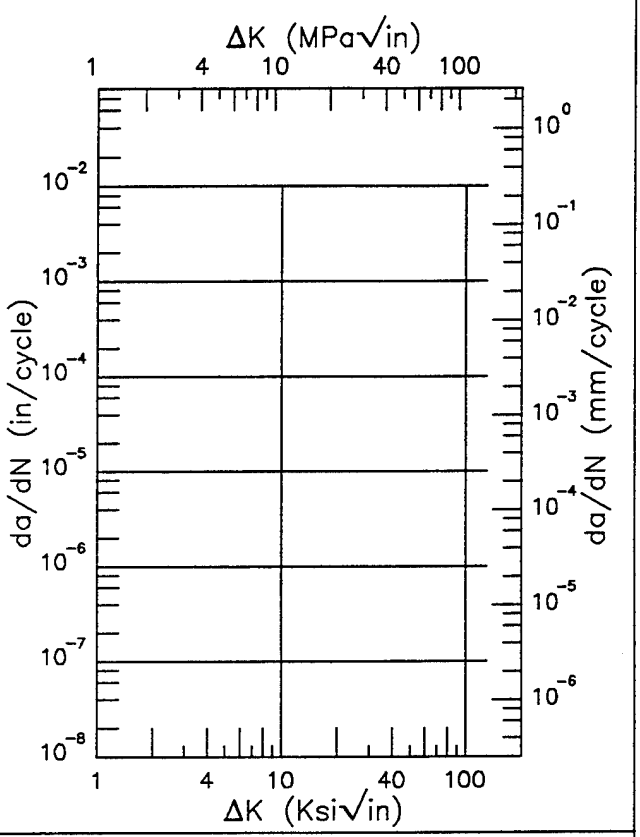
**Figure 7.18.3.1.6**

AL905XL F

Condition/Ht:
Form: Forging
Specimen Type: CT
Orientation: S–T
Stress Ratio: 0.1
Environment: LAB AIR; RT

Yield Strength: 59.2 – 59.7 ksi
Ult. Strength: 71.2 – 72.5 ksi
Specimen Thk: 0.25 – 0.251 in.
Specimen Width: 1.598 – 1.602 in.
Ref: WL002




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 4.22 (min) | 3.74 |
| 5. | 4.86 |
| 6. | 7.22 |
| 7. | 11.4 |
| 8. | 17.2 |
| 9. | 20.3 |
| 9.49 (max) | 19.3 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 16.99 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

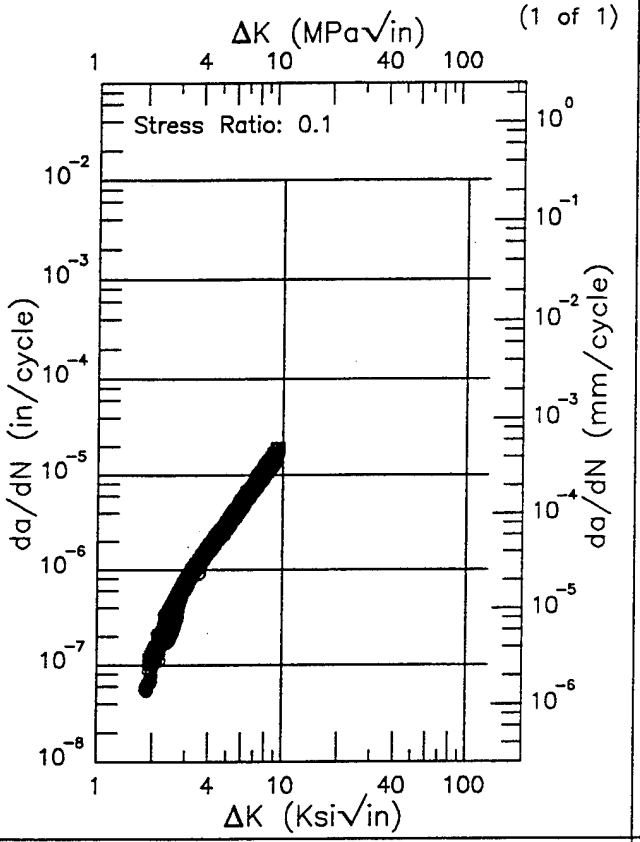
**Figure 7.18.3.1.6 (Concluded)**

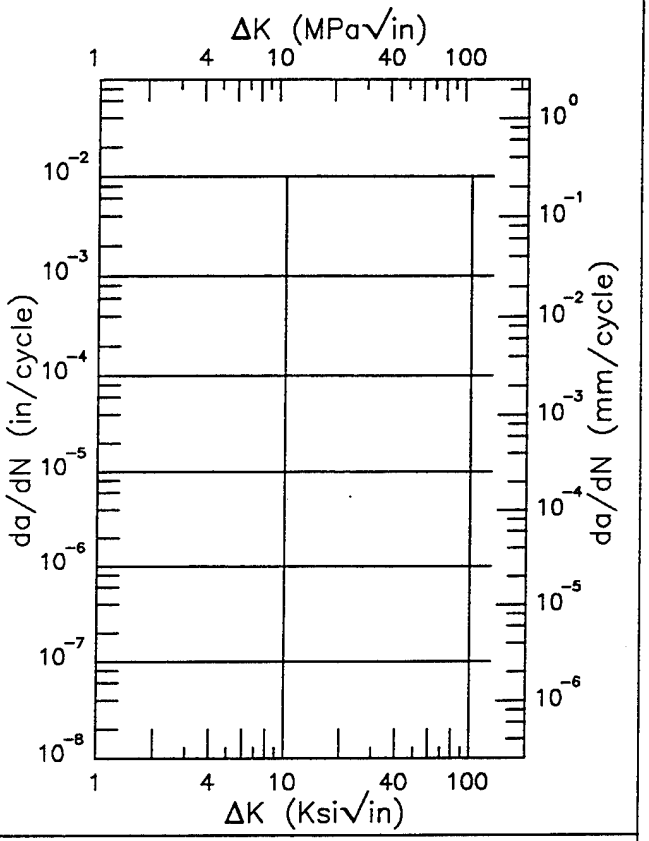
AL905XL

R

Condition/Ht:
Form: Forging
Specimen Type: CT
Orientation: S-T
Frequency: 10 Hz
Environment: LAB AIR; RT

Yield Strength: 58.3 ksi
Ult. Strength: 71.7 ksi
Specimen Thk: 0.25 in.
Specimen Width: 1.5 in.
Ref: WL002




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 1.84 (min) | 0.0605 |
| 2. | 0.101 |
| 2.5 | 0.313 |
| 3. | 0.650 |
| 3.5 | 1.09 |
| 4. | 1.62 |
| 5. | 2.96 |
| 6. | 4.80 |
| 7. | 7.35 |
| 8. | 10.7 |
| 9. | 15.1 |
| 9.37 (max) | 17.0 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 14.37 | 0. .5 .8 1.25 2. |

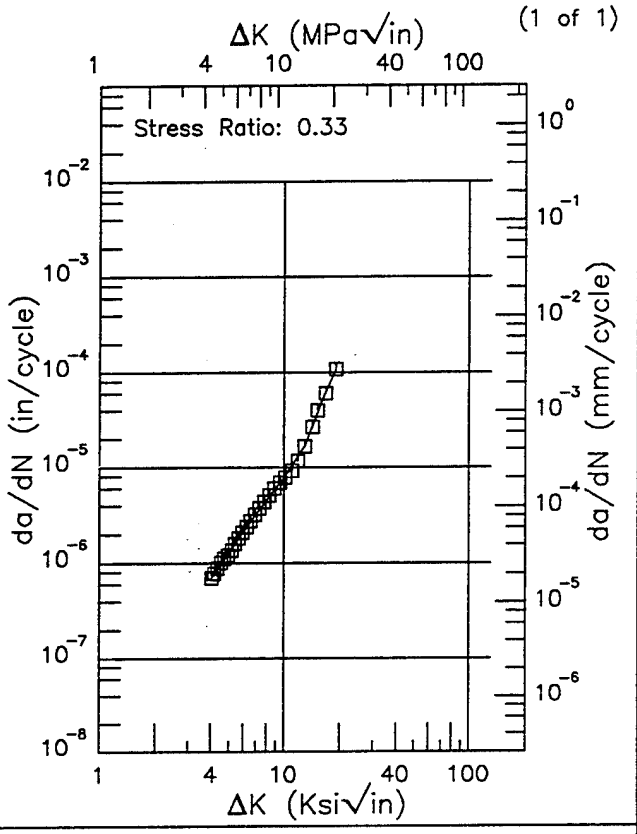
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

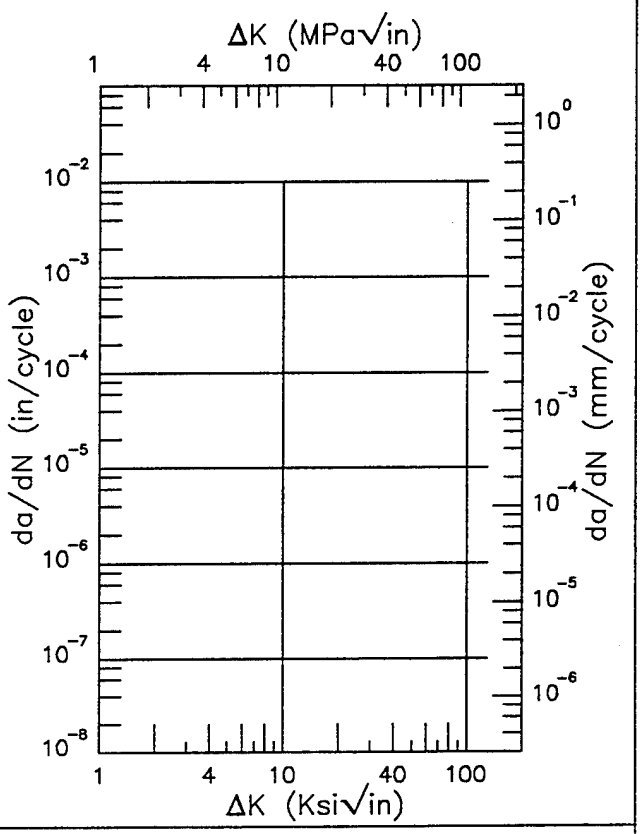
**Figure 7.18.3.1.7**

AL905XL R

Condition/Ht:
Form: Forging
Specimen Type: CT
Orientation: S-T
Frequency:
Environment: LAB AIR; RT

Yield Strength: 59.7 ksi
Ult. Strength: 71.2 ksi
Specimen Thk: 0.25 in.
Specimen Width: 1.6 in.
Ref: WL002




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 4.02 (min) | 0.703 |
| 5. | 1.28 |
| 6. | 2.13 |
| 7. | 3.23 |
| 8. | 4.54 |
| 9. | 6.01 |
| 10. | 7.64 |
| 13. | 17.0 |
| 16. | 50.5 |
| 18.83 (max) | 105. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 3.39 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.18.3.1.8**

## TABLE 7.19.1.2.1



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK IN905XL AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: H.H.A.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* ($Ksi\sqrt{in}$) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| Unspecified | FORGING | 0.1 | | 0.24 | 1.98 | 13.07 | | | |

## TABLE 7.19.1.2.2

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK IN905XL AT ROOM TEMPERATURE

**ORIENTATION: L-T** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* ($Ksi\sqrt{in}$) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| 850F 2HRS; 665F 2HRS; WARM H20 Q; 230F 24HRS | FORGING | 0.1 | 3 | | | | 82.03 | | |
| | | 0.1 | 3 | | | 11.9 | | | |
| Unspecified | FORGING | 0.02 | 1-15 | | 3.54 | 22 | 268.45 | | |
| | | 0.02 | 1-20 | 0.32 | 1.33 | 11.21 | | | |

## TABLE 7.19.1.2.3



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK IN905XL AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: H.H.A.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | FCGR ($10^{-6}$ in/cycle) ΔK Level ($Ksi\sqrt{in}$) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| Unspecified | FORGING | 0.1 | | 0.25 | 1.53 | | | | |

## TABLE 7.19.1.2.4

## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK IN905XL AT ROOM TEMPERATURE

**ORIENTATION: T-L** **ENVIRONMENT: Lab Air**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | $\Delta K$ *Level* ($Ksi\sqrt{in}$) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| 850F 2HRS; 665F 2HRS; WARM H20 Q; 230F 24HRS | FORGING | 0.1 | 6 | | 3.69 | | | | |
| | | 0.1 | 6 | | | 17.71 | 171.44 | | |
| Unspecified | FORGING | 0.02 | 0.1-20 | 1.24 | 18.92 | | | | |
| | | 0.02 | 0.1-25 | 0.07 | 1.68 | 14.82 | 149.84 | | |

## TABLE 7.19.1.2.5



## FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF STRESS INTENSITY FACTOR ΔK IN905XL AT ROOM TEMPERATURE

**ORIENTATION: S-L** **ENVIRONMENT: H.H.A.**

| CONDITION/ HEAT TREATMENT | PRODUCT FORM | R | FREQ (Hz) | *FCGR* ($10^{-6}$ *in/cycle*) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *ΔK Level* ($Ksi\sqrt{in}$) | | | | | |
| | | | | 2.5 | 5.0 | 10.0 | 20.0 | 50.0 | 100.0 |
| Unspecified | FORGING | 0.1 | | | 0.75 | 13.61 | 87.78 | | |

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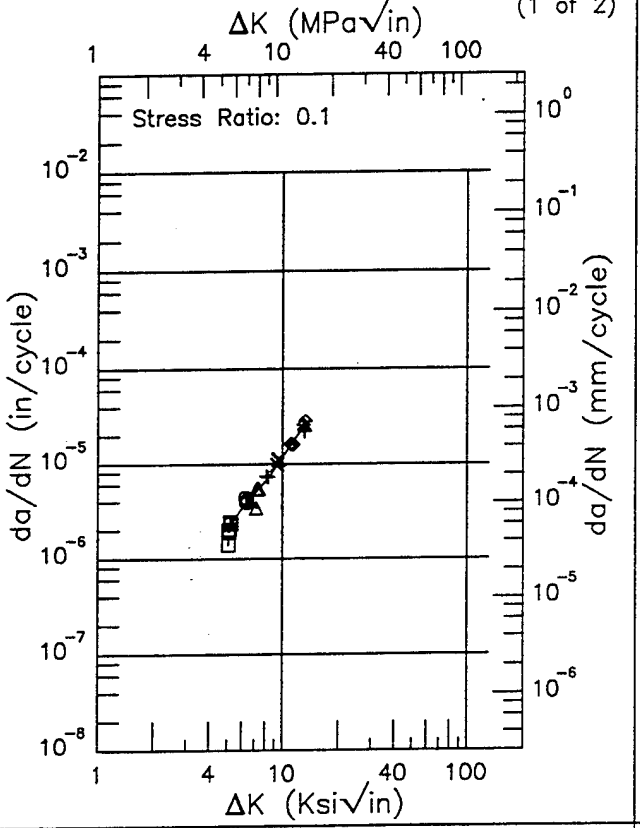
## IN905XL

R

Condition/Ht: 850F 2HRS; 665F 2HRS; WARM H20 Q; 230F 24HRS
Form: Forging
Specimen Type: CT
Orientation: L–T
Frequency: 3 Hz
Environment: LAB AIR; RT

Yield Strength: 57.7 ksi
Ult. Strength: 69.6 ksi
Specimen Thk: 0.444 in.
Specimen Width: 2.553 in.
Ref: WL002

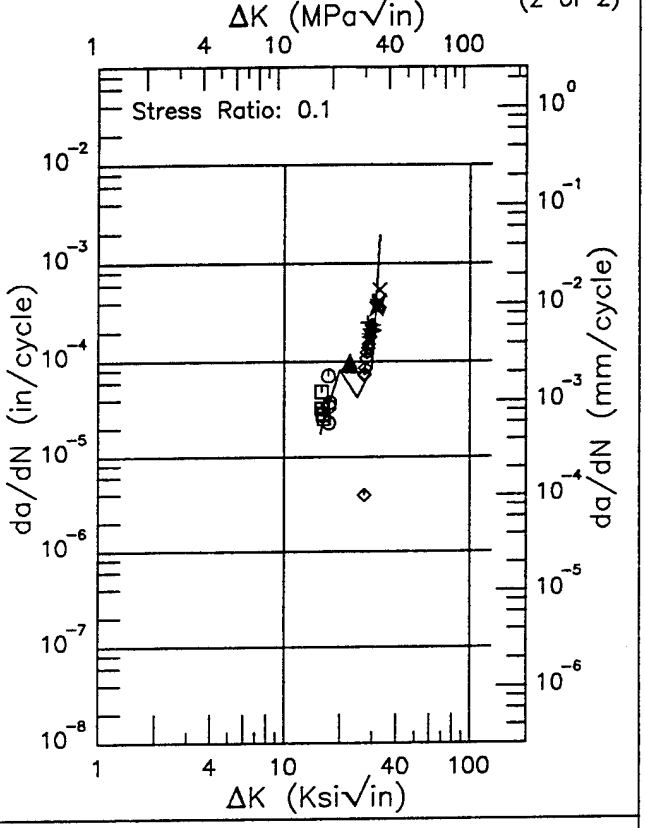
(1 of 2)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 5.05 (min) | 2.03 |
| 6. | 3.38 |
| 7. | 4.85 |
| 8. | 6.55 |
| 9. | 8.78 |
| 10. | 11.9 |
| 13. | 25.1 |
| 13.14 (max) | 25.7 |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 9.98 | 0. .5 .8 1.25 2. |

(2 of 2)

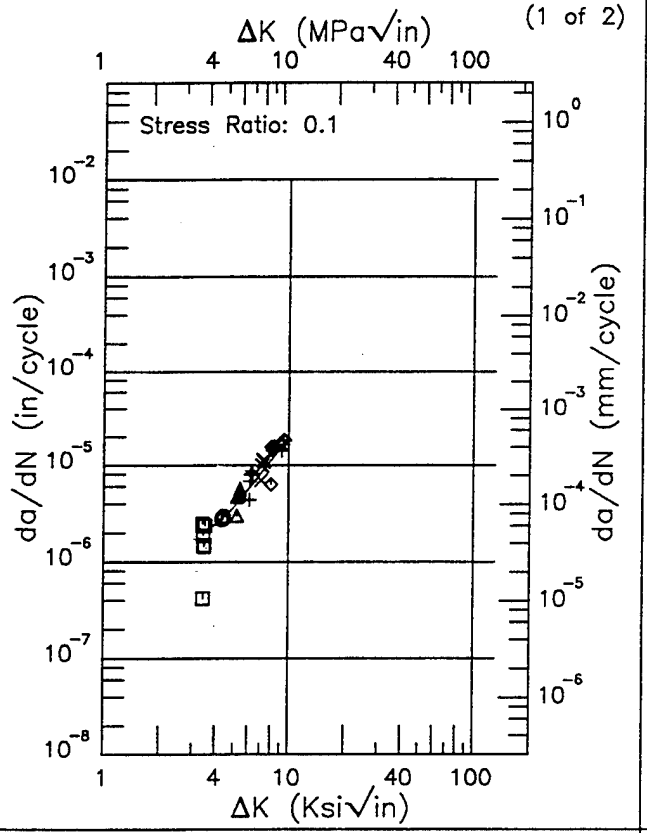


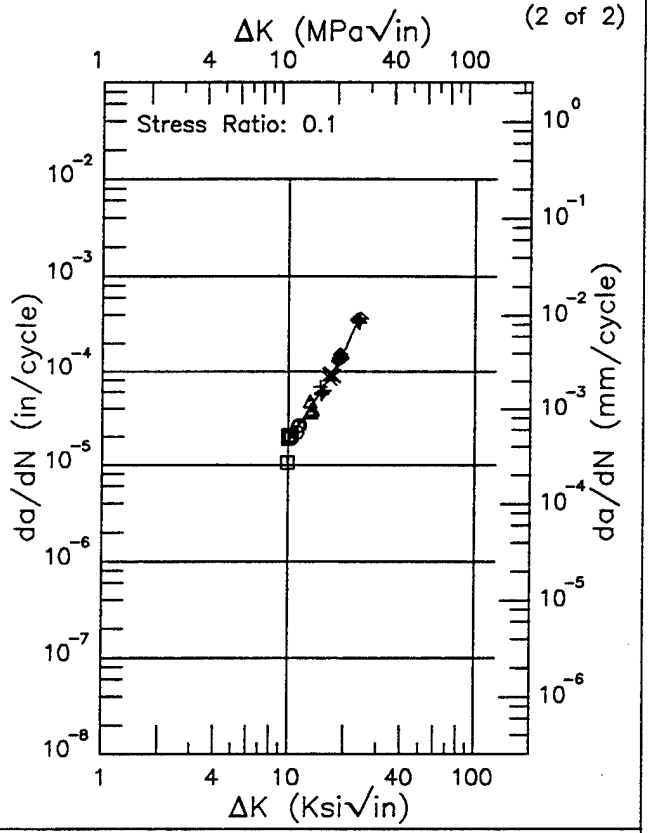

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 15.78 (min) | 17.4 |
| 16. | 20.7 |
| 20. | 82.0 |
| 25. | 42.0 |
| 30. | 87.6 |
| 32.70 (max) | 1931. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| >100.0 | 0. .5 .8 1.25 2. |

**Figure 7.19.3.1.1**

Condition/Ht: 850F 2HRS; 665F 2HRS; WARM H20 Q; 230F 24HRS
Form: Forging
Specimen Type: CT
Orientation: T-L
Frequency: 6 Hz
Environment: LAB AIR; RT
Yield Strength: 58.4 ksi
Ult. Strength: 68.4 ksi
Specimen Thk: 0.444 in.
Specimen Width: 2.566 in.
Ref: WL002




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.39 (min) | 1.98 |
| 3.5 | 2.05 |
| 4. | 2.43 |
| 5. | 3.69 |
| 6. | 5.59 |
| 7. | 8.15 |
| 8. | 11.3 |
| 9. | 15.0 |
| 9.50 (max) | 16.9 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 9.88 (min) | 17.0 |
| 10. | 17.7 |
| 13. | 39.6 |
| 16. | 75.5 |
| 20. | 171. |
| 24.15 (max) | .414. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 24.40 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 10.61 | 0. .5 .8 1.25 2. |

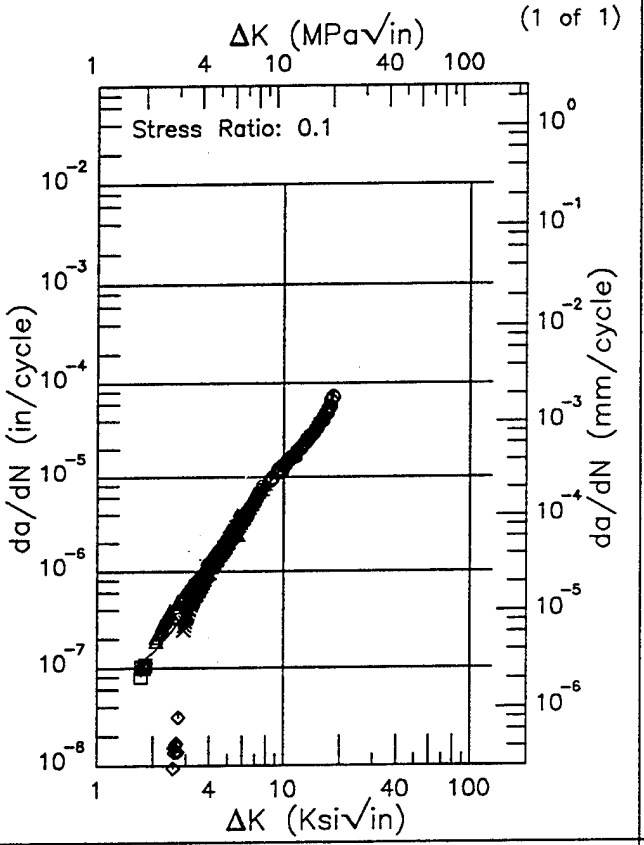
**Figure 7.19.3.1.2**

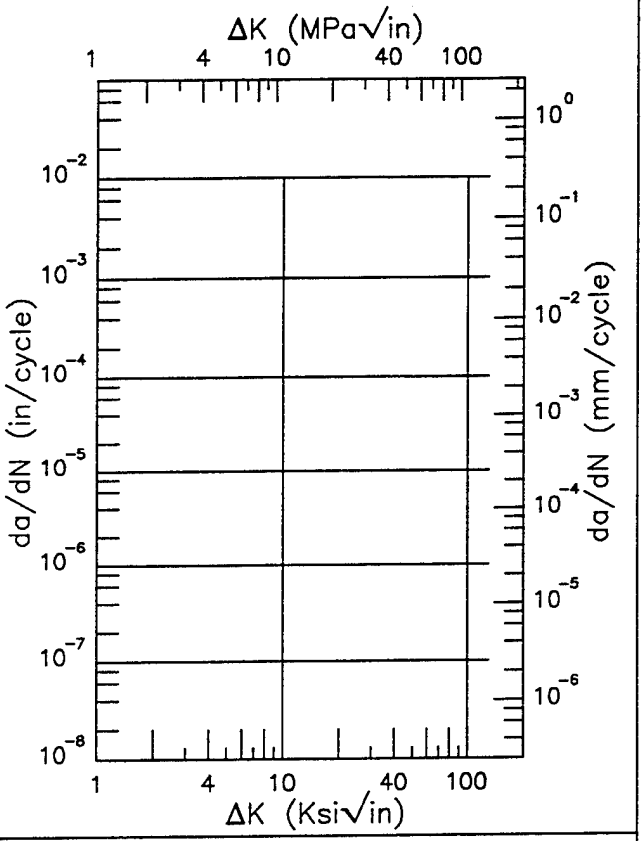
IN905XL

R

Condition/Ht:
Form: Forging
Specimen Type: CT
Orientation: L–T
Frequency:
Environment: H.H.A.; RT

Yield Strength: 55.5 – 55.7 ksi
Ult. Strength: 65.6 ksi
Specimen Thk: 0.248 – 0.25 in.
Specimen Width: 1.495 – 1.497 in.
Ref: WL002




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 1.71 (min) | 0.112 |
| 2. | 0.144 |
| 2.5 | 0.236 |
| 3. | 0.390 |
| 3.5 | 0.625 |
| 4. | 0.958 |
| 5. | 1.98 |
| 6. | 3.50 |
| 7. | 5.48 |
| 8. | 7.77 |
| 9. | 10.3 |
| 10. | 13.1 |
| 13. | 23.4 |
| 16. | 41.0 |
| 18.28 (max) | 70.3 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 25.20 | 0. .5 .8 1.25 2. |

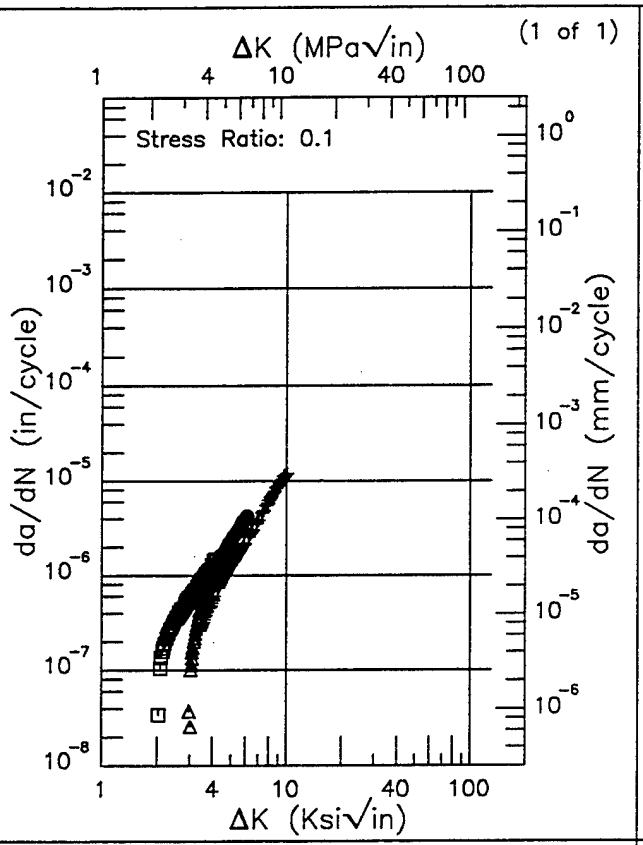
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

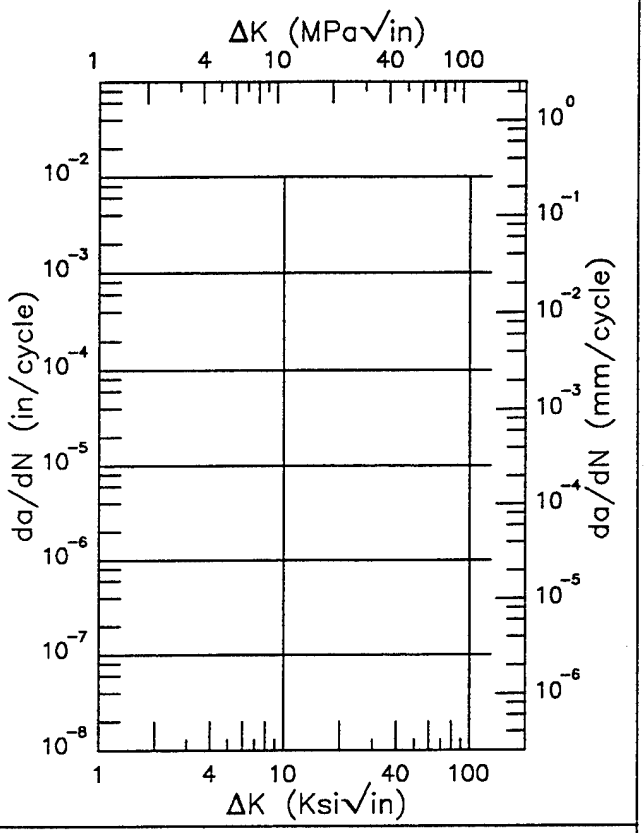
**Figure 7.19.3.1.3**

IN905XL R

Condition/Ht:
Form: Forging
Specimen Type: CT
Orientation: T–L
Frequency:
Environment: H.H.A.; RT

Yield Strength: 54.3 – 54.6 ksi
Ult. Strength: 65.7 ksi
Specimen Thk: 0.25 in.
Specimen Width: 1.493 – 1.497 in.
Ref: WL002




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.02 (min) | 0.138 |
| 2.5 | 0.252 |
| 3. | 0.407 |
| 3.5 | 0.604 |
| 4. | 0.849 |
| 5. | 1.53 |
| 6. | 2.56 |
| 7. | 4.09 |
| 8. | 6.21 |
| 9. | 8.92 |
| 9.97 (max) | 12.1 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 34.82 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

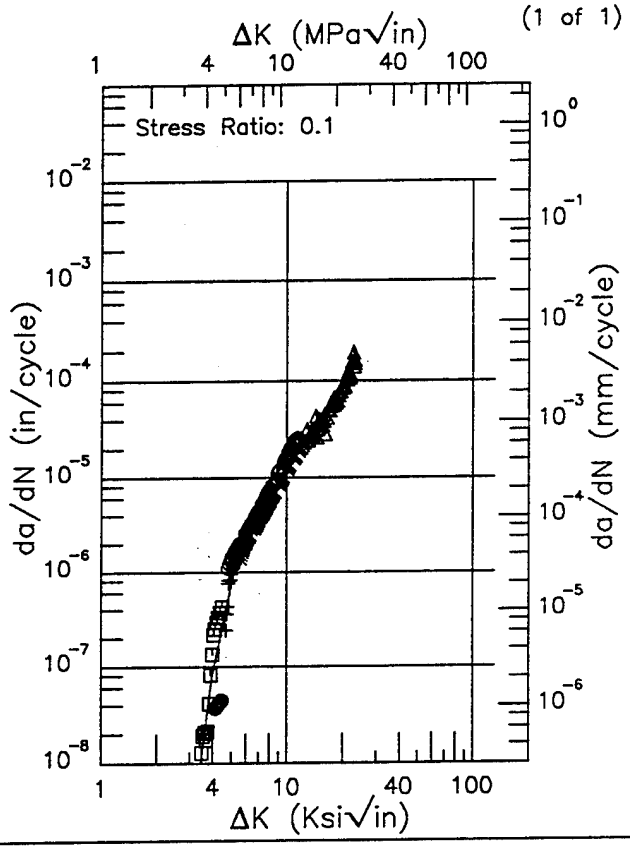
**Figure 7.19.3.1.4**

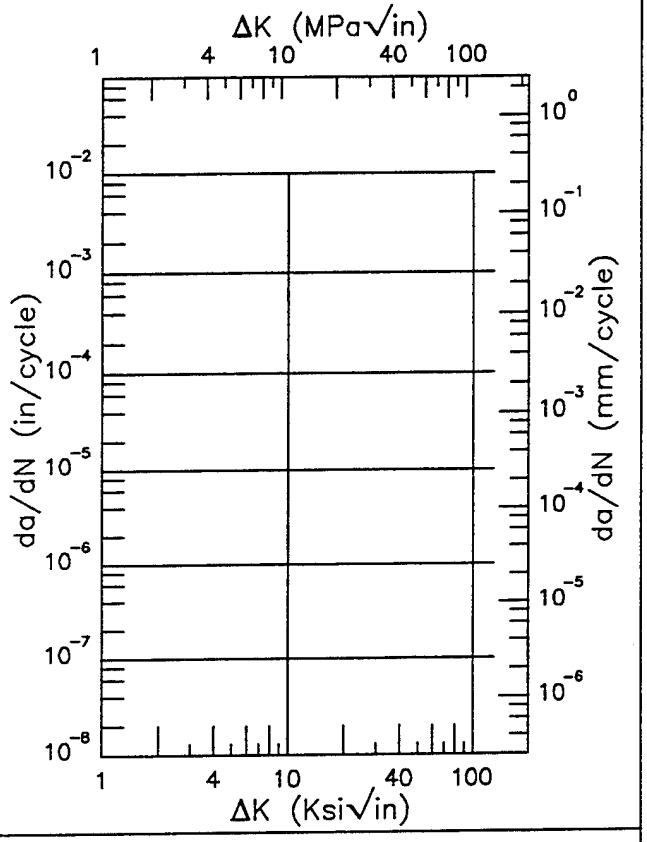
R IN905XL

Condition/Ht:
Form: Forging
Specimen Type: CT
Orientation: S–L
Frequency:
Environment: H.H.A.; RT

Yield Strength: 51 – 51.4 ksi
Ult. Strength:
Specimen Thk: 0.248 – 0.249 in.
Specimen Width: 1.496 – 1.498 in.
Ref: WL002

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 3.46 (min) | 0.00995 |
| 3.5 | 0.0123 |
| 4. | 0.0845 |
| 5. | 0.752 |
| 6. | 2.23 |
| 7. | 4.17 |
| 8. | 6.48 |
| 9. | 9.56 |
| 10. | 13.6 |
| 13. | 28.6 |
| 16. | 41.4 |
| 20. | 87.8 |
| 23.02 (max) | 165. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

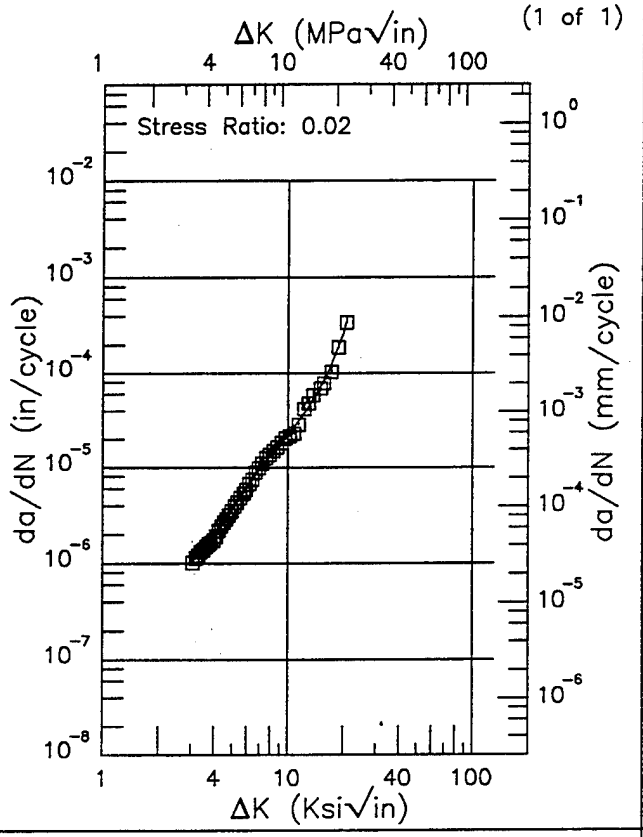
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 33.18 | 0. .5 .8 1.25 2. |

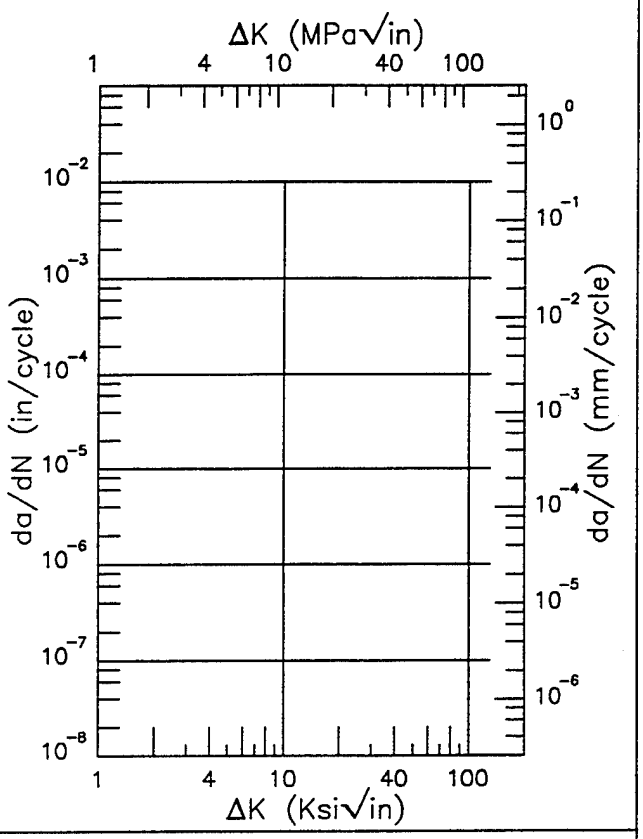
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.19.3.1.5**

Condition/Ht:
Form: Forging
Specimen Type: WOL
Orientation: L–T
Frequency: 1 – 15 Hz
Environment: LAB AIR; RT

Yield Strength: 63.8 ksi
Ult. Strength: 75 ksi
Specimen Thk: 0.249 in.
Specimen Width: 1.642 in.
Ref: WL002




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 3.07 (min) | 1.06 |
| 3.5 | 1.35 |
| 4. | 1.86 |
| 5. | 3.54 |
| 6. | 6.20 |
| 7. | 9.66 |
| 8. | 13.5 |
| 9. | 17.5 |
| 10. | 22.0 |
| 13. | 44.4 |
| 16. | 90.4 |
| 20. | 268. |
| 20.61 (max) | 347. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 5.40 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.19.3.1.6**

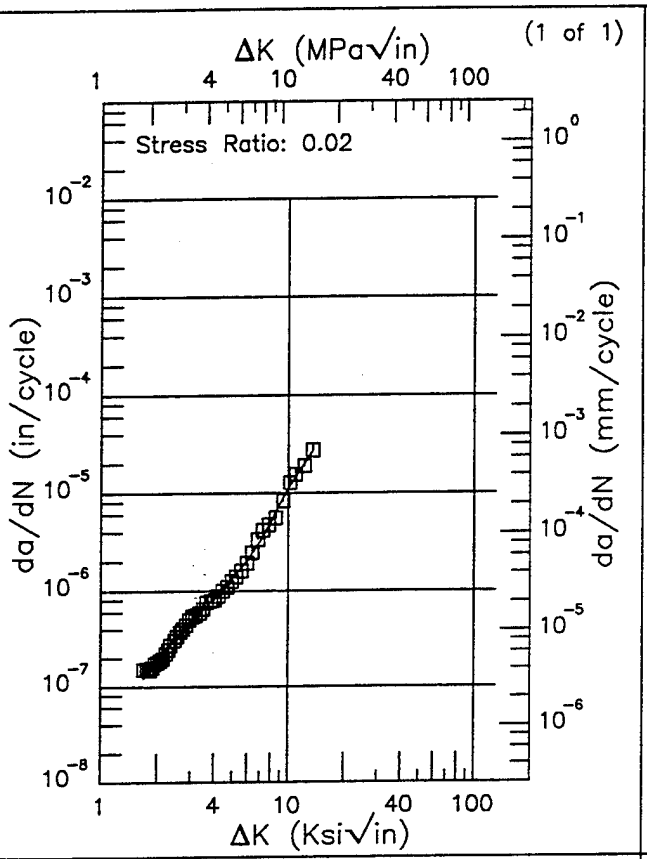
IN905XL

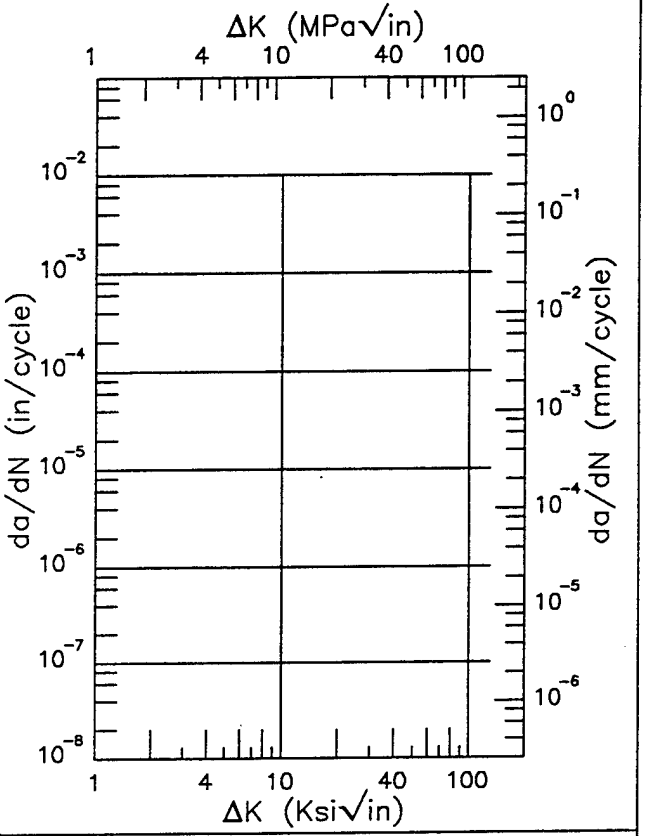
R

Condition/Ht:
Form: Forging
Specimen Type: WOL
Orientation: L–T
Frequency: 1 – 20 Hz
Environment: LAB AIR; RT

Yield Strength: 63.8 ksi
Ult. Strength: 75 ksi
Specimen Thk: 0.251 in.
Specimen Width: 1.6 in.
Ref: WL002

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 1.70 (min) | 0.122 |
| 2. | 0.189 |
| 2.5 | 0.318 |
| 3. | 0.465 |
| 3.5 | 0.633 |
| 4. | 0.826 |
| 5. | 1.33 |
| 6. | 2.07 |
| 7. | 3.22 |
| 8. | 5.04 |
| 9. | 7.75 |
| 10. | 11.2 |
| 13. | 23.8 |
| 13.53 (max) | 27.0 |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 7.38 | 0. .5 .8 1.25 2. |

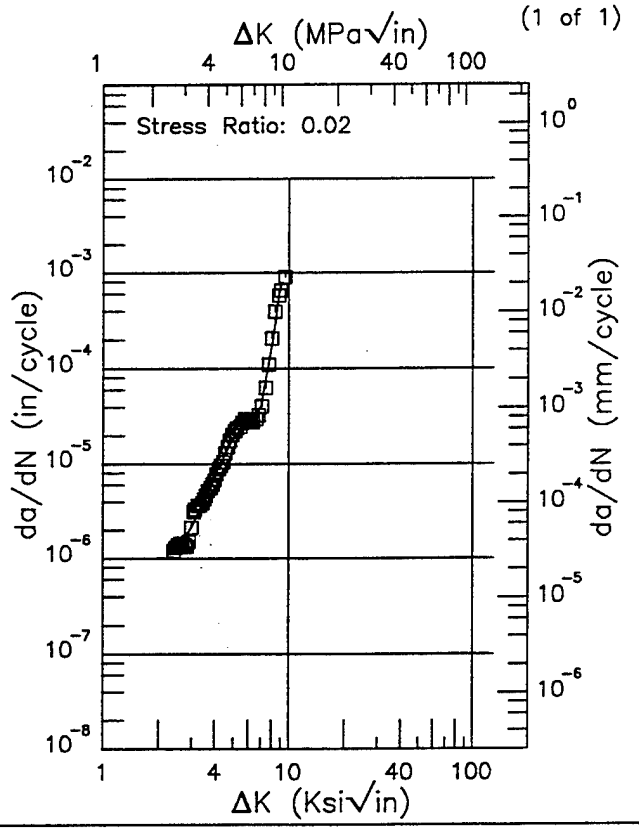
| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

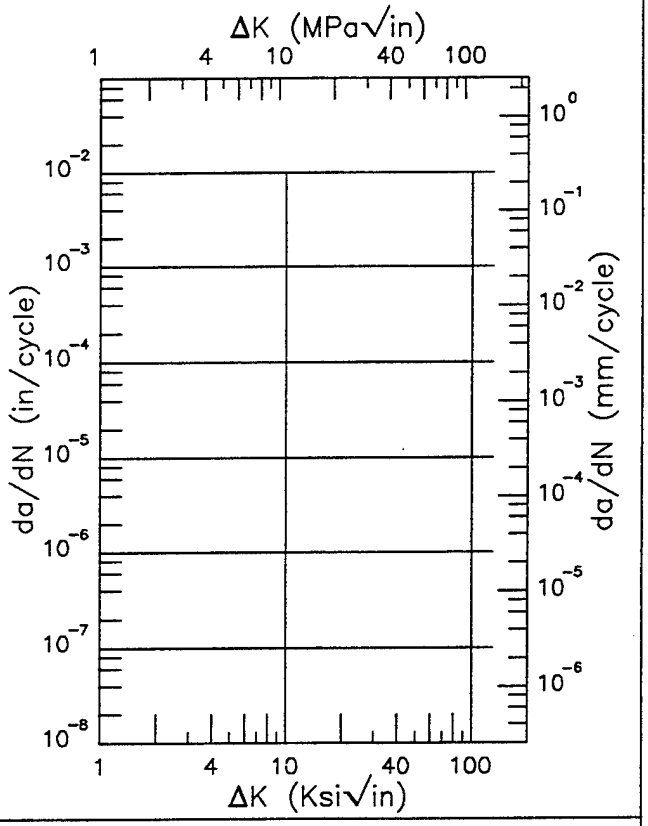
**Figure 7.19.3.1.7**

Condition/Ht:
Form: Forging
Specimen Type: WOL
Orientation: T-L
Frequency: 0.1 - 20 Hz
Environment: LAB AIR; RT

Yield Strength: 64 ksi
Ult. Strength: 74.5 ksi
Specimen Thk: 0.248 in.
Specimen Width: 1.998 in.
Ref: WL002

(1 of 1)




| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|
| 2.39 (min) | 1.14 |
| 2.5 | 1.24 |
| 3. | 2.16 |
| 3.5 | 4.12 |
| 4. | 7.56 |
| 5. | 18.9 |
| 6. | 28.7 |
| 7. | 39.9 |
| 8. | 166. |
| 9. | 791. |
| 9.47 (max) | 768. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 12.56 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

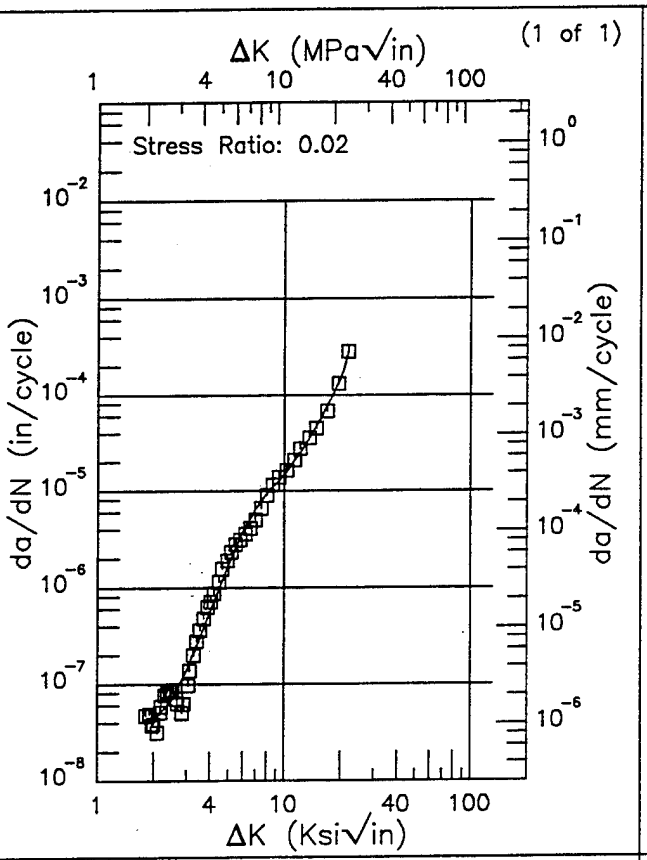
**Figure 7.19.3.1.8**

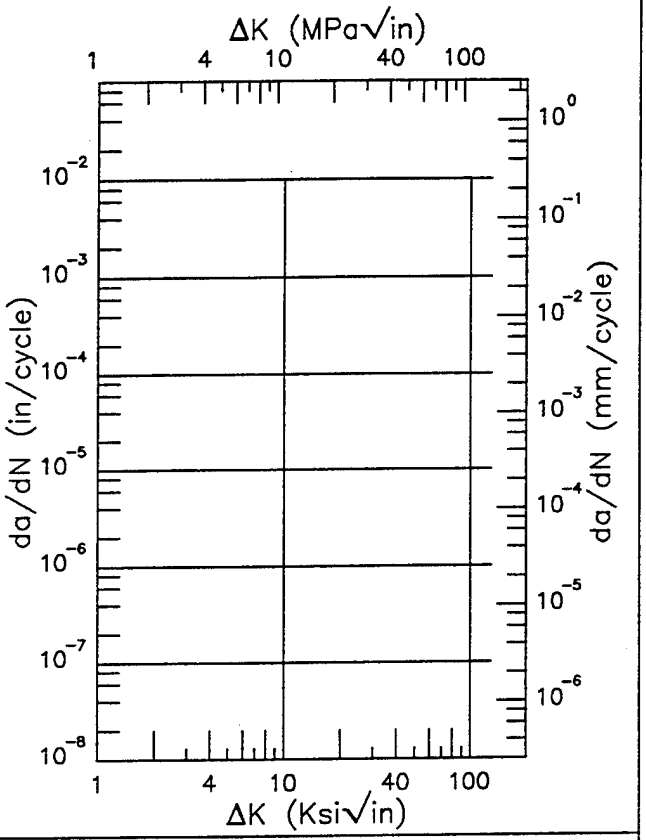
IN905XL

R

Condition/Ht:
Form: Forging
Specimen Type: WOL
Orientation: T–L
Frequency: 0.1 – 25 Hz
Environment: LAB AIR; RT

Yield Strength: 64 ksi
Ult. Strength: 74.5 ksi
Specimen Thk: 0.251 in.
Specimen Width: 1.6 in.
Ref: WL002




| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|
| 1.81 (min) | 0.0391 |
| 2. | 0.0416 |
| 2.5 | 0.0688 |
| 3. | 0.138 |
| 3.5 | 0.282 |
| 4. | 0.551 |
| 5. | 1.68 |
| 6. | 3.79 |
| 7. | 6.53 |
| 8. | 9.25 |
| 9. | 11.9 |
| 10. | 14.8 |
| 13. | 30.1 |
| 16. | 62.6 |
| 20. | 150. |
| 21.84 (max) | 286. |

| ΔK (Ksi√in) | da/dN ($10^{-6}$ in/cycle) |
|---|---|

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| 22.21 | 0. .5 .8 1.25 2. |

| RMS % Error | Life Prediction Ratio Summary |
|---|---|
| | 0. .5 .8 1.25 2. |

**Figure 7.19.3.1.9**

## TABLE 7.20

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6061 $K_{Ic}$

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|---|---|---|
| 84284 | 2024 | da/dt |

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|---|---|---|
| 84288 | 2014 | $K_{Ic}$ |
| | 2024 | $K_{Ic}$ |
| | 6061 | $K_{Ic}$ |

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|---|---|---|
| 84306 | 2024 | $K_{Ic}$ |
| | 2124 | $K_{Ic}$ |
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| | | |
|---|---|---|
| 84331 | 2020 | $K_{Iscc}$ |
| | 2219 | $K_{Iscc}$ |

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| | | |
|---|---|---|
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85836 2024 $K_{Ic}$
2219 $K_{Ic}$

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| | | |
|---|---|---|
| 85837 | 2024 | a-vs-N; da/dN |
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| 86210 | 2024 | $K_{Ic}$ |

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| | | |
|---|---|---|
| 86213 | 2014 | $K_{Ic}$; $K_c$; a-vs-N; da/dN |
| | 2020 | $K_{Ic}$; $K_c$; a-vs-N; da/dN |
| | 2020 (ALCLAD) | $K_c$ |
| | 2021 | $K_{Ic}$ |
| | 2024 | $K_{Ic}$; $K_c$; a-vs-N; da/dN |
| | 2024 (ALCLAD) | $K_c$; a-vs-N; da/dN |
| | 2124 | $K_{Ic}$; $K_c$ |
| | 2214 | $K_{Ic}$ |
| | 2219 | $K_{Ic}$; $K_c$; a-vs-N; da/dN |
| | 2618 | $K_{Ic}$; $K_c$ |
| | 6061 | $K_{Ic}$; $K_c$ |

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| | | |
|---|---|---|
| 86575 | 2024 | a-vs-N; da/dN |

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|---|---|---|
| 86688 | 2014 | $K_{Iscc}$ |
| | 2021 | $K_{Iscc}$ |
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|---|---|---|
| 86734 | 2014 | a-vs-N; da/dN |
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| | 2024 (ALCLAD) | $K_c$ |
| | 2618 | a-vs-N; da/dN |

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| 86842 | 2124 | a-vs-N; da/dN |

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|---|---|---|
| 87398 | 2024 | a-vs-N; da/dN |

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2219 $K_{Ic}$

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## REFERENCES FOR THE 2000 SERIES ALUMINUM ALLOY DATA

| | | |
|---|---|---|
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| AL001 | 2048 | $K_{Ic}$; da/dN |
| | 2219 | $K_{Ic}$; da/dN |

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| | 2024 | a-vs-N; da/dN |

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| | | |
|---|---|---|
| AL010 | 2024 | a-vs-N; da/dN |

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| | | |
|---|---|---|
| AL011 | 2324 | a-vs-N; da/dN |

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## REFERENCES FOR THE 2000 SERIES ALUMINUM ALLOY DATA

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2219 $K_{Ic}$
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2124 $K_{Ic}$; da/dN

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Summary of Plane-Strain Fracture Toughness and Notch-Tensile Tests-Reynolds Metals Company, Metallurgical Research Division, Richmond, VA, Project 36-KFP-3M04, September 1978 - June 1980.

## TABLE 7.20 (CONTINUED)

## REFERENCES FOR THE 2000 SERIES ALUMINUM ALLOY DATA

RA002 2124 $K_{Ic}$

Summary of Plane-Strain Fracture Toughness and Notch-Tensile Tests-Reynolds Metals Company, Metallurgical Research Division, Richmond, VA, Project 38-KFP, November 1978.

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2124 $K_{Iscc}$
2219 $K_{Iscc}$

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SW001 2024 $K_{Ic}$; a-vs-N; da/dN

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UD004 2419 $K_{Ic}$; da/dN

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## TABLE 7.20 (CONTINUED)

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## TABLE 7.20 (CONCLUDED)

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