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Volume 2

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Damage Tolerant Design Handbook

A Compilation of Fracture and Crack-Growth Data for High Strength Alloys

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Metals and Ceramics Information Center
Battelle
Columbus Laboratories

Prepared by

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This edition entirely revamps the 1975 edition. This edition is arranged by alloy rather than by property as in the previous addition. The data are presented in eight chapters and four volumes. Plane-strain fracture toughness (K_{IC}), critical plane stress fracture toughness, apparent fracture toughness, R-curve, fatigue crack growth rates, sustained-load crack growth rate and threshold stress intensity (K_{ISCC}) data are presented for stainless steels, titanium alloys, nickel-base alloys, alloy steels, 2000-, 6000- and 7000-series aluminum alloys.

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Sponsored by

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MCIC is publishing this revised and expanded edition of the Damage Tolerant Design Handbook to increase the availability of information to the technical community. The loose leaf format was selected to facilitate updating the handbook as new information becomes available. This edition is a completely revised and expanded version of the original handbook first published by MCIC in 1972 and revised in 1973 and 1975.

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TABLE 1.4

ABBREVIATIONS FOR MATERIAL SYSTEMS

Abbreviation	Materials
ALUM	Aluminum Alloys
TITAN.	Titanium Alloys
NICKEL	Nickel-Base Alloys
STAIN. STEEL	Stainless Steel Alloys
ALLOY STEEL	Steel Alloys

TABLE 1.5

ABBREVIATIONS FOR ALLOY CONDITIONING AND HEAT TREATMENTS

Abbreviation	Condition/Heat Treatment
OQ	Oil Quenched
ABQ	Aus-Bay Quench
AC	Air Cool
WC	Water Quench
MA	Mill Anneal
BA	Beta Anneal
DA	Duplex Anneal
RA	Recrystallize Anneal
ST	Solution Treated
STA	Solution Treated And Aged

TABLE 1.6

ABBREVIATIONS FOR PRODUCT FORMS

Abbreviations	Product Form
S	Sheet
P	Plate
E	Extrusion
F	Forging
FB	Forged Bar
BT	Billet
BR	Round Bar
RB	Rolled Bar
C	Casting
W	Weldment
D	Disk
EB	Extruded Bar
B	Bar

TABLE 1.7

ABBREVIATIONS FOR ENVIRONMENTAL SYSTEMS

Abbreviations	Environmental System
R. T.	Room Temperature (65°F-80°F)
L. H. A.	Low Humidity Air (< 10% RH)
Dry Air	Low Humidity Air (< 10% RH)
H. H. A.	High Humidity Air (> 80% RH)
Lab. Air	Laboratory Air (% RH unspecified)
Dist. H_2O	Distilled Water
Dist. Water	Distilled Water
3.5 PCT Nacl	3.5% Salt Water Solution
JP.4	JP-4 Aircraft Fuel
JP.4 - Fuel	JP-4 Aircraft Fuel
S. T. W.	Sump Tank Water
S. S. W.	Simulated Sea Water
S. C. S.	Shop Cleaning Solvent
F. C. S.	Field Cleaning Solvent
Salt Fog	Salt Fog
Temp.	Temperature

TABLE 1.8

ABBREVIATIONS FOR SPECIMEN DESIGNS

Abbreviations	Specimen Design*
CT	Compact Tension
NB	3Pt. Notched Bend
WOL	Wedge Open Load
CCP	Center Cracked Panel
BWOL	Bolt Loaded-Wedge Open Load
CANT	Cantilever Beam
TDCB	Tapered Double Cantilever Beam
CHAR	Charpy
PTSC	Part Through Surface Crack
SENT	Single Edge Notch Tension
K_BBAR	K_B Bar
4-NB	4 Pt. Notched Bend
MCT	Modified Compact Tension
CNT	Center Notched Tension
DCB	Double Cantilever Beam
BDCB	Bolt Loaded Double Cantilever Beam

*Also note that when "SG" is used in conjunction with a specimen design, the specimen is side-grooved along the path of the crack.

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Table 5.0.1

AVAILABLE DATA FOR NICKEL-BASE SUPERALLOYS

ALLOY	CONDITION/HT	PRODUCT FORM	KIC	KC	R CURVES	DA/DN	DA/DT	KISCC
ASTROLOY P/M-H	2025F 3HR AC, 1600F 8HR AC, 1800F 4HR AC, 1200F 24HR AC, 1400F 8HR AC	DISK				X		
ASTROLOY P/M-W	2025F 4HRS AC, 1600F 8HRS AC, 1800F 4HRS AC, 1200F 24HRS AC, 1400F 8HRS AC	DISK				X		
ASTROLOY 901	-----	----				X		
INCOLOY 901	-----	----				X		
INCONEL 600	1585F .75HR AC	PLATE				X		
	1585F .75HR AC, 1000F, 18800HRS	PLATE				X		
	1585F .75HR AC, 1200F 1450 HRS	PLATE				X		
INCONEL 625	MA	PLATE				X		
INCONEL 718	COLD ROLLED 30 PERCENT AND AGED	SHEET		X				
	ST 1850F, 1360F 9HRS F/C 1175F	FORGED BAR				X		
	1325F 8 HR, FC TO 1150F, HOLD 18 HR	FORGING	X					
	1325F 8HRS, FC TO 1150F	FORGING				X		
	1325F 9 HR, FC TO 1150F AT 100F/HR, HOLD AT 1150F 8 HR, AC	FORGING	X					
	1730F 1HR Q, 1325F 8HR FC TO 1150F AT 100F/HR HOLD 8HR, AC	DISK				X		

Table 5.0.1 (con't)

AVAILABLE DATA FOR NICKEL-BASE SUPERALLOYS

ALLOY	CONDITION/HT	PRODUCT FORM	KIC	KC	R CURVES	DA/DN	DA/DT	KISCC
INCONEL 718	1750F, AC, 1325F, 8HRS, FC TO 1130F, HELD 18HRS, AC	SHEET				X		
		PLATE				X		
		FORGING				X		
		FORGED BAR				X		
	1750F, 1HR, AC 1325F, 8HRS, FC TO 1150F, HELD 18HRS, AC (VIM-EFR)	PLATE				X		
	1750F, 1HR, AC 1325F, 8HRS, FC TO 1150F, HELD 18HRS, AC (VIM-VAR)	FORGED BAR				X		
	1760F 1HR WQ, 1325F 8HRS, FC TO 1150F 8HRS, AC	DISK				X		
	1800F 1HR Q, 1325F 8HRS FC TO 1150F HOLD 8HRS AC	FORGING				X		
	1850F 1.5HR OQ, 1360F 9HRS, FC TO 1175F	FORGED BAR						X
	1880F 1HR AC 1520F 8HR FC 1200F 16HR AC	SHEET						X
	1950F, AC, 1325F, 8HRS, FC TO 1150F, HELD 18HRS, AC	PLATE				X		
IN100	------	----				X		
		FORGING				X		
	PRESTRAIN	FORGING				X		
IN100 P/M-G	2050F 2HRS OQ, 1600F 0.67HR AC, 1200F 24HRS AC, 1400F 4HRS AC	DISK				X		
NASA IIB-7 P/M	1650F 16HRS TO 2000F 1HR OQ, 1400F 16HRS AC	DISK				X		

Table 5.0.1 (con't)

AVAILABLE DATA FOR NICKEL-BASE SUPERALLOYS

ALLOY	CONDITION/HT	PRODUCT FORM	KIC	KC	R CURVES	DA/DN	DA/DT	KISCC
P/M RENE 95	2080F 1HR AC, 1600F 1HR AC, 1200F 24HRS AC	DISK				X		
	2100F 1HR, SQ AT 1000F, 1600F 1HR, 1200F 24HRS, AC	DISK				X		
RENE 95 (H&F)	2000F 1HR, SQ AT 1000F, 1400F 16HRS	FORGING				X		
WASPALOY	-----	----				X		
		FORGING				X		
	1850F 2HRS, 1350F 6HRS, (FINE GS, SMALL PRECIPITATES)	BILLET				X		
	1850F 2HRS, 1600F 24HRS (FINE GS, LARGE PRECIPITATES)	BILLET				X		
	1875F 4HRS OQ, 1550F 4HRS AC, 1400F 4HRS AC	DISK				X		
	2010F 2HRS, 1350F 6HRS, (COARSE GS, SMALL PRECIPITATES)	BILLET				X		
	2010F 2HRS, 1600F 24HRS, (COARSE GS, LARGE PRECIPITATES)	BILLET				X		

TABLE 5.0.2

PLANE STRESS AND TRANSITIONAL FRACTURE TOUGHNESS
OF NICKEL BASE ALLOYS (WITHOUT BUCKLING CONSTRAINTS)

Alloy	Condition/HT	Test Temp. (^{O}F)	Specimen Orient	Specimen Width (in)	Yield Strength (KSI)	Specimen Thickness (in) = 0.027 K_c^* (Ksi $\sqrt{in}$)
Inconel 718	Cold Rolled 30 Percent and aged	-423	L-T	4.0	269.0	191.1/7.5 (15)
		-320	L-T	4.0	259.0	200.6/13.8 (13)
		R.T.	L-T	4.0	218.0	178.5/3.6 (6)
				18.0	218.0	224.6/11.1 (5)

*Mean/Standard Deviation (No. of Specimens)

Table 5.0.3.1

COMPARISON OF FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS OF THE STRESS INTENSITY FACTOR FOR NICKEL-BASE SUPERALLOYS

TEST CONDITIONS:

SPECIMEN ORIENTATION: Unknown

ENVIRONMENT: LAB AIR AT R.T.

STRESS RATIO: 0.05-0.10

FREQUENCY: 10.00HZ

ALLOY	CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQUENCY	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) FOR DELTA K LEVELS (KSI SQRT(IN)) = 2.5	5.0	10.0	20.0	50.0	100.0
INCONEL 718	1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC	PLATE	0.05	10.00				1.77	44.1	
	1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC	FORGING	0.05	10.00				1.77	41.7	
	1750F 1HR AC, 1325F 8HR FC TO 1150F, HELD 18HR AC(VIM-EFR)	PLATE	0.05	10.00				1.57		
WASPALOY	1850F 2HRS, 1350F 6HRS(FINE GS, SMALL PRECIPITATES)	BILLET	0.10	10.00					10.7	
	2010F 2HR, 1350F 6HR(COARSE GS, SMALL PRECIPITATES)	BILLET	0.10	10.00					2.84	
	2010F 2HR, 1600F 24HR(COARSE GS, LARGE PRECIPITATES)	BILLET	0.10	10.00					9.65	

Table 5.0.3.2

COMPARISON OF FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS OF THE STRESS INTENSITY FACTOR FOR NICKEL-BASE SUPERALLOYS

TEST CONDITIONS:

SPECIMEN ORIENTATION: L-T

ENVIRONMENT: LAB AIR AT R.T.

STRESS RATIO: 0.05

FREQUENCY: 8.33HZ

ALLOY	CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQUENCY	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) FOR DELTA K LEVELS (KSI SQRT(IN)) = 2.5	5.0	10.0	20.0	50.0	100.0
INCONEL 718	1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS AC	PLATE	0.05	8.33				1.29	30.4	
	1950F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS AC	PLATE	0.05	8.33				1.05		

Table 5.0.3.3

COMPARISON OF FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS OF THE STRESS INTENSITY FACTOR FOR NICKEL-BASE SUPERALLOYS

TEST CONDITIONS:

SPECIMEN ORIENTATION: T-L

ENVIRONMENT: LAB AIR AT R.T.

STRESS RATIO: 0.05

FREQUENCY: 8.33-10.00HZ

ALLOY	CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQUENCY	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) FOR DELTA K LEVELS (KSI SQRT(IN)) = 2.5	5.0	10.0	20.0	50.0	100.0
INCONEL 718	1750F 1HR AC, 1325F 8HR FC TO 1150F, HELD 18HR AC(VIM-VAR)	FORGED BAR	0.05	8.33- 10.00				2.99	122.	

Table 5.0.3.4

COMPARISON OF FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS OF THE STRESS INTENSITY FACTOR FOR NICKEL-BASE SUPERALLOYS

TEST CONDITIONS:

SPECIMEN ORIENTATION: C-R

ENVIRONMENT: LAB AIR AT R.T.

STRESS RATIO: 0.00-0.05

FREQUENCY: 0.33-10.00HZ

ALLOY	CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQUENCY	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) FOR DELTA K LEVELS (KSI SQRT(IN)) = 2.5	5.0	10.0	20.0	50.0	100.0
INCONEL 718	1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC	FORGED BAR	0.05	10.00				2.55	47.2	
	1760F 1HR WQ, 1325F 8HRS, FC TO 1150F 8HRS, AC	DISK	0.00	.33				2.86		
P/M RENE 95	2080F 1HR AC, 1600F 1HR AC, 1200F 24HRS AC	DISK	0.00	.33				.394	27.6	

TABLE 5.0.4

INDIVIDUAL STRESS CORROSION CRACKING THRESHOLD
DATA FOR NICKEL BASE ALLOYS AT ROOM TEMPERATURE

K_{Iscc} (Ksi$\sqrt{in}$)
ENVIRONMENTS

ALLOY	CONDITION	PRODUCT FORM	SPECIMEN ORIENTATION	SHOP CLEANING SOLVENT	SUMP TANK WATER	AEROZINE 50	MARTIN-MARIETTA REFINED GRADE HYDRAZINE	MATHESON-COLEMAN-BELL 97% GRADE HYDRAZINE	PROPELLANT GRADE HYDRAZINE
INCONEL 718	1850 1.5 HR OQ, 1360F 9 HRS, FC to 1175F	FB	L-T	>166.0;>86.0	>86.0;>180.0				
		FB	T-L		>89.0;121.0				
		FB	S-L		>87.0;>99.0				
	1880F 1 HR AC, 1520F 8 HR FC, 1200F 16 HR AC	S	---			80.0	79.0;79.0	25.8	87.5

Table 5.1.1

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE ASTROLOY P/M-H

TEST CONDITIONS:

SPECIMEN ORIENTATION: C-R

ENVIRONMENT: AIR AT 1200 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIQUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	30	100
2025F 3HR AC, 1600F 8HR AC, 1800F 4HR AC, 1200F 24HR AC, 1400F 8HR AC	DISK	0.05	2 MIN. HOLDTIME TRAPEZOIDAL WAVEFORM						173	
2025F 3HR AC, 1600F 8HR AC, 1800F 4HR AC, 1200F 24HR AC, 1400F 8HR AC	DISK	0.05	5 MIN. HOLDTIME TRAPEZOIDAL WAVEFORM						181	
2025F 3HR AC, 1600F 8HR AC, 1800F 4HR AC, 1200F 24HR AC, 1400F 8HR AC	DISK	0.05	15 MIN. HOLDTIME TRAPEZOIDAL WAVEFORM						514	
2025F 3HR AC, 1600F 8HR AC, 1800F 4HR AC, 1200F 24HR AC, 1400F 8HR AC	DISK	0.05	0.01						275	
2025F 3HR AC, 1600F 8HR AC, 1800F 4HR AC, 1200F 24HR AC, 1400F 8HR AC	DISK	0.05	0.33					7.93	84.4	
2025F 3HR AC, 1600F 8HR AC, 1800F 4HR AC, 1200F 24HR AC, 1400F 8HR AC	DISK	0.05	20.00					4.53		

TABLE 5.1.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.1.3.1 INDICATING EFFECT

OF FREQUENCY

MATERIAL: NICKEL BASE ASTROLOY P/M-H
CONDITION: 2025F 3HR AC, 1600F 8HR AC, 1800F 4HR AC, 1200F 24HR AC, 1400F 8HR AC

ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			F(HZ)= 0.01	F(HZ)= 0.33	F(HZ)= 20.00	
	A:	21.63	12.0			
DELTA K MIN	B:	14.25		2.67		
	C:	15.27			2.39	
	D:					
		16.00		3.95	2.64	
		20.00		7.93	4.53	
		25.00	18.4	14.9	8.25	
		30.00	31.2	24.2	13.6	
		35.00	54.7	35.7	20.2	
		40.00	103.	49.4	27.8	
		50.00	275.	84.4		
		60.00	410.	130.		
		70.00	582.			
		80.00	1085.			
	A:	80.05	1089.			
DELTA K MAX	B:	62.12		142.		
	C:	44.64			35.6	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			33.43	24.73	8.73	

LIFE PREDICTION RATIO SUMMARY (NP/NA)
0.0-0.5
0.5-0.8
0.8-1.25
1.25-2.0
>2.0

CONDITION/HT: 2025F 3HR AC, 1600F 8HR AC, 1800F 4HR AC, 1200F 24HR AC, 1400F 8HR AC
FORM: DISK
SPECIMEN TYPE: WOL
ORIENTATION: C-R
STRESS RATIO: +0.05
ENVIRONMENT: +1200° F, AIR

YIELD STRENGTH: 135.8 KSI
ULT. STRENGTH: 202.0 KSI
SPECIMEN THK: 0.500"
SPECIMEN WIDTH: 2.500"
REFERENCES: PW004

NICKEL BASE

ASTROLOY P/M-H

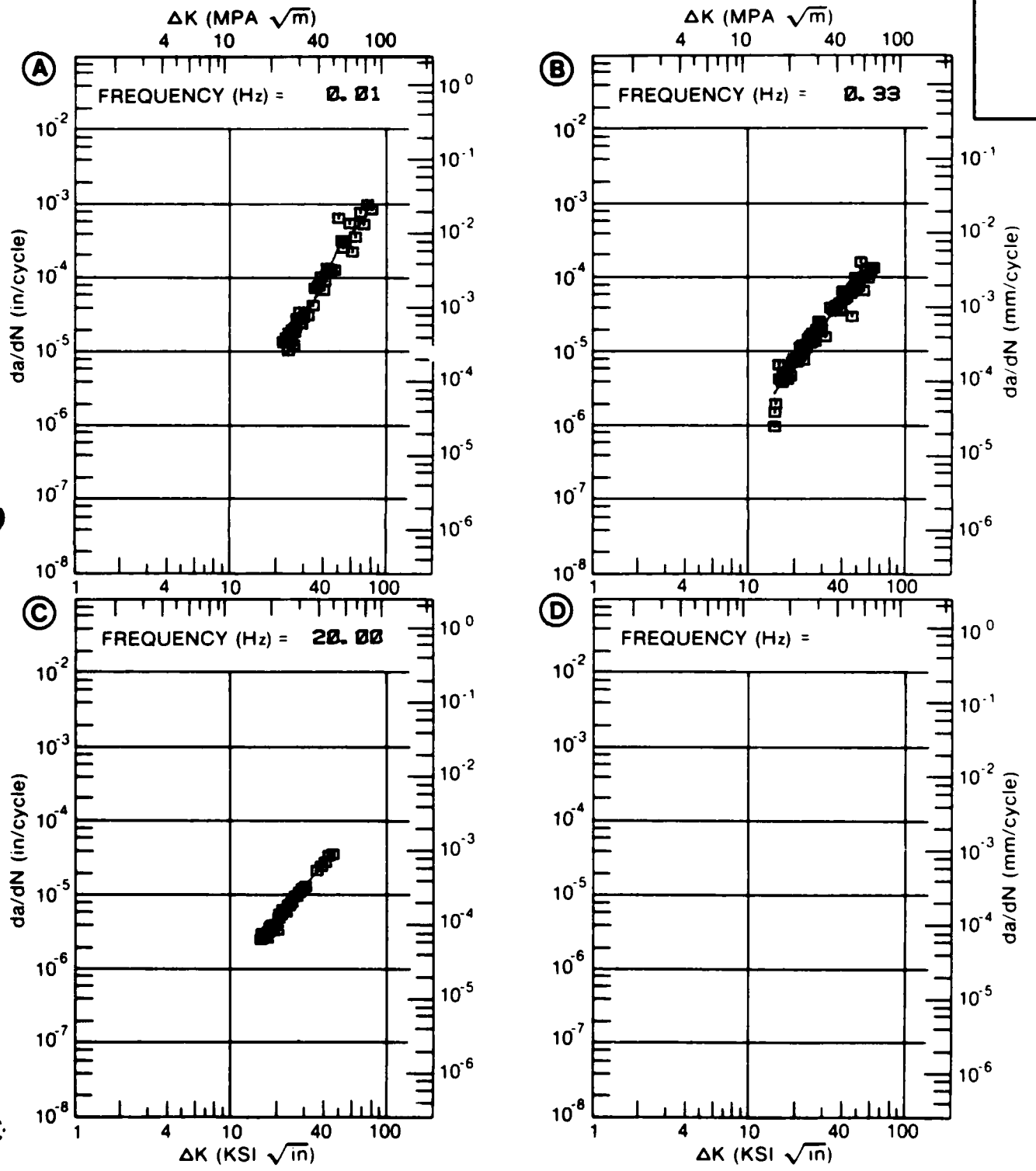


Figure 5.1.3.1

TABLE 5.1.3.2

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.1.3.2 INDICATING EFFECT

OF FREQUENCY

MATERIAL: NICKEL BASE ASTROLOY P/M-H
CONDITION: 2025F 3HR AC, 1600F 8HR AC, 1800F 4HR AC, 1200F 24HR AC, 1400F 8HR AC

ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE) A: F=2 MIN HOLD TRAPEZOIDAL	B: F=5 MIN HOLD TRAPEZOIDAL	C: F=15 MIN HOLD TRAPEZOIDAL	D
DELTA K MIN	A:	29.04	38.9			
	B:	28.95		90.9		
	C:	23.79			60.7	
	D:					
		25.00			64.9	
		30.00	43.3	90.1	97.1	
		35.00	65.5	95.9	156.	
		40.00	90.0	114.	246.	
		50.00	173.	181.	514.	
		60.00	327.	298.	926.	
		70.00	559.	472.	1574.	
		80.00	842.	708.	2622.	
		90.00		1000.	4352.	
DELTA K MAX	A:	87.40	1050.			
	B:	93.51		1113.		
	C:	92.44			4928.	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			26.66	26.49	24.65	

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

NICKEL BASE

ASTROLOY P/M-H

2025F 3HR AC, 1600F 8HR AC, 1800F 4HR
CONDITION/HT: AC, 1200F 24HR AC, 1400F 8HR AC
FORM: DISK
SPECIMEN TYPE: WOL
ORIENTATION: C-R
STRESS RATIO: +0.05
ENVIRONMENT: +1200° F, AIR
YIELD STRENGTH: 135.8 KSI
ULT. STRENGTH: 202.0 KSI
SPECIMEN THK: 0.500"
SPECIMEN WIDTH: 2.500"
REFERENCES: PW004

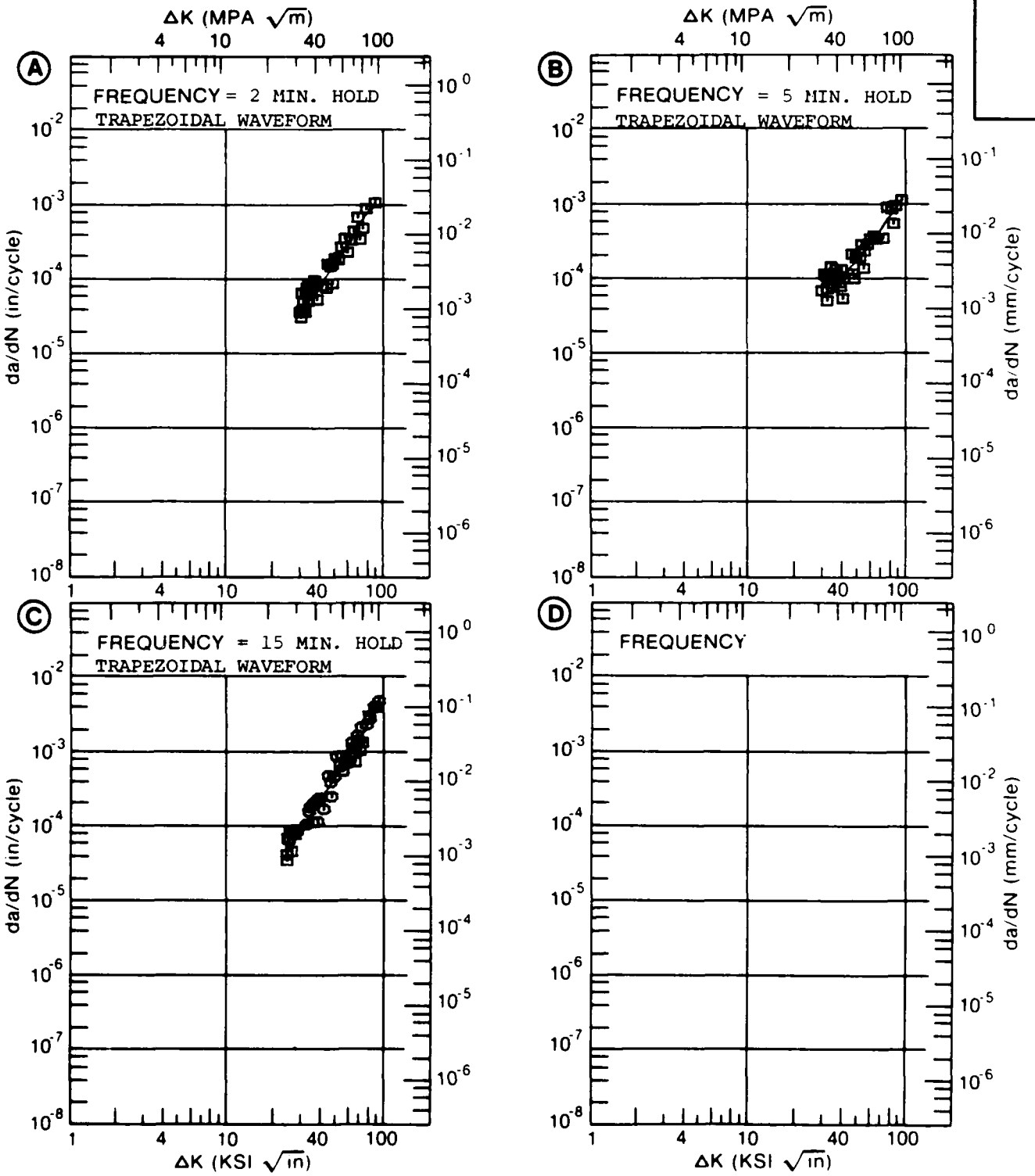


Figure 5.1.3.2

Table 5.2.1

FATIQUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE ASTROLOY P/M-W

TEST CONDITIONS:

SPECIMEN ORIENTATION: C-R

ENVIRONMENT: AIR AT 1200 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIQUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
2025F 4HR AC, 1600F 8HR AC, 1800F 4HR AC, 1200F 24HR AC, 1400F 8HR AC	DISK	0.05	15 MIN. HOLDTIME TRAPEZOIDAL WAVEFORM					50.2	1155	
2025F 4HR AC, 1600F 8HR AC, 1800F 4HR AC, 1200F 24HR AC, 1400F 8HR AC	DISK	0.05	0.33					10.3	132	
2025F 4HR AC, 1600F 8HR AC, 1800F 4HR AC, 1200F 24HR AC, 1400F 8HR AC	DISK	0.05	20.00					3.48		

TABLE 5.2.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.2.3.1 INDICATING EFFECT

OF FREQUENCY

MATERIAL: NICKEL BASE ASTROLOY P/M-W
CONDITION: 2025F 4HR AC, 1600F 8HR AC, 1800F 4HR
1200F 24HR AC, 1400F 8HR AC

ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			F=15 MIN HOLD TRAPEZOIDAL	F(HZ)= 0.33	F(HZ)= 20.00	
DELTA K MIN	A:	15.46	18.2			
	B:	12.48		3.50		
	C:	16.61			2.59	
	D:					
		13.00		3.61		
		16.00	21.0	5.26		
		20.00	50.2	10.3	3.48	
		25.00	113.	21.7	5.84	
		30.00	218.	37.7	9.22	
		35.00	373.	55.9	13.6	
		40.00	578.	76.5	18.8	
		50.00	1156.	132.		
		60.00	2205.	225.		
		70.00	4714.			
		80.00	14680.			
DELTA K MAX	A:	84.92	30709.			
	B:	61.82		249.		
	C:	45.34			25.4	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			97.51	14.52	15.84	

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

2025F 4HR AC, 1600F 8HR AC, 1800F 4HR AC
CONDITION/HT. .1200F 24HR AC, 1400F 8HR AC
FORM: DISK
SPECIMEN TYPE: WOL
ORIENTATION: C-R
STRESS RATIO: +0.05
ENVIRONMENT: +1200° F, AIR

YIELD STRENGTH: 153.0 KSI
ULT. STRENGTH: 220.0 KSI
SPECIMEN THK: 0.500"
SPECIMEN WIDTH: 2.500"
REFERENCES: PW004

NICKEL BASE

ASTROLOY P/M-W

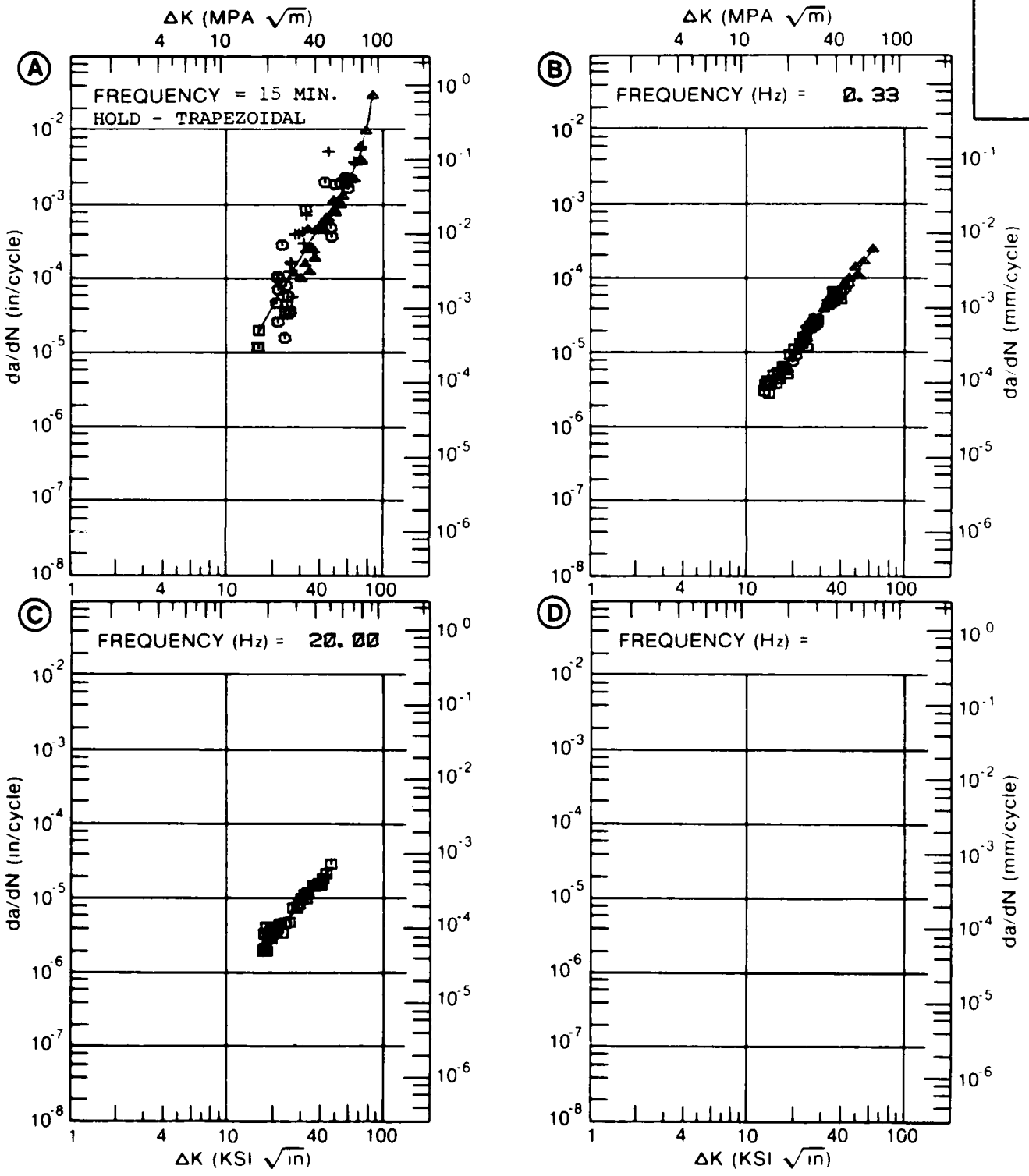


Figure 5.2.3.1

TABLE 5.3.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.3.3.1 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE ASTROLOY 901
CONDITION:
ENVIRONMENT: R.T. ,LAB AIR

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		R=+0.10			
DELTA K MIN	A: 18.88	.752			
	B:				
	C:				
	D:				
	20.00	1.12			
	25.00	2.62			
	30.00	4.55			
	35.00	6.35			
	40.00	8.55			
	50.00	22.1			
DELTA K MAX	A: 59.15	35.1			
	B:				
	C:				
	D:				

ROOT MEAN SQUARE PERCENT ERROR 11.20

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM:
SPECIMEN TYPE: SENT
ORIENTATION:
FREQUENCY: 0.17 HZ
ENVIRONMENT: R.T.,LAB AIR

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK: 0.126"
SPECIMEN WIDTH: 2.500"
REFERENCES:PW003

NICKEL BASE

ASTROLOY 901

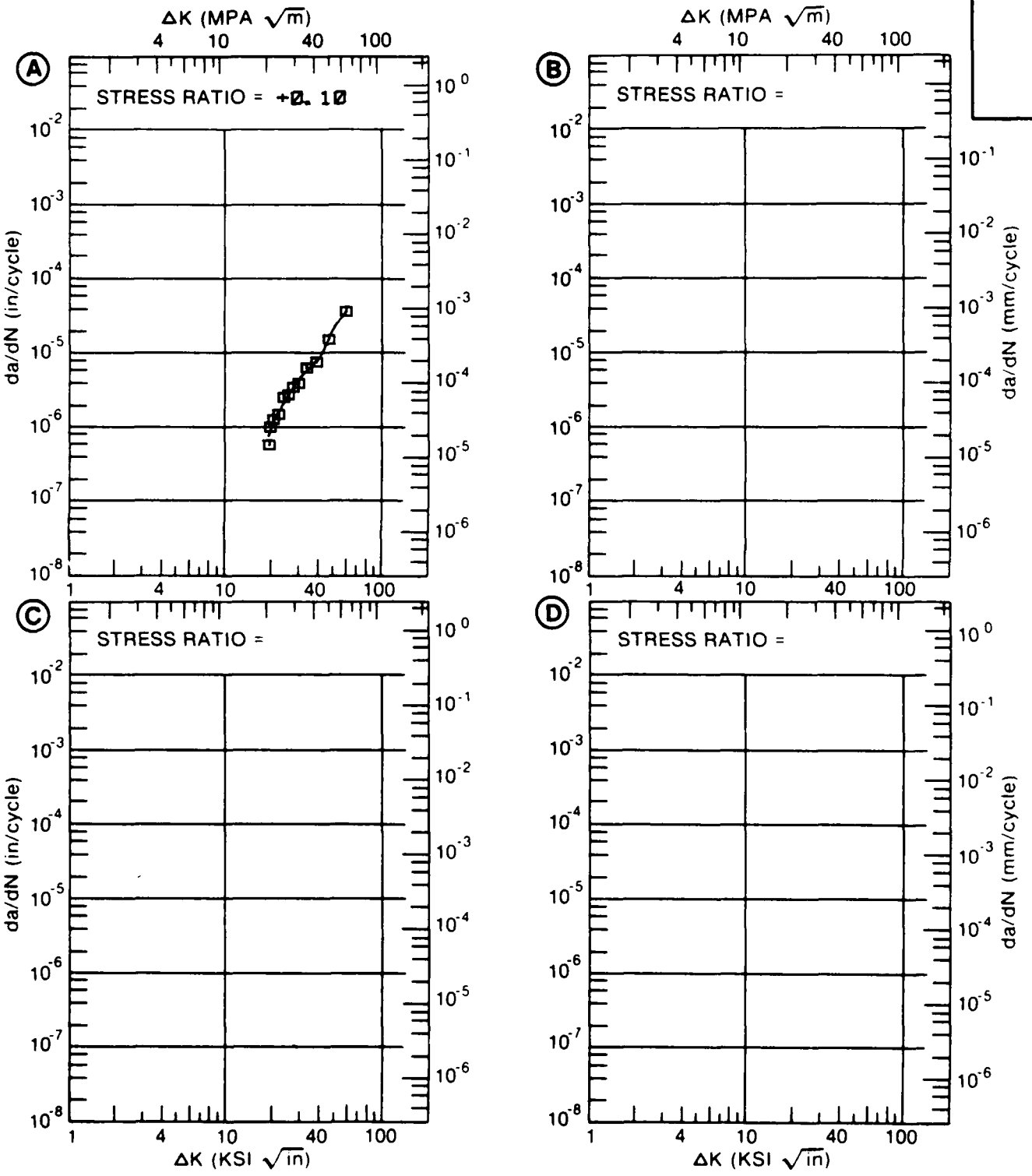


Figure 5.3.3.1

TABLE 5.3.3.2

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.3.3.2 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE ASTROLOY 901
CONDITION:
ENVIRONMENT: + 800F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.10	R=+0.50		
DELTA K MIN	A:	16.50	1.99			
	B:	9.87		.867		
	C:					
	D:					
		10.00		1.21		
		13.00		2.25		
		16.00		3.72		
		20.00	3.58	5.85		
		25.00	7.14	9.39		
		30.00	12.0	15.3		
		35.00	18.9	23.7		
		40.00	27.7	34.2		
		50.00	50.0			
		60.00	87.1			
		70.00	172.			
		80.00	402.			
DELTA K MAX	A:	88.23	918.			
	B:	48.57		54.2		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			21.41	14.70		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM:
SPECIMEN TYPE: SENT
ORIENTATION:
FREQUENCY: 0.17 HZ
ENVIRONMENT: + 800° F, AIR

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK: 0.121- 0.124"
SPECIMEN WIDTH: 2.500"
REFERENCES:PW003

NICKEL BASE

ASTROLOY 901

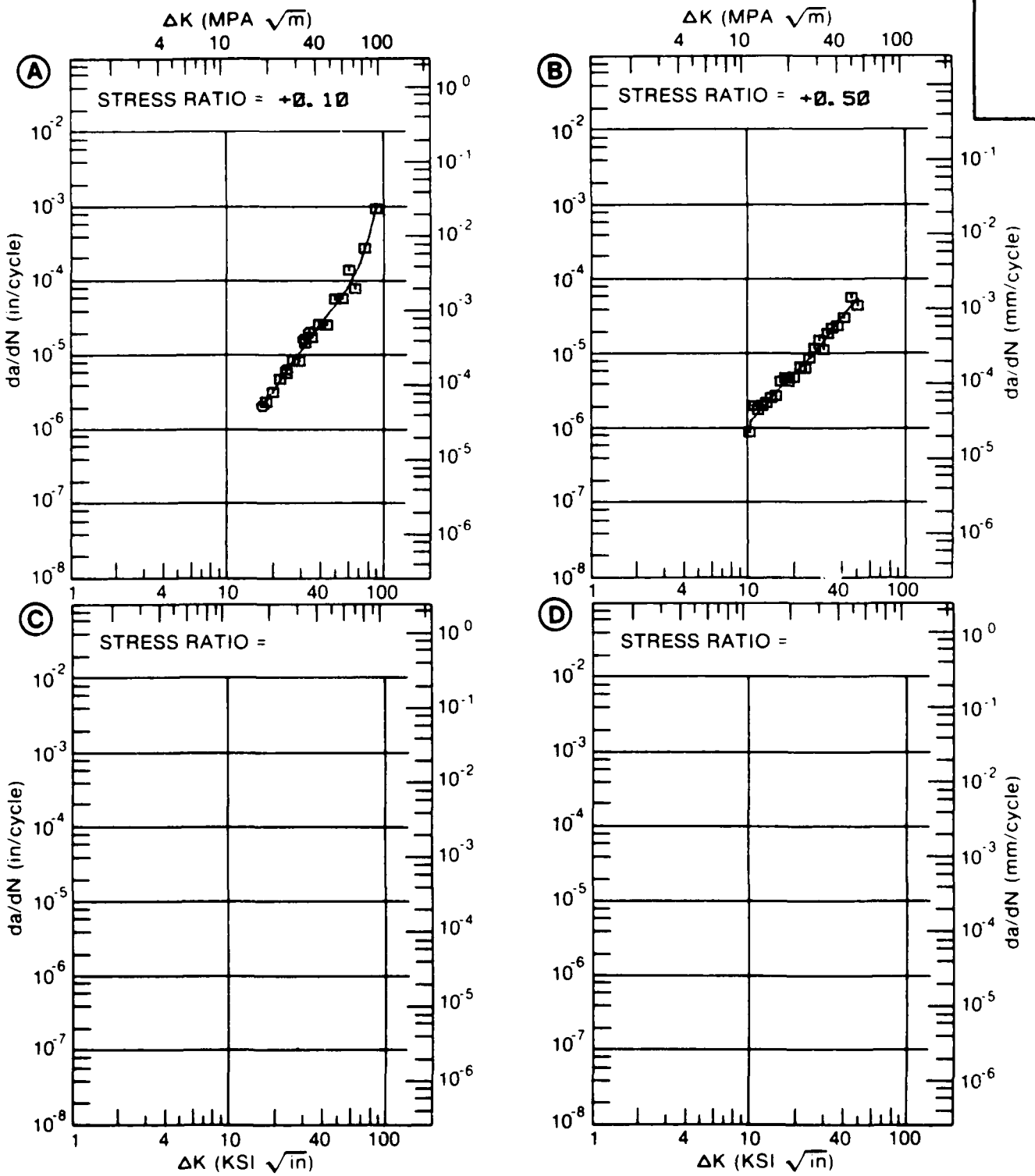


Figure 5.3.3.2

TABLE 5.3.3.3

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.3.3.3 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE ASTROLOY 901
CONDITION:
ENVIRONMENT: + 800F, AIR

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE) A	B	C	D
		R=+0.70			
DELTA K MIN	A: 8.01	.441			
	B:				
	C:				
	D:				
	9.00	.428			
	10.00	.601			
	13.00	1.44			
	16.00	2.26			
	20.00	3.93			
	25.00	5.98			
DELTA K MAX	A: 26.83	7.68			
	B:				
	C:				
	D:				

ROOT MEAN SQUARE PERCENT ERROR 14.00

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM:
SPECIMEN TYPE: SENT
ORIENTATION:
FREQUENCY: 30.00 HZ
ENVIRONMENT: + 800° F, AIR

YIELD STRENGTH:
ULT STRENGTH:
SPECIMEN THK: 0.123"
SPECIMEN WIDTH: 2.500"
REFERENCES PW003

NICKEL BASE

ASTROLOY 901

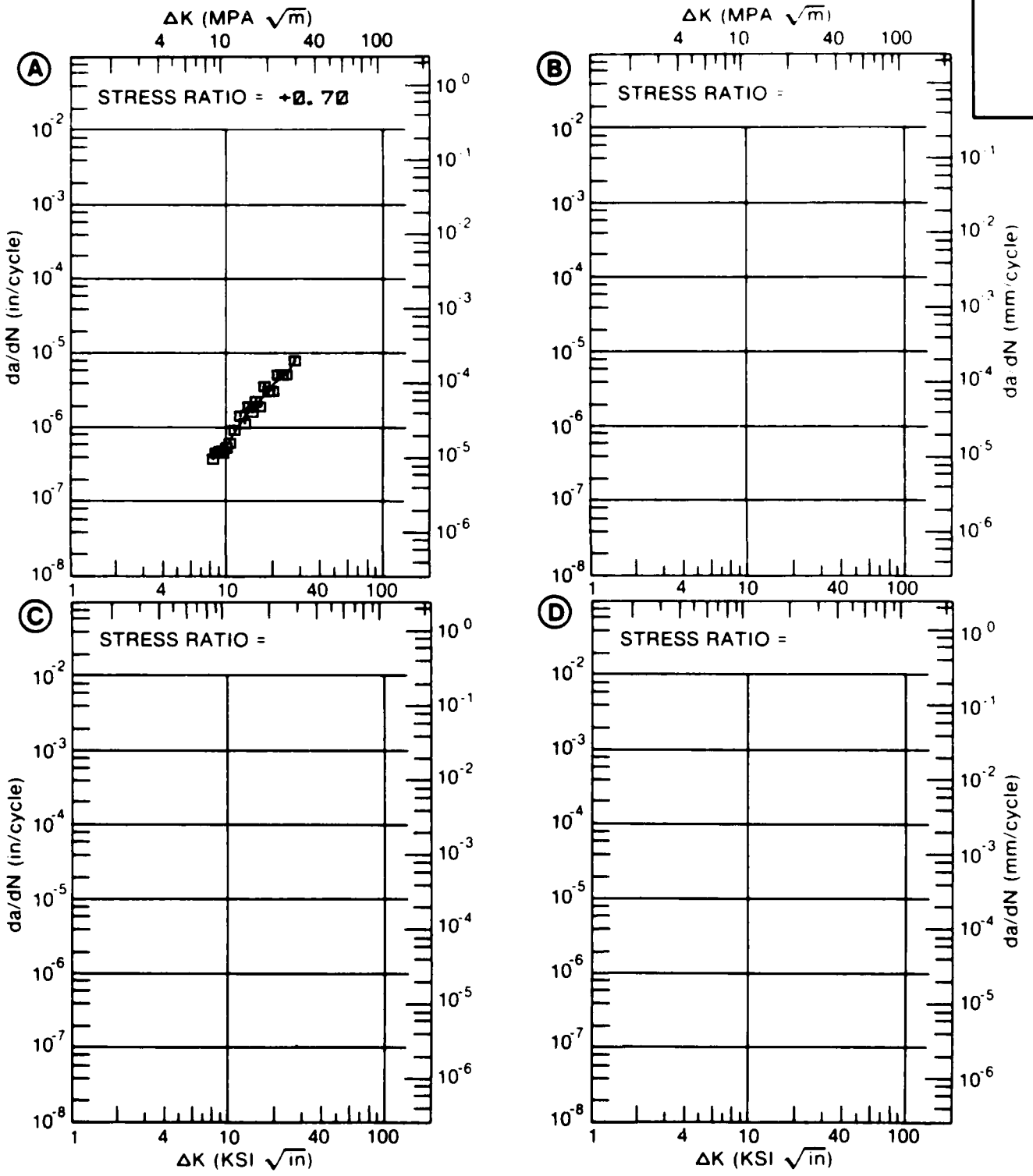


Figure 5.3.3.3

TABLE 5.3.3.4

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.3.3.4 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE ASTROLOY 901
CONDITION:
ENVIRONMENT: + 950F, AIR

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		R=+0.10	R=+0.50	R=+0.80	
DELTA K MIN A:	14.98	1.53			
DELTA K MIN B:	13.38		1.60		
DELTA K MIN C:	8.44			.948	
DELTA K MIN D:					
	9.00			1.64	
	10.00			2.08	
	13.00			3.12	
	16.00	3.15	4.57	5.03	
	20.00	6.81	10.0	7.69	
	25.00	10.6	15.6		
	30.00	15.8	20.7		
	35.00	22.1	27.7		
	40.00	30.4	39.7		
	50.00	65.5			
	60.00	151.			
	70.00	191.			
DELTA K MAX A:	71.72	182.			
DELTA K MAX B:	42.89		50.9		
DELTA K MAX C:	24.05			11.9	
DELTA K MAX D:					
ROOT MEAN SQUARE PERCENT ERROR		18.21	16.75	12.71	

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM:
SPECIMEN TYPE: SENT
ORIENTATION:
FREQUENCY: Ø.17 HZ
ENVIRONMENT: + 950° F. AIR

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK: Ø.117- Ø.123"
SPECIMEN WIDTH: 2.500"
REFERENCES:PW003

NICKEL BASE

ASTROLOY 901

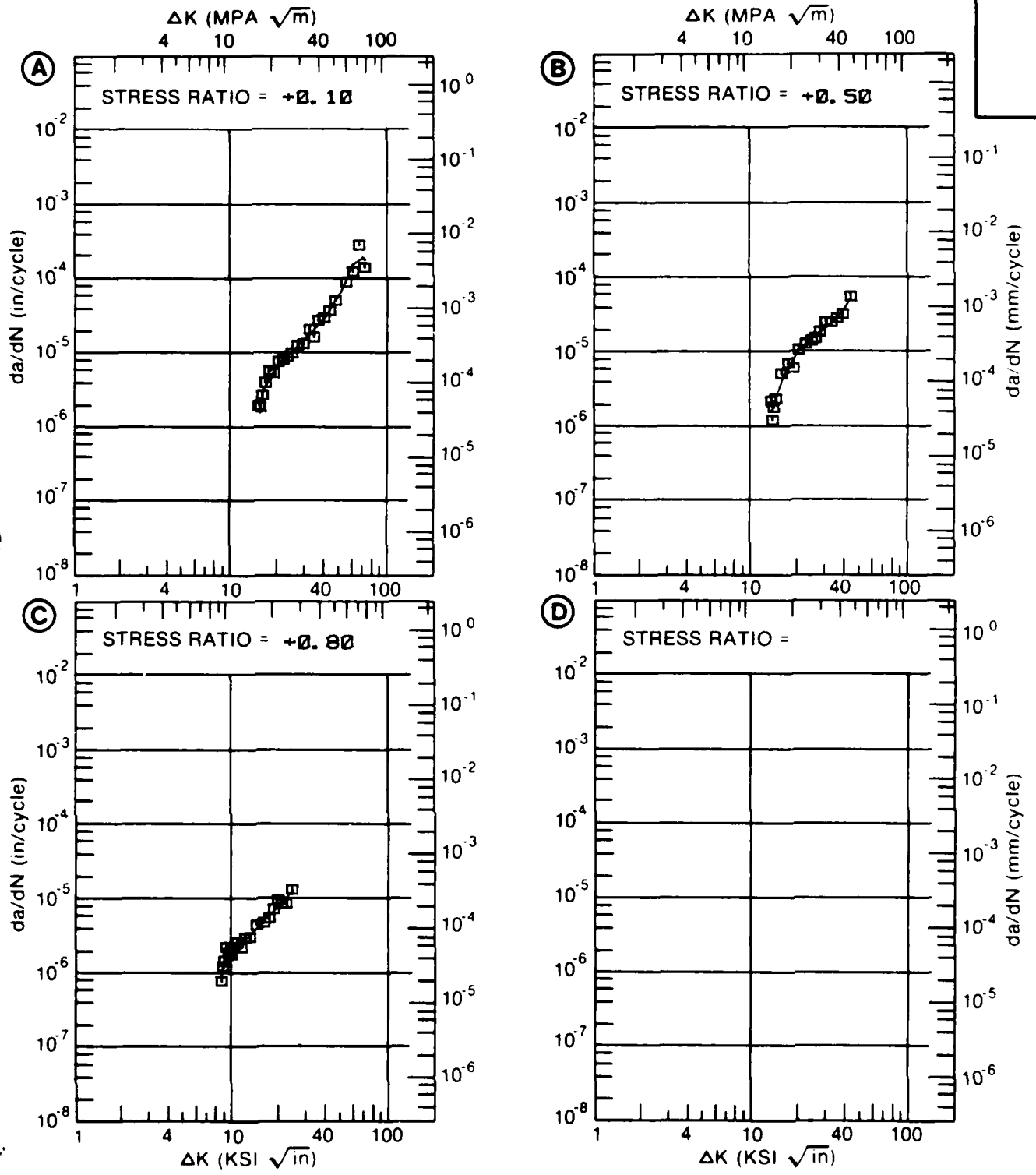


Figure 5.3.3.4

TABLE 5.3.3.5

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.3.3.5 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE ASTROLOY 901
CONDITION:
ENVIRONMENT: +1100F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.10	R=+0.50		
DELTA K MIN	A:	17.59	7.88			
	B:	15.58		5.64		
	C:					
	D:					
		16.00		6.02		
		20.00	11.4	11.4		
		25.00	19.3	20.2		
		30.00	27.9	26.9		
		35.00	37.0	35.0		
		40.00	47.3	50.9		
		50.00	78.0			
		60.00	139.			
DELTA K MAX	A:	67.44	249.			
	B:	48.57		110.		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			14.45	13.87		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM:
SPECIMEN TYPE: SENT
ORIENTATION:
FREQUENCY: Ø. 17 HZ
ENVIRONMENT: +1100° F. AIR

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK: Ø. 122"
SPECIMEN WIDTH: 2. 500"
REFERENCES: PW003

NICKEL BASE

ASTROLOY 901

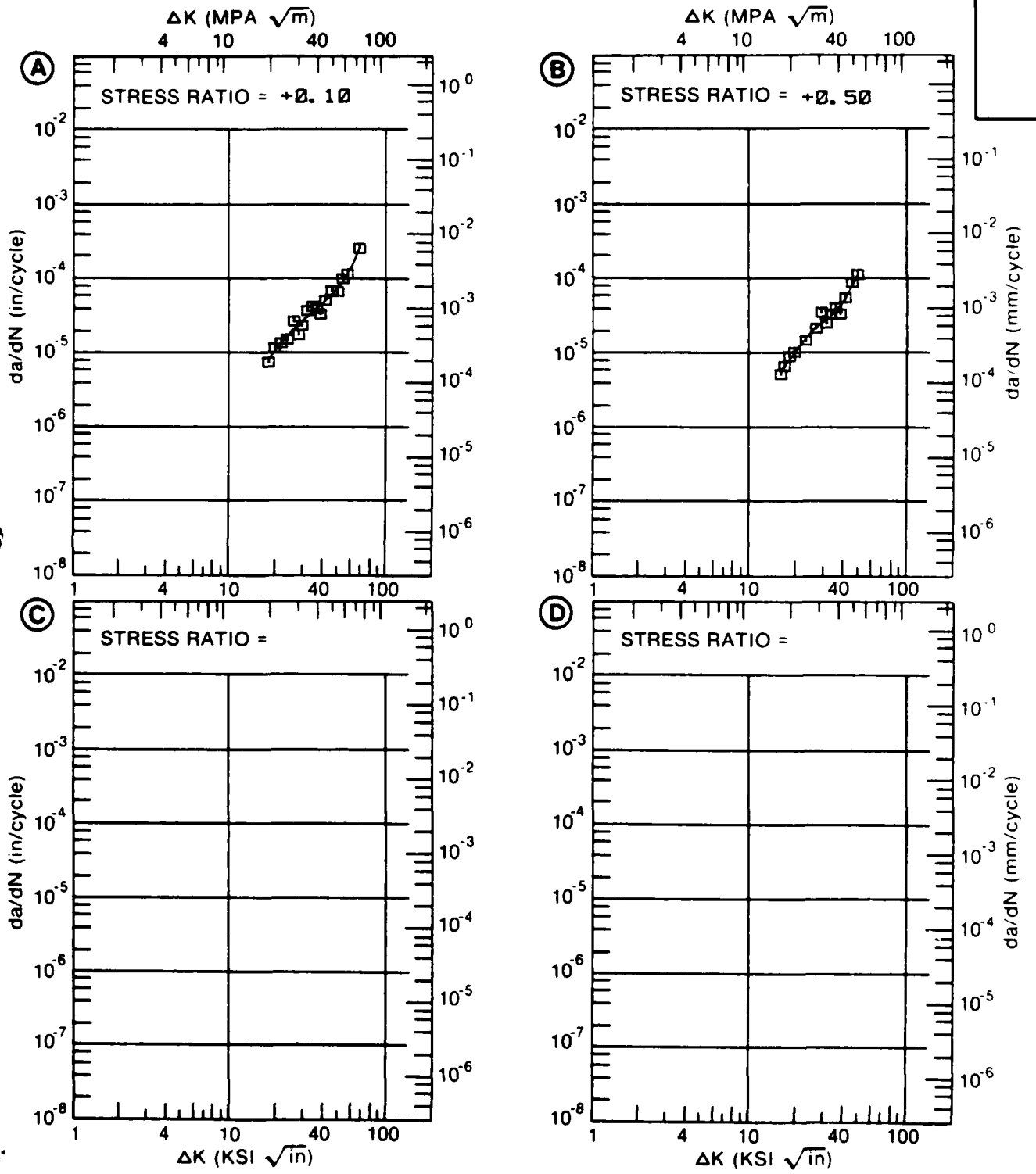


Figure 5.3.3.5

TABLE 5.3.3.6

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.3.3.6 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE ASTROLOY 901
CONDITION:
ENVIRONMENT: +1350F, AIR

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE) A	B	C	D
		R=+0.10			
DELTA K MIN	A:				
	B:				
	C:				
	D:				
200.00					
DELTA K MAX	A:				
	B:				
	C:				
	D:				

ROOT MEAN SQUARE PERCENT ERROR 0.00

LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM:
SPECIMEN TYPE: SENT
ORIENTATION:
FREQUENCY: 0.17 HZ
ENVIRONMENT: +1350° F, AIR

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK:
SPECIMEN WIDTH: 2.500"
REFERENCES:PW003

NICKEL BASE

ASTROLOY 901

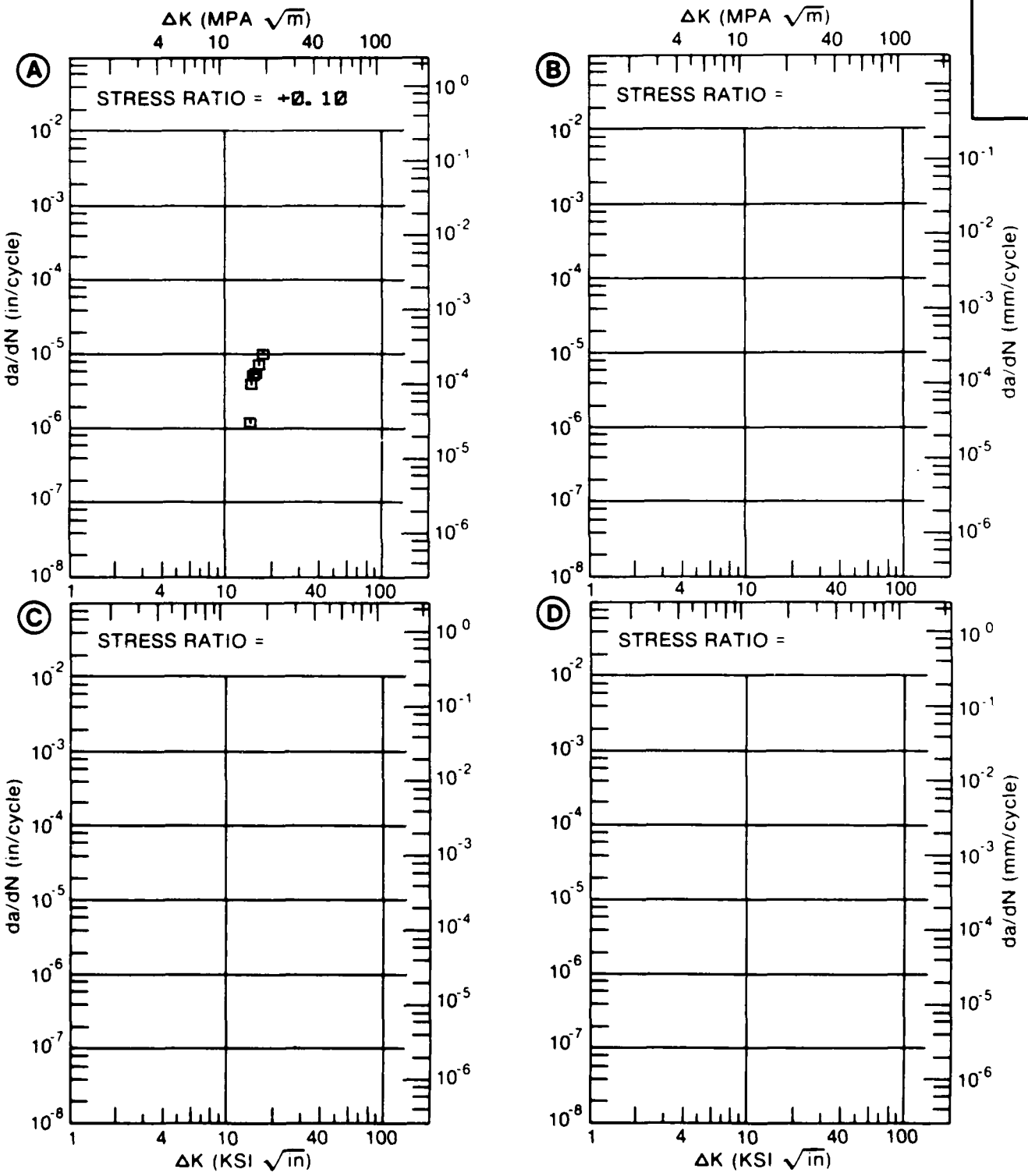


Figure 5.3.3.6

TABLE 5.3.3.7

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.3.3.7 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE ASTROLOY 901
CONDITION:

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+800F AIR	E=+1100F AIR		
DELTA K MIN	A:	10.86	1.81			
	B:	11.04		4.57		
	C:					
	D:					
		13.00	2.58	5.22		
		16.00	3.71	10.9		
		20.00	5.96	16.6		
		25.00	9.97	24.6		
		30.00	13.8	35.1		
		35.00	19.9	37.8		
		40.00	29.4			
DELTA K MAX	A:	45.80	37.3			
	B:	36.86		35.6		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			11.65	15.60		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM:
SPECIMEN TYPE: SENT
ORIENTATION: C-R
STRESS RATIO: +0.50
FREQUENCY: 0.17 HZ

YIELD STRENGTH:
ULT STRENGTH:
SPECIMEN THK: 0.122"
SPECIMEN WIDTH: 2.500"
REFERENCES: PW003

NICKEL BASE

ASTROLOY 901

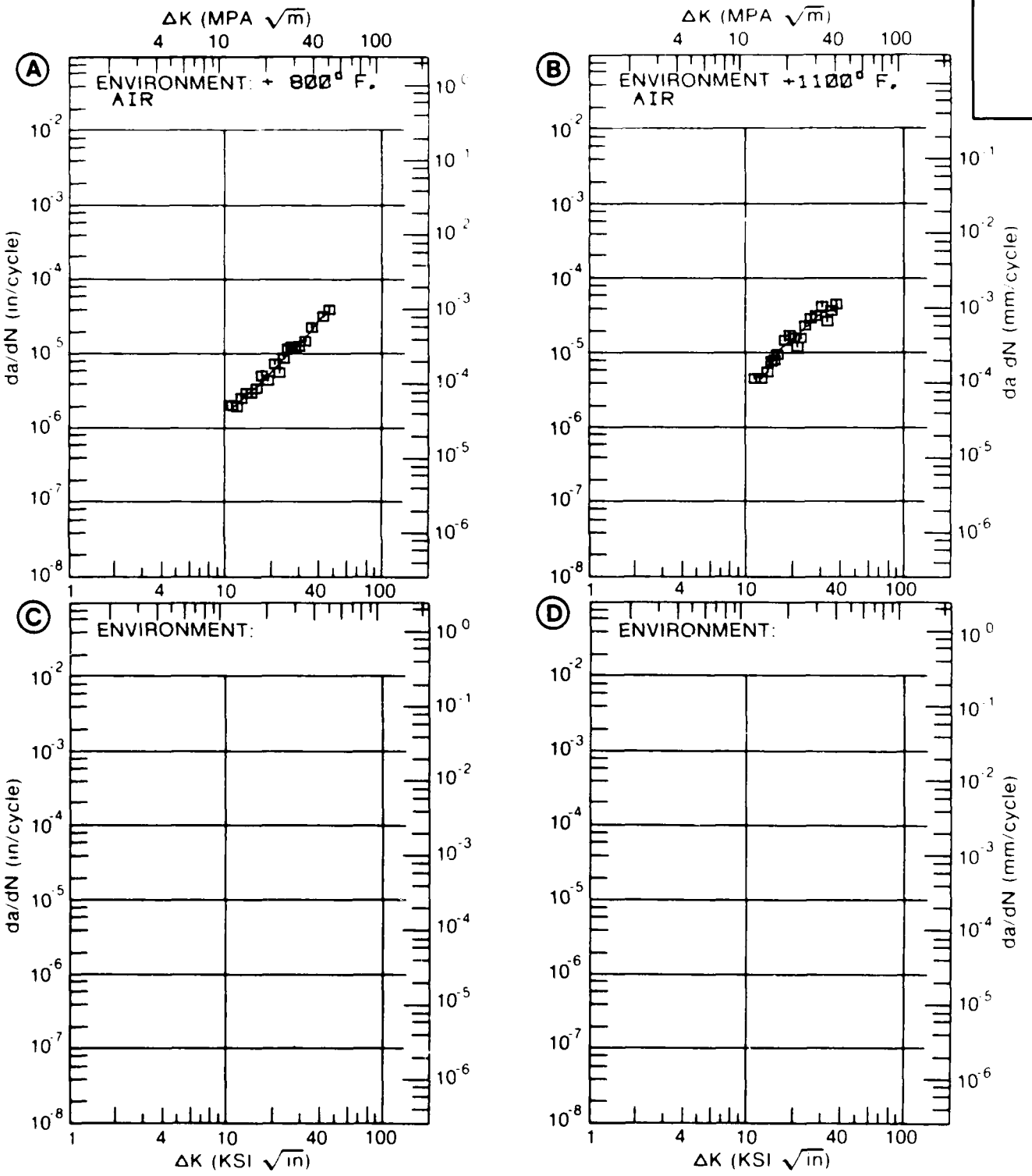


Figure 5.3.3.7

TABLE 5.3.3.8

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.3.3.8 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE ASTROLOY 901
CONDITION:

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+ 800F AIR	E=+1100F AIR		
DELTA K MIN	A:	8.97	.504			
	B:	7.57		.560		
	C:					
	D:					
		8.00		.661		
		9.00	.504	.894		
		10.00	.567	1.12		
		13.00	1.23	1.82		
		16.00		2.78		
		20.00		5.32		
		25.00		14.3		
DELTA K MAX	A:	15.69	1.88			
	B:	25.23		15.0		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			9.84	17.19		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM:
SPECIMEN TYPE: SENT
ORIENTATION:
STRESS RATIO: +0.70
FREQUENCY: 30.00 HZ

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK: 0.119- 0.123"
SPECIMEN WIDTH: 2.500"
REFERENCES:PW003

NICKEL BASE

ASTROLOY 901

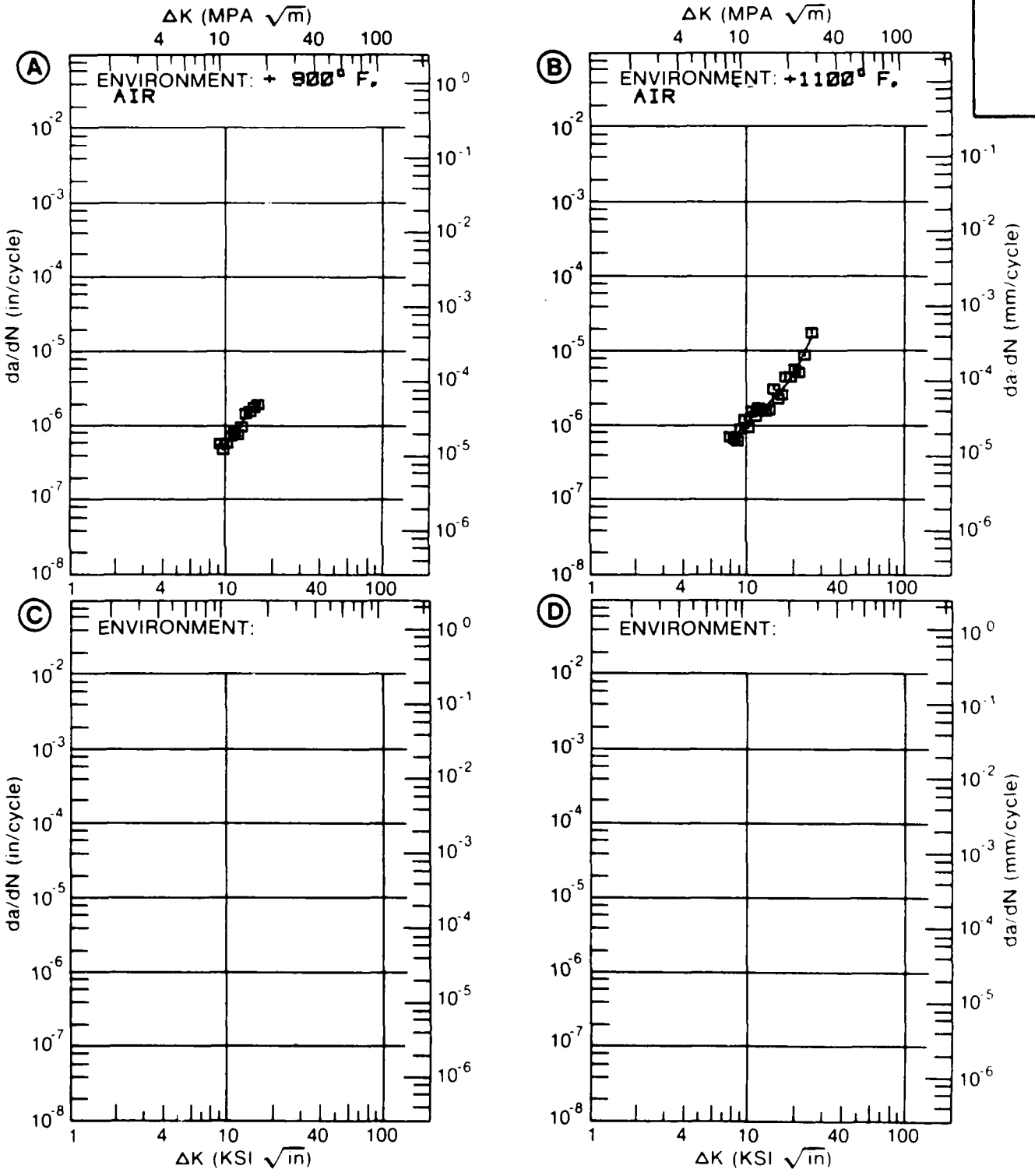


Figure 5.3.3.8

TABLE 5.4.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.4.3.1 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCOLOY 901
CONDITION:

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE) A	B	C	D
		E=+ 900F AIR			
DELTA K MIN	A: 14.89	.779			
	B:				
	C:				
	D:				
	16.00	1.00			
	20.00	2.20			
	25.00	4.87			
	30.00	9.23			
	35.00	15.6			
	40.00	24.3			
	50.00	48.7			
DELTA K MAX	A: 56.30	68.7			
	B:				
	C:				
	D:				

ROOT MEAN SQUARE PERCENT ERROR 23.65

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM:
SPECIMEN TYPE: CT
ORIENTATION: C-R
STRESS RATIO: +0.05
FREQUENCY: 20.00 HZ

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK: 0.500"
SPECIMEN WIDTH: 2.500"
REFERENCES:PW003

NICKEL BASE

INCOLOY 901

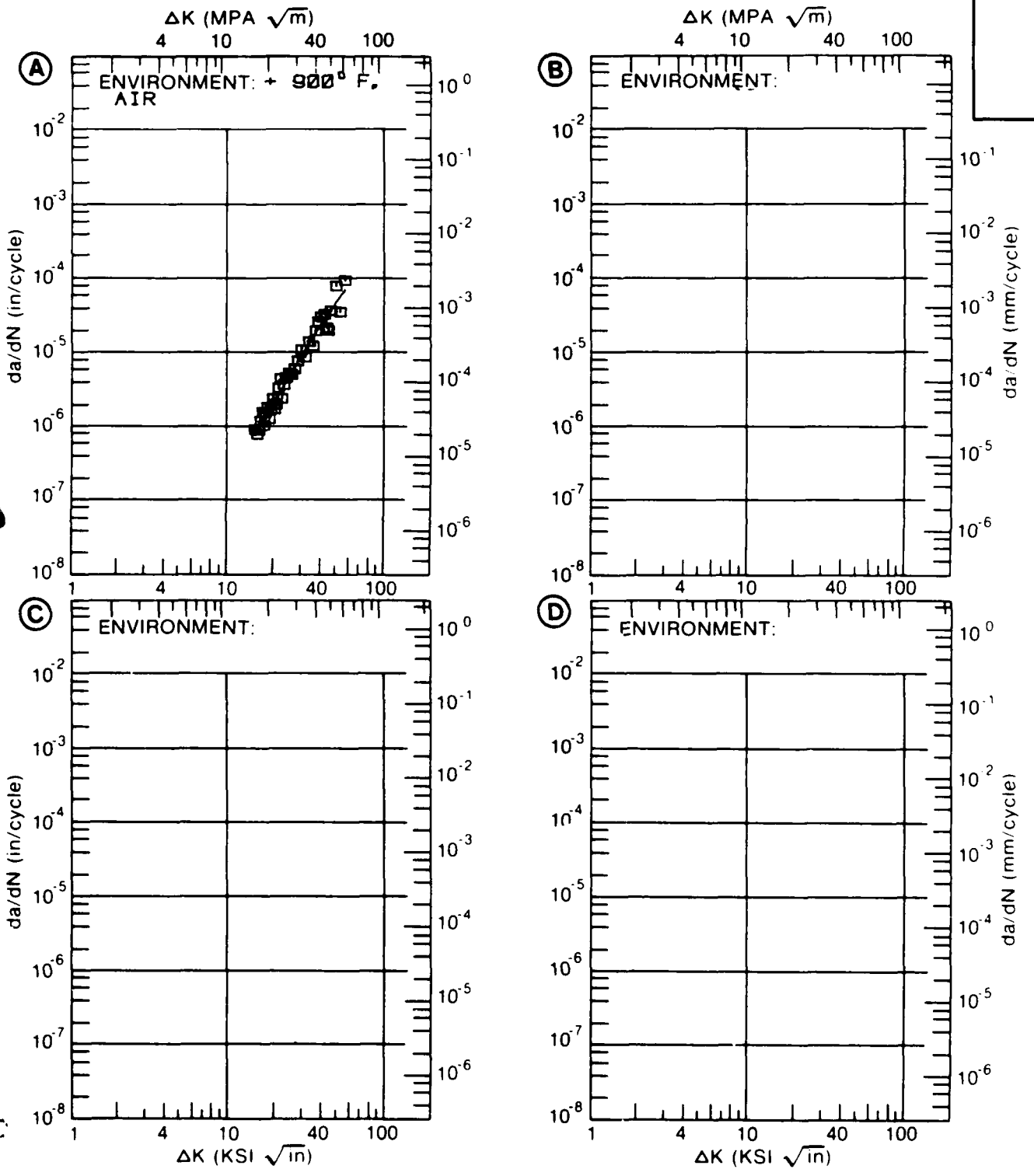


Figure 5.4.3.1

Table 5.5.1.1

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE INCONEL 600

TEST CONDITIONS

SPECIMEN ORIENTATION: Unknown

ENVIRONMENT: AIR AT 800 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1585F 75HR AC	PLATE	0.05	6.67					1.71		
1585F 75HR AC	PLATE	0.33	6.67					3.91		
1585F 75HR AC	PLATE	0.60	6.67				0.54			

Table 5.5.1.2

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE INCONEL 600

TEST CONDITIONS:

SPECIMEN ORIENTATION: Unknown

ENVIRONMENT: AIR AT 1000 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1585F 75HR AC	PLATE	0.05	6.67					3.85		
1585F 75HR AC	PLATE	0.05	0.67					4.60		
1585F 75HR AC	PLATE	0.33	6.67					6.55		
1585F 75HR AC	PLATE	0.50	6.67				0.86			
1585F 75HR AC	PLATE	0.66	6.67				0.68			
1585F 75HR AC, 1000F 18000 HRS	PLATE	0.05	0.67					4.81		

TABLE 5.5.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.5.3.1 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE INCONEL 600
CONDITION: 1585F .75HR AC
ENVIRONMENT: R.T. ,AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.05			
DELTA K MIN	A:	25.33	2.73			
	B:					
	C:					
	D:					
		30.00	5.03			
		35.00	10.3			
		40.00	18.7			
DELTA K MAX	A:	40.56	19.8			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 5.08

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: 1585F .75HR AC
FORM: 1.00"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION:
FREQUENCY: 5.00 HZ
ENVIRONMENT: R.T., AIR

YIELD STRENGTH: 35.0 KSI
ULT. STRENGTH: 94.3 KSI
SPECIMEN THK: 0.390"
SPECIMEN WIDTH: 2.000"
REFERENCES:HD003

NICKEL BASE

INCONEL 600

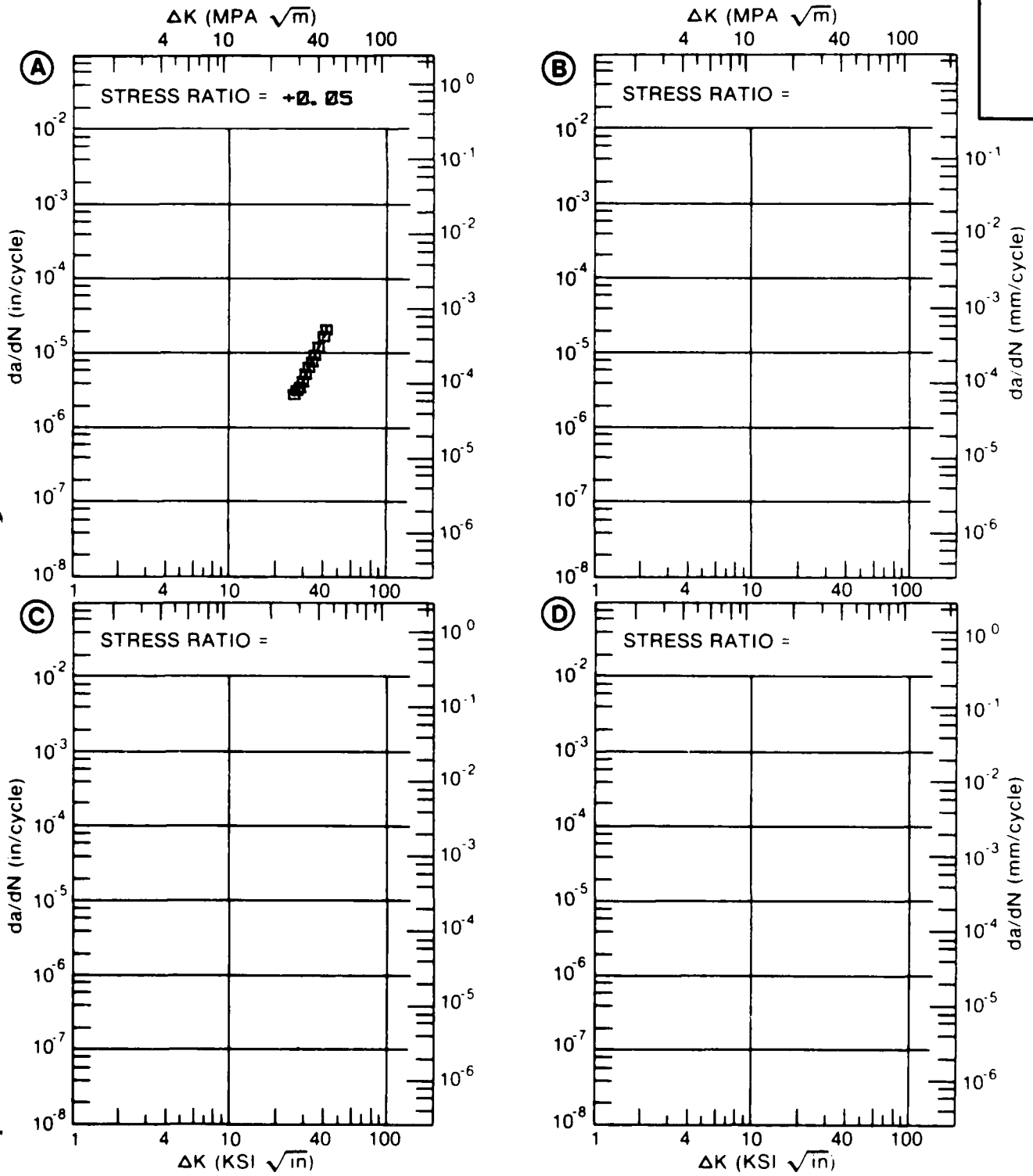


Figure 5.5.3.1

TABLE 5.5.3.2

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.5.3.2 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE INCONEL 600
CONDITION: 1585F .75HR AC
ENVIRONMENT: + 800F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.05	R=+0.33	R=+0.60	
DELTA K MIN	A:	16.89	.630			
	B:	12.17		.490		
	C:	6.90			.172	
	D:					
		7.00			.176	
		8.00			.250	
		9.00			.379	
		10.00			.547	
		13.00		.623		
		16.00		1.35		
		20.00	1.71	3.91		
		25.00	5.41			
DELTA K MAX	A:	27.20	9.04			
	B:	20.75		4.85		
	C:	12.06			.818	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			7.02	8.23	7.41	
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1	1	
		1.25-2.0				
		>2.0				

CONDITION/HT: 1585F .75HR AC
FORM: 1.00"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION:
FREQUENCY: 6.67 HZ
ENVIRONMENT: + 800° F, AIR

YIELD STRENGTH: 35.0 KSI
ULT. STRENGTH: 94.3 KSI
SPECIMEN THK: 0.412- 0.413"
SPECIMEN WIDTH: 2.002- 2.003"
REFERENCES: HD003

NICKEL BASE

INCONEL 600

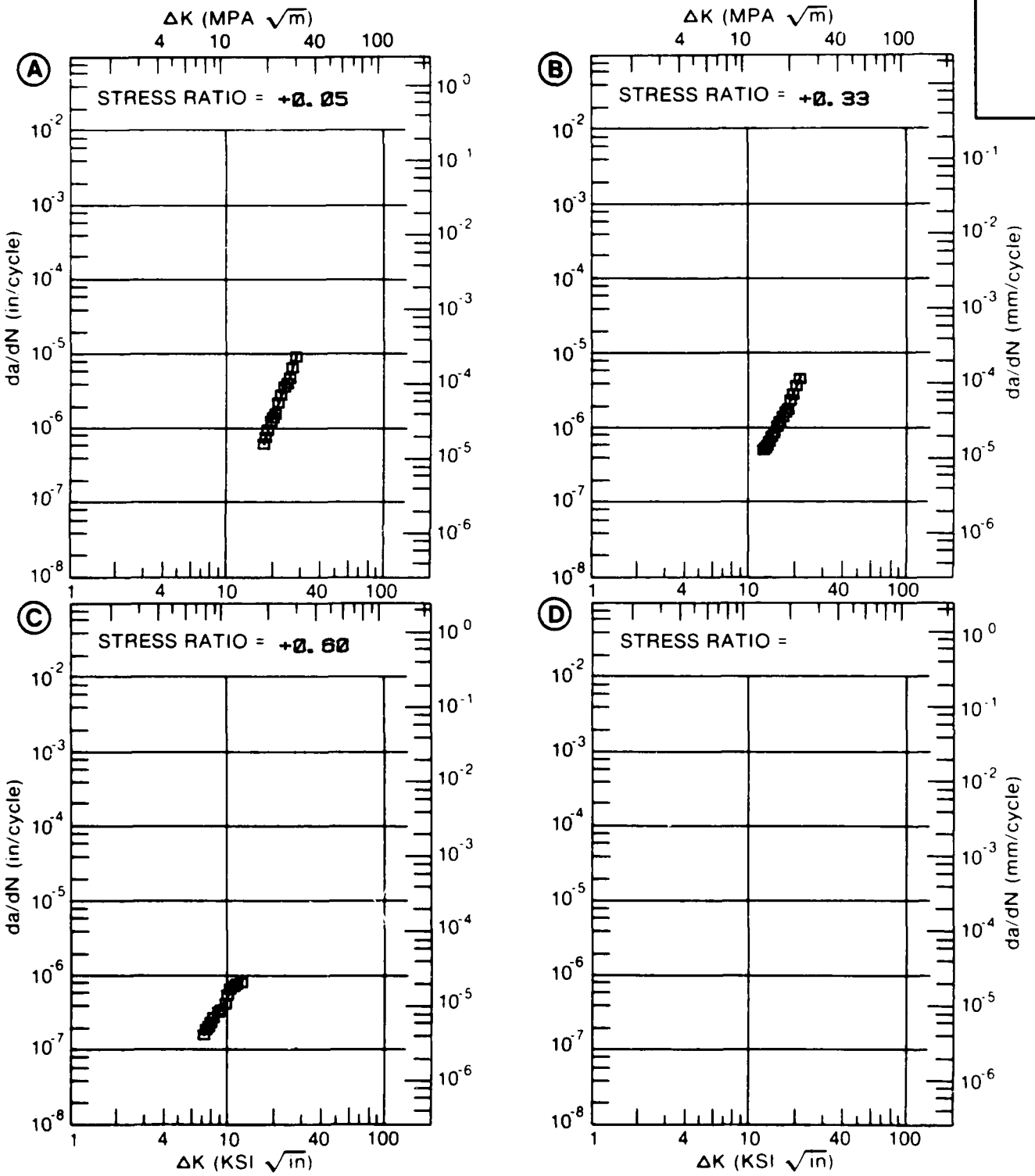


Figure 5.5.3.2

TABLE 5.5.3.3

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.5.3.3 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE INCONEL 600
CONDITION: 1585F .75HR AC
ENVIRONMENT: +1000F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.33	R=+0.50	R=+0.66	
DELTA K MIN	A:	11.70	1.02			
	B:	9.14		.688		
	C:	6.43			.208	
	D:					
		7.00			.255	
		8.00			.366	
		9.00			.512	
		10.00		.861	.684	
		13.00	1.32	1.73		
		16.00	2.79	3.53		
		20.00	6.55			
DELTA K MAX	A:	22.90	9.57			
	B:	16.53		4.03		
	C:	11.40			.941	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			4.59	4.43	2.38	
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1	1	
		1.25-2.0				
		>2.0				

CONDITION/HT: 1585F .75HR AC
FORM: 1.00"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION:
FREQUENCY: 6.67 HZ
ENVIRONMENT: +1000° F, AIR

YIELD STRENGTH: 35.0 KSI
ULT. STRENGTH: 94.3 KSI
SPECIMEN THK: 0.410- 0.413"
SPECIMEN WIDTH: 2.002- 2.004"
REFERENCES: HD003

NICKEL BASE

INCONEL 600

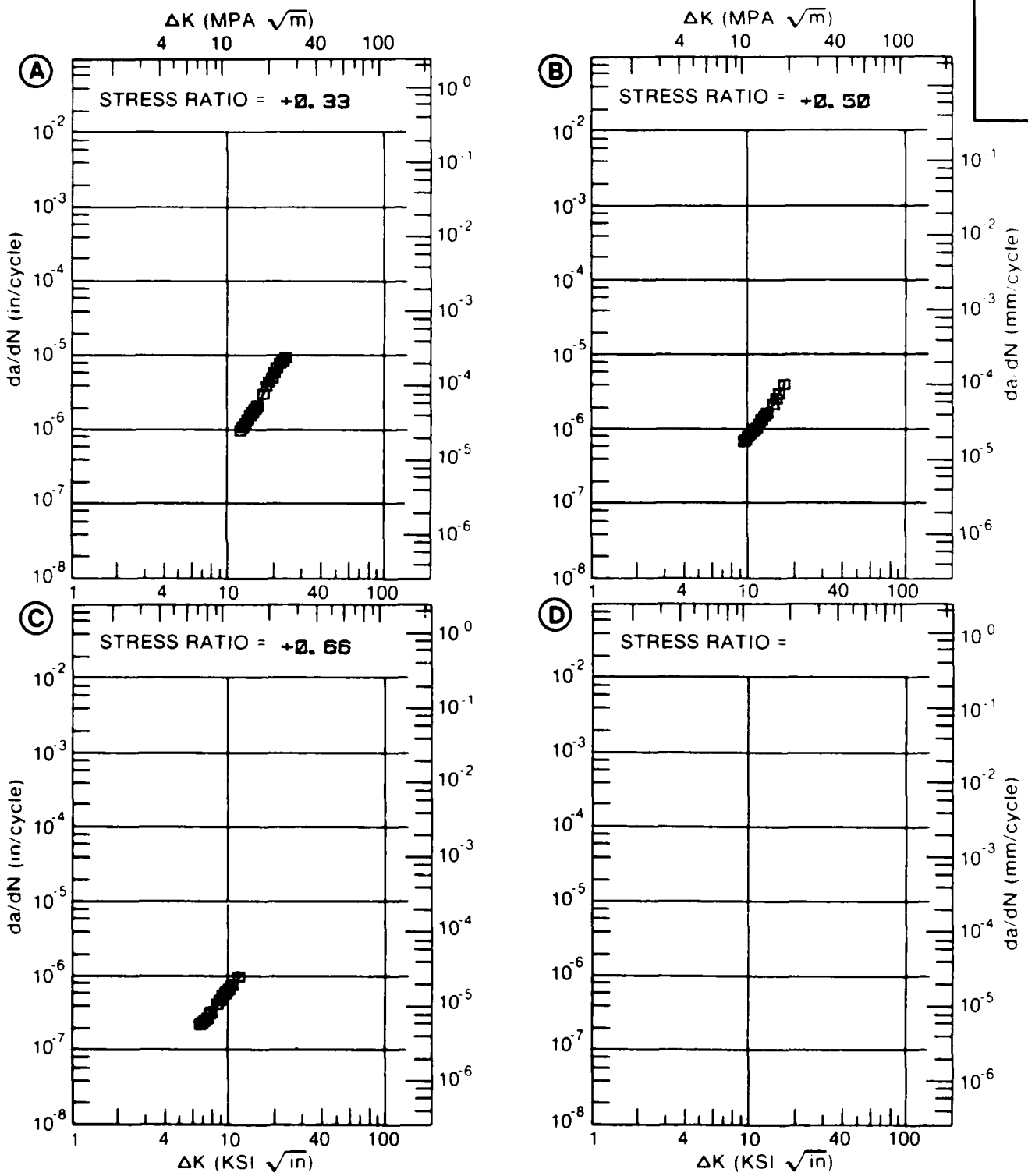


Figure 5.5.3.3

TABLE 5.5.3.4

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.5.3.4 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 600
CONDITION: 1585F 75HR AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+ 600F AIR	E=+ 800F AIR	E=+1000F AIR	E=+1200F AIR
DELTA K MIN	A:	25.08	4.25			
	B:	22.56		4.60		
	C:	19.93			4.54	
	D:					
		20.00			4.60	
		25.00		6.72	11.1	
		30.00	11.5	15.2	20.9	
DELTA K MAX	A:	31.85	17.2			
	B:	32.19		20.8		
	C:	32.64			27.5	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			15.37	5.28	4.51	0.00
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	2	1	2	
		1.25-2.0				
		>2.0				

CONDITION/HT: 1585F .75HR AC
FORM: 1.00"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION:
STRESS RATIO: +0.05
FREQUENCY: 0.67 HZ

YIELD STRENGTH: 35.0 KSI
ULT. STRENGTH: 94.3 KSI
SPECIMEN THK: 0.396- 0.402"
SPECIMEN WIDTH: 1.997- 2.001"
REFERENCES:HD003

NICKEL BASE

INCONEL 600

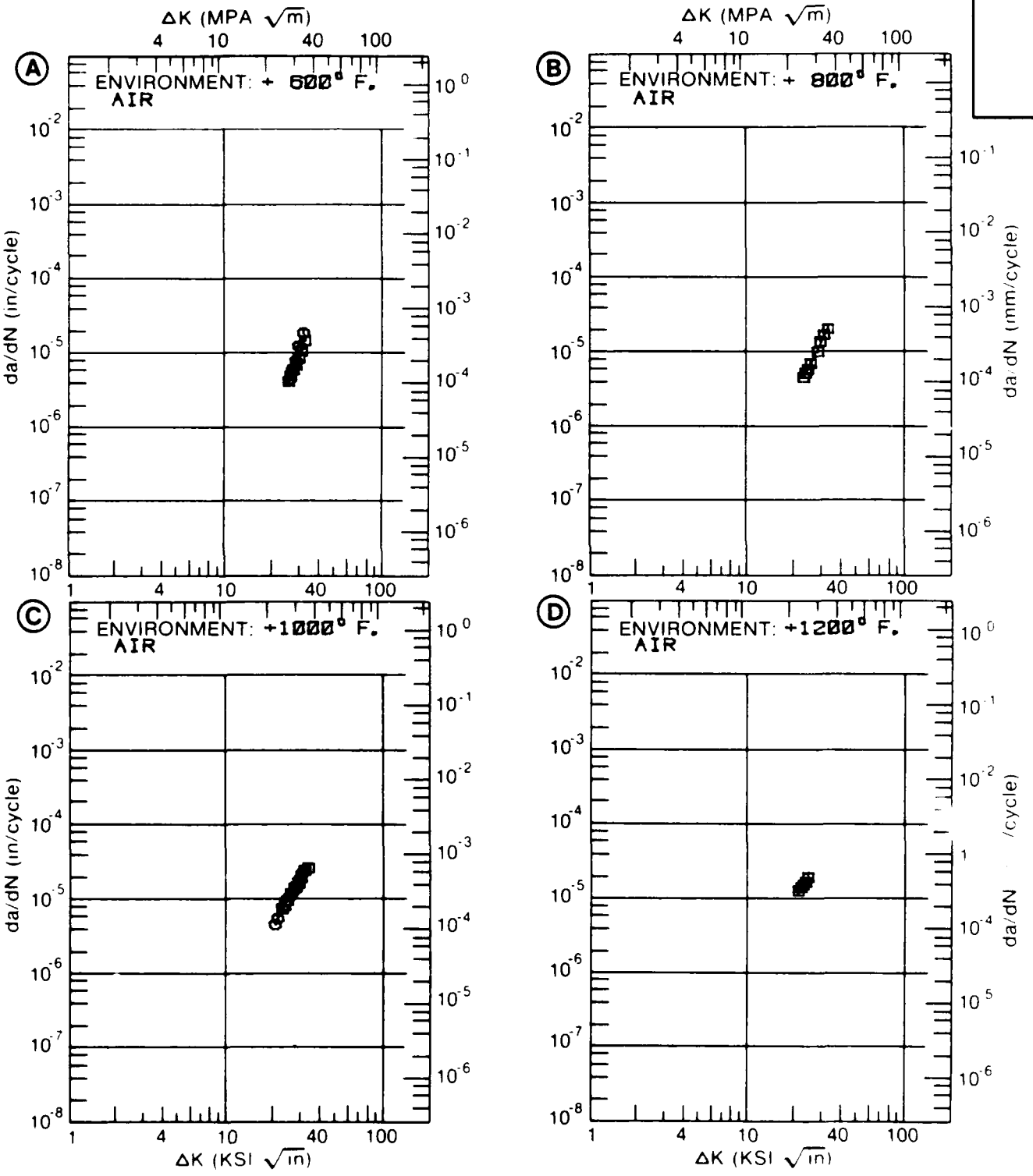


Figure 5.5.3.4

TABLE 5.5.3.5

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.5.3.5 INDICATING EFFECT

OF FREQUENCY

MATERIAL: NICKEL BASE INCONEL 600
CONDITION: 1585F .75HR AC
ENVIRONMENT: +1000F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			F(HZ)= 0.001	F(HZ)= 0.07	F(HZ)= 6.67	
DELTA K MIN	A:					
	B:	20.04		6.75		
	C:	16.50			1.55	
	D:					
		20.00			3.85	
		25.00		12.8	11.8	
		30.00		24.1	22.9	
DELTA K MAX	A:					
	B:	32.54		30.6		
	C:	30.56			23.9	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			0.00	3.86	7.59	
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25		1	1	
		1.25-2.0				
		>2.0				

CONDITION/HT: 1585F .75HR AC
FORM: 1.00"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION:
STRESS RATIO: +0.05
ENVIRONMENT: +1000° F, AIR

YIELD STRENGTH: 35.0 KSI
ULT. STRENGTH: 94.3 KSI
SPECIMEN THK: 0.412- 0.420"
SPECIMEN WIDTH: 2.002- 2.004"
REFERENCES: HD003

NICKEL BASE

INCONEL 600

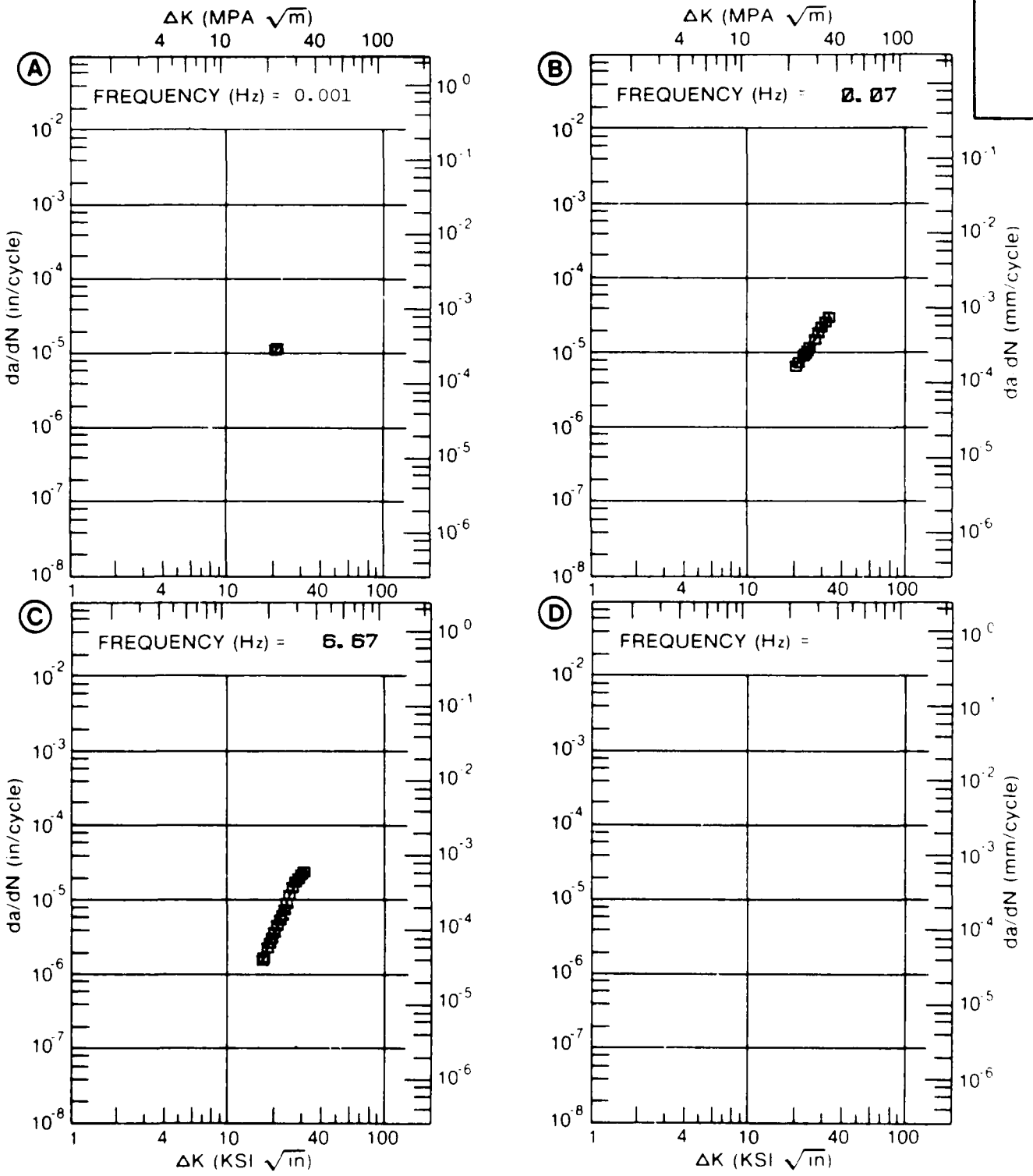


Figure 5.5.3.5

TABLE 5.5.3.6

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.5.3.6 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 600
CONDITION: 1585F 75HR AC, 1000F 18,800HRS

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+1000F AIR			
DELTA K MIN	A:	18.57	4.68			
	B:					
	C:					
	D:					
		20.00	4.81			
		25.00	13.2			
		30.00	24.3			
DELTA K MAX	A:	30.70	30.5			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 12.33

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	2
	1.25-2.0	
	>2.0	

CONDITION/HT: 1585F .75HR AC, 1000F 18,800HRS
FORM: 1.00"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION:
STRESS RATIO: +0.05
FREQUENCY: 0.67 HZ

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK: 0.398"
SPECIMEN WIDTH: 2.001"
REFERENCES:HD003

NICKEL BASE

INCONEL 600

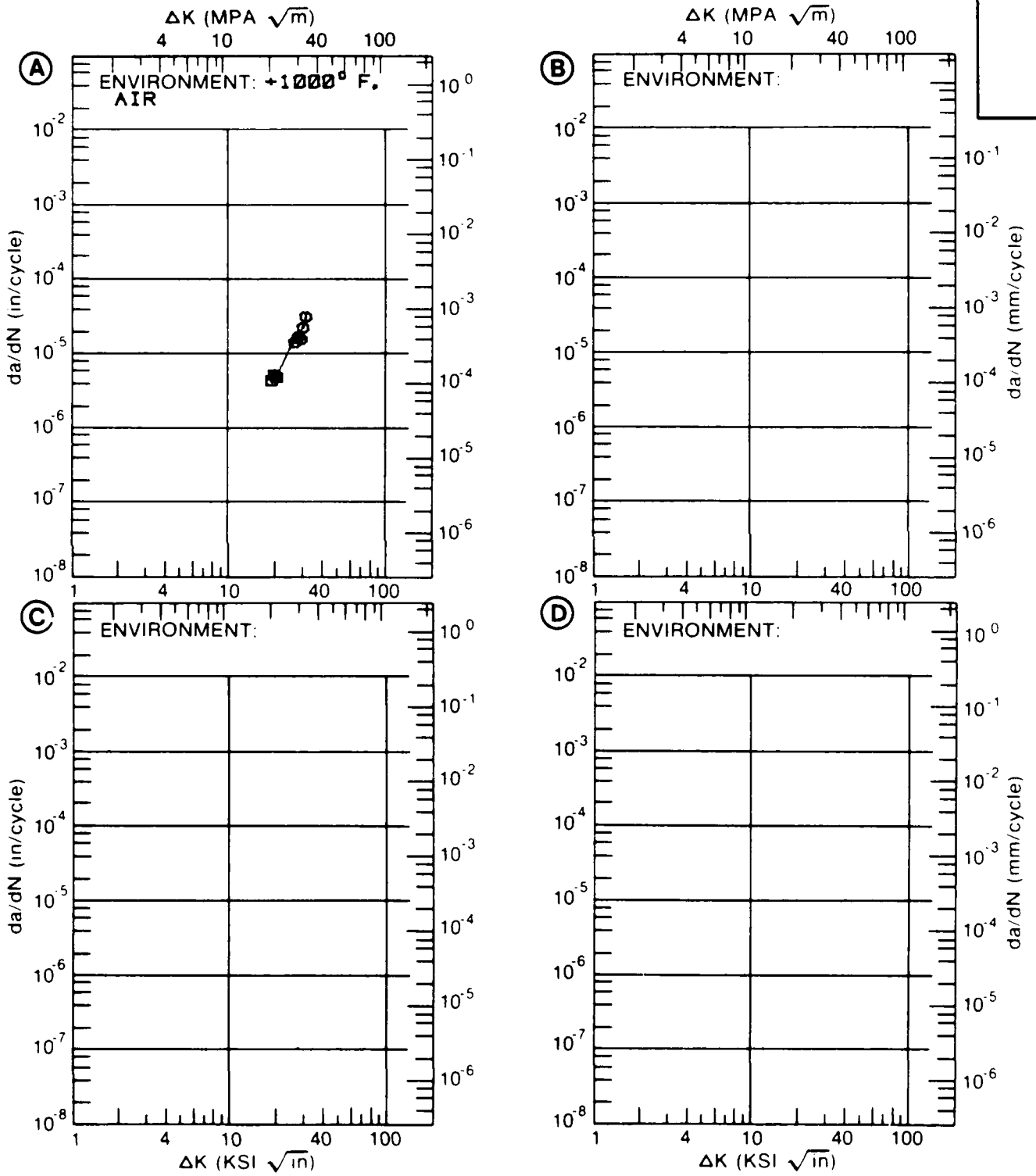


Figure 5.5.3.6

TABLE 5.5.3.7

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.5.3.7 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 600
CONDITION: 1585F 75HR AC, 1200F 14,500HRS

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+1200F AIR			
DELTA K MIN	A:	14.24	4.17			
	B:					
	C:					
	D:					
		16.00	7.87			
		20.00	18.3			
DELTA K MAX	A:	23.73	37.6			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR		5.92
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: 1585F .75HR AC. 1200F 14.500HRS
FORM: 1.00"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION:
STRESS RATIO: +0.05
FREQUENCY: 0.67 HZ

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK: 0.482"
SPECIMEN WIDTH: 2.005"
REFERENCES:HD003

NICKEL BASE

INCONEL 600

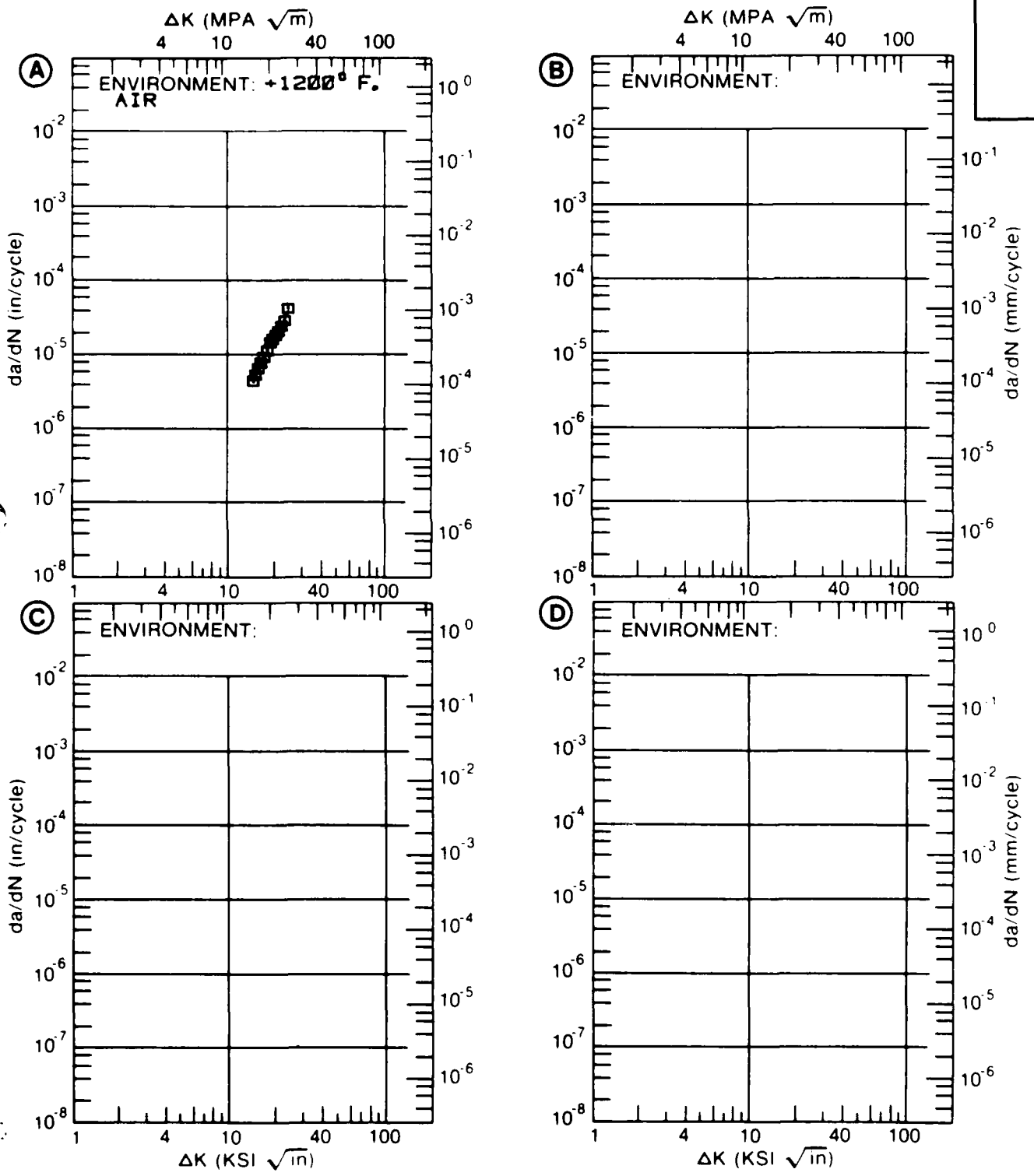


Figure 5.5.3.7

TABLE 5.6.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.6.3.1 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE INCONEL 625
CONDITION: MA
ENVIRONMENT: R.T., AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.05			
DELTA K MIN	A:	18.93	1.71			
	B:					
	C:					
	D:					
		20.00	2.07			
		25.00	4.35			
		30.00	8.25			
		35.00	15.4			
DELTA K MAX	A:	37.87	22.2			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR: 3.21

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: MA
FORM: 1.00"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION:
FREQUENCY: 10.00 HZ
ENVIRONMENT: R. T., AIR

YIELD STRENGTH: 65.9 KSI
ULT. STRENGTH: 132.9 KSI
SPECIMEN THK: 0.295"
SPECIMEN WIDTH: 1.153"
REFERENCES:HD005

NICKEL BASE

INCONEL 625

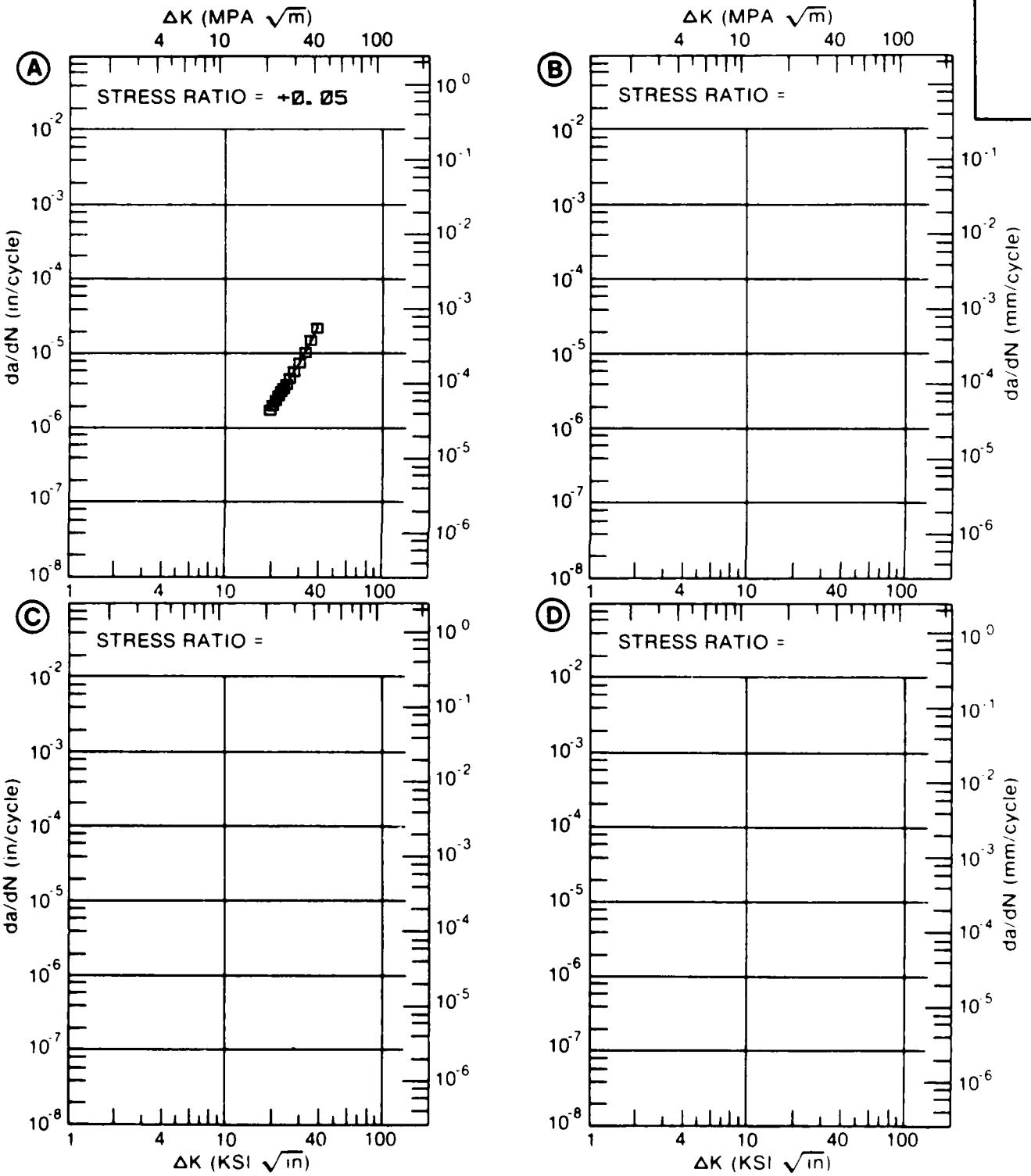


Figure 5.6.3.1

TABLE 5.6.3.2

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.6.3.2 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 625
CONDITION: MA

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. LAB AIR-10HZ			
DELTA K MIN	A:	20.25	3.01			
	B:					
	C:					
	D:					
		25.00	7.20			
		30.00	14.3			
		35.00	25.1			
		40.00	40.8			
DELTA K MAX	A:	49.76	94.8			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR		5.17
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: MA
FORM: 1.00"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION:
STRESS RATIO: +0.05
FREQUENCY:

YIELD STRENGTH: 65.9 KSI
ULT. STRENGTH: 132.9 KSI
SPECIMEN THK: 0.443"
SPECIMEN WIDTH: 2.002"
REFERENCES:HD005

NICKEL BASE

INCONEL 625

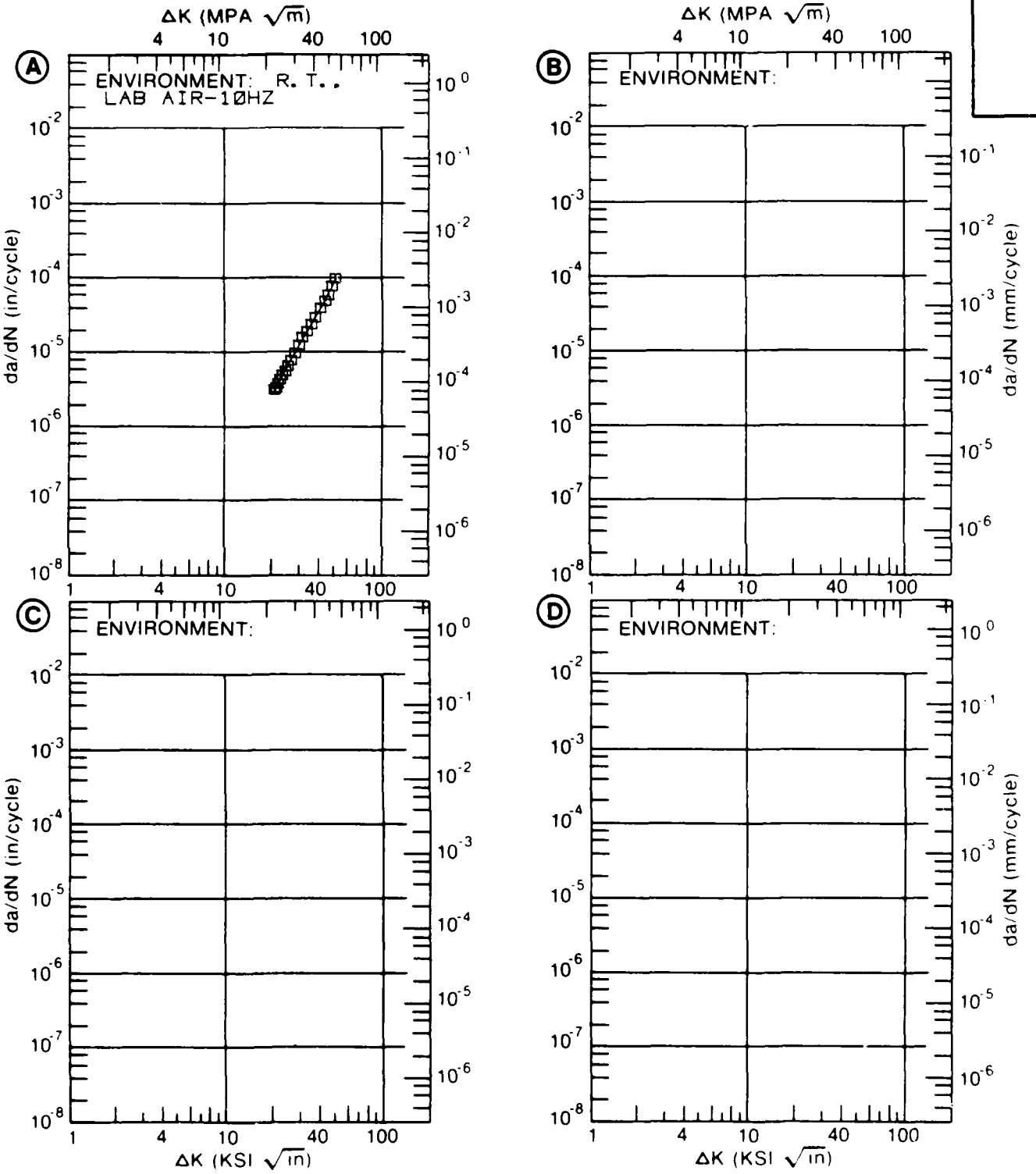


Figure 5.6.3.2

TABLE 5.6.3.3

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.6.3.3 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 625
CONDITION: MA

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+ 600F AIR	E=+ 800F AIR	E=+1000F AIR	E=+1200F AIR
DELTA K MIN	A:	20.70	6.81			
	B:	16.88		4.19		
	C:	15.46			5.59	
	D:	13.75				4.52
		16.00			5.87	7.50
		20.00		7.00	9.68	18.0
		25.00	12.5	18.3	20.0	40.3
		30.00	26.5	30.3	38.1	
		35.00	56.2		62.6	
DELTA K MAX	A:	35.47	60.3			
	B:	34.08		55.2		
	C:	35.43			64.8	
	D:	26.80				49.1
ROOT MEAN SQUARE PERCENT ERROR			4.72	7.54	5.17	4.35
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1	1	1
		1.25-2.0				
		>2.0				

CONDITION/HT: MA
FORM: 1.00"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION:
STRESS RATIO: +0.05
FREQUENCY: 0.67 HZ

YIELD STRENGTH: 65.9 KSI
ULT. STRENGTH: 132.9 KSI
SPECIMEN THK: 0.299"
SPECIMEN WIDTH: 1.153- 1.154"
REFERENCES:HD005

NICKEL BASE

INCONEL 625

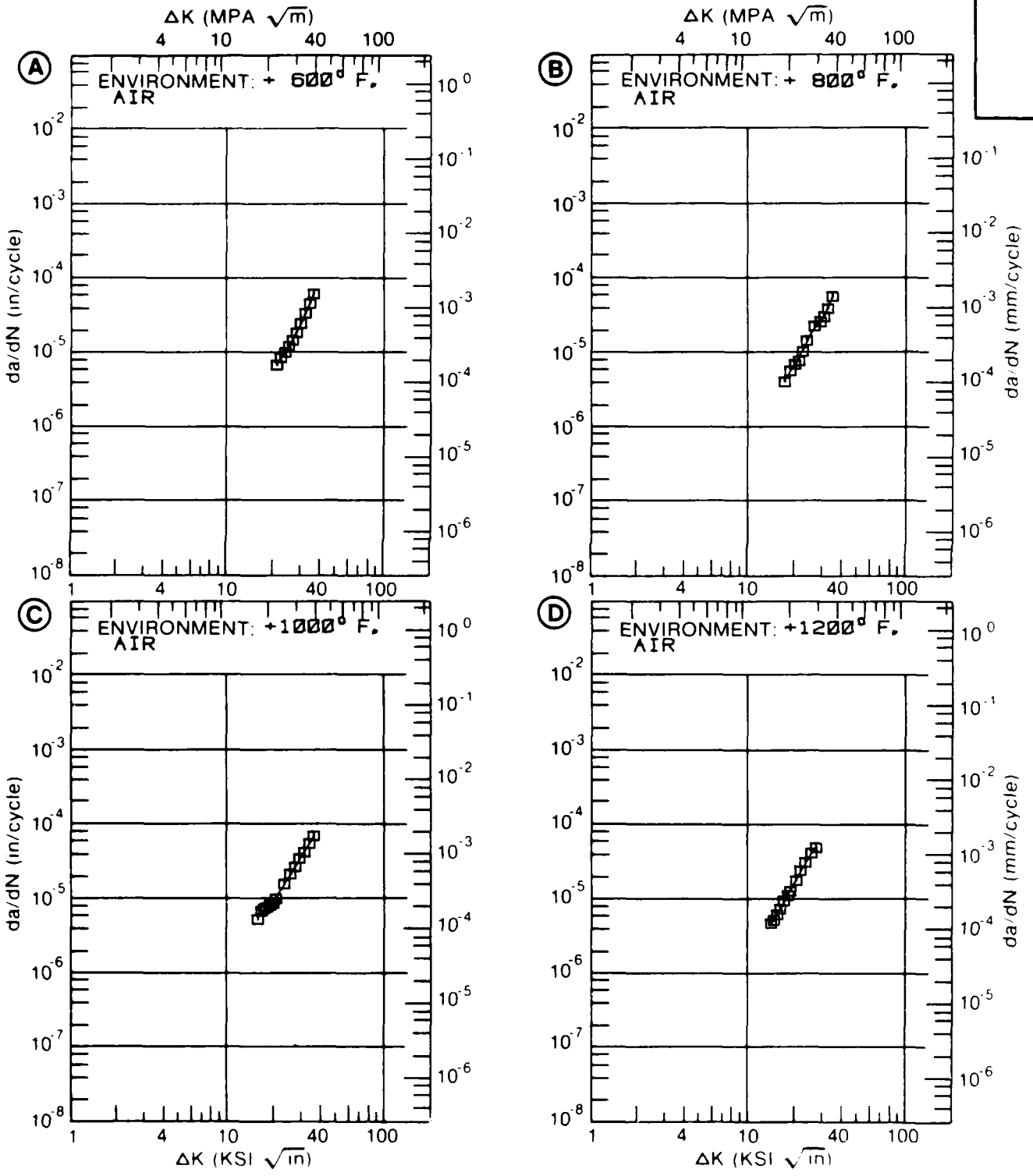


Figure 5.6.3.3

TABLE 5.6.3.4

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.6.3.4 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 625
CONDITION: MA

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		E=+ 600F AIR	E=+ 800F AIR	E=+1000F AIR	E=+1200F AIR
DELTA K MIN	A: 17.31	1.69			
	B: 19.54		4.13		
	C: 17.98			7.23	
	D: 14.04				6.78
	16.00				9.17
	20.00	2.98	4.55	9.05	16.5
	25.00	7.55	10.7	15.6	30.7
	30.00	15.9	21.0	26.9	50.4
	35.00	33.6	38.3	46.6	74.1
	40.00	63.7	67.0	80.8	
DELTA K MAX	A: 46.44	113.			
	B: 44.02		103.		
	C: 43.39			117.	
	D: 38.90				93.8
ROOT MEAN SQUARE PERCENT ERROR		6.43	3.83	3.21	2.39
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5				
	0.5-0.8				
	0.8-1.25	2	1	1	1
	1.25-2.0				
	>2.0				

CONDITION/HT: MA
FORM: 1.00"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION:
STRESS RATIO: +0.05
FREQUENCY: 0.67 HZ

YIELD STRENGTH: 65.9 KSI
ULT. STRENGTH: 132.9 KSI
SPECIMEN THK: 0.443- 0.445"
SPECIMEN WIDTH: 2.000- 2.002"
REFERENCES:HD005

NICKEL BASE

INCONEL 625

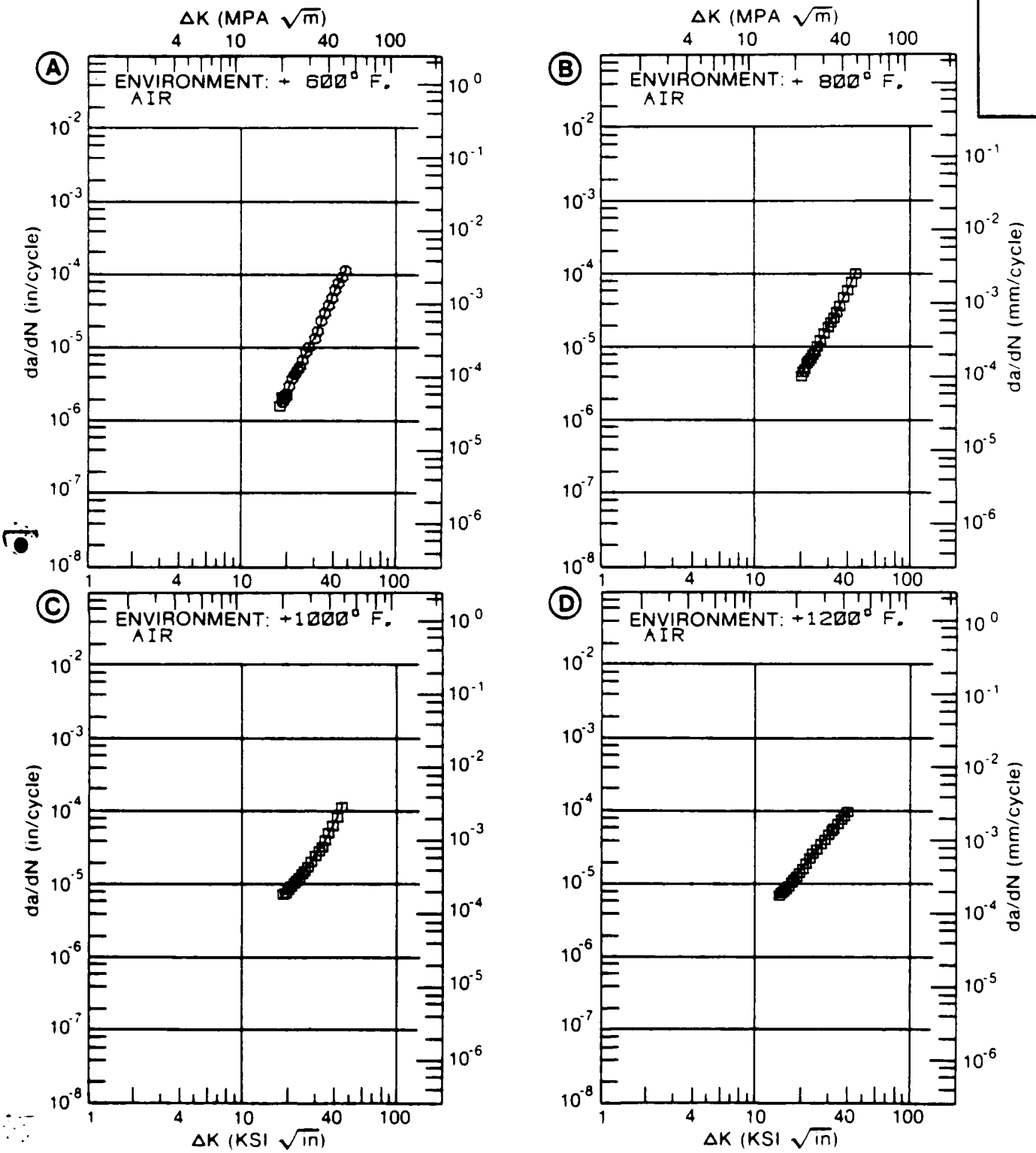


Figure 5.6.3.4

Table 5.7.1.1

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE INCONEL 718

TEST CONDITIONS

SPECIMEN ORIENTATION: Unknown

ENVIRONMENT: LAB AIR AT R.T.

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1750F AC, 1325F 8HR FC TO 1150F HELD 18HR AC	PLATE	0.05	10.00					1.77	44.1	
1750F AC, 1325F 8HR FC TO 1150F HELD 18HR AC	FORGING	0.05	10.00					1.77	41.7	
1750F 1HR AC, 1325F 8HR FC TO 1150F, HELD 18HR AC(VIM-ERR)	PLATE	0.05	10.00					1.57		

Table 5.7.1.2

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE INCONEL 718

TEST CONDITIONS

SPECIMEN ORIENTATION Unknown

ENVIRONMENT: AIR AT 600 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS, AC	SHEET	0.05	0.67					1.91	28.4	
1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS, AC	PLATE	0.05	0.67					2.33	58.8	
1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS, AC	FORGING	0.05	0.67					1.44		
1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS, AC	PLATE	0.05	0.67					1.23		

Table 5.7.1.3

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE INCONEL 718

TEST CONDITIONS

SPECIMEN ORIENTATION: Unknown

ENVIRONMENT: AIR AT 800 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC	SHEET	0.05	0.67					2.24	30.6	
1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC	PLATE	0.05	0.67					3.29		
1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC	FORGING	0.05	0.67					2.05	48.6	

Table 5.7.1.4

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE INCONEL 718

TEST CONDITIONS

SPECIMEN ORIENTATION Unknown

ENVIRONMENT: AIR AT 1000 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS, AC	PLATE	0.05	0.06					4.90		
1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS, AC	PLATE	0.05	0.67					5.01		
1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS, AC	PLATE	0.05	6.67					3.23		
1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS, AC	PLATE	0.33	6.67					4.06		
1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS, AC	PLATE	0.50	6.67				0.77	6.48		
1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS, AC	FORGING	0.05	0.67					5.93		

Table 5.7.1.5

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE INCONEL 718

TEST CONDITIONS

SPECIMEN ORIENTATION: L-T

ENVIRONMENT: AIR AT 1200 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC	PLATE	0.05	0.67					17.5		
1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC	FORGING	0.05	0.67					9.30		

Table 5.7.1.6

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE INCONEL 718

TEST CONDITIONS

SPECIMEN ORIENTATION: L-T

ENVIRONMENT: L. H. A. AT R. T.

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE)					
					2.5	5	10	20	50	100
ST 1850F, 1360F 9HRS, F/C 1175F	FORGED BAR	0.08	6.00						10.0	
ST 1850F, 1360F 9HRS, F/C 1175F	FORGED BAR	0.50	6.00					0.77	30.2	
1325F 8HRS, FC TO 1150F	FORGING	0.08	6.00					1.13	19.0	
1325F 8HRS, FC TO 1150F	FORGING	0.50	6.00					2.17	34.0	

Table 5.7.1.7

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE INCONEL 718

TEST CONDITIONS

SPECIMEN ORIENTATION: L-T

ENVIRONMENT: L. H. A. AT 400 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
ST 1850F, 1360F 9HRS, F/C 1175F	FORGED BAR	0.08	6.00						13.3	
ST 1850F, 1360F 9HRS, F/C 1175F	FORGED BAR	0.50	6.00					1.66		

Table 5.7.1.8

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE INCONEL 718

TEST CONDITIONS:

SPECIMEN ORIENTATION: L-T

ENVIRONMENT: LAB AIR AT R.T.

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS AC	PLATE	0.05	8.33					1.29	30.4	
1950F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS AC	PLATE	0.05	8.33					1.05		

Table 5.7.1.9

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE INCONEL 718

TEST CONDITIONS

SPECIMEN ORIENTATION: L-T

ENVIRONMENT: AIR AT 800 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS AC	PLATE	0.05	0.67					2.93	69.4	
1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS AC	PLATE	0.05	6.67					1.98		
1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS AC	PLATE	0.33	6.67					4.40		
1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS AC	PLATE	0.50	6.67				0.54	5.14		

Table 5.7.1.10

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE INCONEL 718

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT: AIR AT 1000 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS AC	PLATE	0.05	0.67					3.78	63.9	
1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS AC	PLATE	0.67	6.67				1.18			

Table 5.7.1.11

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE INCONEL 718

TEST CONDITIONS

SPECIMEN ORIENTATION: T-L

ENVIRONMENT: L.H.A. AT R.T.

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
ST 1850F, 1360F 9HRS, F/C 1175F	FORGED BAR	0.08	6.00						16.1	
1325F 8HRS, FC TO 1150F	FORGING	0.08	6.00						32.3	

Table 5.7.1.12

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE INCONEL 718

TEST CONDITIONS

SPECIMEN ORIENTATION: C-R

ENVIRONMENT: LAB AIR AT R.T.

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC	FORGED BAR	0.05	10.00					2.55	47.2	
1760F 1HR WQ, 1325F 8HRS, FC 1150F 8HRS, AC	DISK	0.00	0.33					2.86		

Table 5.7.1.13

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE INCONEL 718

TEST CONDITIONS

SPECIMEN ORIENTATION C-R

ENVIRONMENT: AIR AT 300 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1750F 1HR Q, 1325F 8HR FC TO 1150F AT 100F /HR HOLD 8HR, AC	DISK	-0.33	0.33					0.77		
1750F 1HR Q, 1325F 8HR FC TO 1150F AT 100F /HR HOLD 8HR, AC	DISK	0.00	0.33					1.45		
1750F 1HR Q, 1325F 8HR FC TO 1150F AT 100F /HR HOLD 8HR, AC	DISK	0.03	0.33					1.86		
1750F 1HR Q, 1325F 8HR FC TO 1150F AT 100F /HR HOLD 8HR, AC	DISK	0.25	0.33					1.09		
1750F 1HR Q, 1325F 8HR FC TO 1150F AT 100F /HR HOLD 8HR, AC	DISK	0.54	0.33					3.25		

Table 5.7.1.14

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE INCONEL 718

TEST CONDITIONS

SPECIMEN ORIENTATION: C-R

ENVIRONMENT: AIR AT 600 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC	FORGED BAR	0.05	0.67					2.32	50.1	
1750F 1HR Q, 1325F 8HR FC TO 1150F AT 100F/HR HOLD 8HR, AC	DISK	-0.33	0.33					2.12		
1750F 1HR Q, 1325F 8HR FC TO 1150F AT 100F/HR HOLD 8HR, AC	DISK	0.00	0.33					1.66		
1750F 1HR Q, 1325F 8HR FC TO 1150F AT 100F/HR HOLD 8HR, AC	DISK	0.25	0.33					2.71		
1750F 1HR Q, 1325F 8HR FC TO 1150F AT 100F/HR HOLD 8HR, AC	DISK	0.54	0.33					3.74		

Table 5.7.1.15

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE INCONEL 718

TEST CONDITIONS

SPECIMEN ORIENTATION: C R

ENVIRONMENT: AIR AT 800 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC	FORGED BAR	0.05	0.67					2.88		
1750F 1HR Q, 1325F 8HR FC TO 1150F AT 100F/HR HOLD 8HR, AC	DISK	-0.33	0.33					2.42	64.2	
1750F 1HR Q, 1325F 8HR FC TO 1150F AT 100F/HR HOLD 8HR, AC	DISK	0.03	0.33				0.34	2.67		
1750F 1HR Q, 1325F 8HR FC TO 1150F AT 100F/HR HOLD 8HR, AC	DISK	0.25	0.33					2.91		
1750F 1HR Q, 1325F 8HR FC TO 1150F AT 100F/HR HOLD 8HR, AC	DISK	0.54	0.33					5.86		

Table 5.7.1.16

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE INCONEL 718

TEST CONDITIONS

SPECIMEN ORIENTATION: C-R

ENVIRONMENT: AIR AT 1000 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC	FORGED BAR	0.05	0.67					7.13	101	
1750F 1HR Q, 1325F 8HR FC TO 1150F AT 100F/HR HOLD 8HR, AC	DISK	-0.33	0.33					3.70		
1750F 1HR Q, 1325F 8HR FC TO 1150F AT 100F/HR HOLD 8HR, AC	DISK	0.00	0.33					3.36		
1750F 1HR Q, 1325F 8HR FC TO 1150F AT 100F/HR HOLD 8HR, AC	DISK	0.03	0.33					2.59		
1750F 1HR Q, 1325F 8HR FC TO 1150F AT 100F/HR HOLD 8HR, AC	DISK	0.03	0.33					4.80		
1750F 1HR Q, 1325F 8HR FC TO 1150F AT 100F/HR HOLD 8HR, AC	DISK	0.25	0.33					6.62		
1750F 1HR Q, 1325F 8HR FC TO 1150F AT 100F/HR HOLD 8HR, AC	DISK	0.54	0.33				0.85	8.45		

Table 5.7.1.17

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE INCONEL 718

TEST CONDITIONS

SPECIMEN ORIENTATION: C-R

ENVIRONMENT: AIR AT 1200 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN)) (COMMENTS)	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC	FORGED BAR	0.05	0.67					21.0		
1750F 1HR Q, 1325F 8HR FC TO 1150F AT 100F/HR HOLD 8HR, AC	DISK	-0.33	0.33					9.75		
1750F 1HR Q, 1325F 8HR FC TO 1150F AT 100F/HR HOLD 8HR, AC	DISK	0.03	0.33					9.92		
1750F 1HR Q, 1325F 8HR FC TO 1150F AT 100F/HR HOLD 8HR, AC	DISK	0.54	0.33				2.12	16.0		
1760F 1HR WQ, 1325F 8HRS, FC TO 1150F 8HRS, AC	DISK	0.00	0.02					8.02	294	
1760F 1HR WQ, 1325F 8HRS, FC TO 1150F 8HRS, AC	DISK	0.00	0.33	SPEC. THK = 0.08"				3.20	60.7	
1760F 1HR WQ, 1325F 8HRS, FC TO 1150F 8HRS, AC	DISK	0.00	0.33	SPEC. THK = 0.25"				11.7	110	

Table 5.7.2.1

NICKEL BASE INCONEL 718 K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	------SPECIMEN------ WIDTH (IN) W	THICK (IN) B	DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	STAN DEV	DATE	REFER
1325F 8 HR, FC TO 1150F, HOLD 18 HR	F	3.00	R.T.	T-L	160.0	4.022	1.120	CT	1.987	0.53	74.00			1973	88187
1325F 9 HR, FC TO 1150F AT 100F/HR, HOLD AT 1150F 8 HR, AC	F	3.30	R.T.	T-L	151.0	2.002	0.746	CT	1.049	0.68	78.80			1973	88187
1325F 9 HR, FC TO 1150F AT 100F/HR, HOLD AT 1150F 8 HR, AC	F	3.30	R.T.	S-L	143.0	2.002	0.749	CT	1.060	0.53	65.60			1973	88187

Table 5.7.2.2

NICKEL BASE INCONEL 718 K(C)

CONDITION	PRODUCT FORM	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) S(O)	GROSS STRESS MAX (KSI) S(MAX)	K(APP) (KSI*SQRT IN)	K(APP) STAN DEV	K(C) (KSI*SQRT IN)	K(C) STAN DEV	DATE	REFER
BUCKLING OF CRACK EDGES NOT RESTRAINED																	
COLD ROLLED 30 S	0 03	- 423 L-T			269.0	4.000	0.028	1.370	1.480	---	112.00	177.30		186.79		1964	60578
PERCENT AND	0 03				269.0	4.000	0.028	1.280	1.420	---	117.00	177.22		189.70		1964	60578
AGED	0 03				269.0	4.000	0.028	1.740	2.000	---	90.50	169.90		190.76		1964	60578
	0 03				269.0	4.000	0.028	1.310	1.340	---	116.00	178.34		180.98		1964	60578
	0 03				269.0	4.010	0.027	1.270	1.450	---	116.00	174.77		190.67		1964	60578
	0 03				269.0	4.010	0.028	1.740	2.000	---	87.50	164.15		184.25		1964	60578
	0 03				269.0	4.010	0.028	1.770	2.050	---	91.50	173.97		197.02		1964	60578
	0 03				269.0	4.010	0.028	1.240	1.500	---	119.00	176.61		200.22		1964	60578
	0 03				269.0	4.010	0.028	1.730	1.920	---	89.00	166.22		180.87		1964	60578
	0 03				269.0	4.010	0.027	1.240	1.370	---	117.00	173.64		185.14		1964	60578
	0 03				269.0	4.010	0.027	1.250	1.400	---	120.00	178.99		192.64		1964	60578
	0 03				269.0	4.010	0.028	0.750	0.890	---	168.00	186.38		204.90*		1964	60578
	0 03				269.0	4.010	0.028	1.250	1.400	---	118.00	176.01		189.43		1964	60578
	0 03				269.0	4.010	0.028	0.740	0.950	---	169.00	186.13		213.90*		1964	60578
	0 03				269.0	4.010	0.027	1.270	1.400	---	119.00	179.29		191.03		1964	60578
	0 03				269.0	4.010	0.028	0.750	1.020	---	158.00	175.29		208.37		1964	60578
	0 03				269.0	4.020	0.027	1.750	2.050	---	92.50	174.19	175.8/ 5.7	198.97	191.1/ 7.5	1964	60578
COLD ROLLED 30 S	0 03	- 320 L-T			259.0	3.980	0.028	1.330	1.550	---	119.00	184.90		205.22		1964	60578
PERCENT AND	0 03				259.0	4.000	0.028	0.730	0.830	---	171.00	186.97*		200.60*		1964	60578
AGED	0 03				259.0	4.000	0.028	1.290	1.650	---	118.00	179.63		212.75		1964	60578
	0 03				259.0	4.000	0.028	0.730	0.930	---	169.00	184.78		211.35*		1964	60578
	0 03				259.0	4.000	0.028	1.270	1.650	---	121.00	182.37		218.16		1964	60578
	0 03				259.0	4.000	0.027	1.310	1.620	---	123.00	189.10		218.77		1964	60578
	0 03				259.0	4.010	0.027	1.250	1.400	---	126.00	187.94		202.27		1964	60578
	0 03				259.0	4.010	0.028	1.730	1.920	---	92.00	171.83		186.97		1964	60578
	0 03				259.0	4.010	0.028	1.300	1.750	---	125.00	191.16		235.55*		1964	60578
	0 03				259.0	4.010	0.028	1.250	1.450	---	119.00	177.50		195.61		1964	60578
	0 03				259.0	4.010	0.028	1.730	1.790	---	89.10	166.41		170.92		1964	60578
	0 03				259.0	4.010	0.028	1.720	2.000	---	90.30	167.90		190.15		1964	60578
	0 03				259.0	4.010	0.028	1.730	2.090	---	91.90	171.64		201.46		1964	60578
	0 03				259.0	4.010	0.028	0.740	0.950	---	177.00	194.94*		224.02*		1964	60578
	0 03				259.0	4.010	0.028	0.730	0.850	---	170.00	185.85*		202.06*		1964	60578
	0 03				259.0	4.010	0.028	1.230	1.400	---	127.00	187.53		203.87		1964	60578

*NOTE- NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STD. DEV

Table 5.7.2.2 (con't)

NICKEL BASE INCONEL 718 K(C)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	---SPECIMEN--- WIDTH (IN) W	THICK (IN) B	CRACK LENGTH INIT (IN) 2A(O)	CRACK LENGTH FINAL (IN) 2A(F)	GROSS STRESS ONSET (KSI) S(O)	GROSS STRESS MAX (KSI) S(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																			
COLD ROLLED 30 S		0.03	- 320	L-T	259.0	4.010	0.028	1.250	1.450	---	129.00	192.42			212.04			1964	60578
PERCENT AND		0.03			259.0	4.010	0.028	1.720	1.950	---	91.90	170.88			189.27			1964	60578
AGED													180.4/	8.8		200.6/	13.8		
COLD ROLLED 30 S		0.03	R T	L-T	218.0	4.000	0.028	1.250	1.550	---	112.00	167.12			192.94*			1964	60578
PERCENT AND		0.03			218.0	4.000	0.028	1.730	1.980	---	83.00	155.12			173.40			1964	60578
AGED		0.03			218.0	4.000	0.028	1.230	1.480	---	116.00	171.34			193.46*			1964	60578
		0.03			218.0	4.000	0.028	1.250	1.450	---	111.00	165.62			182.54			1964	60578
		0.03			218.0	4.000	0.028	0.730	1.050	---	138.00	150.89			185.16*			1964	60578
		0.03			218.0	4.000	0.028	1.720	2.100	---	81.80	152.20			180.32			1964	60578
		0.03			218.0	4.010	0.028	0.720	0.890	---	143.00	155.17			174.41*			1964	60578
		0.03			218.0	4.010	0.028	1.720	2.150	---	85.50	158.98			192.56*			1964	60578
		0.03			218.0	4.010	0.028	0.720	0.940	---	145.00	157.34*			182.41*			1964	60578
		0.03			218.0	4.010	0.028	0.740	0.880	---	138.00	151.99			167.24*			1964	60578
		0.03			218.0	4.010	0.028	1.730	2.100	---	80.10	149.60			176.38			1964	60578
		0.03			218.0	4.010	0.028	1.240	1.460	---	110.00	163.25			181.66			1964	60578
		0.03			218.0	4.010	0.028	0.730	1.000	---	148.00	161.80*			192.94*			1964	60578
		0.03			218.0	4.010	0.028	1.720	1.950	---	85.80	159.53			176.70			1964	60578
		0.03			218.0	4.010	0.027	1.280	1.500	---	118.00	178.68			198.54*			1964	60578
		0.03			218.0	4.010	0.028	1.320	1.650	---	104.00	160.62			187.39*			1964	60578
		0.03			218.0	4.010	0.028	1.240	1.550	---	112.00	166.22			192.84*			1964	60578
		0.03			218.0	4.020	0.028	1.270	1.730	---	108.00	162.67			201.57*			1964	60578
		0.03			218.0	4.020	0.026	1.310	1.700	---	114.00	175.14	161.4/	8.6	209.94*	178.5/	3.6	1964	60578
COLD ROLLED 30 S		0.03	R.T.	L-T	218.0	17.930	0.026	5.480	5.880	---	64.40	200.63			233.26			1964	60578
PERCENT AND		0.03			218.0	17.930	0.026	5.480	5.880	---	64.30	200.31			209.48			1964	60578
AGED		0.03			218.0	17.940	0.026	5.470	6.820	---	65.50	203.81			235.75			1964	60578
		0.03			218.0	18.080	0.026	5.480	6.680	---	61.30	190.77			217.14			1964	60578
		0.03			218.0	18.080	0.026	5.470	7.200	---	60.90	189.31	197.0/	6.5	227.47	224.6/	11.1	1964	60578

*NOTE- NET SECTION STRESS EXCEEDS 80% OF YIELD STRENGTH. VALUE NOT INCLUDED IN MEAN OR STD. DEV

TABLE 5.7.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.1 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1325F 8HRS, FC TO 1150F
ENVIRONMENT: R.T. /L.H.A.

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.08	R=+0.50		
DELTA K MIN	A:	15.35	.300			
	B:	17.63		1.40		
	C:					
	D:					
		16.00	.462			
		20.00	1.13	2.17		
		25.00	2.31	4.27		
		30.00	4.22	7.07		
		35.00	6.76	10.9		
		40.00	9.68	16.1		
		50.00	19.0	34.0		
		60.00		71.4		
		70.00		152.		
		80.00		329.		
DELTA K MAX	A:	54.42	27.2			
	B:	89.46		689.		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			6.41	11.84		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: 1325F 8HRS. FC TO 1150F
FORM: 4.00"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 6.00 HZ
ENVIRONMENT: R. T., L. H. A.

YIELD STRENGTH: 168.0 KSI
ULT. STRENGTH: 199.0 KSI
SPECIMEN THK: 0.540- 0.550"
SPECIMEN WIDTH: 7.400"
REFERENCES: 88579

NICKEL BASE

INCONEL 718

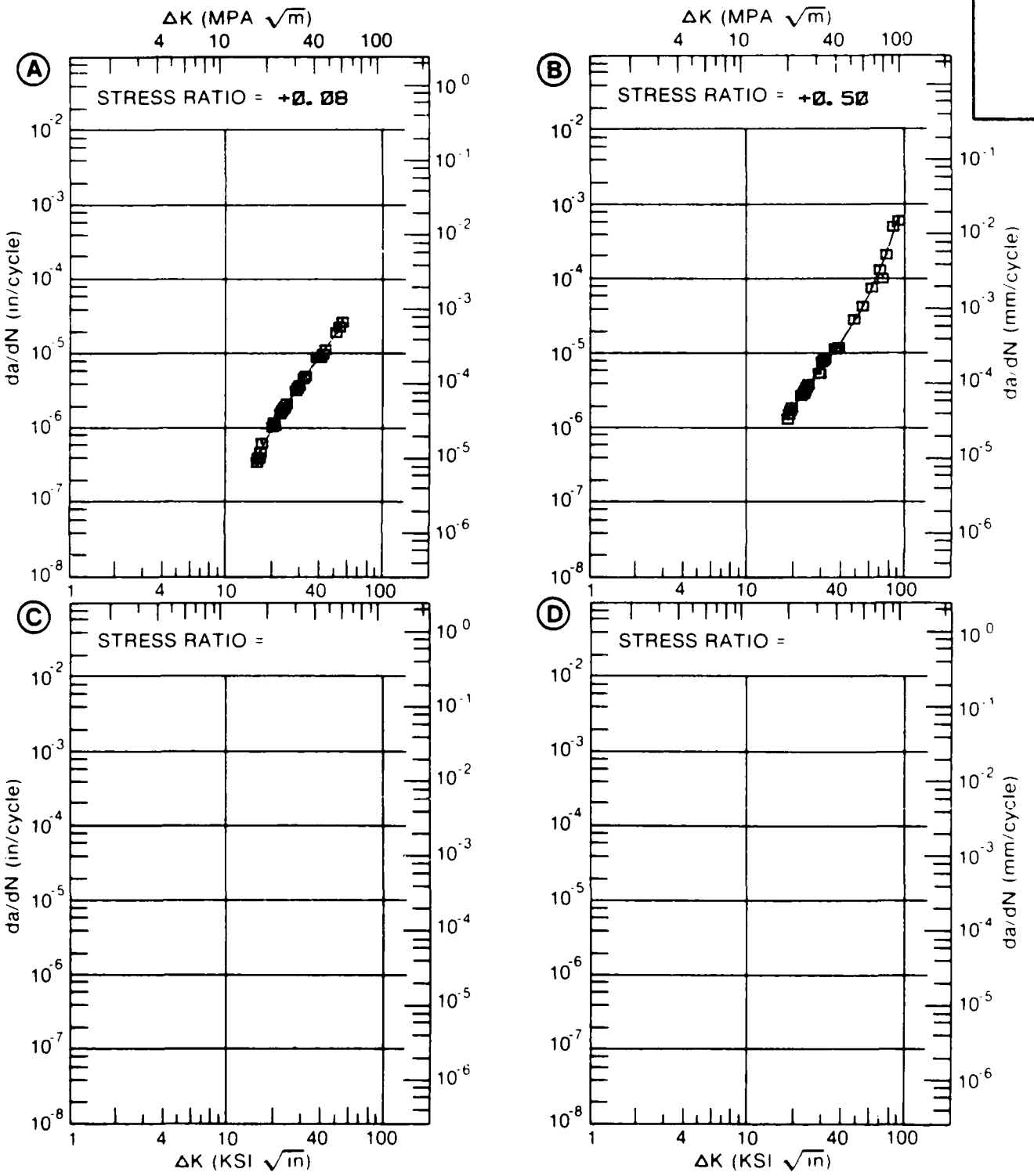


Figure 5.7.3.1

TABLE 5.7.3.2

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1325F 8HRS, FC TO 1150F
ENVIRONMENT: R.T. , L.H.A.

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.08			
DELTA K MIN	A:	21.31	1.56			
	B:					
	C:					
	D:					
		25.00	2.77			
		30.00	5.09			
		35.00	8.68			
		40.00	14.3			
		50.00	32.3			
		60.00	59.0			
		70.00	107.			
		80.00	284.			
DELTA K MAX	A:	86.24	790.			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR		8.94
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: 1325F 8HRS. FC TO 1150F
FORM: 4.00"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: T-L
FREQUENCY: 6.00 HZ
ENVIRONMENT: R. T., L. H. A.

YIELD STRENGTH: 166.0 KSI
ULT. STRENGTH: 197.0 KSI
SPECIMEN THK: 0.510"
SPECIMEN WIDTH: 6.010"
REFERENCES: 88579

NICKEL BASE

INCONEL 718

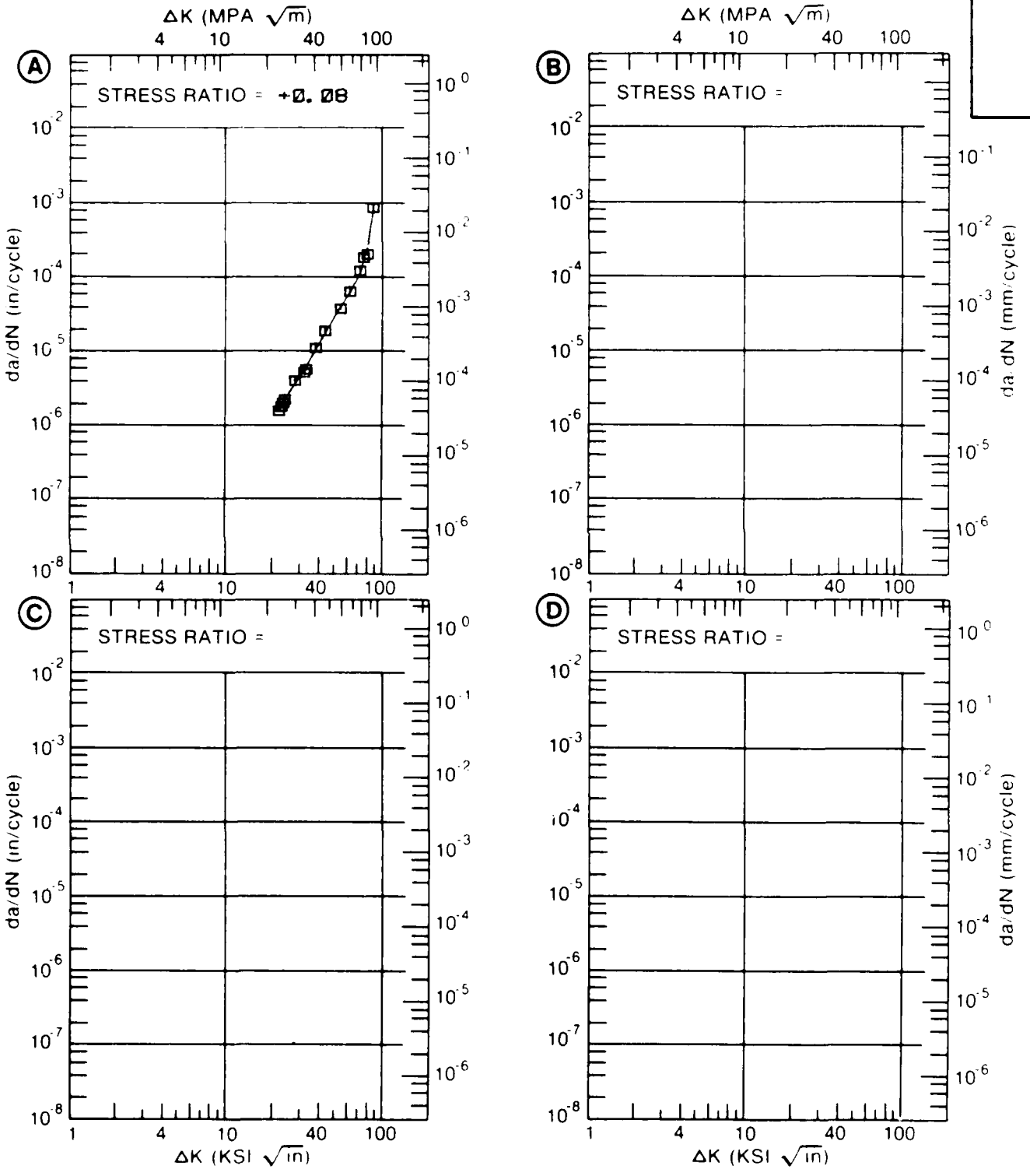


Figure 5.7.3.2

TABLE 5.7.3.3

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.3 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F AC, 1325 F 8HR FC TO 1150F, HELD 18HR AC

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE) A	B	C	D
		E= R.T. AIR			
DELTA K MIN A:	14.22	.612			
B:					
C:					
D:					
	16.00	.975			
	20.00	1.96			
	25.00	3.39			
	30.00	5.13			
	35.00	7.46			
	40.00	10.8			
DELTA K MAX A:	47.95	20.1			
B:					
C:					
D:					

ROOT MEAN SQUARE PERCENT ERROR 3.66

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: 1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC
FORM: 0.06"TH SHEET
SPECIMEN TYPE: CCP
ORIENTATION:
STRESS RATIO: +0.05
FREQUENCY: 5.00 HZ

YIELD STRENGTH: 174.0 KSI
ULT STRENGTH: 204.1 KSI
SPECIMEN THK: 0.061"
SPECIMEN WIDTH: 1.994"
REFERENCES: HD017

NICKEL BASE

INCONEL 718

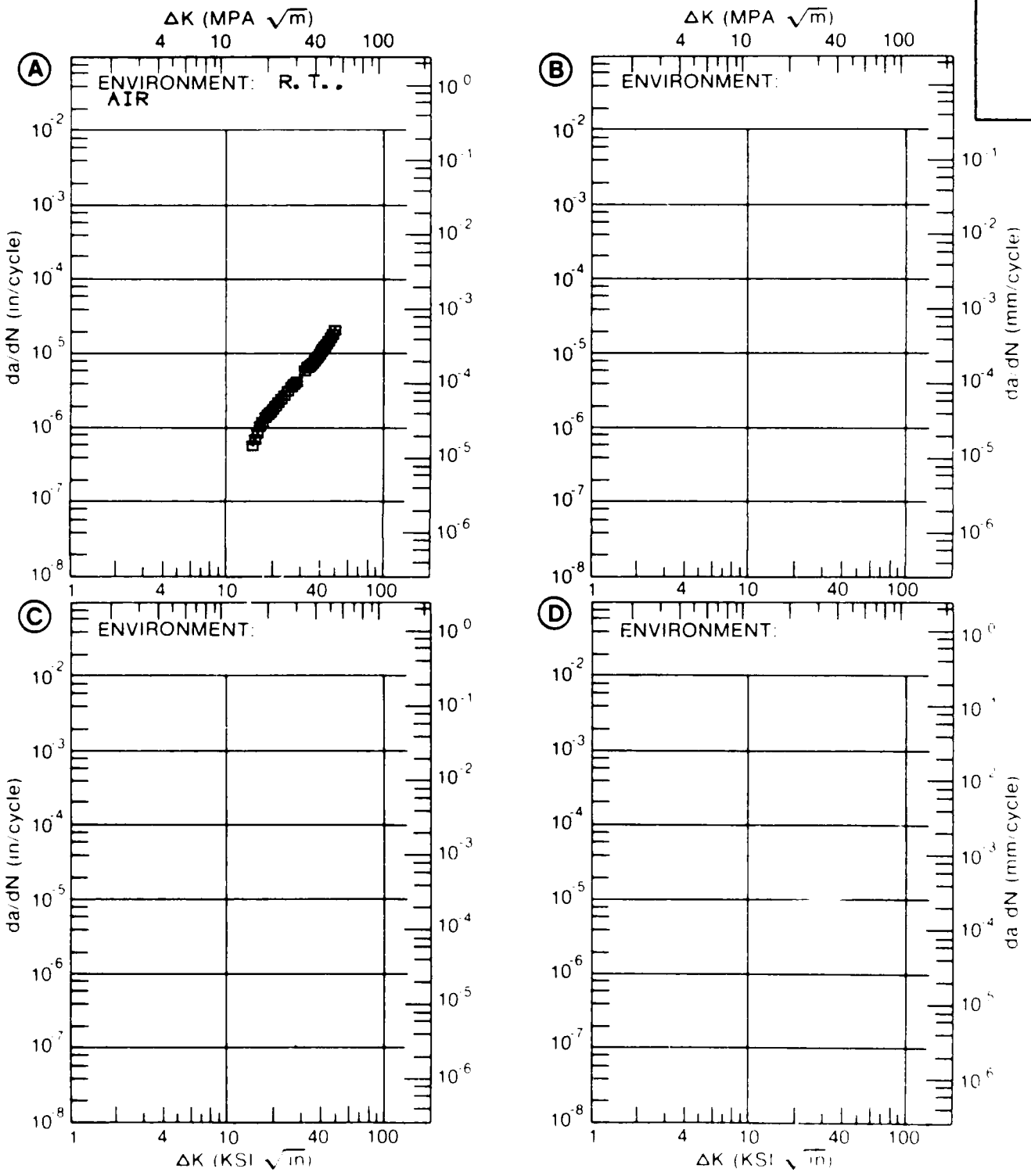


Figure 5.7.3.3

TABLE 5.7.3.4

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.4 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+ 600F AIR	E=+ 800F AIR	E=+1000F AIR	
DELTA K MIN	A:	18.40	1.51			
	B:	19.39		2.06		
	C:	23.42			10.8	
	D:					
		20.00	1.91	2.24		
		25.00	3.50	3.95	12.3	
		30.00	5.72	6.35	17.9	
		35.00	8.86	9.71	23.7	
		40.00	13.3	14.4	28.4	
		50.00	28.4	30.6		
DELTA K MAX	A:	57.54	49.4			
	B:	57.84		53.8		
	C:	40.06			28.5	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			3.58	4.18	3.30	
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1	1	
		1.25-2.0				
		>2.0				

CONDITION/HT: 1750F AC. 1325F 8HR FC TO 1150F. HELD 18HR AC
FORM: 0.06"TH SHEET
SPECIMEN TYPE: CCP
ORIENTATION:
STRESS RATIO: +0.05
FREQUENCY: 0.67 HZ

YIELD STRENGTH: 174.0 KSI
ULT. STRENGTH: 204.1 KSI
SPECIMEN THK: 0.061"
SPECIMEN WIDTH: 1.995- 2.000"
REFERENCES: HD017

NICKEL BASE

INCONEL 718

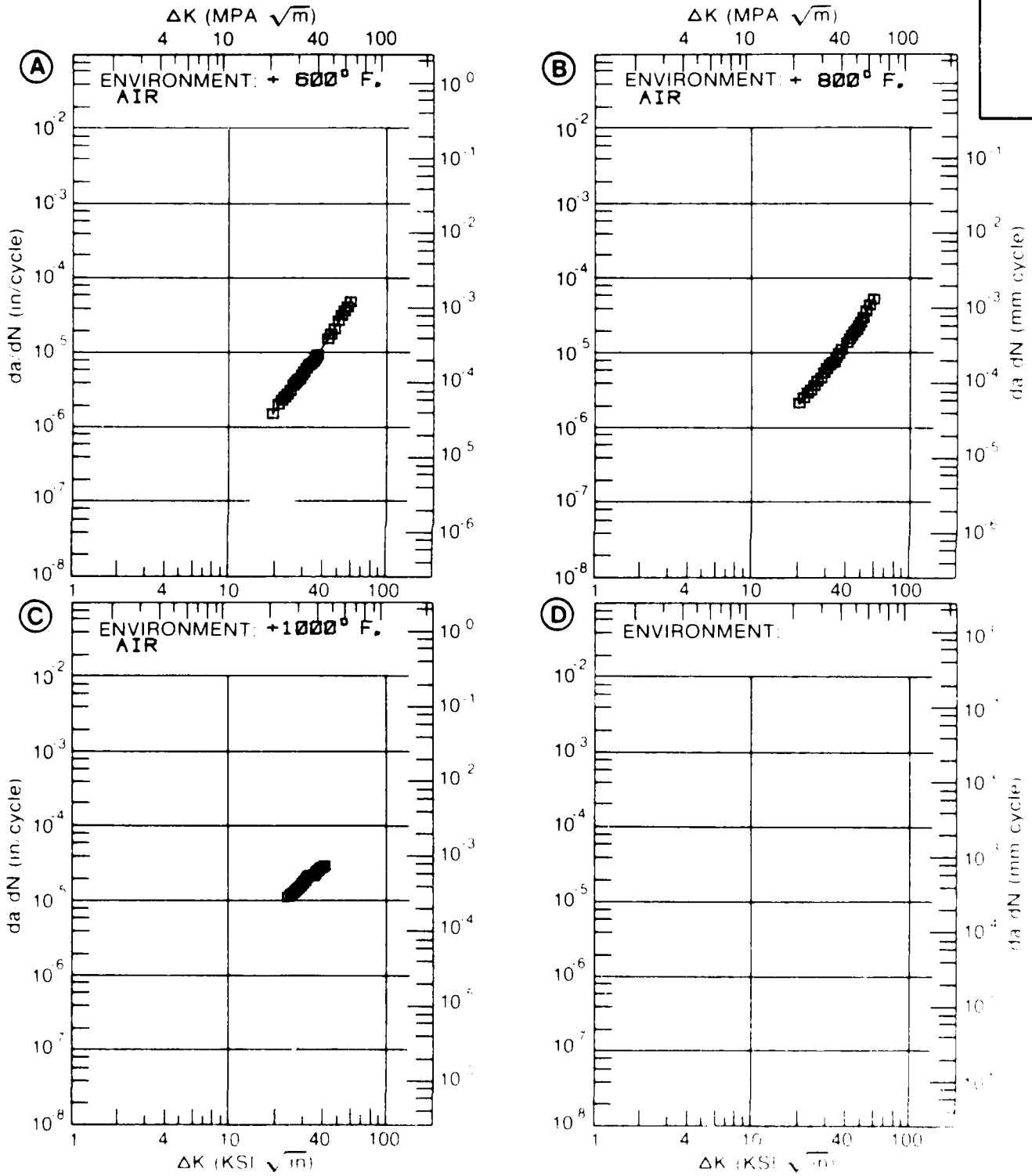


TABLE 5.7.3.5

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.5 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F AC, 1325 F 8HR FC TO 1150F, HELD 18HR AC

ENVIRONMENT: R.T., LAB AIR

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		R=+0.05			
DELTA K MIN A:	14.19	.438			
	16.00	.754			
	20.00	1.77			
	25.00	3.72			
	30.00	6.69			
	35.00	11.2			
	40.00	18.0			
	50.00	44.1			
DELTA K MAX A:	58.21	89.9			

ROOT MEAN SQUARE PERCENT ERROR		4.88
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: 1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC
FORM: 0.50"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION:
FREQUENCY: 10.00 HZ
ENVIRONMENT: R.T., LAB AIR

YIELD STRENGTH: 156.4 KSI
ULT. STRENGTH: 200.7 KSI
SPECIMEN THK: 0.495"
SPECIMEN WIDTH: 1.998"
REFERENCES:HD017

NICKEL BASE

INCONEL 718

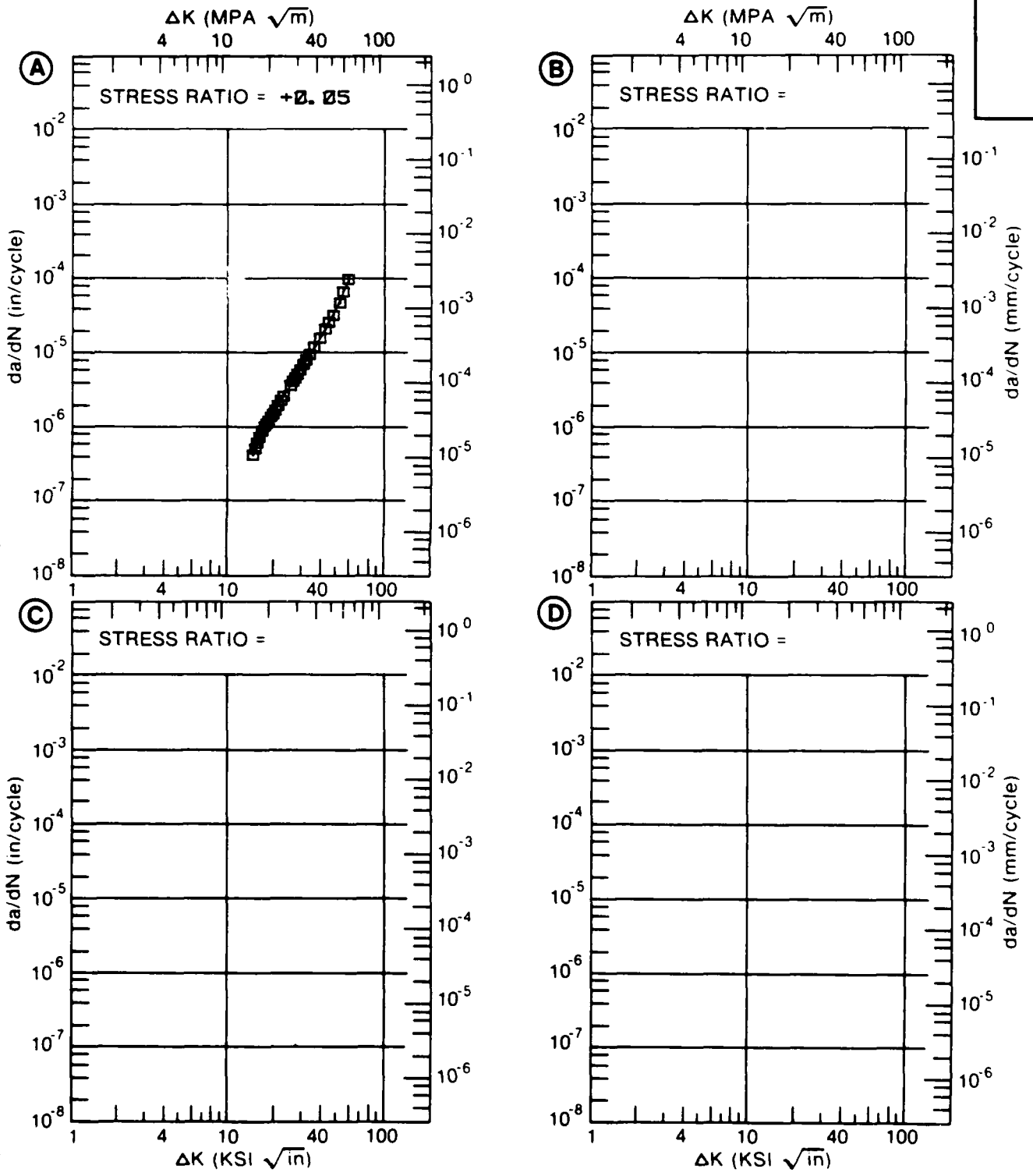


Figure 5.7.3.5

TABLE 5.7.3.6

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.6 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F AC, 1325 F 8HRS, FC TO 1150F, HELD 18HRS AC
ENVIRONMENT: +1000F, AIR

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		R=+0.05	R=+0.33	R=+0.50	
DELTA K MIN A:	12.91	.693			
DELTA K MIN B:	10.17		.471		
DELTA K MIN C:	9.19			.615	
DELTA K MIN D:					
	10.00			.770	
	13.00	.717	1.16	1.72	
	16.00	1.77	2.17	3.38	
	20.00	3.23	4.06	6.48	
	25.00	5.55	7.91	10.9	
	30.00	10.6	14.9		
	35.00	20.1			
	40.00	32.9			
DELTA K MAX A:	44.45	43.3			
DELTA K MAX B:	31.81		18.8		
DELTA K MAX C:	25.68			11.7	
DELTA K MAX D:					
ROOT MEAN SQUARE PERCENT ERROR		4.84	6.03	4.04	
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5				
	0.5-0.8				
	0.8-1.25	1	1	1	
	1.25-2.0				
	>2.0				

CONDITION/HT: 1750F AC. 1325F 8HRS. FC TO 1150F. HELD 18HRS AC
FORM: 0.50"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION:
FREQUENCY: 6.67 HZ
ENVIRONMENT: +1000° F. AIR

YIELD STRENGTH: 150.5 KSI
ULT. STRENGTH: 191.3 KSI
SPECIMEN THK: 0.298- 0.299"
SPECIMEN WIDTH: 1.151- 1.152"
REFERENCES: HD015

NICKEL BASE

INCONEL 718

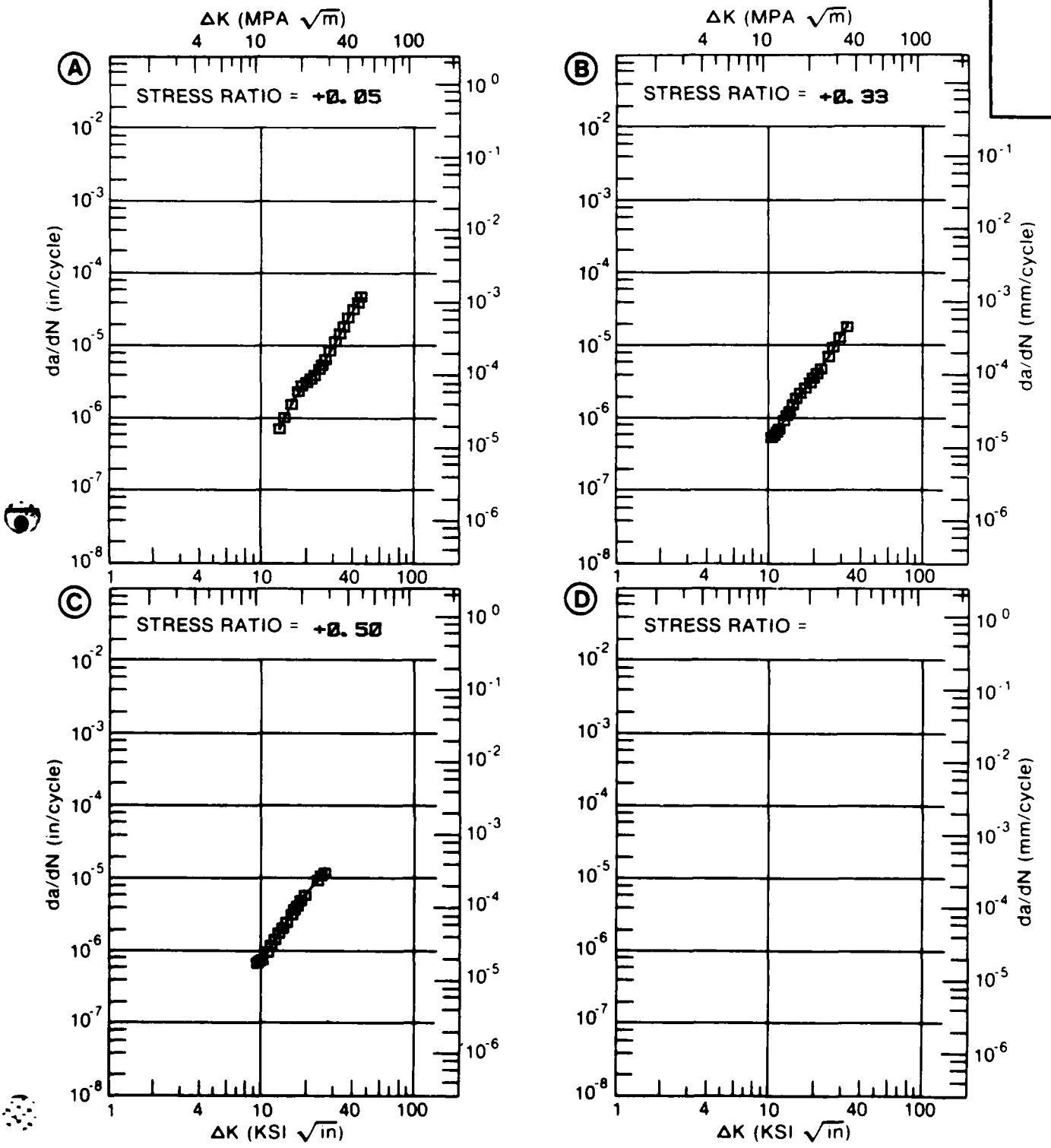


Figure 5.7.3.6

TABLE 5.7.3.7

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.7 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS, AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+ 600F AIR, .67HZ	E=+1000F AIR, .001HZ	E=+1000F AIR, .06HZ	
DELTA K MIN	A:	14.29	.386			
	B:					
	C:	15.63			2.11	
	D:					
		16.00	.549		2.27	
		20.00	1.23		4.90	
		25.00	3.03		10.3	
		30.00	6.43		17.2	
		35.00	11.9			
DELTA K MAX	A:	39.08	18.0			
	B:					
	C:	34.70			23.2	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			5.47	0.00	3.25	
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1		1	
		1.25-2.0				
		>2.0				

CONDITION/HT: 1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS, AC
FORM: 0.50"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION:
STRESS RATIO: +0.05
FREQUENCY:

YIELD STRENGTH: 150.5 KSI
ULT. STRENGTH: 191.3 KSI
SPECIMEN THK: 0.299- 0.300"
SPECIMEN WIDTH: 1.151- 1.152"
REFERENCES: HD015

NICKEL BASE

INCONEL 718

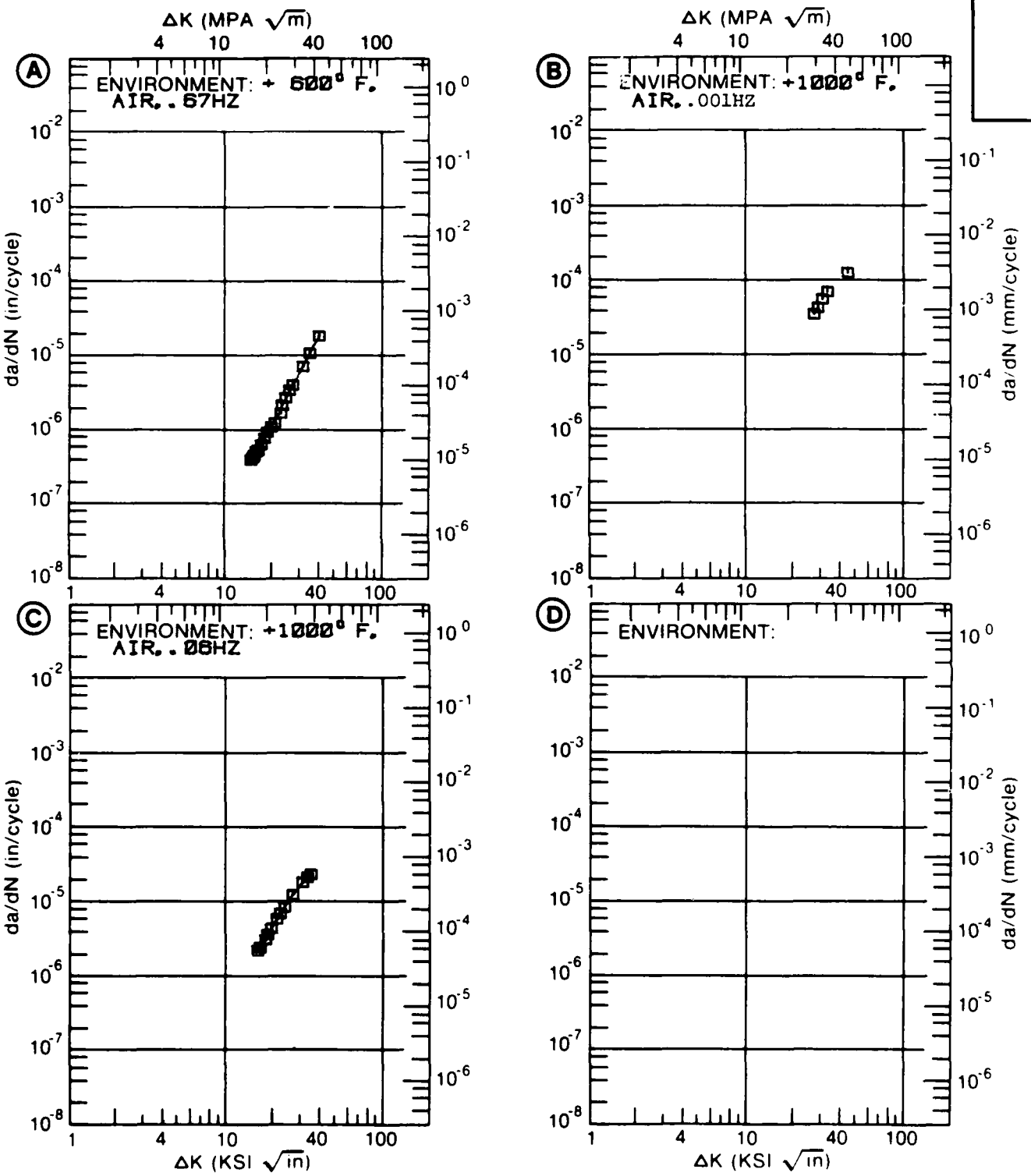


Figure 5.7.3.7

TABLE 5.7.3.8

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.8 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+ 600F AIR	E=+ 800F AIR	E=+1000F AIR	E=+1200F AIR
DELTA K MIN	A:	14.43	.743			
	B:	16.56		1.49		
	C:	13.60			1.44	
	D:	16.93				11.1
		16.00	1.06		2.33	
		20.00	2.33	3.29	5.01	17.5
		25.00	5.18	7.87	11.2	32.8
		30.00	9.97	15.0	20.9	52.4
		35.00	17.3	24.2	33.5	73.1
		40.00	27.6	34.7	47.0	
		50.00	58.8			
DELTA K MAX	A:	57.98	95.2			
	B:	44.06		43.5		
	C:	41.58			51.1	
	D:	35.62				75.6
ROOT MEAN SQUARE PERCENT ERROR			5.71	7.22	2.95	4.81
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1	1	1
		1.25-2.0				
		>2.0				

CONDITION/HT: 1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC
FORM: 0.50"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION:
STRESS RATIO: +0.05
FREQUENCY: 0.67 HZ

YIELD STRENGTH: 156.4 KSI
ULT. STRENGTH: 200.7 KSI
SPECIMEN THK: 0.485- 0.497"
SPECIMEN WIDTH: 1.997- 1.999"
REFERENCES: HD017

NICKEL BASE

INCONEL 718

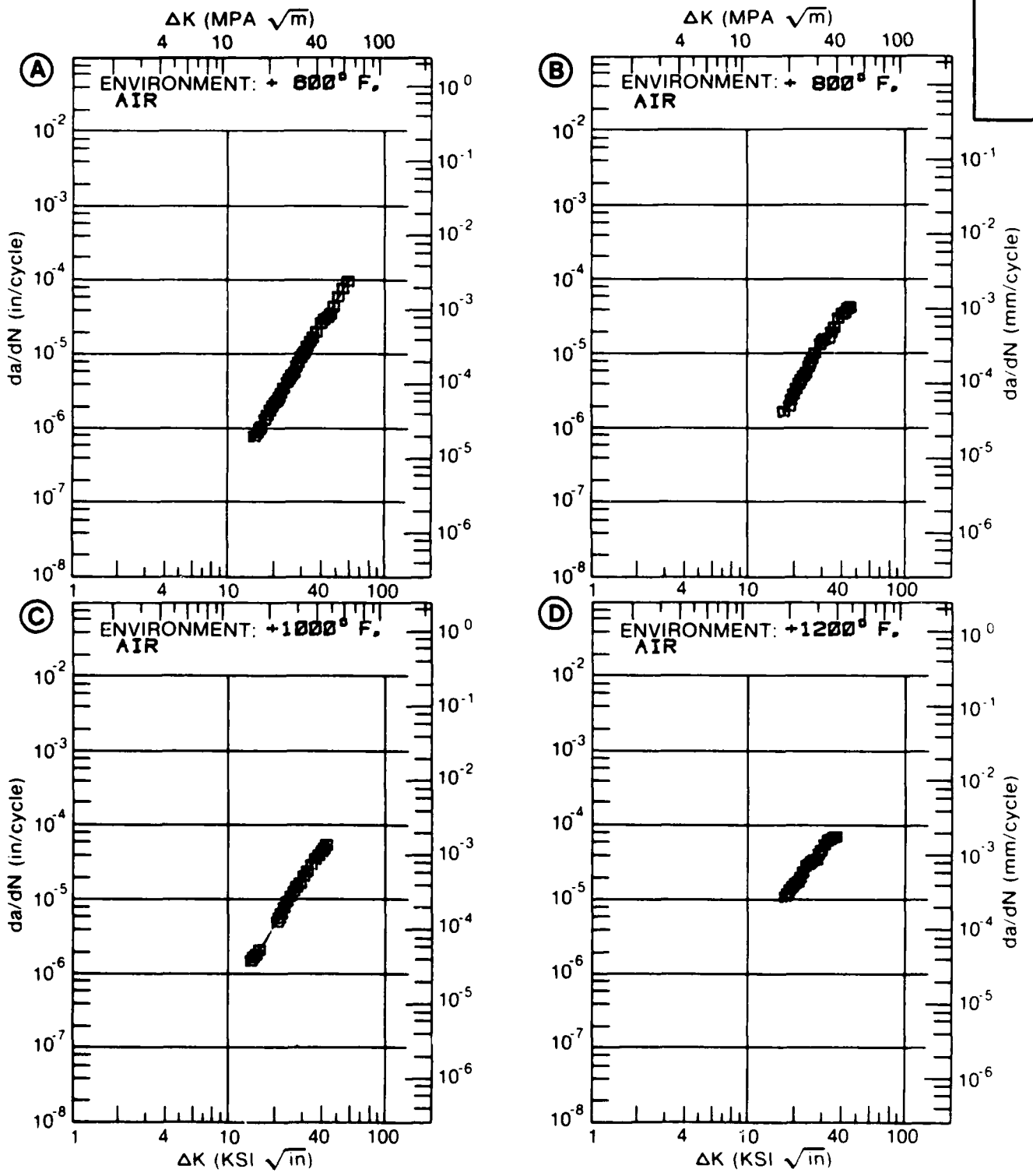


Figure 5.7.3.8

TABLE 5.7.3.9

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.9 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F AC, 1325 F 8HRS, FC TO 1150F, HELD 18HRS AC
ENVIRONMENT: + 800F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.33	R=+0.50		
DELTA K MIN	A:	10.68	.499			
	B:	7.32		.147		
	C:					
	D:					
		8.00		.220		
		9.00		.362		
		10.00		.548		
		13.00	1.00	1.39		
		16.00	2.08	2.68		
		20.00	4.40	5.14		
		25.00	8.86			
DELTA K MAX	A:	29.34	14.1			
	B:	23.56		8.10		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			3.82	5.67		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: 1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS AC
FORM: 0.50"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 6.67 HZ
ENVIRONMENT: + 800° F, AIR

YIELD STRENGTH: 150.5 KSI
ULT. STRENGTH: 191.3 KSI
SPECIMEN THK. 0.477- 0.478"
SPECIMEN WIDTH: 1.996"
REFERENCES: HD015

NICKEL BASE

INCONEL 718

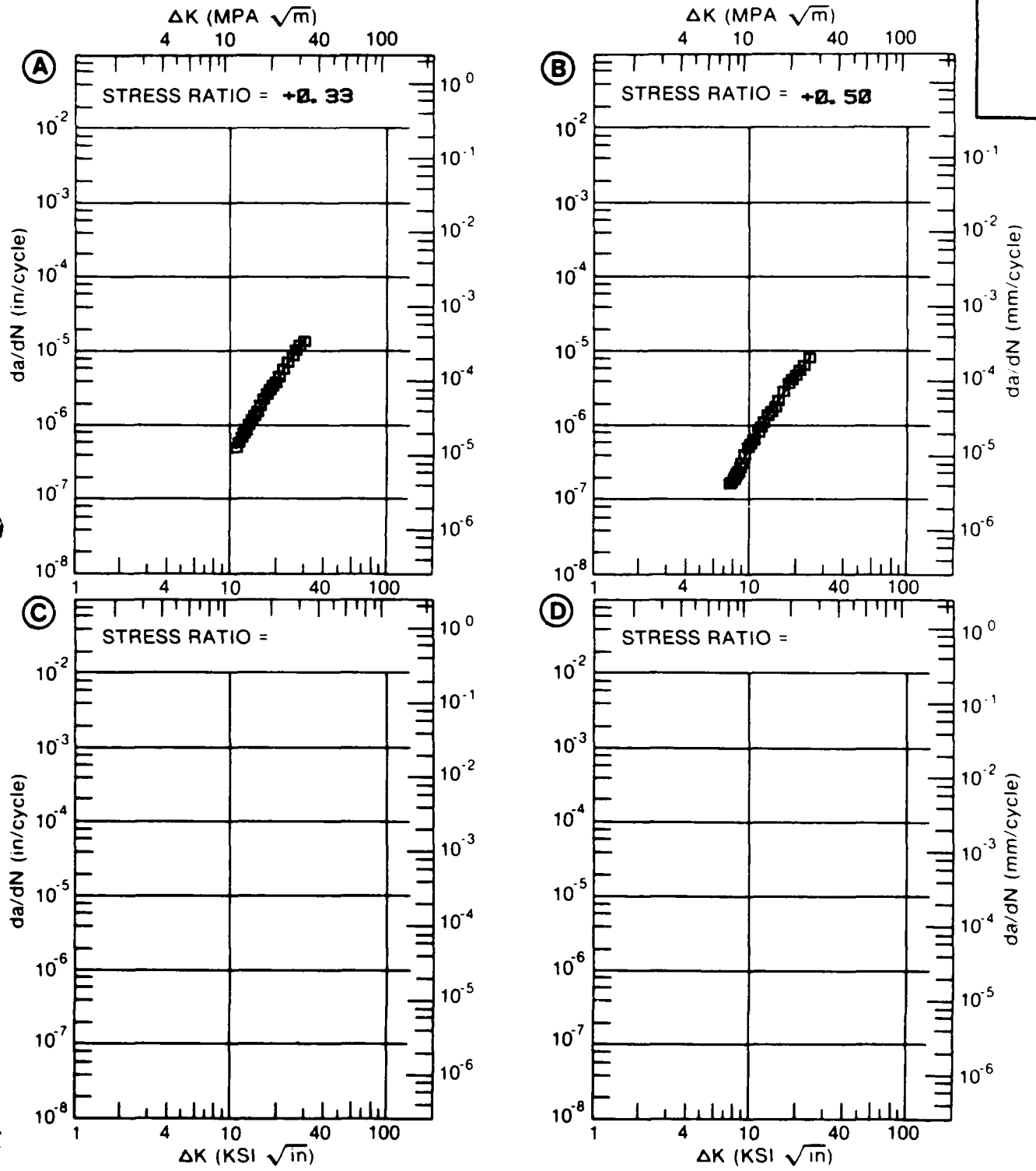


Figure 5.7.3.9

TABLE 5.7.3.10

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.10 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F AC, 1325 F 8HRS, FC TO 1150F, HELD 18HRS AC
ENVIRONMENT: +1000F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.67			
DELTA K MIN	A:	7.74	.523			
	B:					
	C:					
	D:					
		8.00	.585			
		9.00	.855			
		10.00	1.18			
		13.00	2.42			
		16.00	4.08			
DELTA K MAX	A:	18.84	6.03			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 2.72

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: 1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS AC
FORM: 0.50"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 6.67 HZ
ENVIRONMENT: +1000° F, AIR
YIELD STRENGTH: 150.5 KSI
ULT. STRENGTH: 191.3 KSI
SPECIMEN THK: 0.479"
SPECIMEN WIDTH: 1.993"
REFERENCES: HD015

NICKEL BASE

INCONEL 718

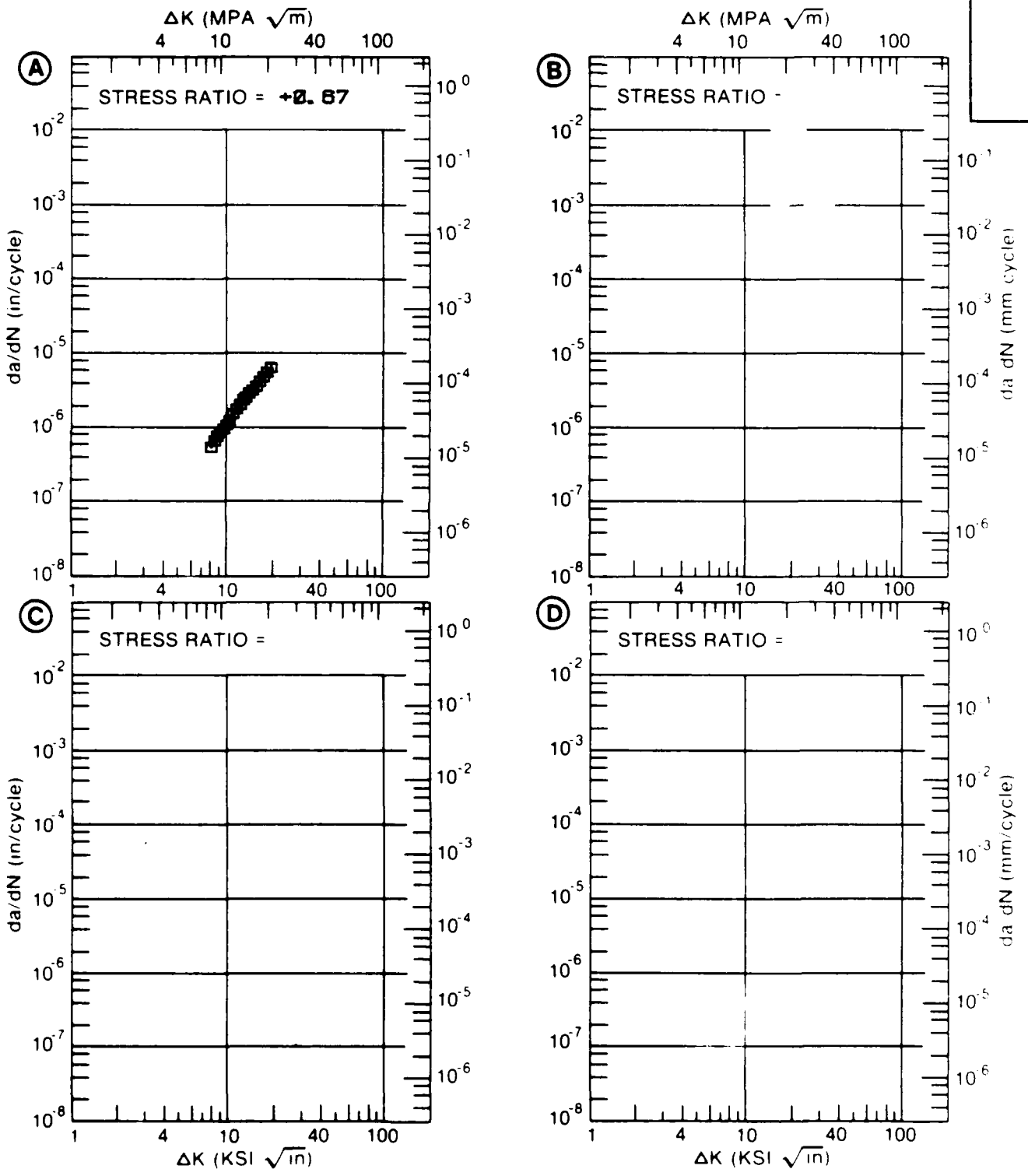


Figure 5.7.3.10

TABLE 5.7.3.11

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.11 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS, AC

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE) A	B	C	D
		E=+1200F AIR			
DELTA K MIN	A: 20.23	9.05			
	B:				
	C:				
	D:				
	25.00	17.8			
	30.00	31.1			
	35.00	48.8			
	40.00	70.7			
	50.00	125.			
DELTA K MAX	A: 55.76	160.			
	B:				
	C:				
	D:				

ROOT MEAN SQUARE PERCENT ERROR	2.88

LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: 1750F AC. 1325F 8HRS. FC TO 1150F. HELD 18HRS. AC
FORM: 0.50"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.03
FREQUENCY: 0.67 HZ

YIELD STRENGTH: 150.5 KSI
ULT. STRENGTH: 191.3 KSI
SPECIMEN THK: 0.477"
SPECIMEN WIDTH: 1.997"
REFERENCES: HD015

NICKEL BASE

INCONEL 718

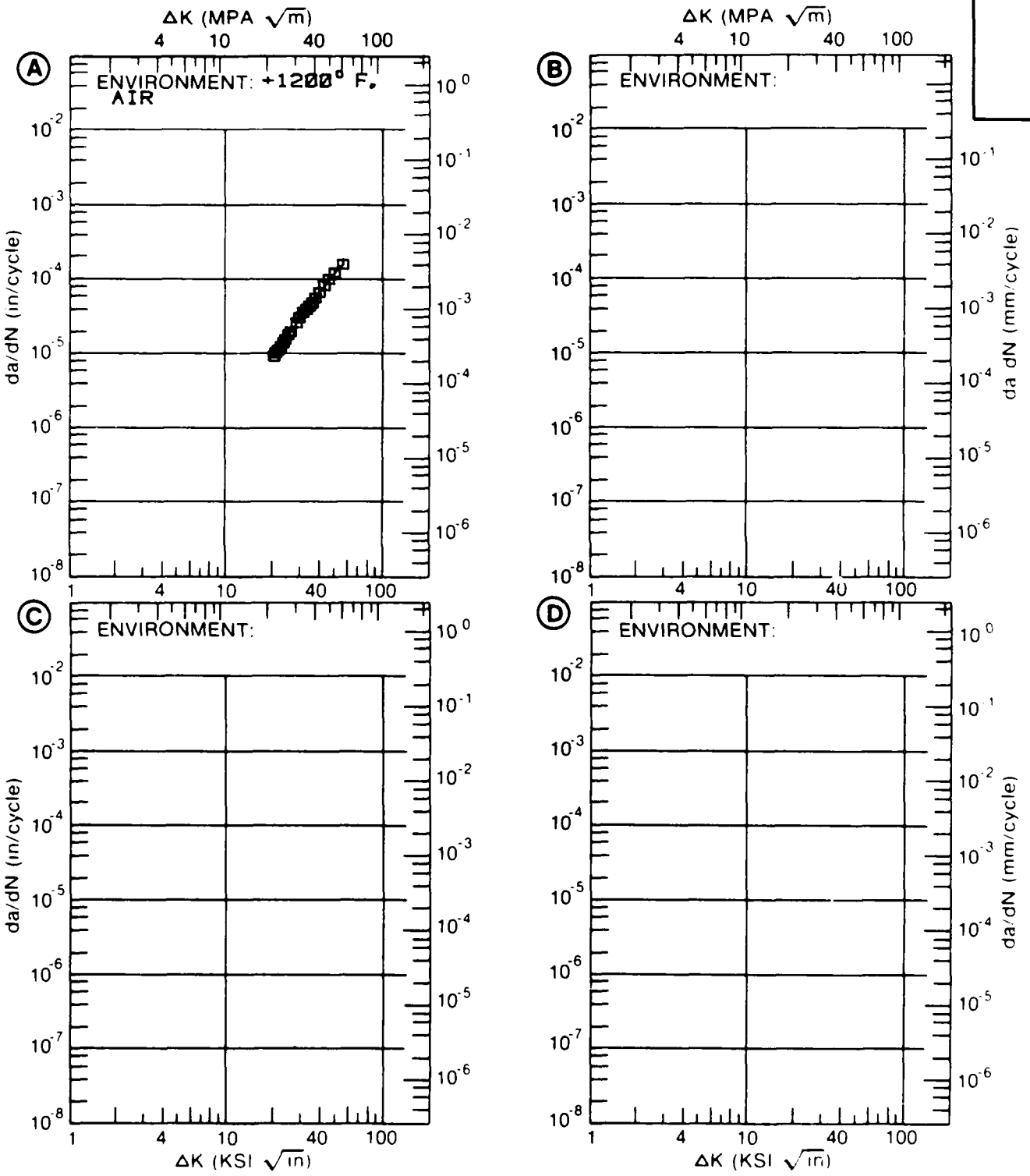


Figure 5.7.3.11

TABLE 5.7.3.12

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.12 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F AC, 1325 F 8HRS, FC TO 1150F, HELD 18HRS AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. LAB AIR, 8.33HZ	E=+ 800F AIR, 6.67HZ		
DELTA K MIN	A:	18.26	1.01			
	B:	15.64		.749		
	C:					
	D:					
		16.00		.820		
		20.00	1.29	1.98		
		25.00	2.73	4.69		
		30.00	5.50	9.30		
		35.00	9.95	16.3		
		40.00	16.0	25.9		
		50.00	30.4			
DELTA K MAX	A:	54.46	35.9			
	B:	42.78		32.5		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			5.56	4.55		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: 1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS AC
FORM: 0.50"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.05
FREQUENCY:

YIELD STRENGTH: 150.5 KSI
ULT. STRENGTH: 181.3 KSI
SPECIMEN THK: 0.477"
SPECIMEN WIDTH: 1.997- 1.998"
REFERENCES: HD015

NICKEL BASE

INCONEL 718

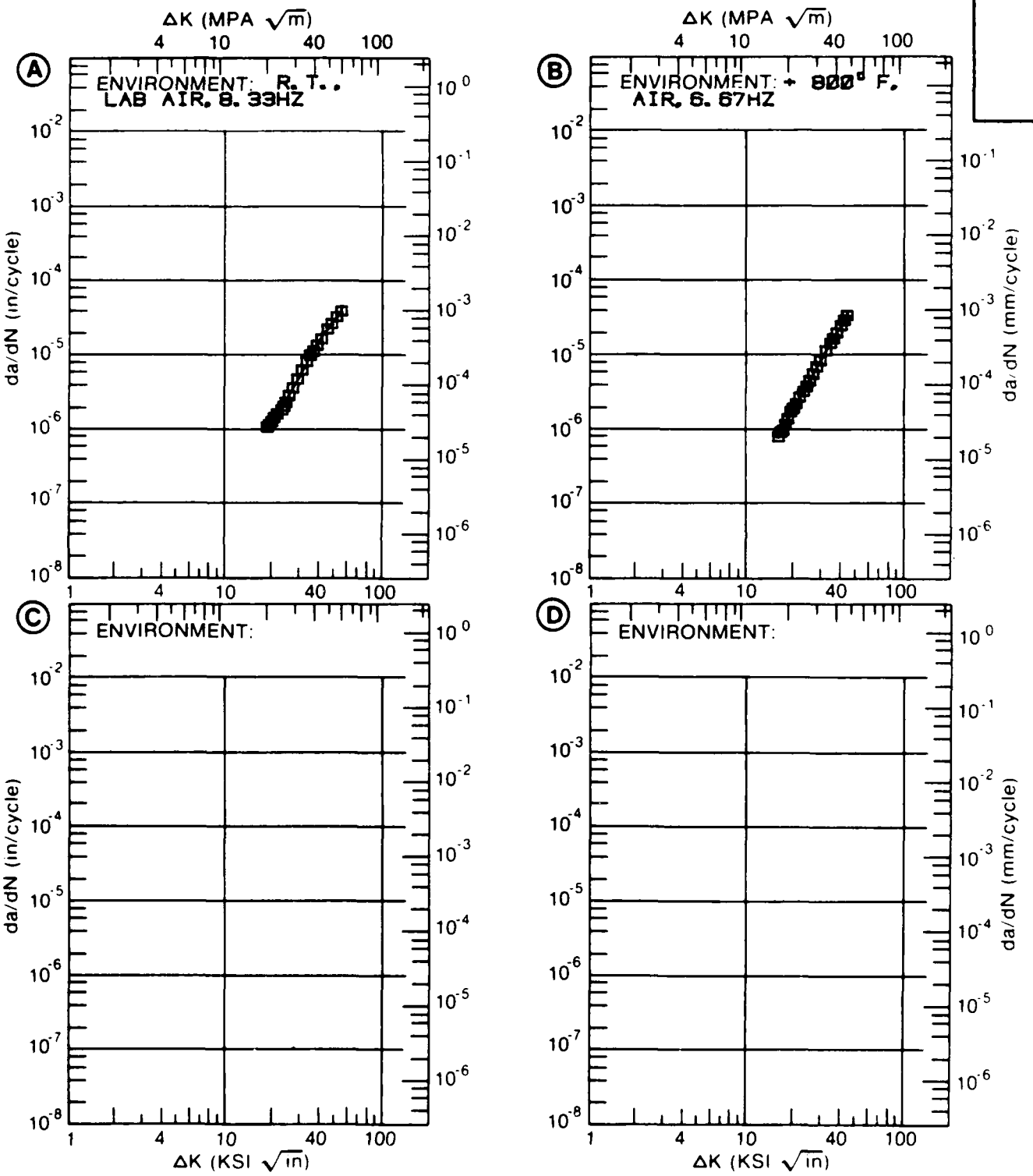


Figure 5.7.3.12

TABLE 5.7.3.13

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.13 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F AC, 1325 F 8HRS, FC TO 1150F, HELD 18HRS AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+ 800F AIR	E=+1000F AIR		
DELTA K MIN	A:	16.57	1.25			
	B:	15.20		1.43		
	C:					
	D:					
		16.00		1.73		
		20.00	2.93	3.78		
		25.00	6.96	7.63		
		30.00	13.1	13.2		
		35.00	21.6	20.8		
		40.00	33.1	31.1		
		50.00	69.4	63.9		
		60.00		122.		
DELTA K MAX	A:	56.07	104.			
	B:	66.35		181.		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			5.56	12.07		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	5		
		1.25-2.0				
		>2.0				

CONDITION/HT: 1750F AC, 1325F 8HRS, FC TO 1150F, HELD 18HRS AC
FORM: 0.50"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.05
FREQUENCY: 0.67 HZ

YIELD STRENGTH: 129.0- 150.5 KSI
ULT. STRENGTH: 160.1- 191.3 KSI
SPECIMEN THK: 0.476- 0.478"
SPECIMEN WIDTH: 1.996- 1.998"
REFERENCES: HD015

NICKEL BASE

INCONEL 718

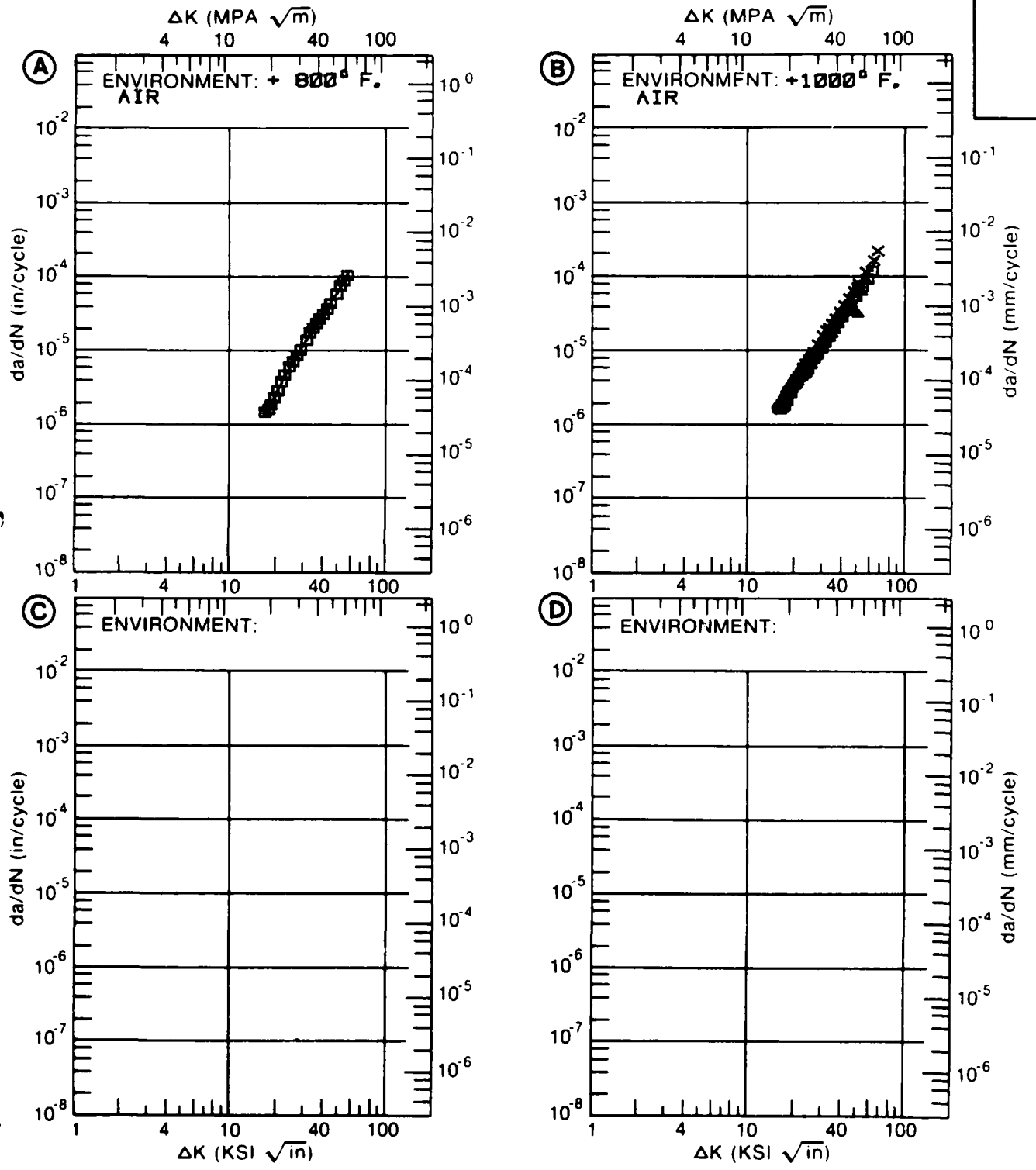


Figure 5.7.3.13

TABLE 5.7.3.14

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.14 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F AC, 1325 F 8HR FC TO 1150F, HELD 18HR AC

ENVIRONMENT: R.T., LAB AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.05			
DELTA K MIN	A:	13.06	.190			
	B:					
	C:					
	D:					
		16.00	.871			
		20.00	1.77			
		25.00	3.70			
		30.00	6.86			
		35.00	11.7			
		40.00	18.7			
		50.00	41.7			
DELTA K MAX	A:	59.94	80.8			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR		9.07
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: 1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC
FORM: FORGING
SPECIMEN TYPE: CT
ORIENTATION:
FREQUENCY: 10.00 HZ
ENVIRONMENT: R.T., LAB AIR

YIELD STRENGTH: 168.4 KSI
ULT. STRENGTH: 195.7 KSI
SPECIMEN THK: 0.402"
SPECIMEN WIDTH: 1.998"
REFERENCES:HD017

NICKEL BASE

INCONEL 718

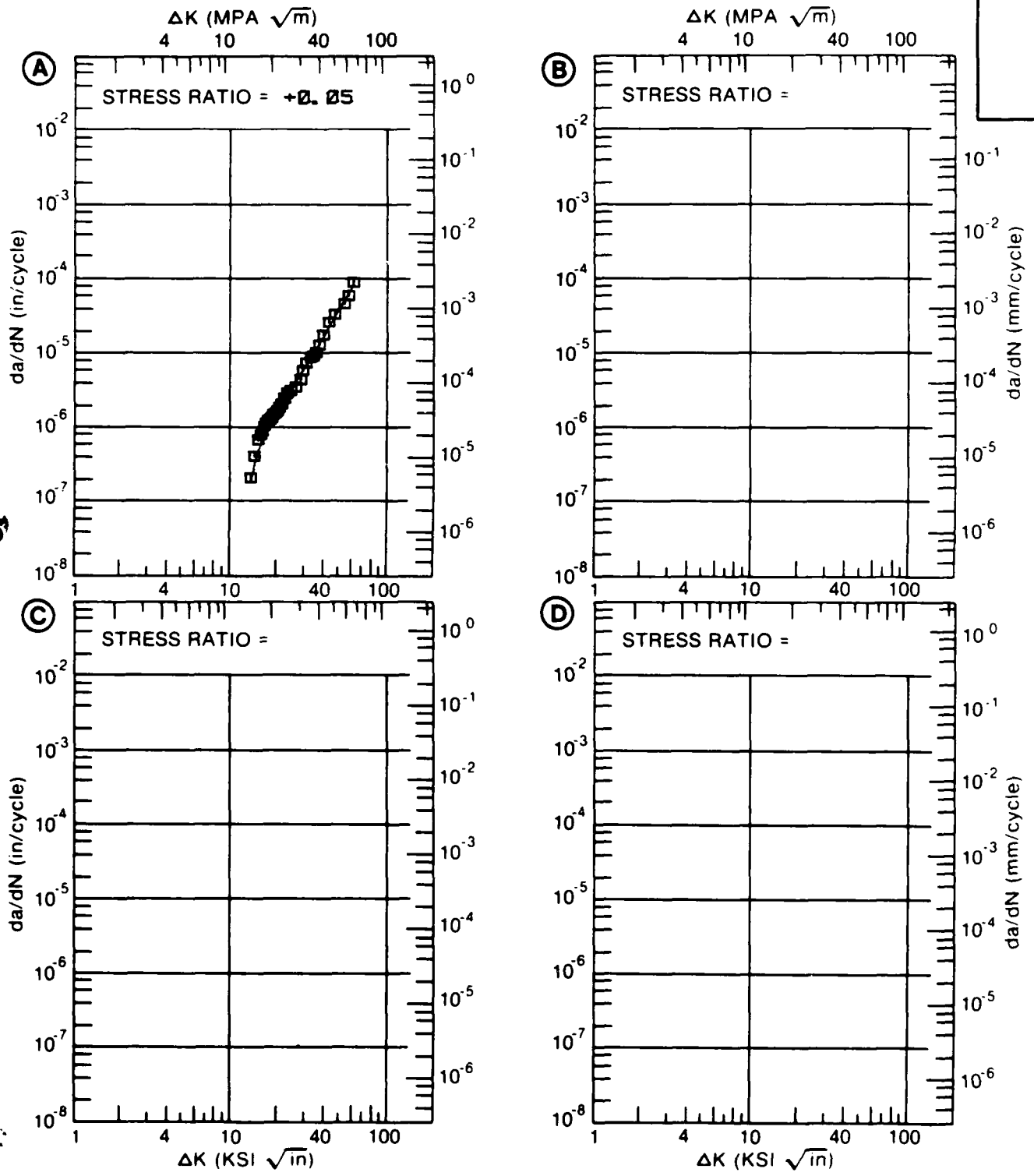


Figure 5.7.3.14

TABLE 5.7.3.15

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.15 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+ 600F AIR	E=+ 800F AIR	E=+1000F AIR	E=+1200F AIR
DELTA K MIN	A:	16.43	.786			
	B:	15.22		.849		
	C:	12.64			1.22	
	D:	14.06				3.09
		13.00			1.38	
		16.00		.993	3.06	4.71
		20.00	1.44	2.05	5.93	9.30
		25.00	3.28	4.40	10.7	17.4
		30.00	6.61	8.32	17.9	28.2
		35.00	11.5	14.3		41.7
		40.00	17.4	22.7		
		50.00		48.6		
DELTA K MAX	A:	41.28	19.0			
	B:	51.90		54.9		
	C:	31.19			20.2	
	D:	38.42				52.5
ROOT MEAN SQUARE PERCENT ERROR			4.75	5.36	3.25	4.14
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1	1	1
		1.25-2.0				
		>2.0				

CONDITION/HT: 1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC
FORM: FORGING
SPECIMEN TYPE: CT
ORIENTATION:
STRESS RATIO: +0.05
FREQUENCY: 0.67 HZ

YIELD STRENGTH: 168.4 KSI
ULT. STRENGTH: 196.7 KSI
SPECIMEN THK: 0.402- 0.403"
SPECIMEN WIDTH: 1.996- 1.998"
REFERENCES: HD017

NICKEL BASE

INCONEL 718

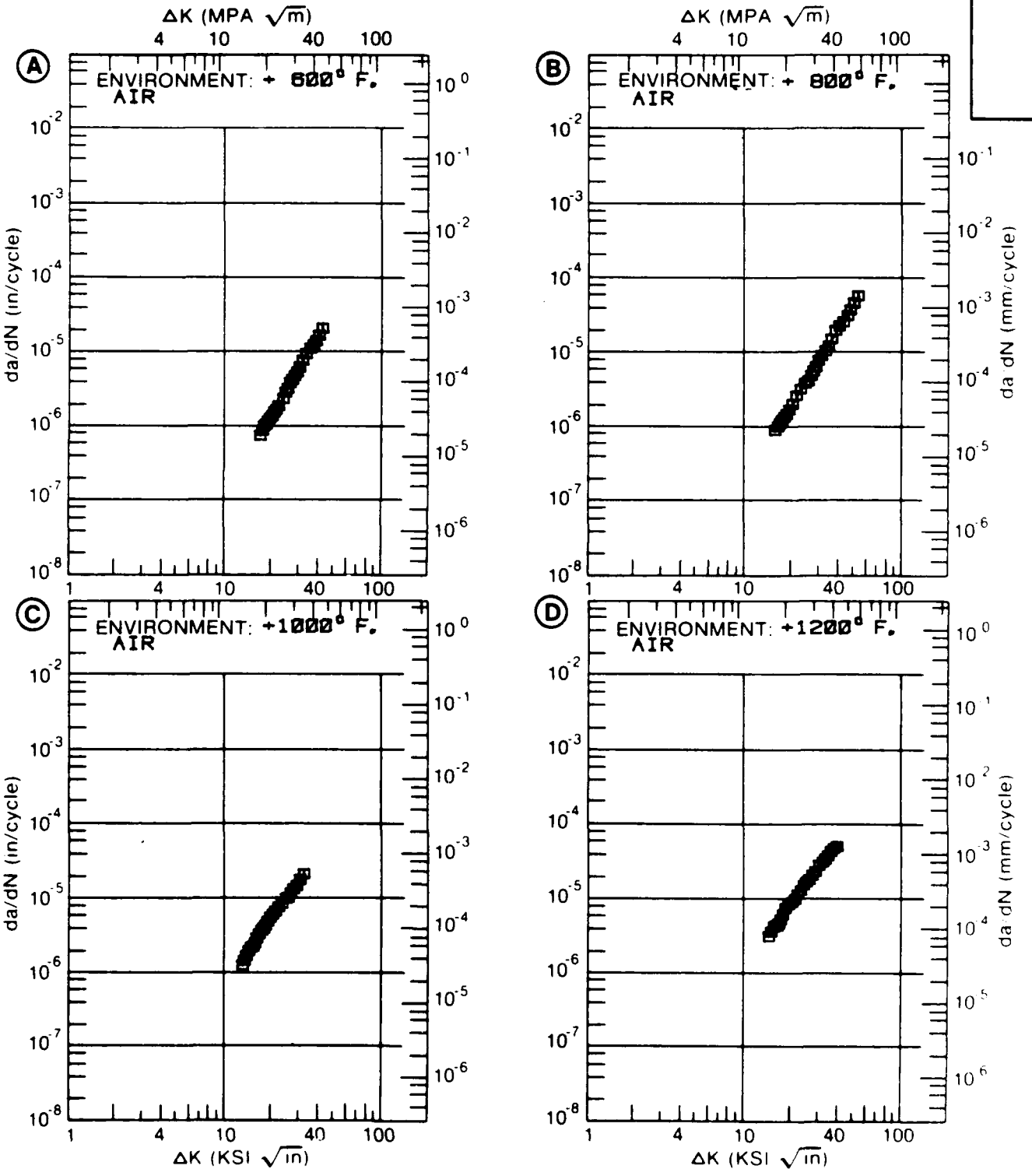


Figure 5.7.3.15

TABLE 5.7.3.16

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.16 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F AC, 1325 F 8HR FC TO 1150F, HELD 18HR AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. LAB AIR			
DELTA K MIN	A:	16.57	1.36			
	B:					
	C:					
	D:					
		20.00	2.55			
		25.00	5.07			
		30.00	8.74			
		35.00	14.0			
		40.00	21.5			
		50.00	47.2			
		60.00	98.4			
DELTA K MAX	A:	63.69	128.			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 7.64

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: 1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC
FORM: 2.00"TH FORGED BAR
SPECIMEN TYPE: CT
ORIENTATION: C-R
STRESS RATIO: +0.05
FREQUENCY: 10.00 HZ
YIELD STRENGTH: 152.1 KSI
ULT. STRENGTH: 194.4 KSI
SPECIMEN THK: 0.304"
SPECIMEN WIDTH: 1.480"
REFERENCES:HD017

NICKEL BASE

INCONEL 718

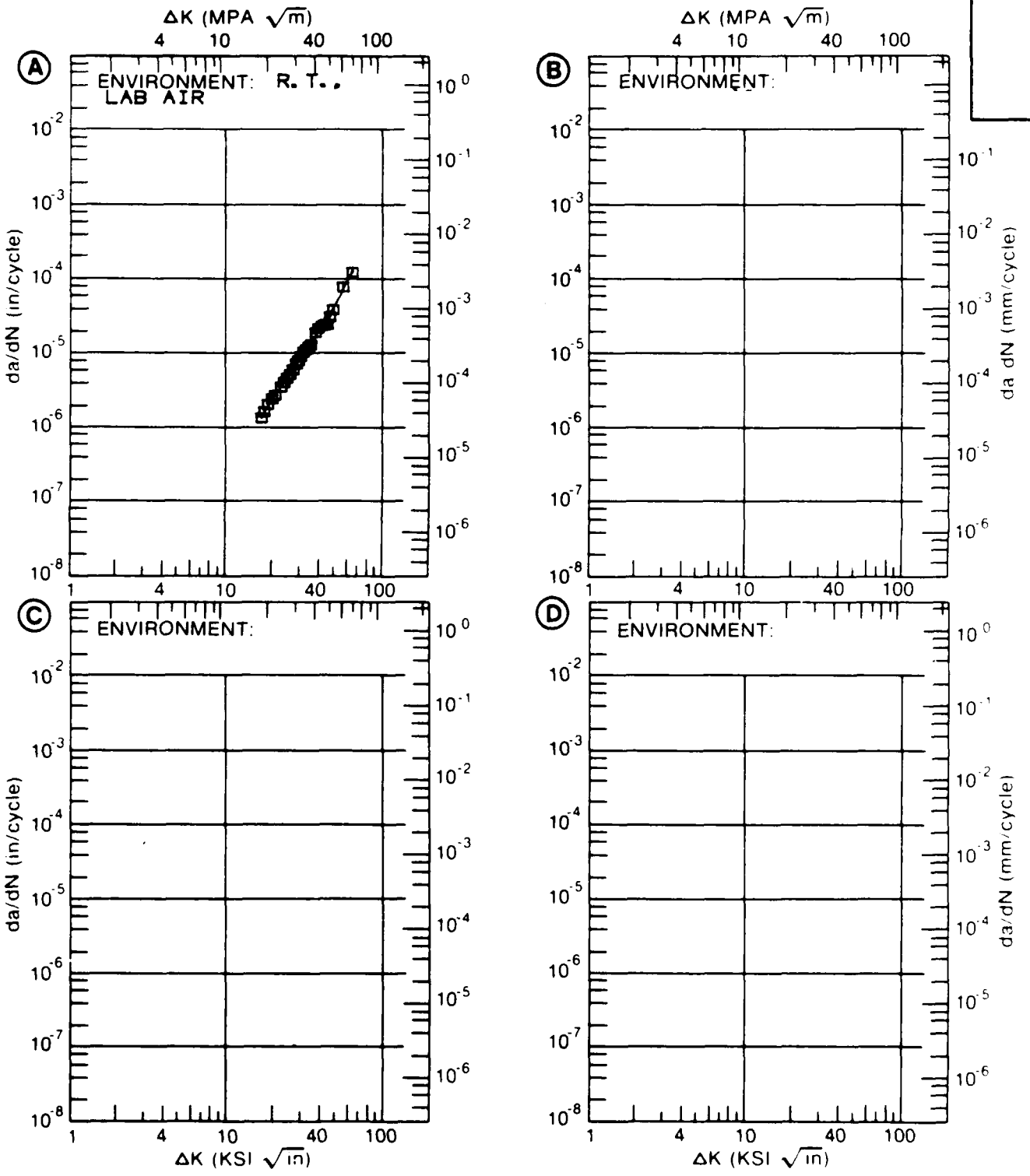


Figure 5.7.3.16

TABLE 5.7.3.17

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.17INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		E=+ 600F AIR	E=+ 800F AIR	E=+1000F AIR	E=+1200F AIR
DELTA K MIN	A: 17.61	1.38			
	B: 17.80		1.72		
	C: 16.17			3.68	
	D: 16.10				12.5
	20.00	2.32	2.88	7.13	21.0
	25.00	5.29	6.91	12.9	36.4
	30.00	9.77	12.9	20.5	55.6
	35.00	16.0	21.0	31.0	76.1
	40.00	24.4	31.2	45.9	95.3
	50.00	50.1		101.	
DELTA K MAX	A: 56.32	74.9			
	B: 42.93		38.3		
	C: 55.00			150.	
	D: 44.50				110.
ROOT MEAN SQUARE PERCENT ERROR		4.54	5.17	4.81	4.86
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5				
	0.5-0.8				
	0.8-1.25	1	1	1	1
	1.25-2.0				
	>2.0				

CONDITION/HT: 1750F AC, 1325F 8HR FC TO 1150F, HELD 18HR AC
FORM: 2.00"TH FORGED BAR
SPECIMEN TYPE: CT
ORIENTATION: C-R
STRESS RATIO: +0.05
FREQUENCY: 0.67 HZ

YIELD STRENGTH: 152.1 KSI
ULT. STRENGTH: 194.4 KSI
SPECIMEN THK: 0.303- 0.304"
SPECIMEN WIDTH: 1.478- 1.481"
REFERENCES:HD017

NICKEL BASE

INCONEL 718

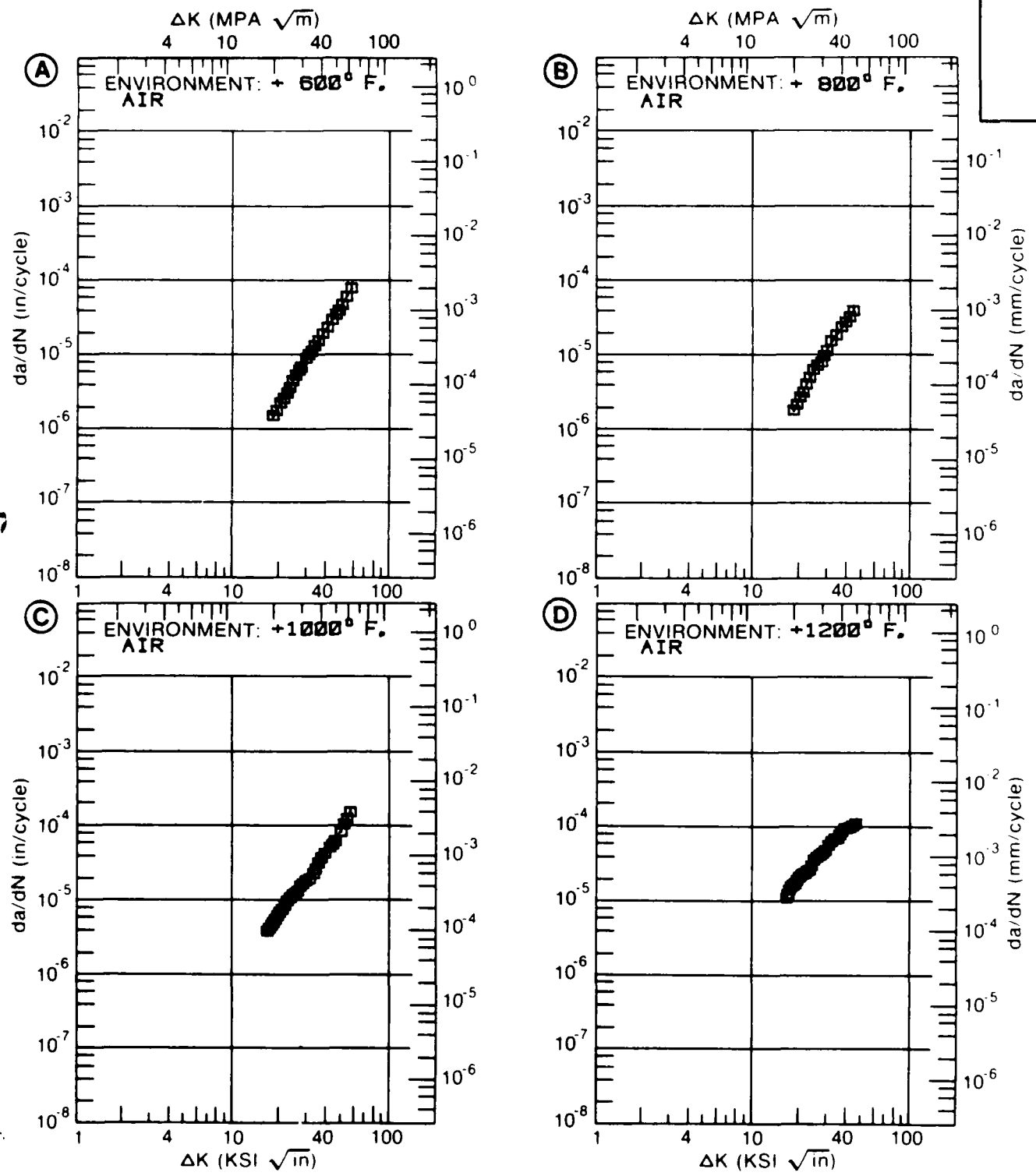


Figure 5.7.3.17

TABLE 5.7.3.18

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.18 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F 1HR AC, 1325F 8HR FC TO 1150F,
HELD 18HR AC(VIM-EFR)

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. LAB AIR, 10HZ	E=+1200F AIR, .67HZ		
DELTA K MIN	A:	12.11	.0962			
	B:	28.72		21.7		
	C:					
	D:					
		13.00	.218			
		16.00	.632			
		20.00	1.57			
		25.00	3.83			
		30.00	7.06	25.1		
		35.00	11.7	37.7		
		40.00	19.5	49.0		
DELTA K MAX	A:	45.38	35.7			
	B:	45.46		60.6		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			4.97	3.70		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION HT: 1750F 1HR AC, 1325F 8HR FC TO 1150F, HELD 18HR AC (VIM-EFR)
FORM: 0.50" TH PLATE
SPECIMEN TYPE: CT
ORIENTATION:
STRESS RATIO: +0.05
FREQUENCY:

YIELD STRENGTH: 147.9 KSI
ULT. STRENGTH: 191.3 KSI
SPECIMEN THK: 0.298- 0.490"
SPECIMEN WIDTH: 1.153- 1.998"
REFERENCES: HD016

NICKEL BASE

INCONEL 718

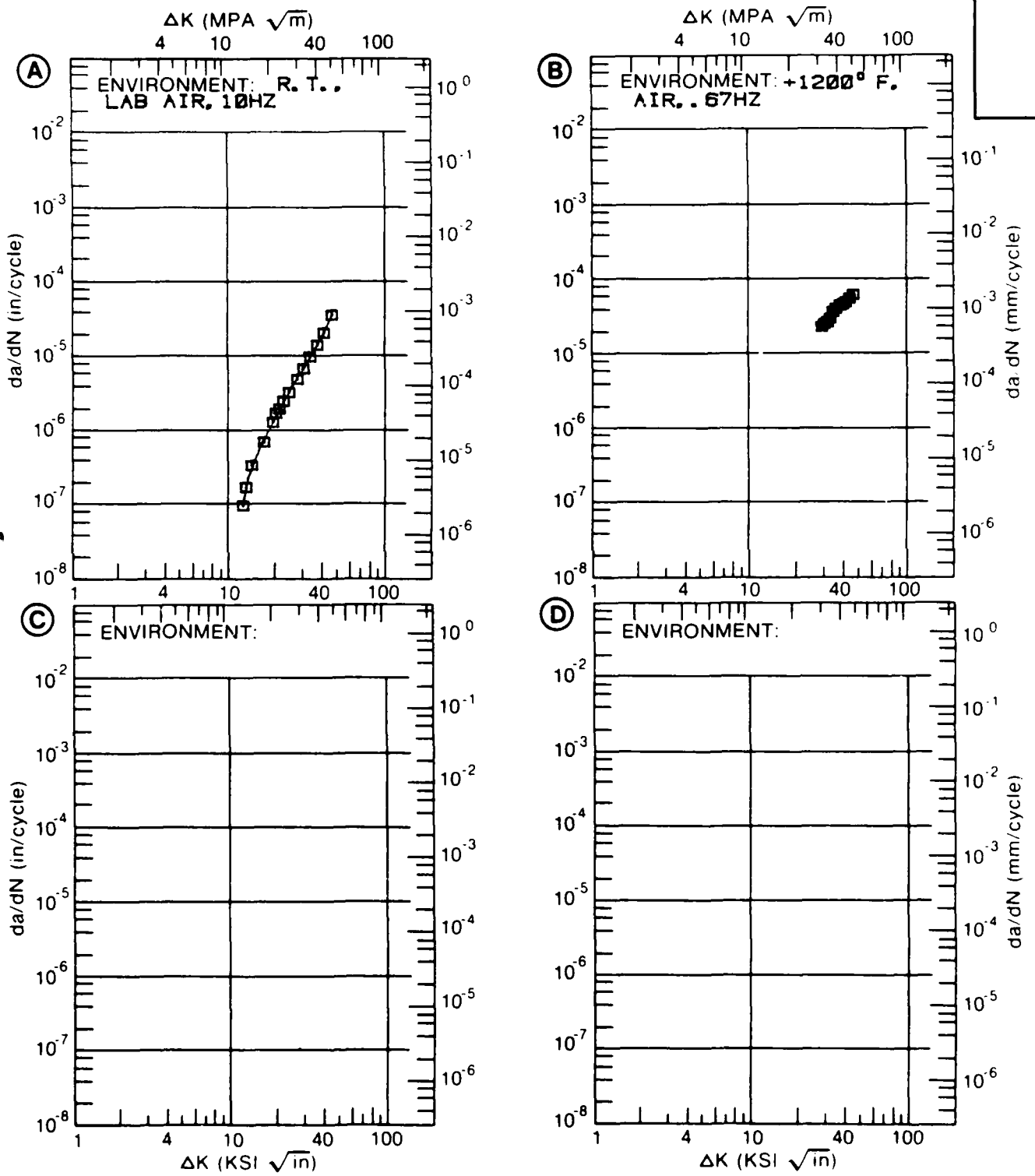


Figure 5.7.3.18

TABLE 5.7.3.19

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.19 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F 1HR AC, 1325F 8HR FC TO 1150F, HELD 18HR AC
(VIM-VAR)

ENVIRONMENT: R.T., LAB AIR

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		R=+0.05			
DELTA K MIN	A: 16.56	1.63			
	B:				
	C:				
	D:				
	20.00	2.99			
	25.00	6.28			
	30.00	12.1			
	35.00	22.4			
	40.00	40.0			
	50.00	122.			
DELTA K MAX	A: 56.03	232.			
	B:				
	C:				
	D:				

ROOT MEAN SQUARE PERCENT ERROR		5.04
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

1750F 1HR AC, 1325F 8HR FC TO 1150F.
HELD 18HR AC(VIM-VAR)

CONDITION/HT:
FORM: 0.63"TH FORGED BAR
SPECIMEN TYPE: CT
ORIENTATION: T-L
FREQUENCY: 8.33- 10.00 HZ
ENVIRONMENT: R.T., LAB AIR

YIELD STRENGTH: 164.9 KSI
ULT. STRENGTH: 208.1 KSI
SPECIMEN THK: 0.301"
SPECIMEN WIDTH: 1.151"
REFERENCES:HD016

NICKEL BASE

INCONEL 718

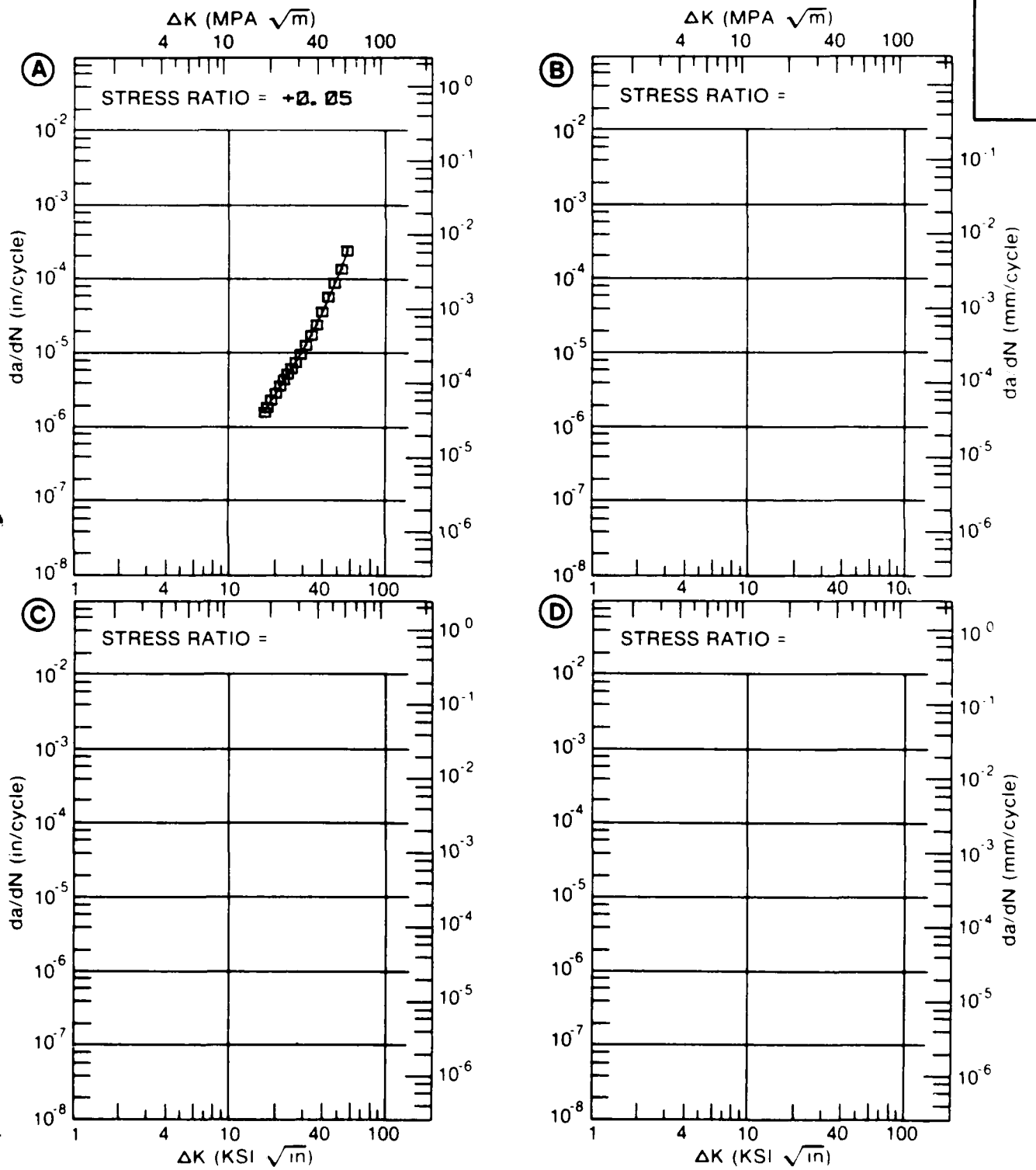


Figure 5.7.3.19

TABLE 5.7.3.20

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.20 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F 1HR AC, 1325F 8HR FC TO 1150F, HELD 18HR AC
(VIM-VAR)

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+ 600F AIR	E=+ 800F AIR	E=+1000F AIR	E=+1200F AIR
DELTA K MIN	A:	13.90	1.13			
	B:	13.42		1.37		
	C:	12.74			1.93	
	D:	16.46				20.1
		13.00			2.06	
		16.00	2.01	2.70	3.88	
		20.00	4.34	5.66	7.07	34.6
		25.00	8.72	11.1	11.9	59.4
		30.00	16.0	19.4	17.2	83.4
		35.00	28.9	32.3	22.5	
		40.00		52.9		
DELTA K MAX	A:	37.80	40.5			
	B:	41.21		59.6		
	C:	39.66			27.2	
	D:	31.33				88.9
ROOT MEAN SQUARE PERCENT ERROR			4.62	3.55	7.73	2.35
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1	1	1
		1.25-2.0				
		>2.0				

1750F 1HR AC, 1325F 8HR FC TO 1150F.
CONDITION/HT: HELD 18HR AC(VIM-VAR)
FORM: 0.63"TH FORGED BAR
SPECIMEN TYPE: CT
ORIENTATION: T-L
STRESS RATIO: +0.05
FREQUENCY: 0.67 HZ

YIELD STRENGTH: 164.9 KSI
ULT. STRENGTH: 208.1 KSI
SPECIMEN THK: 0.300- 0.302"
SPECIMEN WIDTH: 1.152- 1.153"
REFERENCES:HD016

NICKEL BASE

INCONEL 718

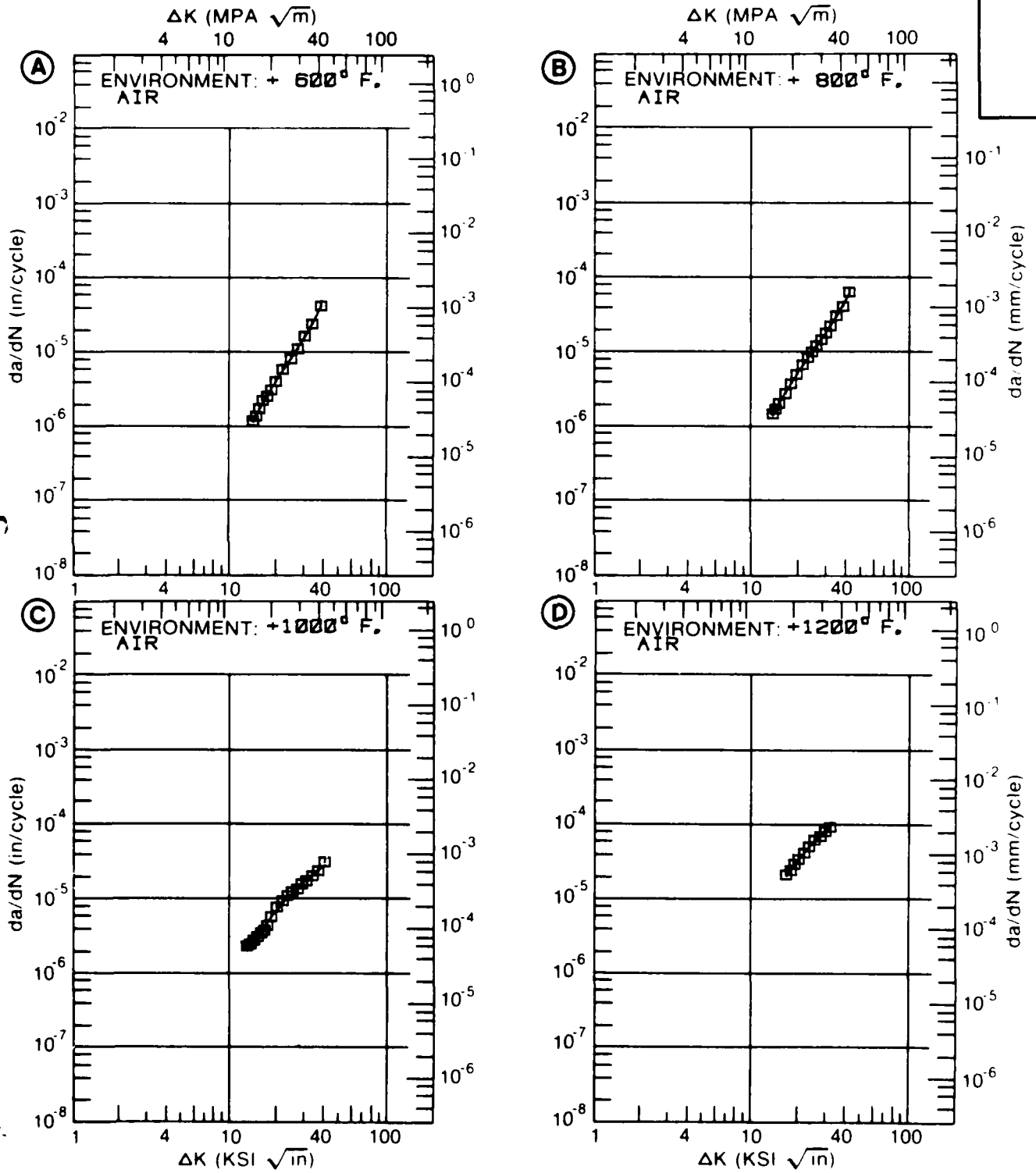


Figure 5.7.3.20

TABLE 5.7.3.21

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.21 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F 1HR Q, 1325F 8HR FC TO 1150F AT
100F/HR HOLD 8HR, AC
ENVIRONMENT: +1000F, AIR

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		R=+0.03			
DELTA K MIN	A: 16.37	2.25			
	B:				
	C:				
	D:				
	20.00	4.80			
	25.00	9.24			
	30.00	14.7			
	35.00	21.9			
	40.00	32.0			
DELTA K MAX	A: 47.47	56.9			
	B:				
	C:				
	D:				

ROOT MEAN SQUARE PERCENT ERROR	8.74

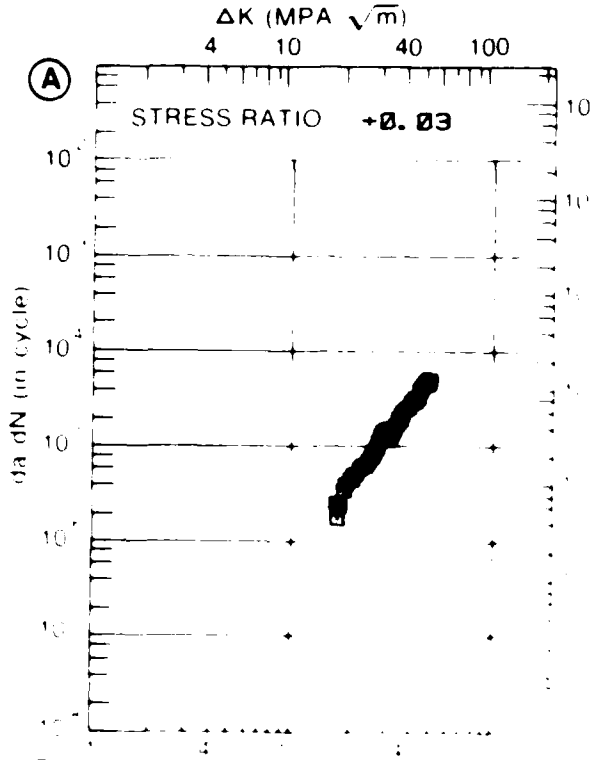
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

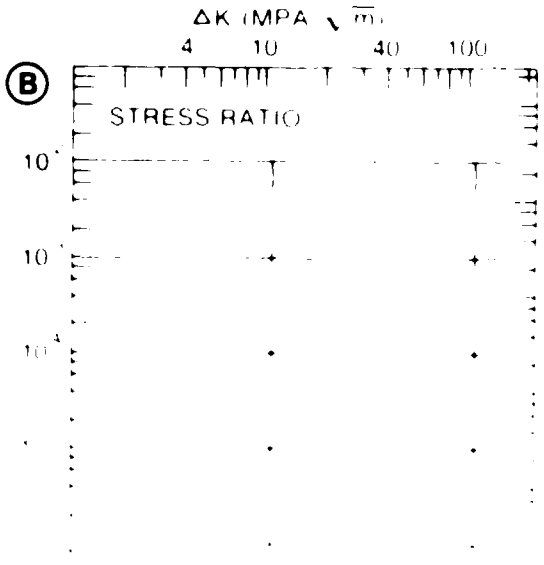
1750F 1HR Q, 1325F 8HR FC TO 1150F AT
CONDITION HT 100F/HR HOLD 8HR, AC
FORM 1.19"TH DISK
SPECIMEN TYPE KB BAR
ORIENTATION C-R
FREQUENCY 0.33 HZ
ENVIRONMENT +1000° F, AIR

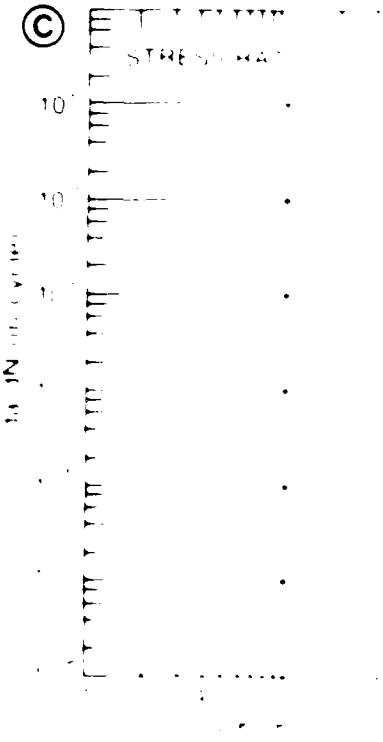
YIELD STRENGTH 150.0 KSI
ULT STRENGTH
SPECIMEN THK 0.250"
SPECIMEN WIDTH 0.900- 0.902"
REFERENCES GE005

NICKEL BASE

INCONEL 718







D

TABLE 5.7.3.22

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.22 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F 1HR Q, 1325F 8HR FC TO 1150F AT
100F/HR HOLD 8HR, AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+ 300F AIR	E=+ 600F AIR	E=+ 800F AIR	
DELTA K MIN	A	18.27	.43			
	B	14.88		1.06		
	C	14.17			1.20	
	D					
		16.00		1.20	1.42	
		20.00	.770	2.12	2.42	
		25.00	2.52	4.47	5.00	
		30.00	5.44	8.76	9.86	
		35.00	9.46	15.5	17.9	
		40.00	14.6	24.8	29.7	
		50.00			64.2	
DELTA K MAX	A	46.06	22.7			
	B	49.55		48.5		
	C	59.08			64.3	
	D					
[illegible] MEAN SQUARE ERROR:			26.22	48.34	19.07	
[illegible]		N= 5				
[illegible]		S= 6				
[illegible]		R= 25				
[illegible]		[illegible]				
[illegible]		[illegible]				

1750F 1HR Q, 1325F 8HR FC TO 1150F AT
CONDITION/HT: 100F/HR HOLD 8HR, AC
FORM: 1.13- 1.30"TH DISK
SPECIMEN TYPE: KB BAR
ORIENTATION: C-R
STRESS RATIO: -0.33
FREQUENCY: 0.33 HZ

YIELD STRENGTH: 150.0 KSI
ULT STRENGTH:
SPECIMEN THK: 0.251- 0.254"
SPECIMEN WIDTH: 0.903- 0.907"
REFERENCES: GE005

NICKEL BASE

INCONEL 718

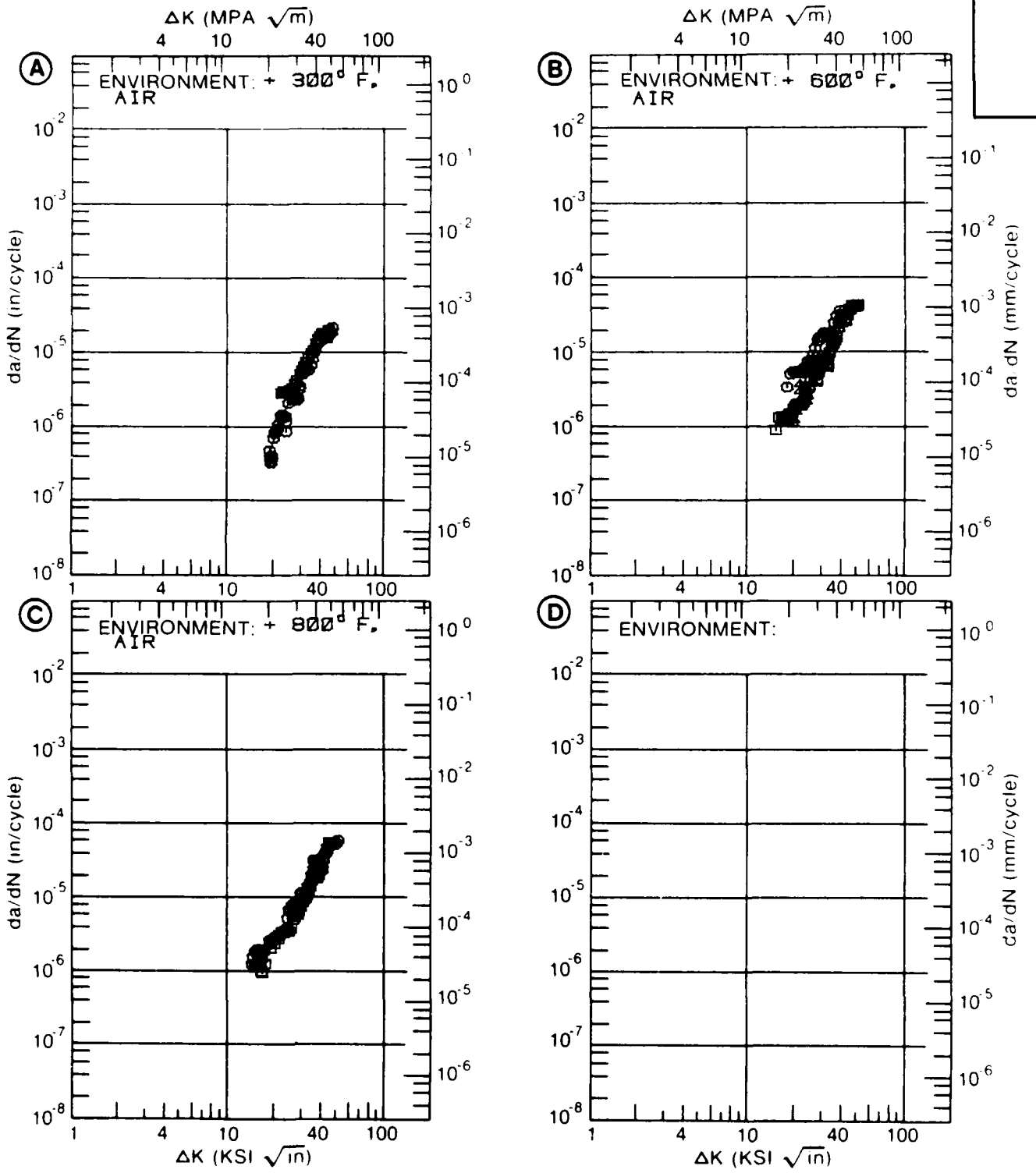


Figure 5.7.3.22

TABLE 5.7.3.23

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.23 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F 1HR Q, 1325F 8HR FC TO 1150F AT
100F/HR HOLD 8HR, AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+1000F AIR	E=+1200F AIR		
DELTA K MIN	A:	13.89	.96			
	B:	17.86		8.13		
	C:					
	D:					
		16.00	1.68			
		20.00	3.70	9.75		
		25.00	7.77	16.8		
		30.00	14.3	28.8		
		35.00	24.6	45.6		
		40.00	40.7	65.4		
DELTA K MAX	A:	48.37	89.9			
	B:	48.27		95.9		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			10.33	19.70		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 1750F 1HR Q. 1325F 8HR FC TO 1150F AT 100F/HR HOLD 8HR. AC
FORM: 1.13"TH DISK
SPECIMEN TYPE: KB BAR
ORIENTATION: C-R
STRESS RATIO: -0.33
FREQUENCY: 0.33 HZ

YIELD STRENGTH: 150.0 KSI
ULT. STRENGTH:
SPECIMEN THK: 0.252- 0.255"
SPECIMEN WIDTH: 0.905- 0.911"
REFERENCES:GE005

NICKEL BASE

INCONEL 718

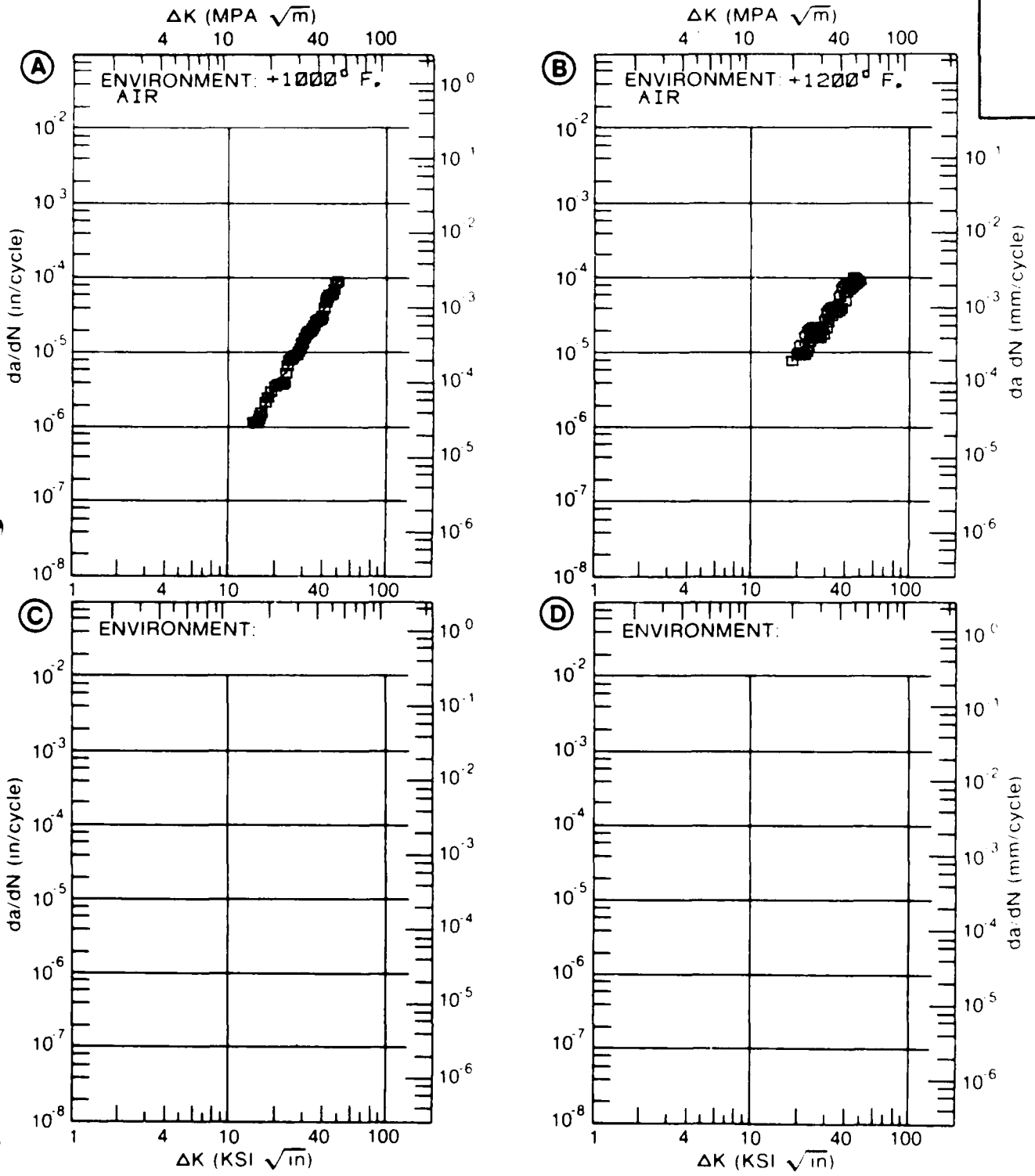


Figure 5.7.3.23

TABLE 5.7.3.24

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.24 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F 1HR Q, 1325F 8HR FC TO 1150F AT
100F/HR HOLD 8HR, AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+ 300F AIR	E=+ 600F AIR	E=+1000F AIR	
DELTA K MIN	A:	15.09	.485			
	B:	15.82		.589		
	C:	14.92			1.28	
	D:					
		16.00	.595	.626	1.70	
		20.00	1.45	1.66	3.36	
		25.00	3.38	3.66	5.95	
		30.00	6.13	7.64	10.8	
		35.00	11.0	13.9	19.1	
		40.00	19.1	19.9	30.3	
DELTA K MAX	A:	44.05	27.9			
	B:	42.52		21.5		
	C:	45.99			43.4	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			16.38	12.85	7.47	

LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

1750F 1HR Q, 1325F 8HR FC TO 1150F AT
CONDITION/HT: 100F/HR HOLD 8HR, AC
FORM: 1.13"TH DISK
SPECIMEN TYPE: KB BAR
ORIENTATION: C-R
STRESS RATIO: +0.00
FREQUENCY: 0.33 HZ

YIELD STRENGTH: 150.0 KSI
ULT. STRENGTH:
SPECIMEN THK: 0.250- 0.252"
SPECIMEN WIDTH: 0.900- 0.906"
REFERENCES: GE005

NICKEL BASE

INCONEL 718

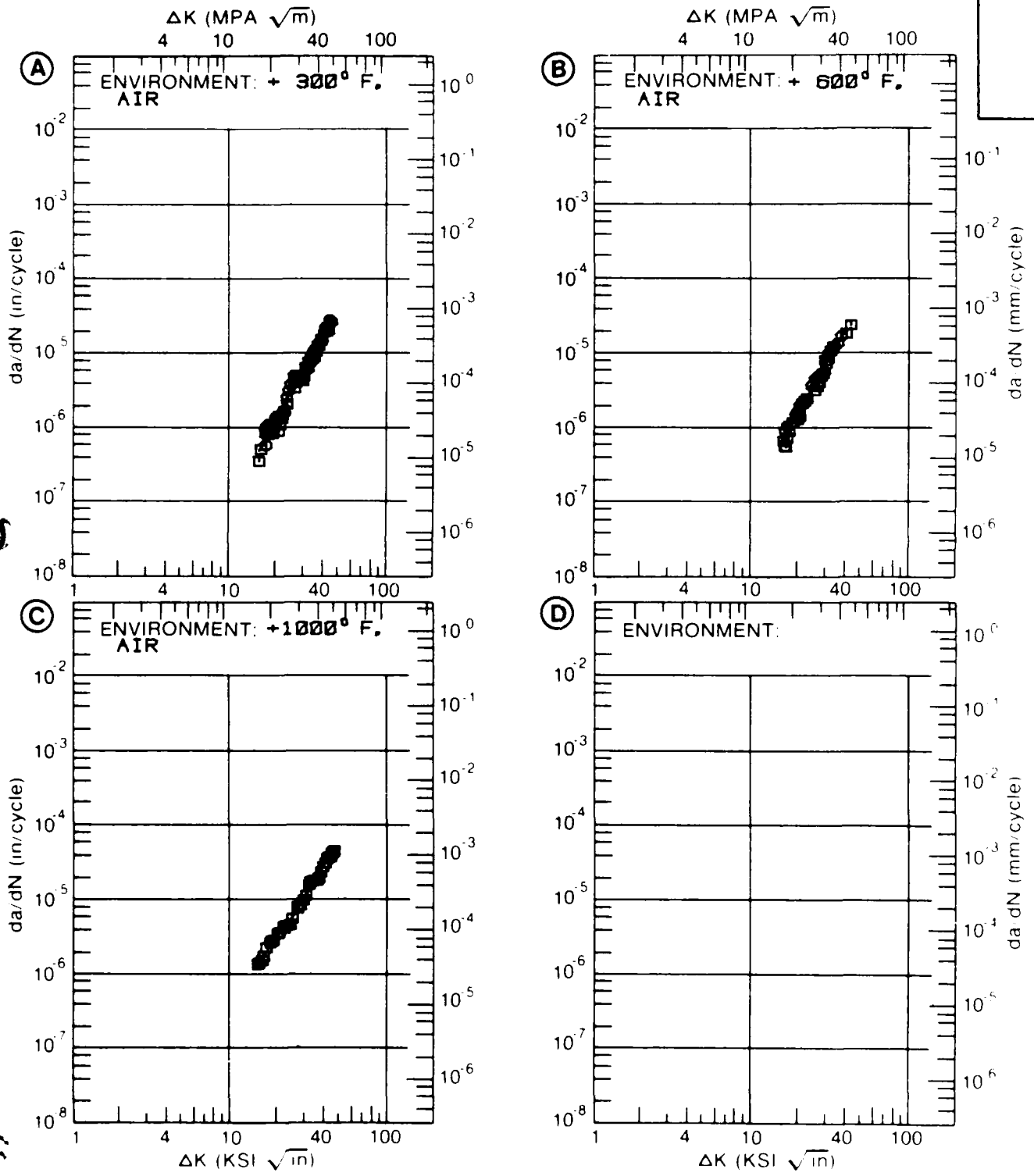


Figure 5.7.3.24

TABLE 5.7.3.25

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.25 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F 1HR Q, 1325F 8HR FC TO 1150F AT
100F/HR HOLD 8HR, AC

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		E=+ 300F AIR	E=+ 800F AIR	E=+1000F AIR	E=+1200F AIR
DELTA K MIN	A: 19.86	1.82			
	B: 7.10		.146		
	C: 14.19			1.84	
	D: 12.99				2.42
	8.00		.149		
	9.00		.221		
	10.00		.346		
	13.00		.749		2.44
	16.00		1.33	1.86	5.51
	20.00	1.86	2.67	2.59	9.92
	25.00	3.98	5.99	6.06	23.4
	30.00	7.94	12.4	14.5	42.7
	35.00	14.3	23.0	20.9	64.3
	40.00	23.4	38.5	27.6	86.3
DELTA K MAX	A: 47.23	40.8			
	B: 40.11		38.9		
	C: 49.01			65.2	
	D: 46.60				114.
ROOT MEAN SQUARE PERCENT ERROR		6.12	15.70	21.44	21.88

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

1750F 1HR Q. 1325F 8HR FC TO 1150F AT
CONDITION/HT: 100F/HR HOLD 8HR. AC
FORM: 1.13- 1.30"TH DISK
SPECIMEN TYPE: KB BAR
ORIENTATION: C-R
STRESS RATIO: +0.03
FREQUENCY: 0.33 HZ

YIELD STRENGTH: 150.0 KSI
ULT. STRENGTH:
SPECIMEN THK: 0.250- 0.254"
SPECIMEN WIDTH: 0.902- 0.910"
REFERENCES: GE005

NICKEL BASE

INCONEL 718

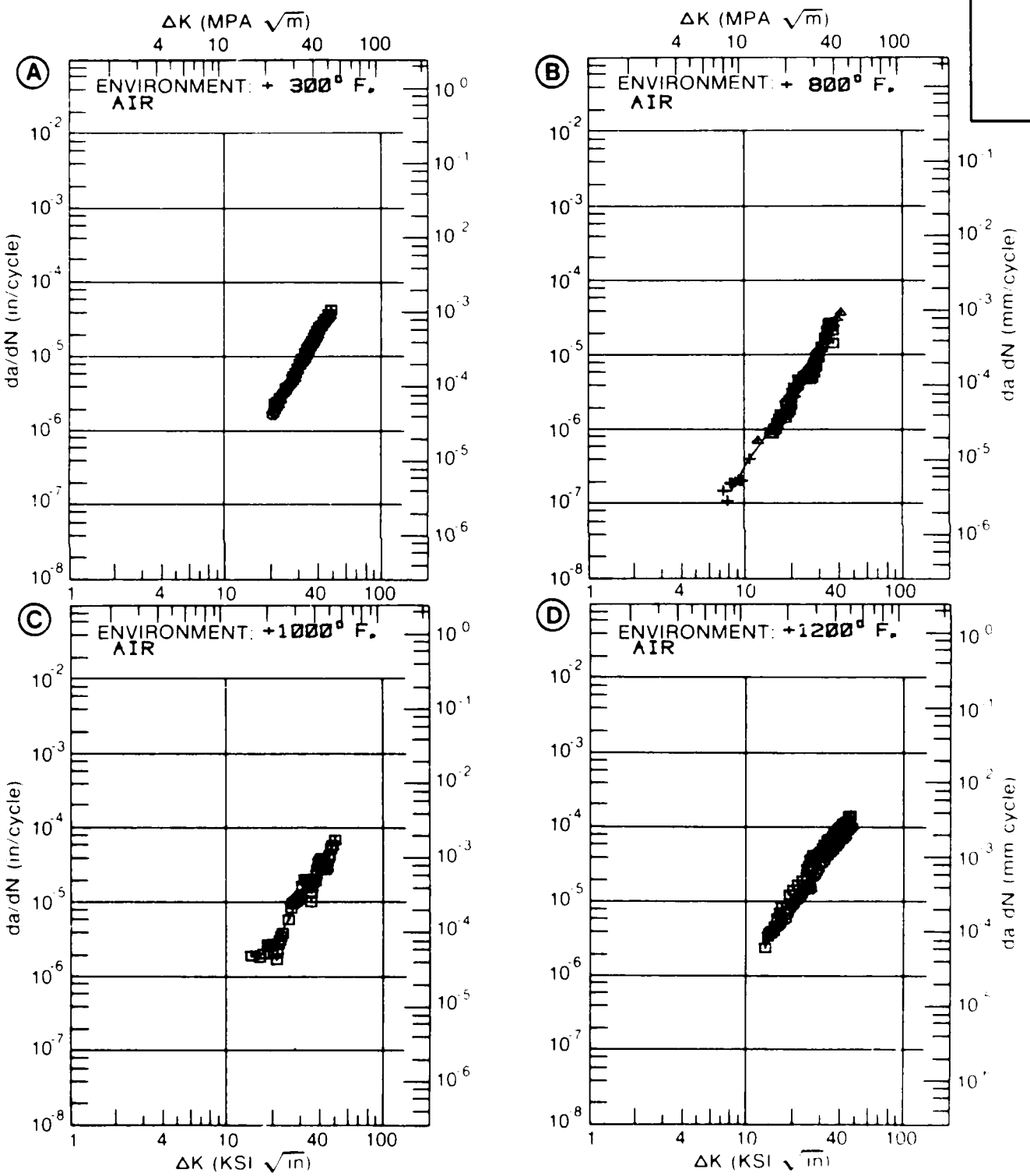


Figure 5.7.3.25

TABLE 5.7.2.26

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.26 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F 1HR Q, 1325F 8HR FC TO 1150F AT
100F/HR HOLD 8HR, AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+ 300F AIR	E=+ 600F AIR	E=+ 800F AIR	E=+1000F AIR
DELTA K MIN	A:	13.99	.523			
	B:	17.33		1.33		
	C:	15.78			1.36	
	D:	12.17				2.60
		13.00				1.81
		16.00	.395		1.41	2.69
		20.00	1.09	2.71	2.91	6.62
		25.00	2.30	6.74	6.95	12.5
		30.00	6.19	13.8	14.4	23.0
		35.00	11.8	24.5		54.6
DELTA K MAX	A:	35.84	12.0			
	B:	38.01		31.5		
	C:	33.30			21.3	
	D:	35.35				59.0
ROOT MEAN SQUARE PERCENT ERROR			21.76	16.02	15.70	20.84

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 1750F 1HR Q. 1325F 8HR FC TO 1150F AT 100F/HR HOLD 8HR. AC
FORM: 1.13- 1.30"TH DISK
SPECIMEN TYPE: KB BAR
ORIENTATION: C-R
STRESS RATIO: +0.25
FREQUENCY: 0.33 HZ

YIELD STRENGTH: 150.0 KSI
ULT. STRENGTH:
SPECIMEN THK: 0.250- 0.253"
SPECIMEN WIDTH: 0.900- 0.909"
REFERENCES: GE005

NICKEL BASE

INCONEL 718

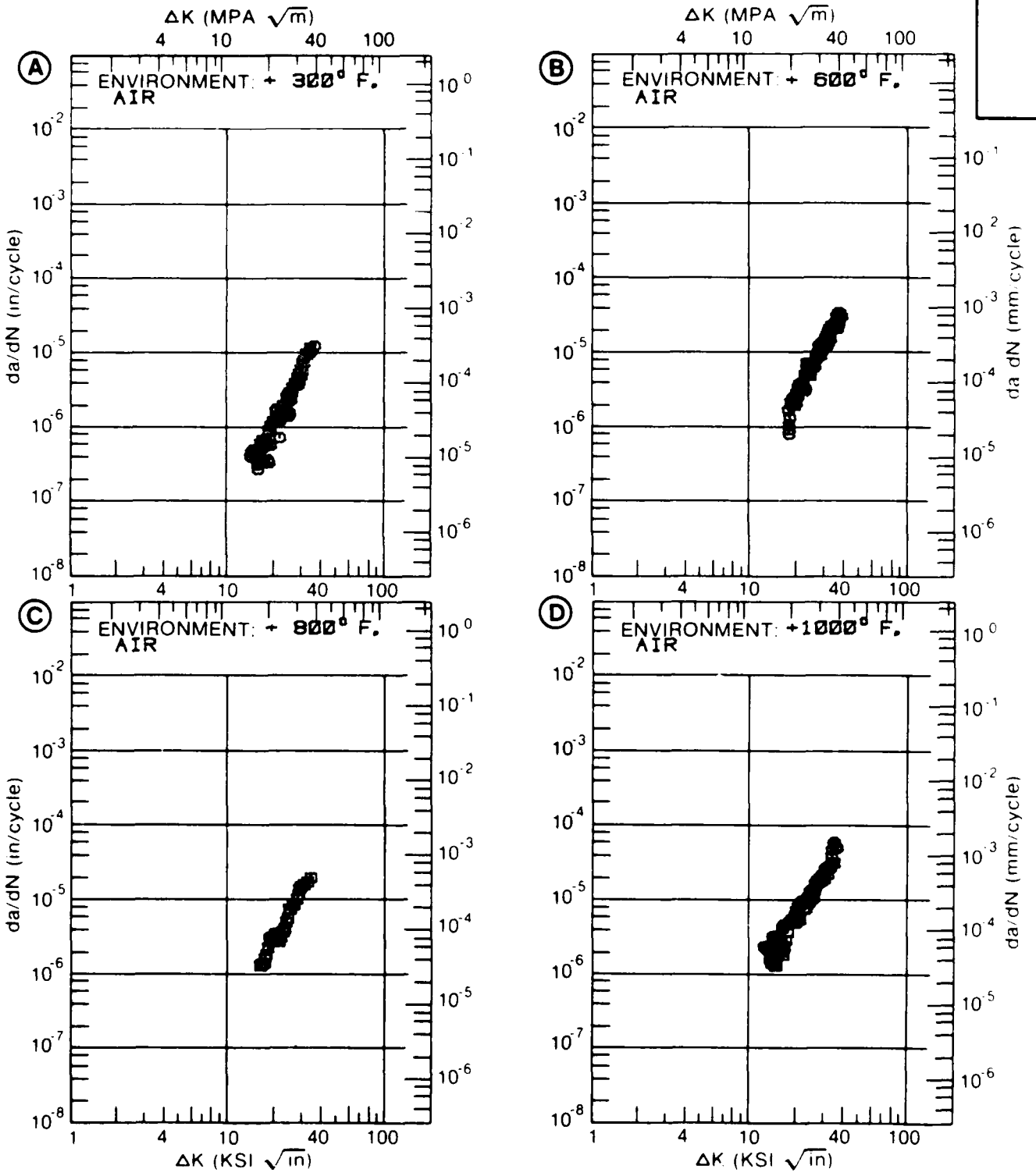


Figure 5.7.3.26

TABLE 5.7.3.27

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.27 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F 1HR Q, 1325F 8HR FC TO 1150F AT
100F/HR HOLD 8HR, AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)		
			A	B	C	D
			E=+ 300F AIR	E=+ 600F AIR	E=+ 800F AIR	
DELTA K MIN	A:	12.37	.849			
	B:	12.93		1.09		
	C:	11.11			.647	
	D:					
		13.00	.518	1.07	1.12	
		16.00	1.08	1.95	3.31	
		20.00	3.25	3.74	5.86	
DELTA K MAX	A:	23.59	6.18			
	B:	23.39		10.2		
	C:	21.92			8.80	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			38.69	24.20	32.95	

LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 1750F 1HR Q. 1325F 8HR FC TO 1150F AT 100F/HR HOLD 8HR. AC
FORM: 1.13- 1.30"TH DISK
SPECIMEN TYPE: KB BAR
ORIENTATION: C-R
STRESS RATIO: +0.54
FREQUENCY: 0.33 HZ

YIELD STRENGTH: 150.0 KSI
ULT. STRENGTH:
SPECIMEN THK: 0.250- 0.255"
SPECIMEN WIDTH: 0.902- 0.922"
REFERENCES: GE005

NICKEL BASE

INCONEL 718

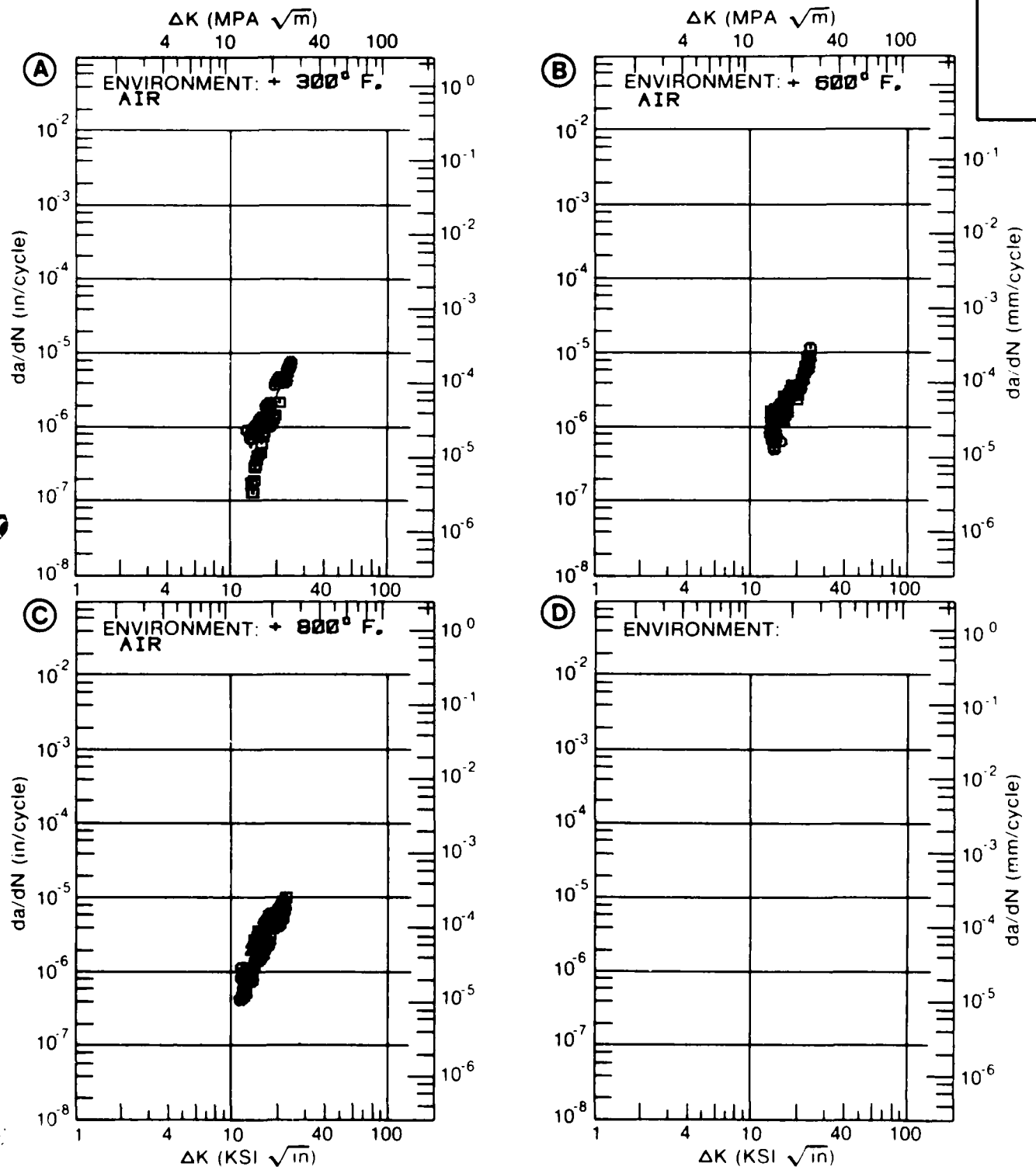


Figure 5.7.3.27

TABLE 5.7.3.28

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.28 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1750F 1HR Q, 1325F 8HR FC TO 1150F AT
100F/HR HOLD 8HR, AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+1000F AIR	E=+1200F AIR		
DELTA K MIN	A:	9.26	.412			
	B:	8.80		.348		
	C:					
	D:					
		9.00		.287		
		10.00	.857	2.12		
		13.00	2.19	5.73		
		16.00	4.03	8.45		
		20.00	8.45	16.0		
DELTA K MAX	A:	22.64	14.3			
	B:	22.63		22.0		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			18.59	24.72		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
0.0-0.5	0
0.5-0.8	8
0.8-1.25	
1.25-2.0	0
>2.0	

1750F 1HR Q. 1325F 8HR

CONDITION HT 100F/HR HOLD 8HR. AC

FORM 1.13"TH DISK

SPECIMEN TYPE KB BAR

ORIENTATION C-R

STRESS RATIO +0.54

FREQUENCY 0.33 HZ

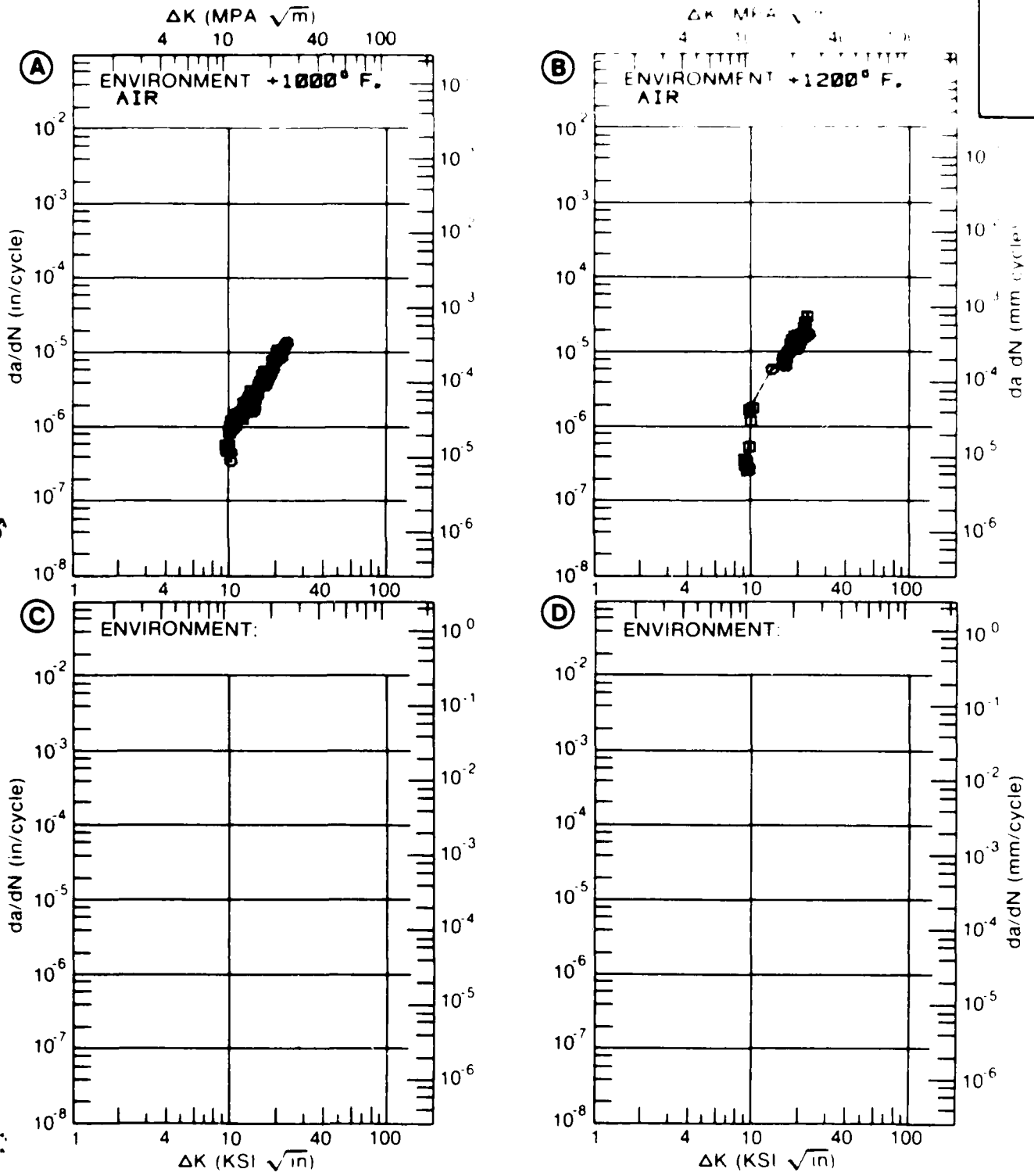


Figure 5.7.3.28

TABLE 5.7.3.29

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.29 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1760F 1HR WQ, 1325F 8HRS, FC TO 1150F 8HRS, AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. LAB AIR, .33HZ	E=+1200F AIR, .33HZ	E=+1200F AIR, .02HZ	E=+1200F AIR, 5MIN HOLD
DELTA K MIN	A:	12.93	.0371			
	B:	13.68		.172		
	C:	19.60			7.05	
	D:	19.03				.615
		13.00	.0525			
		16.00	1.02	.692		
		20.00	2.86	3.20	8.02	1.30
		25.00	6.85	9.59	27.7	18.0
		30.00	14.7	18.4	61.0	87.8
		35.00	32.3	28.3	106.	300.
		40.00		38.5	160.	953.
		50.00		60.7	294.	
		60.00		88.9	472.	
		70.00		130.	719.	
DELTA K MAX	A:	39.18	324.			
	B:	71.33		136.		
	C:	77.64			978.	
	D:	41.00				1205.
ROOT MEAN SQUARE PERCENT ERROR			19.82	18.82	20.92	29.11

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 1760F 1HR WQ, 1325F 8HRS, FC TO 1150F 8HRS, AC
FORM: 3.60"TH DISK
SPECIMEN TYPE: CCP
ORIENTATION: C-R
STRESS RATIO: +0.00
FREQUENCY:

YIELD STRENGTH: 171.6 KSI
ULT. STRENGTH: 201.7 KSI
SPECIMEN THK: 0.080"
SPECIMEN WIDTH: 2.000"
REFERENCES: GE008

NICKEL BASE

INCONEL 718

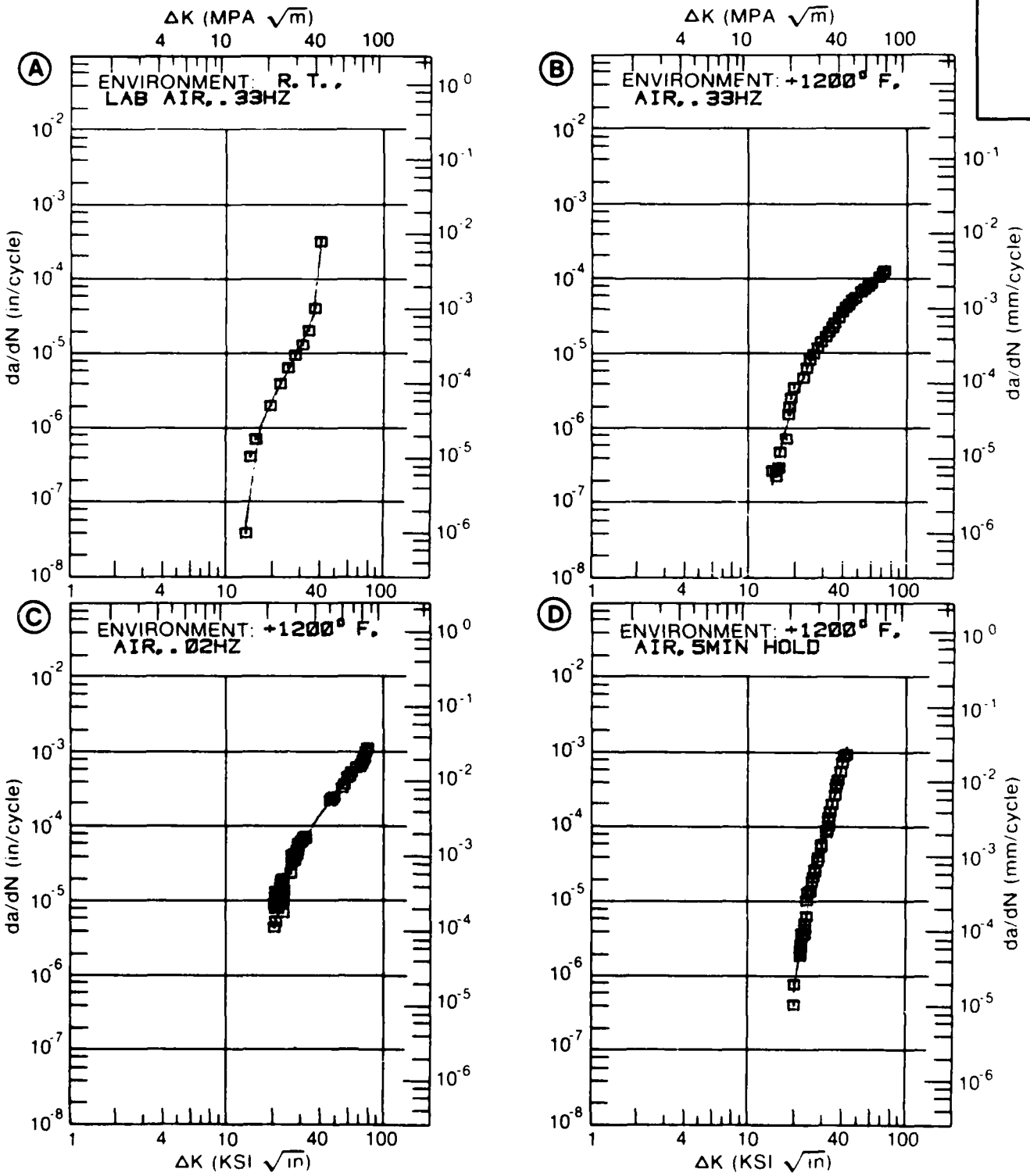


Figure 5.7.3.29

TABLE 5.7.3.80

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.80 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1760F 1HR WQ, 1325F 8HRS FC TO 1150F 8HRS AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+1200F AIR			
DELTA K MIN	A:	13.48	.203			
	B:					
	C:					
	D:					
		16.00	2.44			
		20.00	11.7			
		25.00	24.2			
		30.00	37.5			
		35.00	51.6			
		40.00	67.3			
		50.00	110.			
DELTA K MAX	A:	58.25	167.			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR: 17.54

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
0.0-0.5	
0.5-0.8	
0.8-1.25	
1.25-2.0	
2.0	

CONDITION/HT: 1760F 1HR WQ, 1325F 8HRS FC TO 1150F 8HRS AC
FORM: 3.60"TH DISK
SPECIMEN TYPE: CCP
ORIENTATION: C-R
STRESS RATIO: +0.00
FREQUENCY: 0.33 HZ
YIELD STRENGTH: 171.6 KSI
ULT. STRENGTH: 201.7 KSI
SPECIMEN THK: 0.250"
SPECIMEN WIDTH: 0.600"
REFERENCES: GE008

NICKEL BASE

INCONEL 718

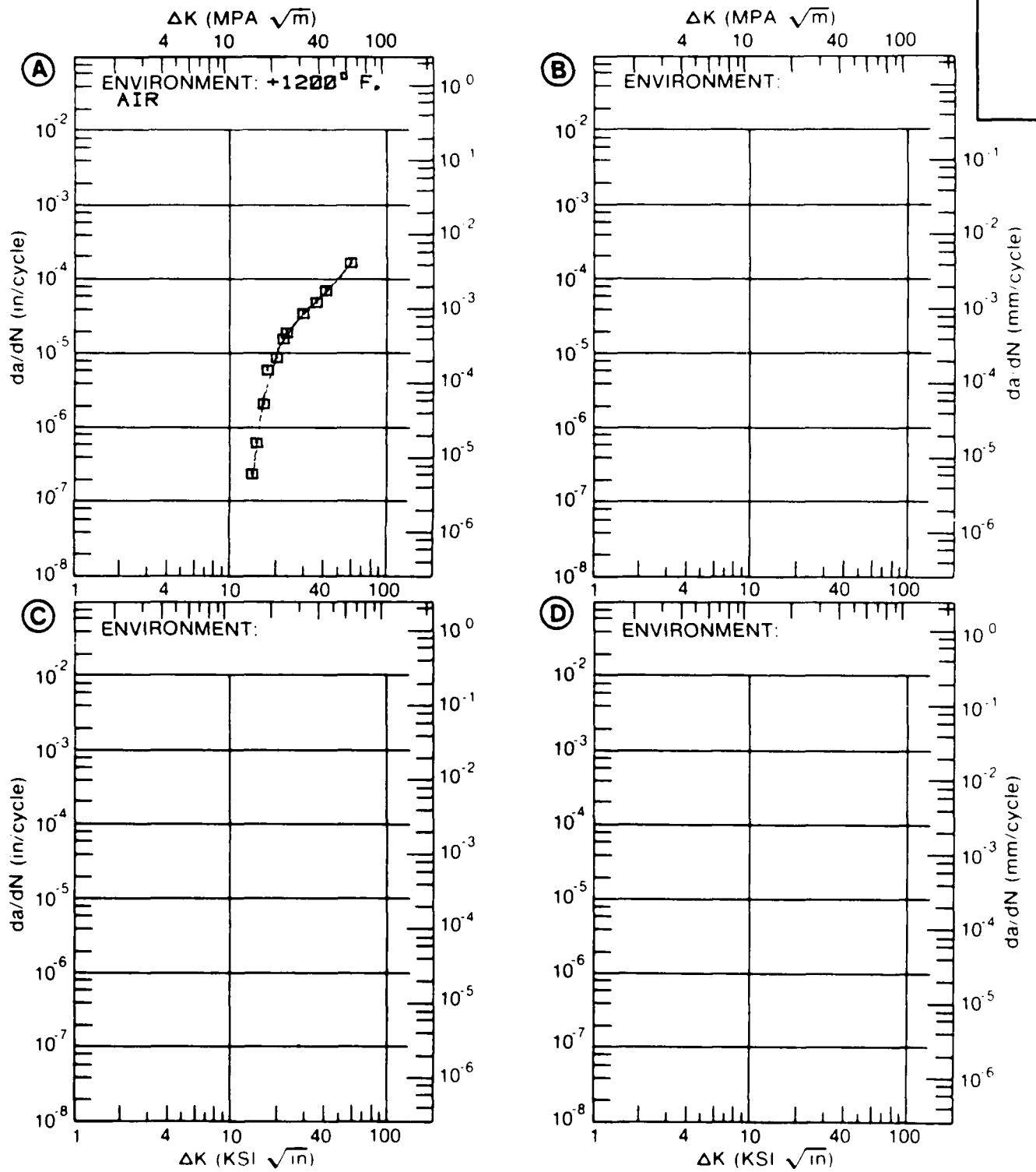


Figure 5.7.3.30

TABLE 5.7.3.31

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.31 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1800F 1HR Q, 1325F 8HRS FC TO 1150F HOLD 8HRS AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+1200F AIR			
DELTA K MIN	A:	14.80	1.41			
	B:					
	C:					
	D:					
		16.00	2.35			
		20.00	5.60			
		25.00	11.9			
		30.00	23.7			
		35.00	42.7			
		40.00	66.5			
		50.00	106.			
DELTA K MAX	A:	55.00	112.			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR	18.01

LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 1800F 1HR Q. 1325F 8HRS FC TO 1150F HOLD 8HRS AC
FORM: 4.67"TH FORGING
SPECIMEN TYPE: KB BAR
ORIENTATION: C-R
STRESS RATIO: +0.05
FREQUENCY: 0.33 HZ

YIELD STRENGTH: 169.2 KSI
ULT. STRENGTH:
SPECIMEN THK: 0.250"
SPECIMEN WIDTH 0.600"
REFERENCES: GE001

NICKEL BASE

INCONEL 718

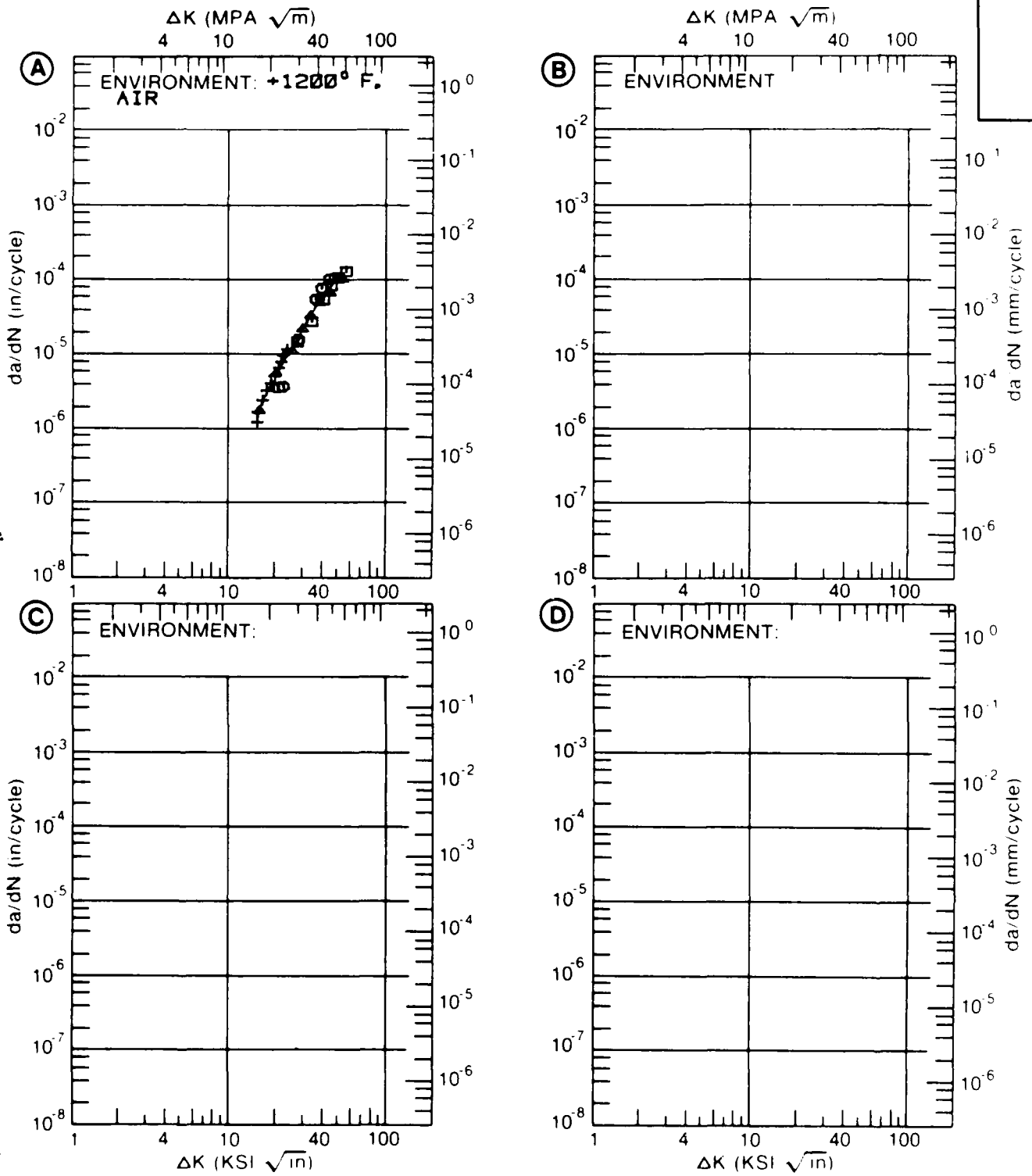


Figure 5.7.3.31

TABLE 5.7.3.32

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.32 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: ST 1850F, 1360F 9HRS, F/C 1175F

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. L.H.A., 6HZ	E=+ 400F L.H.A., 6HZ	E= R.T. S.T.W., 1HZ	
DELTA K MIN	A:	27.73	.357			
	B:	25.53		.175		
	C:	26.20			.345	
	D:					
		30.00	.840	.963	.933	
		35.00	2.09	2.41	2.57	
		40.00	3.73	4.82	4.12	
		50.00	9.99	13.3	11.4	
		60.00	21.2	28.5	23.2	
DELTA K MAX	A:	69.11	34.8			
	B:	68.07		48.0		
	C:	62.69			27.2	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			6.46	6.32	9.48	
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1	1	
		1.25-2.0				
		>2.0				

CONDITION/HT: ST 1850F, 1360F 9HRS, F/C 1175F
FORM: 4.00"TH FORGED BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.08
FREQUENCY:

YIELD STRENGTH: 160.0 KSI
ULT. STRENGTH: 192.0 KSI
SPECIMEN THK: 0.500"
SPECIMEN WIDTH: 5.900- 6.000"
REFERENCES: 88579

NICKEL BASE

INCONEL 718

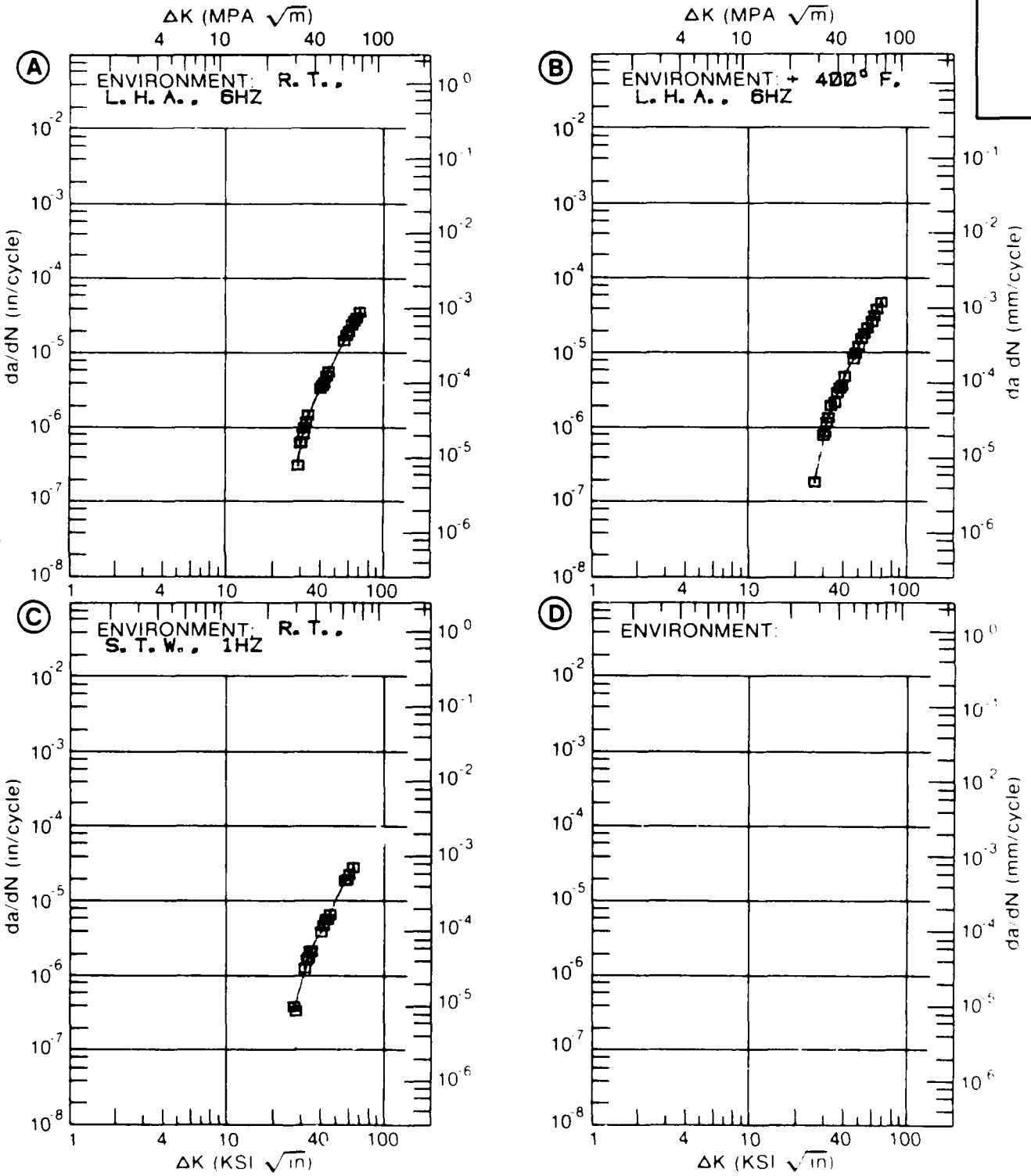


Figure 5.7.3.32

TABLE 5.7.3.33

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.33 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: ST 1850F, 1360F 9HRS F/C 1175F

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. L.H.A.	E=+ 400F L.H.A.		
DELTA K MIN	A:	19.84	.710			
	B:	17.85		.738		
	C:					
	D:					
		20.00	.773	1.66		
		25.00	3.38	5.47		
		30.00	6.69	12.1		
		35.00	10.8	20.2		
		40.00	16.0	27.7		
		50.00	30.2			
DELTA K MAX	A:	59.27	47.0			
	B:	49.30		49.8		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			3.11	6.49		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8		1		
		0.8-1.25	1			
		1.25-2.0				
		>2.0				

CONDITION/HT: ST 1850F, 1360F 9HRS F/C 1175F
FORM: 4.00"TH FORGED BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.50
FREQUENCY: 6.00 HZ

YIELD STRENGTH: 160.0 KSI
ULT. STRENGTH: 192.0 KSI
SPECIMEN THK: 0.500"
SPECIMEN WIDTH: 5.990- 6.000"
REFERENCES: 88579

NICKEL BASE

INCONEL 718

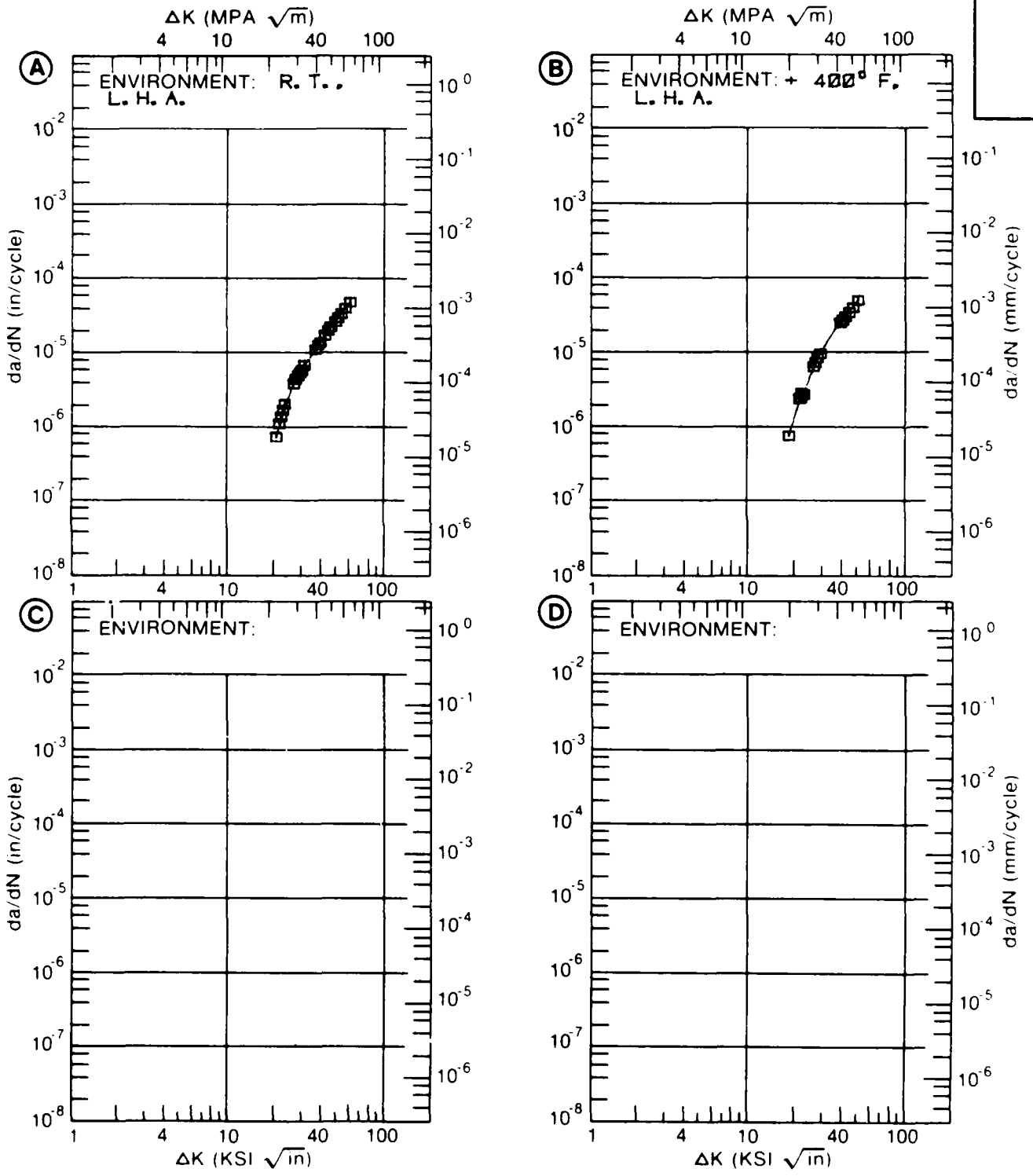


Figure 5.7.3.33

TABLE 5.7.3.34

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.34 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: ST 1850F, 1360F 9HRS, F/C 1175F

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. L.H.A., 6HZ	E= R.T. S.T.W., 1HZ	E= R.T. S.C.S., 1HZ	
DELTA K MIN	A:	26.21	.346			
	B:	28.93		.394		
	C:	31.51			1.18	
	D:					
		30.00	1.12	.631		
		35.00	3.13	1.93	2.18	
		40.00	6.30	2.82	3.92	
		50.00	16.1	8.61	11.0	
		60.00	32.9	27.8	25.8	
		70.00		40.5	50.3	
		80.00		208.	87.1	
		90.00			154.	
DELTA K MAX	A:	67.39	54.8			
	B:	81.34		306.		
	C:	95.99			225.	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			13.44	16.84	8.36	
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5					
	0.5-0.8		1			
	0.8-1.25			1	1	
	1.25-2.0					
	>2.0					

CONDITION/HT: ST 1850F. 1360F 9HRS. F/C 1175F
FORM: 4.00"TH FORGED BAR
SPECIMEN TYPE: CT
ORIENTATION: T-L
STRESS RATIO: +0.08
FREQUENCY:

YIELD STRENGTH: 160.0 KSI
ULT. STRENGTH: 192.0 KSI
SPECIMEN THK: 0.500- 0.510"
SPECIMEN WIDTH: 7.390- 7.400"
REFERENCES: 88579

NICKEL BASE

INCONEL 718

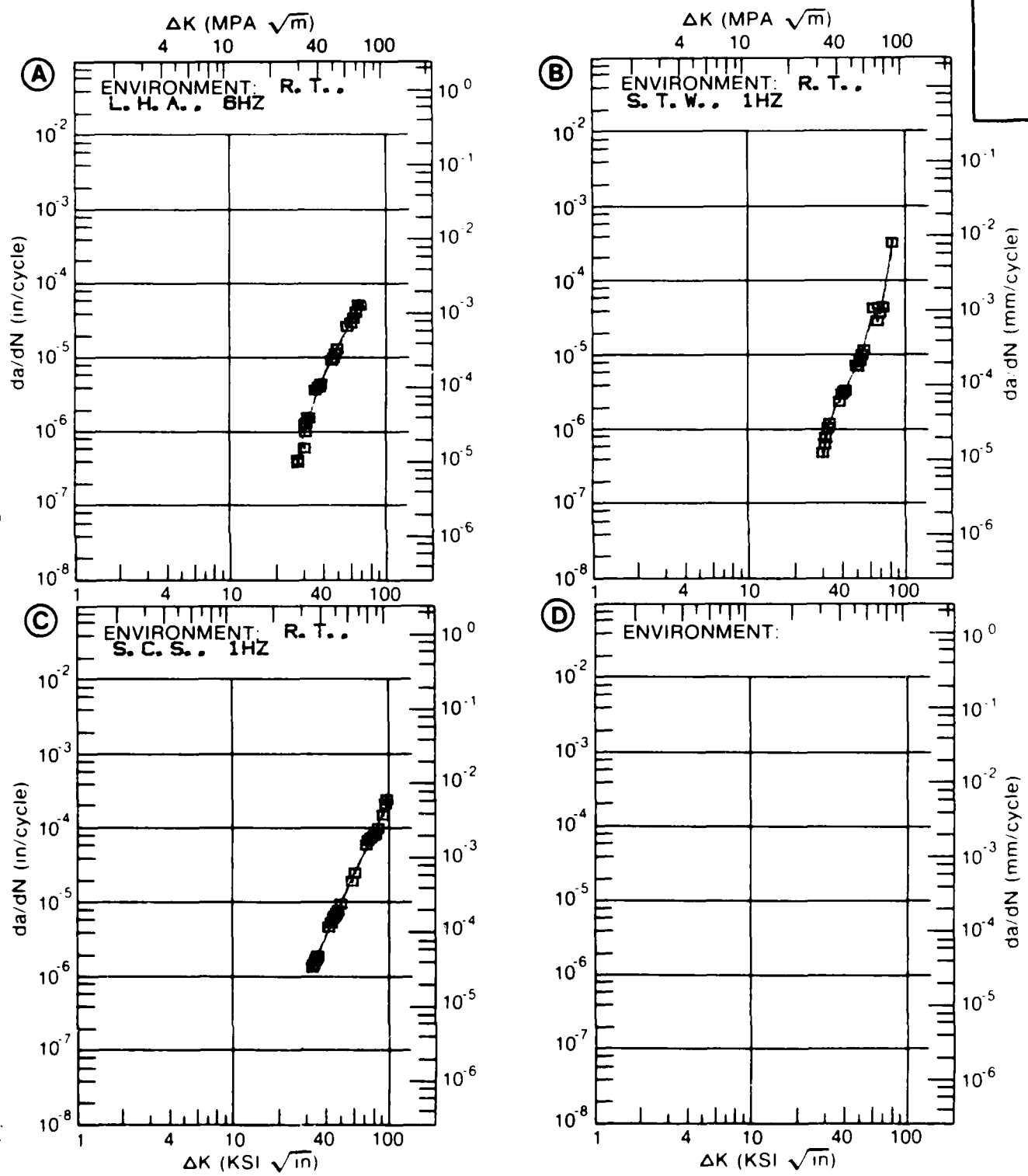


Figure 5.7.3.34

TABLE 5.7.3.35

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.35 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: ST 1850F, 1360F 9HRS, F/C 1175F

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. L.H.A.	E=+ 400F L.H.A.	E= R.T. S.T.W.	
DELTA K MIN	A:	28.21	2.84			
	B:	20.07		.335		
	C:	20.92			.253	
	D:					
		25.00		1.23	1.02	
		30.00	3.57	2.86	2.63	
		35.00	6.84	5.47	4.07	
		40.00	11.4	9.81	7.38	
		50.00	27.0	29.8		
		60.00	78.8	74.0		
		70.00	277			
		80.00	564.			
DELTA K MAX	A:	84.76	550.			
	B:	61.11		80.0		
	C:	43.46			13.5	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			8.98	13.52	13.99	
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8	1			
		0.8-1.25		1	1	
		1.25-2.0				
		>2.0				

CONDITION/HT: ST 1850F, 1360F 9HRS, F/C 1175F
FORM: 4.00"TH FORGED BAR
SPECIMEN TYPE: CT
ORIENTATION: S-L
STRESS RATIO: +0.08
FREQUENCY: 1.00- 6.00 HZ

YIELD STRENGTH: 160.0 KSI
ULT. STRENGTH: 192.0 KSI
SPECIMEN THK: 1.000"
SPECIMEN WIDTH: 3.770"
REFERENCES: 88579

NICKEL BASE

INCONEL 718

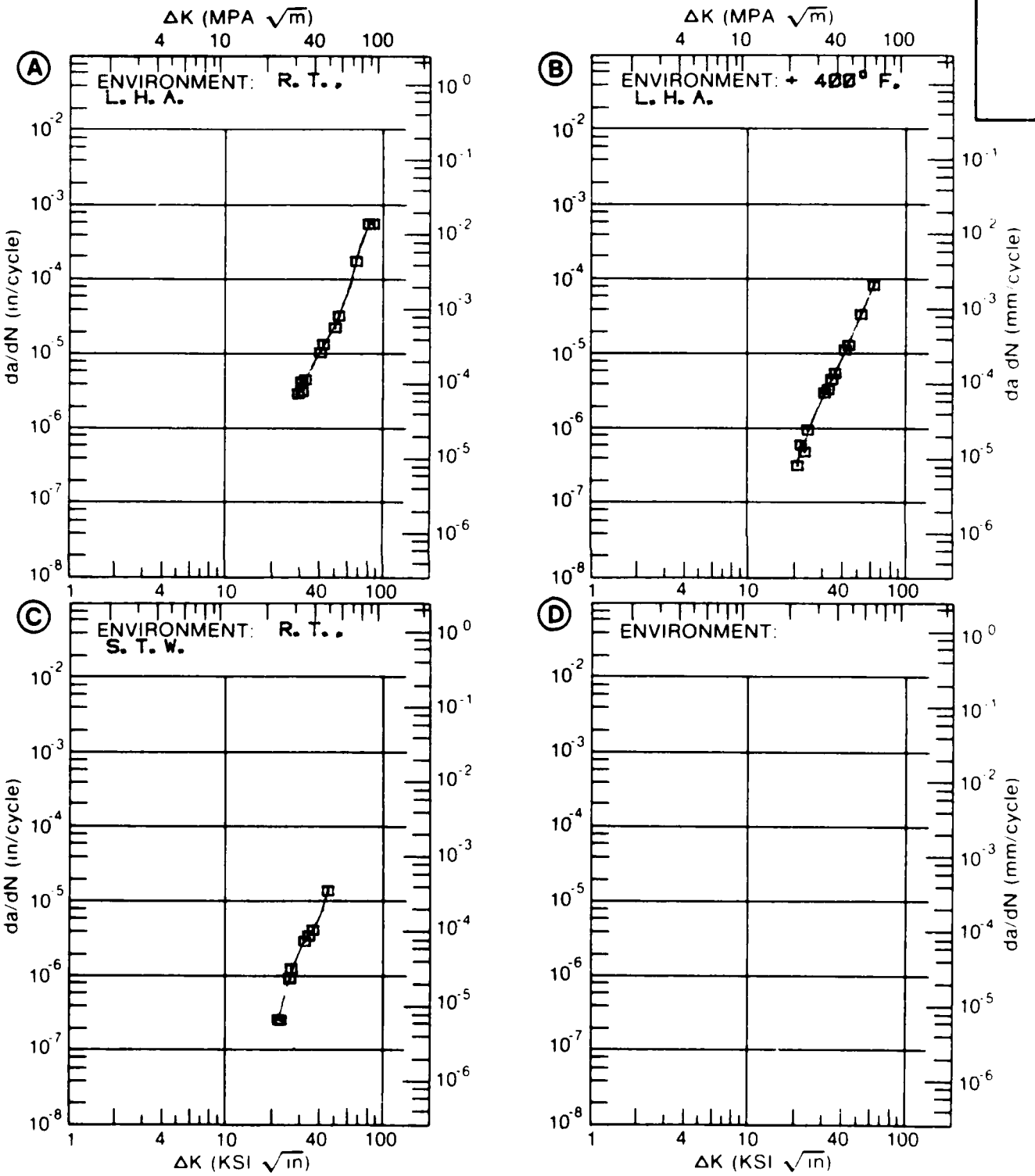


Figure 5.7.3.35

TABLE 5.7.3.36

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.36 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1950F AC, 1325 F 8HRS, FC TO 1150F, HELD 18HRS AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. LAB AIR, 8.33HZ	E=+ 600F AIR, .67HZ		
DELTA K MIN	A:	19.66	1.02			
	B:	20.46		1.94		
	C:					
	D:					
		20.00	1.05			
		25.00	1.97	3.92		
		30.00	3.95	7.70		
		35.00	7.36	13.5		
		40.00		21.1		
DELTA K MAX	A:	38.40	10.5			
	B:	47.52		34.6		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			4.50	4.32		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: 1950F AC. 1325F 8HRS. FC TO 1150F. HELD 18HRS AC
FORM: 0.50"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.05
FREQUENCY:

YIELD STRENGTH: 161.1 KSI
ULT. STRENGTH: 198.2 KSI
SPECIMEN THK: 0.490- 0.491"
SPECIMEN WIDTH: 1.992- 1.997"
REFERENCES: HD015

NICKEL BASE

INCONEL 718

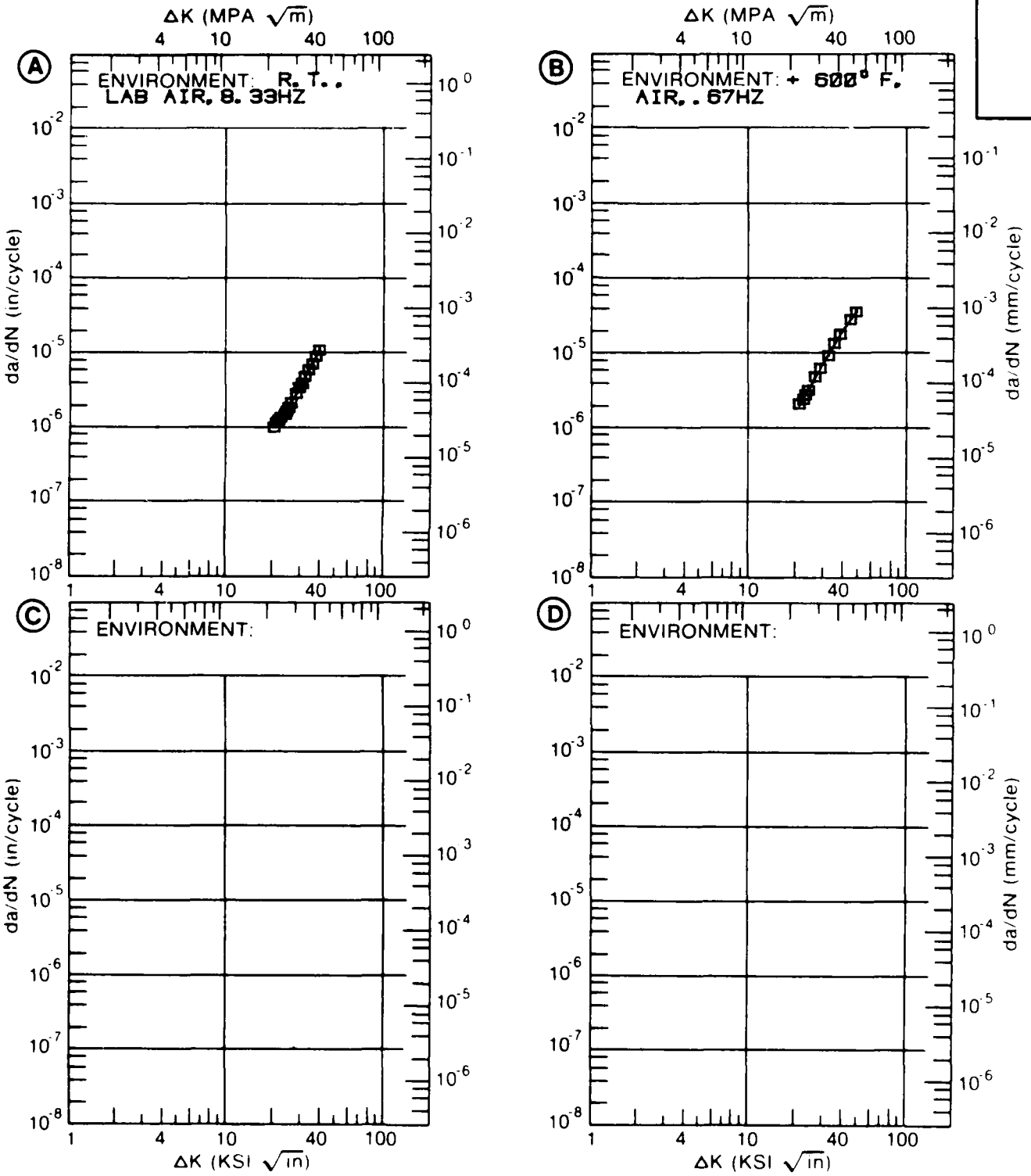


Figure 5.7.3.36

TABLE 5.7.3.37

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.7.3.37 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE INCONEL 718
CONDITION: 1950F AC, 1325 F 8HRS, FC TO 1150F, HELD 18HRS AC
ENVIRONMENT: +1000F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN /CYCLE) A	B	C	D
			R=+0 05			
DELTA K MIN	A:	21 00	4 93			
	B:					
	C:					
	D:					
		25 00	7 94			
		30 00	1[illegible]			
		35 00	[illegible]			
		40 00	[illegible]			
DELTA K MAX	A	46 50	[illegible]			
	B					
	C					
	D					

ROOT MEAN SQUARE PERCENT ERROR	
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0 0 0 5 0 [illegible] 1 2[illegible]

CONDITION/HT: 1950F AC. 1325F 8HRS. FC TO 1150F. HELD 18HRS AC
FORM: 0.50"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: T-L
FREQUENCY: 0.67 HZ
ENVIRONMENT: +1000° F. AIR

YIELD STRENGTH: 161.1 KSI
ULT. STRENGTH: 198.2 KSI
SPECIMEN THK: 0.490"
SPECIMEN WIDTH: 1.996- 1.998"
REFERENCES: HD015

NICKEL BASE

INCONEL 718

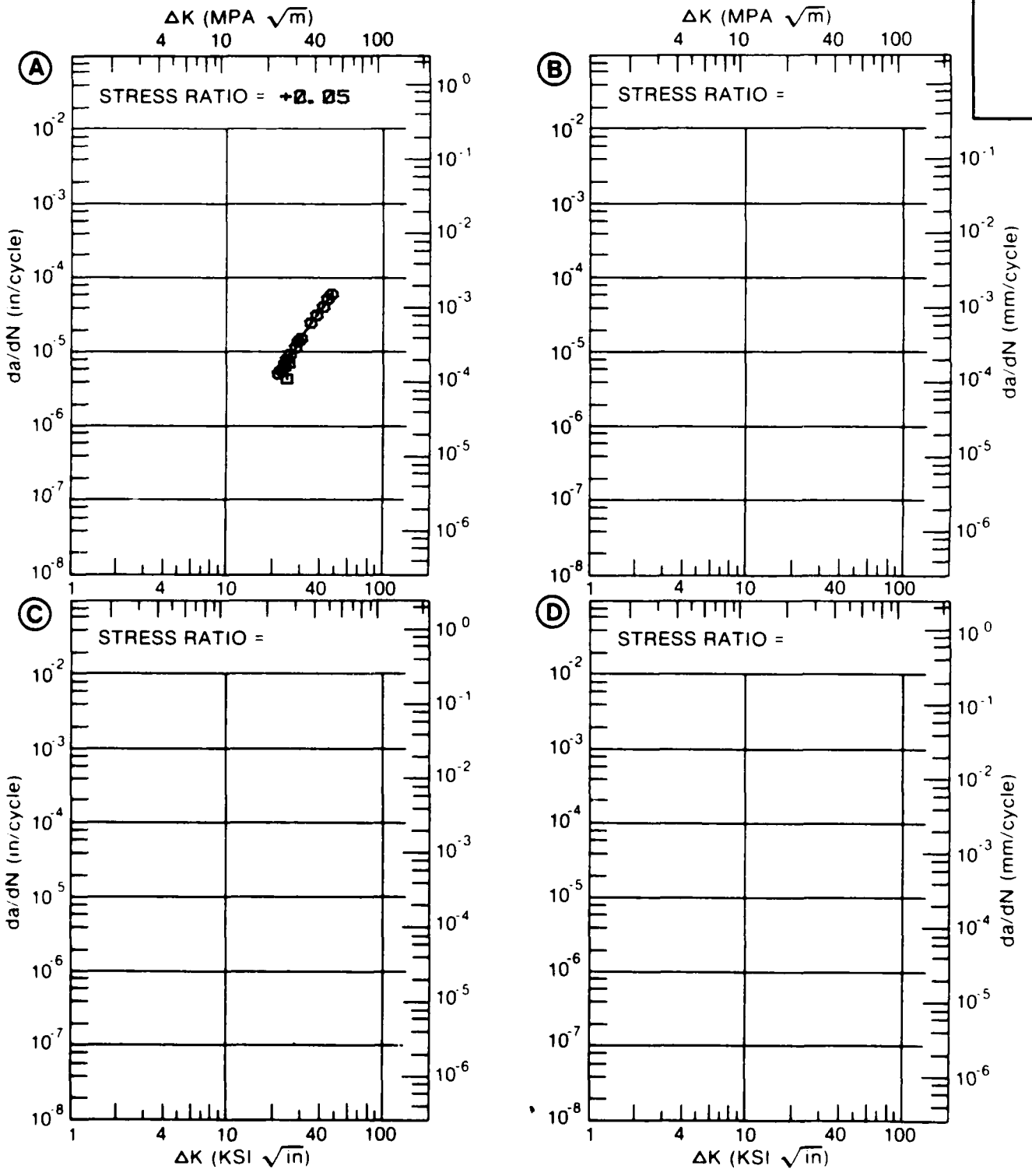


Figure 5.7.3.37

Table 5.7.3.38

NICKEL BASE INCONEL 718 K(ISCC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN (*=SG)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
1850F 1.5HR	FB	4.00	R.T.	L-T	160.0	S.C.S.	2.000	1.000	DCB	----	103.00	>166.00			60180	1976	RI006
00,1360F 9HRS, FC TO 1175F		4.00			160.0		2.000	1.000	DCB	----	103.00	> 86.00			60180	1976	RI006
1850F 1.5HR	FB	4.00	R.T.	L-T	160.0	S.T.W.	2.000	1.000	DCB	----	103.00	> 86.00			60060	1976	RI006
00,1360F 9HRS, FC TO 1175F		4.00			160.0		2.000	1.000	DCB	----	103.00	>180.00			119100	1976	RI006
1850F 1.5HR	FB	4.00	R.T.	T-L	160.0	S.T.W.	2.000	1.000	DCB	----	104.00	> 89.00			60060	1976	RI006
00,1360F 9HRS, FC TO 1175F		4.00			160.0		2.000	1.000	DCB	----	104.00	121.00			119100	1976	RI006
1850F 1.5HR	FB	4.00	R.T.	S-L	160.0	S.T.W.	2.000	1.000	DCB	----	104.00	> 87.00			60120	1976	RI006
00,1360F 9HRS, FC TO 1175F		4.00			160.0		2.000	1.000	DCB	----	104.00	> 99.00			76380	1976	RI006
1880F 1HR AC 1520F 8HR FC 1200F 16HR AC	S	0.13	R.T.	---	----	AEROZINE 50	1.300	0.125	WOL	----	------	80.00*			----	1974	88700
1880F 1HR AC 1520F 8HR FC 1200F 16HR AC	S	0.13	R.T.	---	----	MARTIN-MARIETTA REFINED GRADE HYDRAZINE	1.300	0.125	WOL	----	------	79.00*			----	1974	88700
1880F 1HR AC 1520F 8HR FC 1200F 16HR AC	S	0.13	R.T.	---	----	MARTIN-MARIETTA REFINED GRADE HYDRAZINE-2PCT OXYGEN	1.300	0.125	WOL	----	------	79.00*			----	1974	88700
1880F 1HR AC 1520F 8HR FC 1200F 16HR AC	S	0.13	R.T.	---	----	MATHESON-COLEMAN-BELL 97PCT GRADE HYDRAZINE	1.300	0.125	WOL	----	------	25.80*			----	1974	88700
1880F 1HR AC 1520F 8HR FC 1200F 16HR AC	S	0.13	R.T.	---	----	PROPELLANT GRADE HYDRAZINE	1.300	0.125	WOL	----	------	87.50*			----	1974	88700

*NOTE-DATA WHICH DO NOT MEET MINIMUM SPECIMEN THICKNESS REQUIREMENTS OF 2.5(KISCC/TYS)SQUARED

Table 5.8.1.1

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE IN100

TEST CONDITIONS

SPECIMEN ORIENTATION Unknown

ENVIRONMENT: AIR AT 800 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
	FORGING	-1.00	0.17					4.11		
	FORGING	-0.50	0.17					7.09		

Table 5.8.1.2

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE IN100

TEST CONDITIONS

SPECIMEN ORIENTATION Unknown

ENVIRONMENT: AIR AT 1200 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
	FORGING	-1.00	0.17					38.5		
	FORGING	-0.50	0.17					40.9		
	FORGING	0.10							3081	
	FORGING	0.80	0.17				10.7			

Table 5.8.1.3

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE IN100

TEST CONDITIONS

SPECIMEN ORIENTATION C R

ENVIRONMENT AIR AT 1200 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2 5	5	10	20	50	100
	FORGING	0 10	0 01					36 9	492	
	FORGING	0 10	0 17					35 3	239	
	FORGING	0 10	0 17					27 6		
	FORGING	0 10	20 00					8 16		
	FORGING	0 50	0 17				4 63	44 1		
	FORGING	0 05	20 00					7 10		
	FORGING	0 80	0 17				19 5			
	FORGING	0 80	20 00			0 60	2 69			

TABLE 5.8.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.8.3.1 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE IN100
CONDITION:

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN /CYCLE)			
			A	B	C	D
			E=+ 800F AIR	E=+1350F AIR		
DELTA K MIN	A:	14.67	4.32			
	B:	7.98		13.7		
	C:					
	D:					
		8.00		13.8		
		9.00		18.9		
		10.00		24.4		
		13.00		41.5		
		16.00	5.39	59.2		
		20.00	10.8	84.9		
		25.00	19.8			
DELTA K MAX	A:	27.30	22.9			
	B:	22.70		105		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			3.22	3.98		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM:
SPECIMEN TYPE: CT
ORIENTATION:
STRESS RATIO: +Ø.5Ø
FREQUENCY: Ø.16 HZ

YIELD STRENGTH: 169.1 KSI
ULT. STRENGTH: 236.5 KSI
SPECIMEN THK: Ø.4Ø1- Ø.5ØØ"
SPECIMEN WIDTH:
REFERENCES:PWØØ6

NICKEL BASE

IN1ØØ

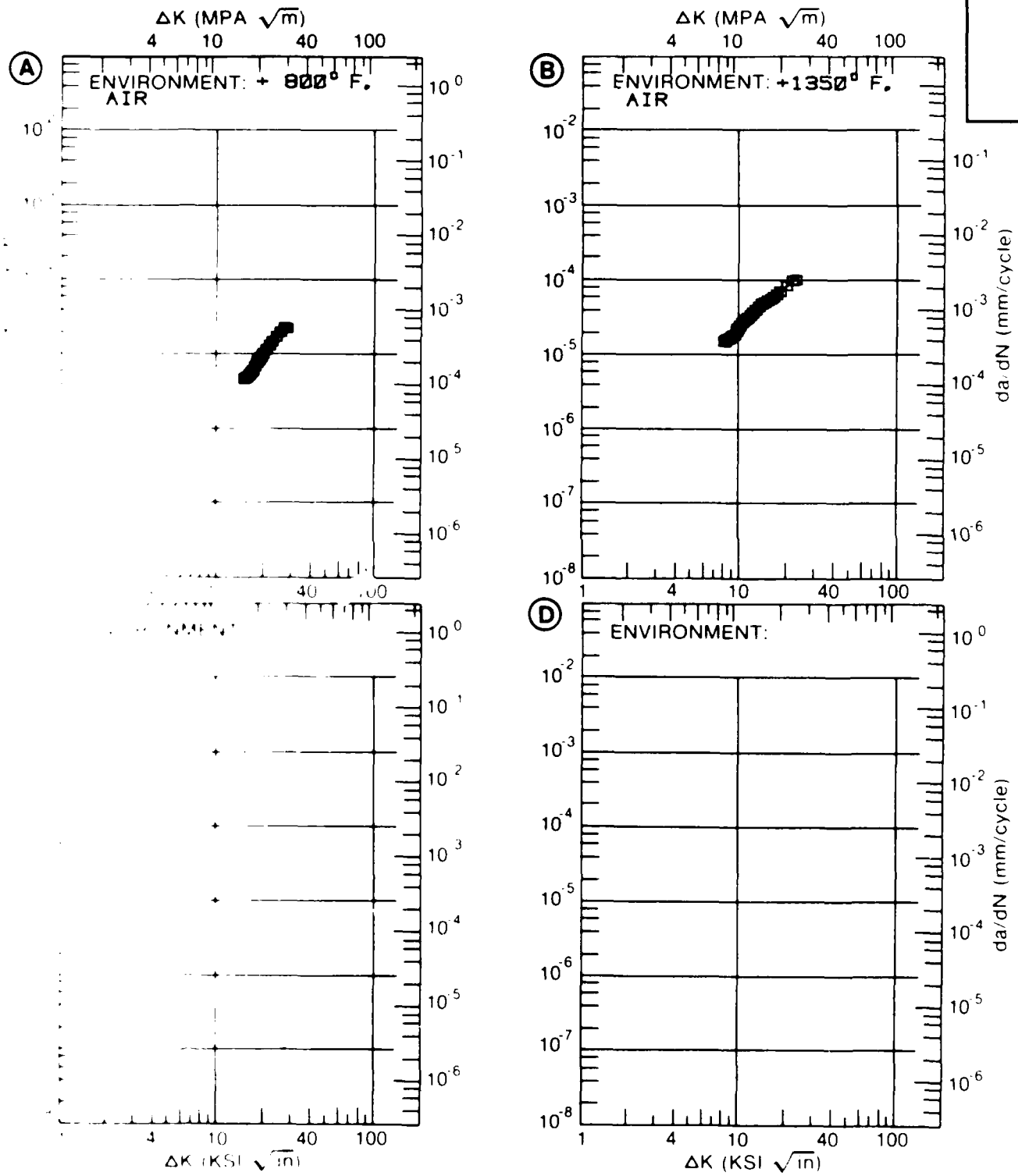


Figure 5.8.3.1

TABLE 5.8.3.2

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.8.3.2 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE IN100
CONDITION:
ENVIRONMENT: +1100F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.10	R=+0.30		
DELTA K MIN	A:	14.26	12.8			
	B:	14.98		14.8		
	C:					
	D:					
		16.00	16.7	19.8		
		20.00	31.7	43.3		
		25.00	55.3	74.7		
		30.00	76.9	105.		
		35.00	97.8	138.		
		40.00	123.	176.		
		50.00	228.	289.		
		60.00		466.		
		70.00		593.		
DELTA K MAX	A:	52.90	289.			
	B:	72.77		601.		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			9.12	21.12		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM:
SPECIMEN TYPE: CT
ORIENTATION: C-R
FREQUENCY: 0.03; 0.16 HZ
ENVIRONMENT: +1100° F, AIR

YIELD STRENGTH: 169.1 KSI
ULT. STRENGTH: 236.5 KSI
SPECIMEN THK: 0.251- 0.500"
SPECIMEN WIDTH:
REFERENCES: PW006

NICKEL BASE

IN100

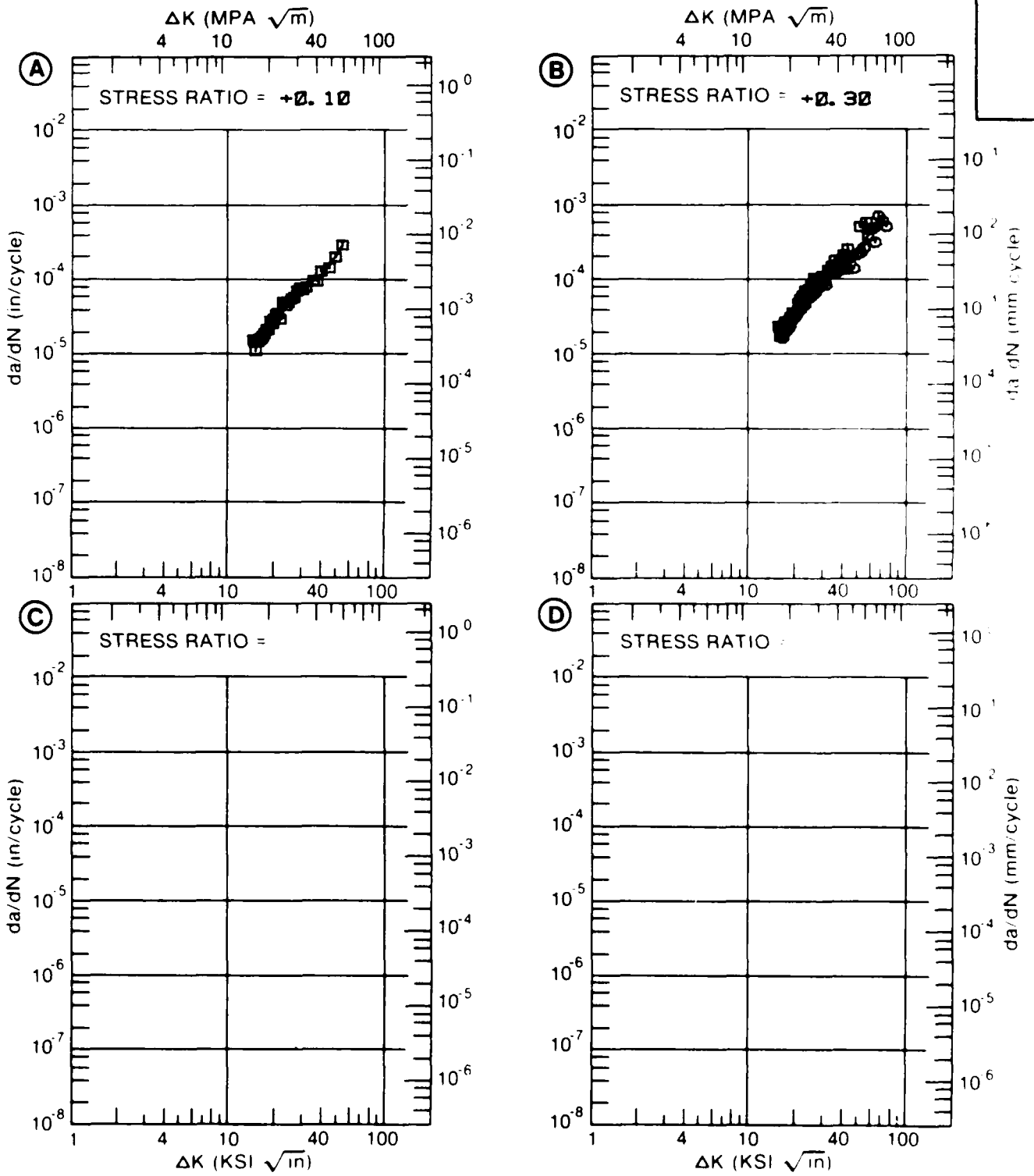


Figure 5.8.3.2

TABLE 5.8.3.3

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.8.3.3 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE IN100
CONDITION:
ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.05	R=+0.10		
DELTA K MIN	A:	15.48	7.64			
	B:	24.21		10.0		
	C:					
	D:					
		16.00	8.62			
		20.00	26.2			
		25.00	54.9	10.6		
		30.00	74.2	15.5		
		35.00	91.0			
		40.00	116.			
		50.00	250.			
DELTA K MAX	A:	50.85	272.			
	B:	30.86		15.9		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			9.69	7.90		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM:
SPECIMEN TYPE: CT
ORIENTATION: C-R
FREQUENCY: 0.33;20.0HZ
ENVIRONMENT: +1200° F, AIR

YIELD STRENGTH: 168.1 KSI
ULT. STRENGTH: 236.5 KSI
SPECIMEN THK: 0.108- 0.826"
SPECIMEN WIDTH:
REFERENCES: PW006

NICKEL BASE

IN100

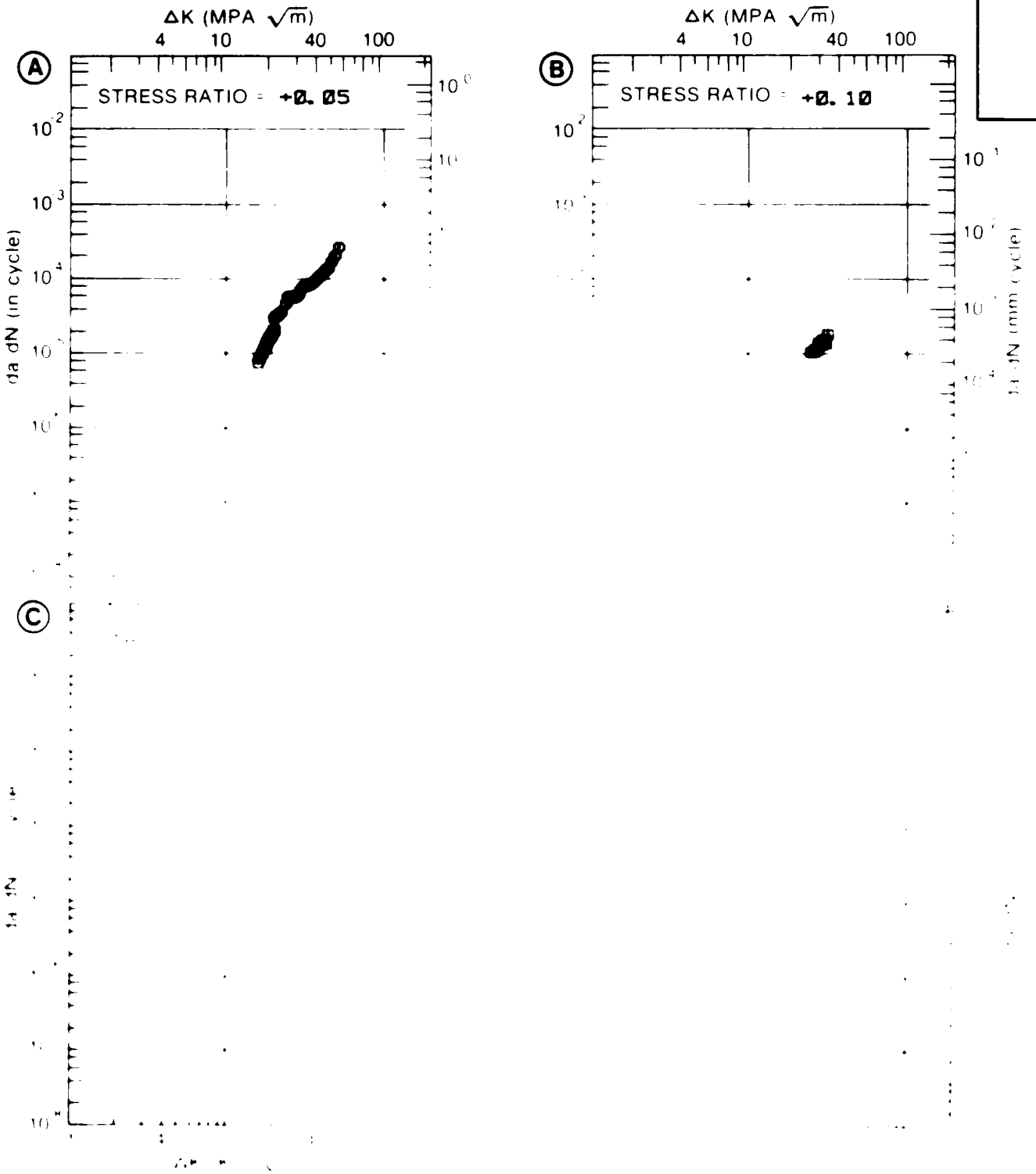


TABLE 5.8.3.4

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.8.3.4 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE IN100
CONDITION:
ENVIRONMENT: +1350F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.10			
DELTA K MIN	A:	14.82	60.0			
	B:					
	C:					
	D:					
		16.00	69.9			
		20.00	117.			
		25.00	217.			
		30.00	378.			
		35.00	623.			
		40.00	977.			
DELTA K MAX	A:	42.68	1221.			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 11.54

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM:
SPECIMEN TYPE: CT
ORIENTATION: C-R
FREQUENCY: MIXED
ENVIRONMENT: +1350° F, AIR

YIELD STRENGTH: 169.1 KSI
ULT. STRENGTH: 236.5 KSI
SPECIMEN THK: 0.246"
SPECIMEN WIDTH:
REFERENCES: PW006

NICKEL BASE

IN100

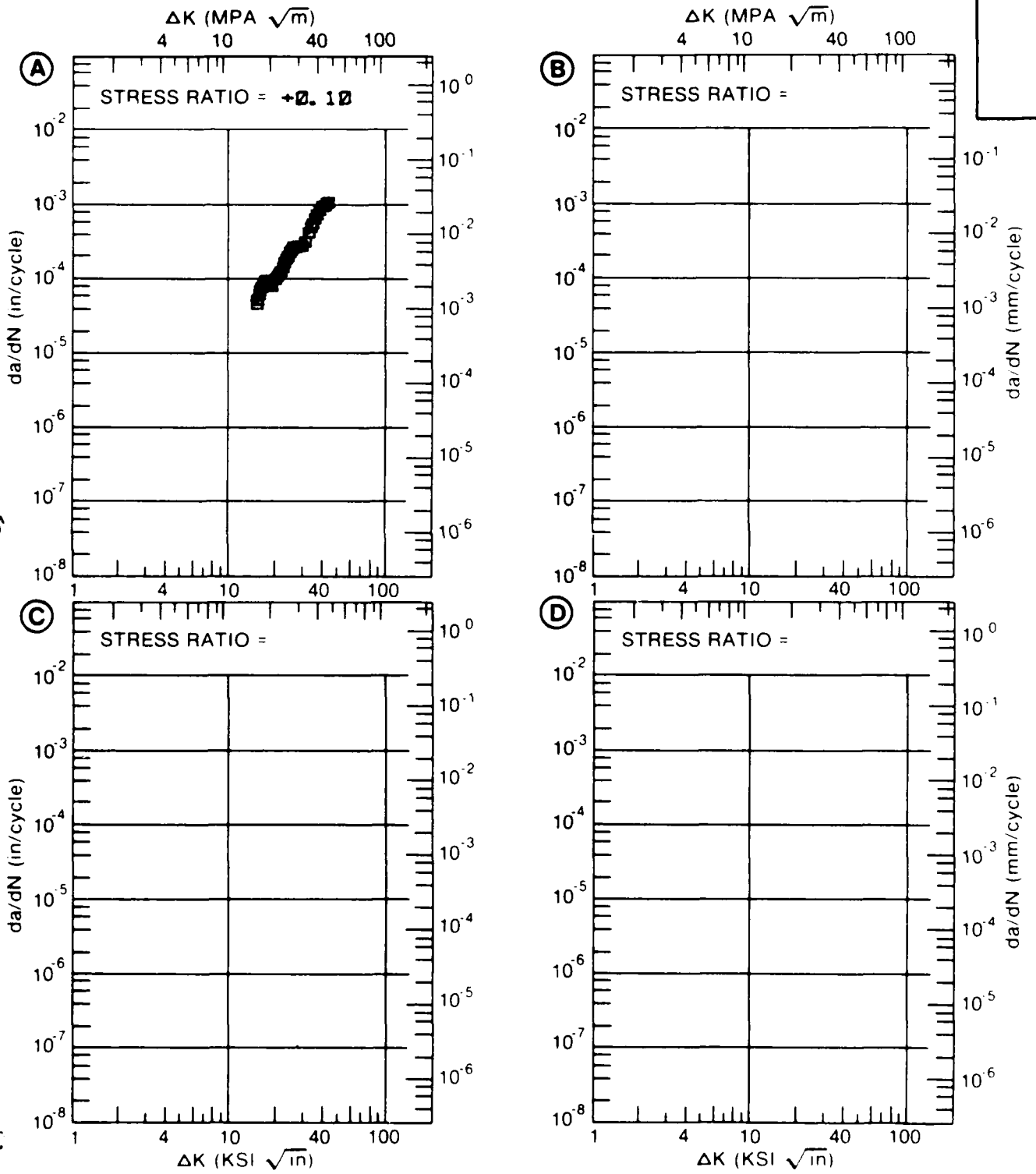


Figure 5.8.3.4

TABLE 5.8.3.5

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.8.3.5 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE IN100
CONDITION:

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+ 300F AIR	E=+ 500F AIR		
DELTA K MIN	A:	14.09	.0917			
	B:	14.58		.871		
	C:					
	D:					
		16.00	.556	1.30		
		20.00	1.42	3.12		
		25.00	3.59	6.47		
DELTA K MAX	A:	29.38	6.54			
	B:	26.09		7.31		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			15.79	8.94		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM:
SPECIMEN TYPE: CT
ORIENTATION: C-R
STRESS RATIO: +0.10
FREQUENCY: 30.00 HZ

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK: 0.500"
SPECIMEN WIDTH: 2.500"
REFERENCES:PW003

NICKEL BASE

IN100

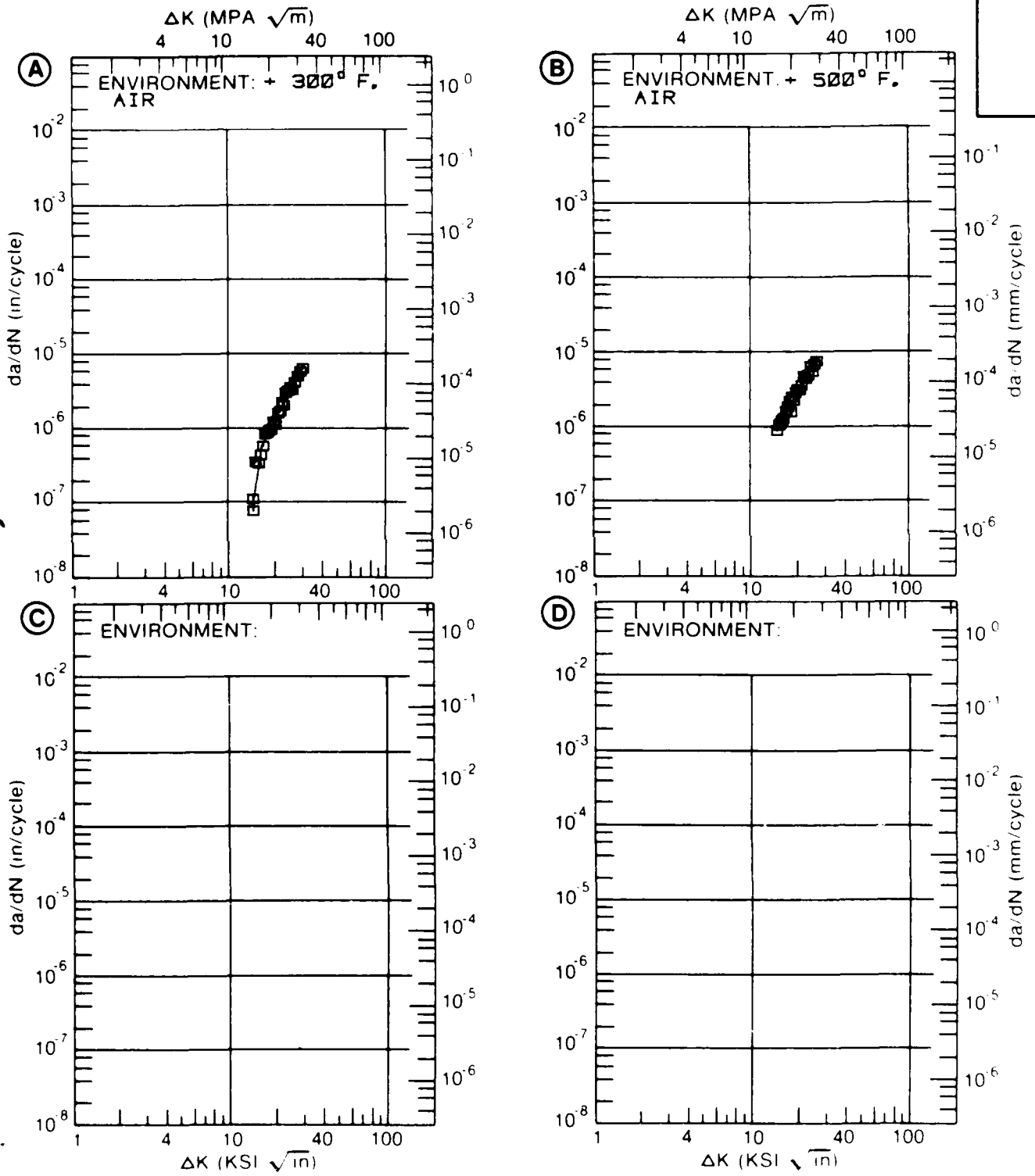


Figure 5.8.3.5

TABLE 5.8.3.6

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.8.3.6 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE IN100
CONDITION:

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+ 800F AIR	E=+1100F AIR	E=+1150F AIR	
DELTA K MIN	A:	16.43	3.24			
	B:	14.26		13.2		
	C:	17.57			13.7	
	D:					
		16.00		16.4		
		20.00	4.71	32.2	22.2	
		25.00		55.4		
		30.00		75.6		
		35.00		96.8		
		40.00		124.		
		50.00		227.		
DELTA K MAX	A:	21.80	6.30			
	B:	52.90		279.		
	C:	23.45			53.8	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			22.76	8.93	10.20	

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM:
SPECIMEN TYPE: CT
ORIENTATION: C-R
STRESS RATIO: +0.10
FREQUENCY: 0.16 HZ

YIELD STRENGTH: 169.1 KSI
ULT. STRENGTH: 236.5 KSI
SPECIMEN THK: 0.250- 0.500"
SPECIMEN WIDTH:
REFERENCES: PW006

NICKEL BASE

IN100

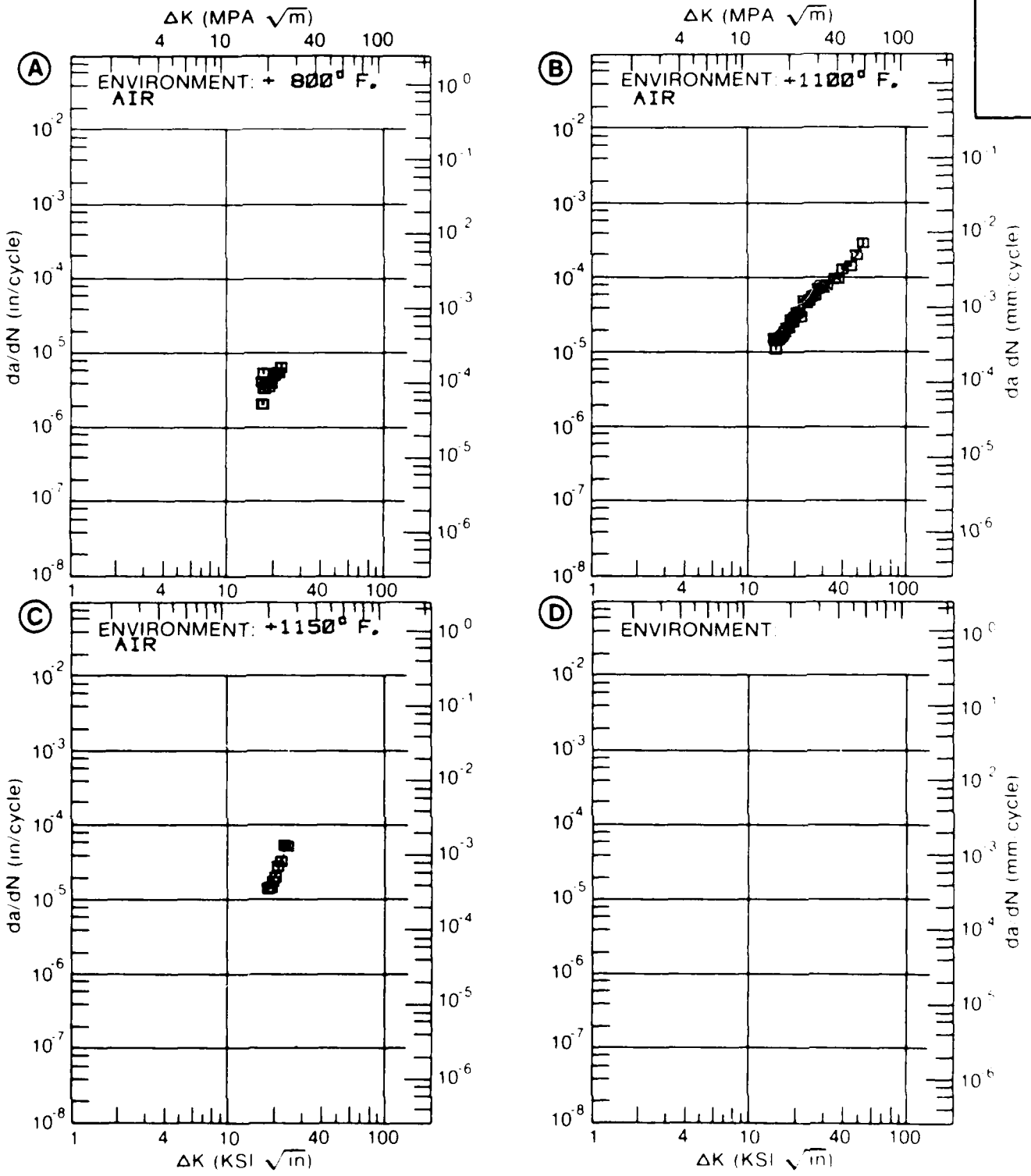


Figure 5.8.3.6

TABLE 5.8.3.7

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.8.3.7 INDICATING EFFECT

OF FREQUENCY

MATERIAL: NICKEL BASE IN100
CONDITION:
ENVIRONMENT: + 800F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			F=2 MIN HOLD TRAPEZOIDAL	F(HZ)= 0.16	F(HZ)= 20.00	
DELTA K MIN	A:	25.35	15.9			
	B:	16.43		3.24		
	C:	12.40			.919	
	D:					
		13.00			1.02	
		16.00			2.01	
		20.00		4.71	4.58	
		25.00			8.07	
		30.00	21.4		13.7	
DELTA K MAX	A:	30.46	16.6			
	B:	21.80		6.30		
	C:	30.78			15.3	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			17.04	22.76	9.62	

LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5 0.5-0.8 0.8-1.25 1.25-2.0 2.0

CONDITION/HT:
FORM:
SPECIMEN TYPE: CT
ORIENTATION: C-R
STRESS RATIO: +0.10
ENVIRONMENT: + 800° F. AIR

YIELD STRENGTH: 169.1 KSI
ULT. STRENGTH: 236.5 KSI
SPECIMEN THK: 0.461- 0.500"
SPECIMEN WIDTH:
REFERENCES: PW006

NICKEL BASE

IN100

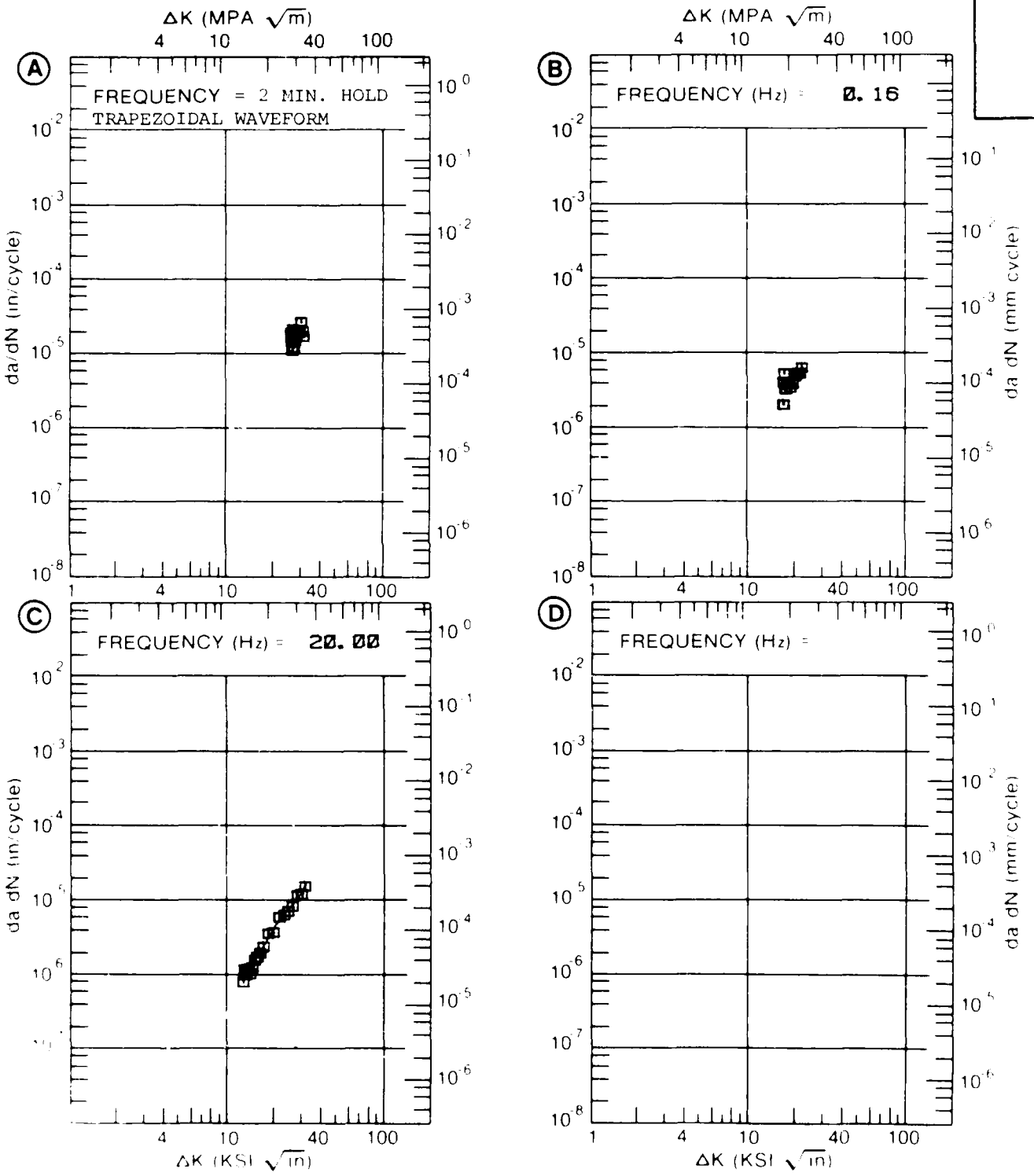


Figure 5.8.3.7

TABLE 5.8.3.8

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.8.3.8 INDICATING EFFECT

OF FREQUENCY

MATERIAL: NICKEL BASE IN100
CONDITION:
ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		F=2 MIN HOLD TRAPEZOIDAL			
DELTA K MIN	A:				
	B:				
	C:				
	D:				
	200.00				
DELTA K MAX	A:				
	B:				
	C:				
	D:				

ROOT MEAN SQUARE PERCENT ERROR 0.00

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM:
SPECIMEN TYPE: CT
ORIENTATION: C-R
STRESS RATIO: +0.10
ENVIRONMENT: +1200° F, AIR

YIELD STRENGTH: 169.1 KSI
ULT. STRENGTH: 236.5 KSI
SPECIMEN THK: 0.440"
SPECIMEN WIDTH:
REFERENCES: PW006

NICKEL BASE

IN100

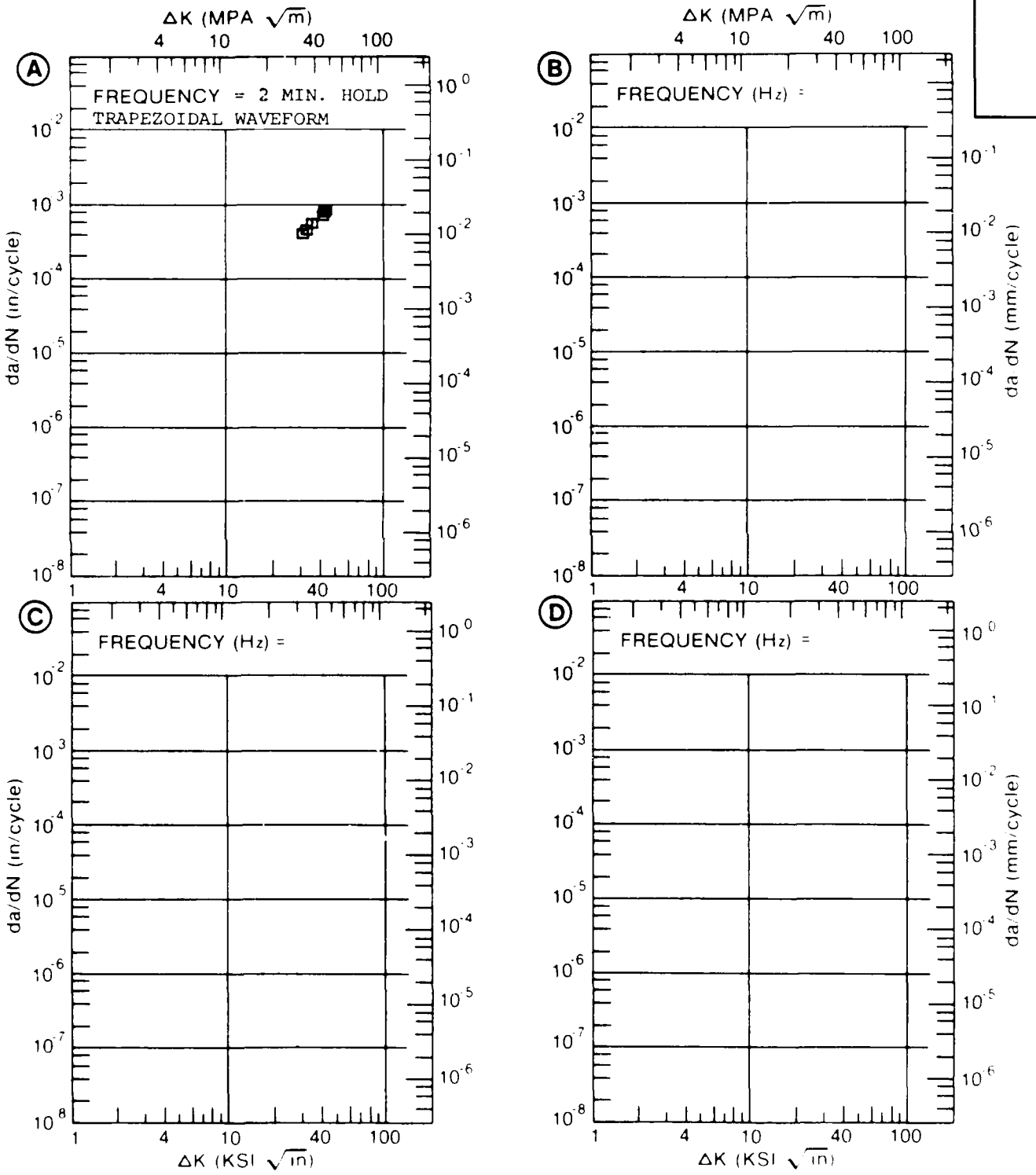


Figure 5.8.3.8

TABLE 5.8.3.4

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.8.3.9 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE IN100
CONDITION:
ENVIRONMENT: + 800F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=-1.00	R=-0.50		
DELTA K MIN	A:	13.48	1.08			
	B:	12.10		.532		
	C:					
	D:					
		13.00		1.88		
		16.00	1.91	4.13		
		20.00	4.11	7.09		
		25.00	11.0	15.9		
		30.00		42.5		
DELTA K MAX	A:	26.54	15.2			
	B:	31.05		43.9		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			6.68	15.29		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CCP
ORIENTATION:
FREQUENCY: 0.17 HZ
ENVIRONMENT: + 800° F, AIR

YIELD STRENGTH: 169.1 KSI
ULT. STRENGTH: 236.5 KSI
SPECIMEN THK: 0.228- 0.298"
SPECIMEN WIDTH: 0.988- 1.000"
REFERENCES: PW002

NICKEL BASE

IN100

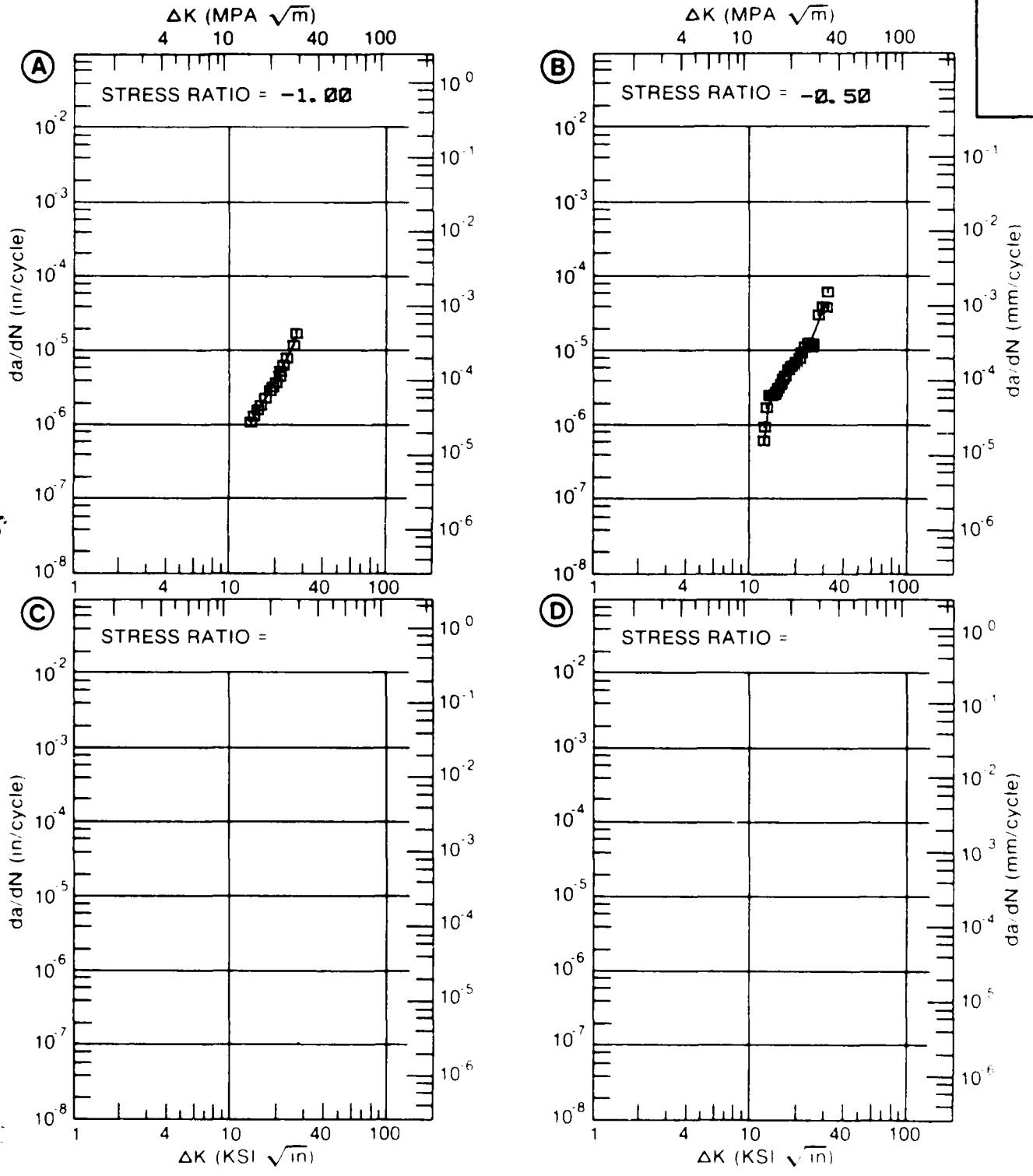


Figure 5.8.3.9

TABLE 5.8.3.10

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.8.3.10 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE IN100
CONDITION:
ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=-1.00	R=-0.50		
DELTA K MIN	A:	19.84	37.8			
	B:	13.75		11.9		
	C:					
	D:					
		16.00		21.7		
		20.00	38.5	40.9		
		25.00	62.4	73.9		
		30.00	91.0	128.		
		35.00	132.			
		40.00	196.			
DELTA K MAX	A:	42.98	253.			
	B:	33.24		184.		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			4.79	9.03		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT
FORM: 1.60" TH FORGING
SPECIMEN TYPE: CCP
ORIENTATION:
FREQUENCY: Ø.17 HZ
ENVIRONMENT: +1200° F, AIR

YIELD STRENGTH 169.1 KSI
ULT STRENGTH 236.5 KSI
SPECIMEN THK Ø.299- Ø.309"
SPECIMEN WIDTH Ø.995- 1.038"
REFERENCES PWØØ2

NICKEL BASE

IN1ØØ

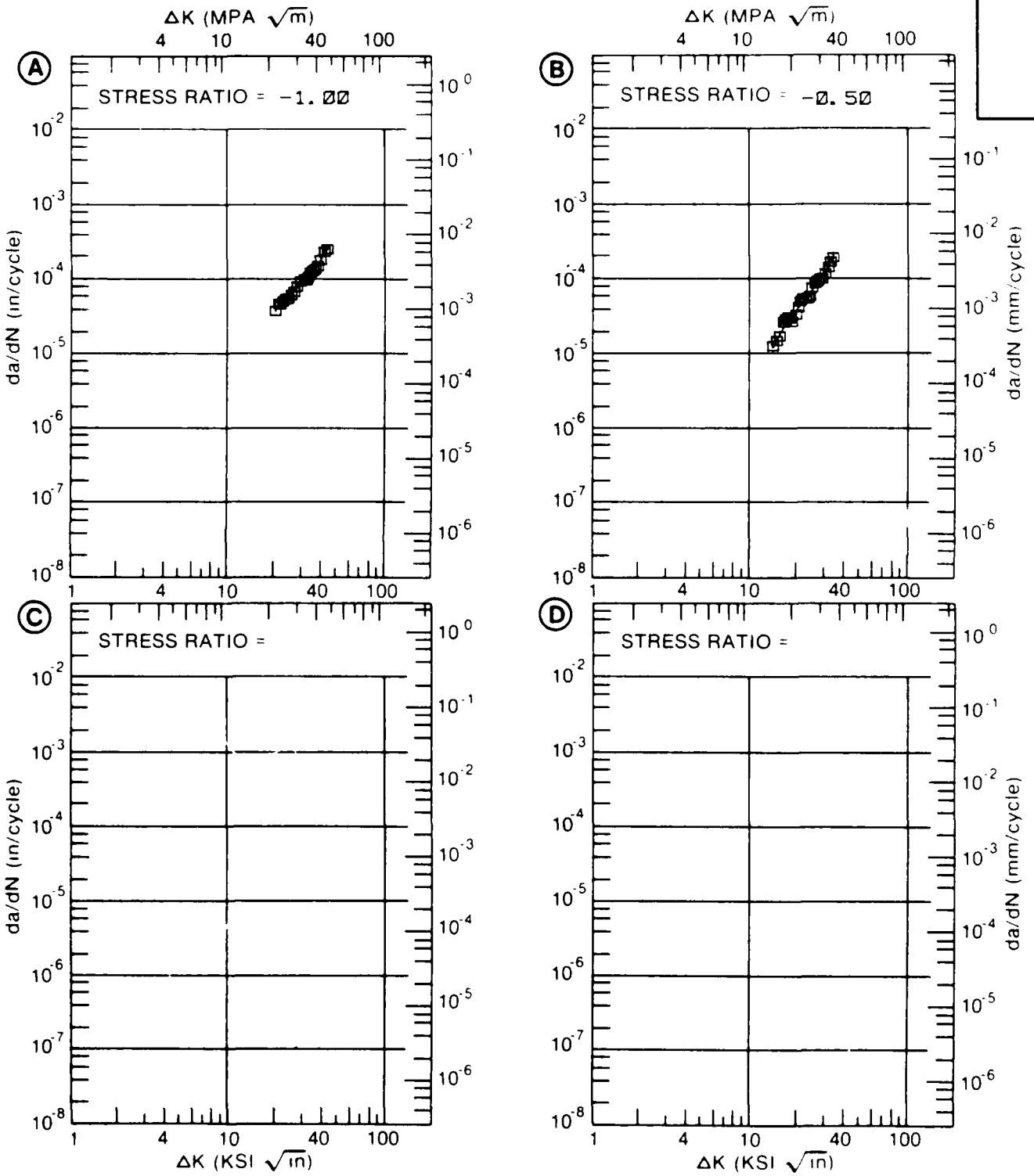


Figure 5.8.3.10

TABLE 5.8.3.11

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.8.3.11 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE IN100
CONDITION:
ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.80			
DELTA K MIN	A:	5.60	2.78			
	B:					
	C:					
	D:					
		6.00	3.03			
		7.00	4.04			
		8.00	5.61			
		9.00	7.82			
		10.00	10.7			
		13.00	23.4			
DELTA K MAX	A:	13.74	27.2			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR: 9.23

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION:
FREQUENCY: 0.17 HZ
ENVIRONMENT: +1200° F. AIR

YIELD STRENGTH: 169.1 KSI
ULT. STRENGTH: 236.5 KSI
SPECIMEN THK: 0.302"
SPECIMEN WIDTH: 2.503"
REFERENCES: PW002

NICKEL BASE

IN100

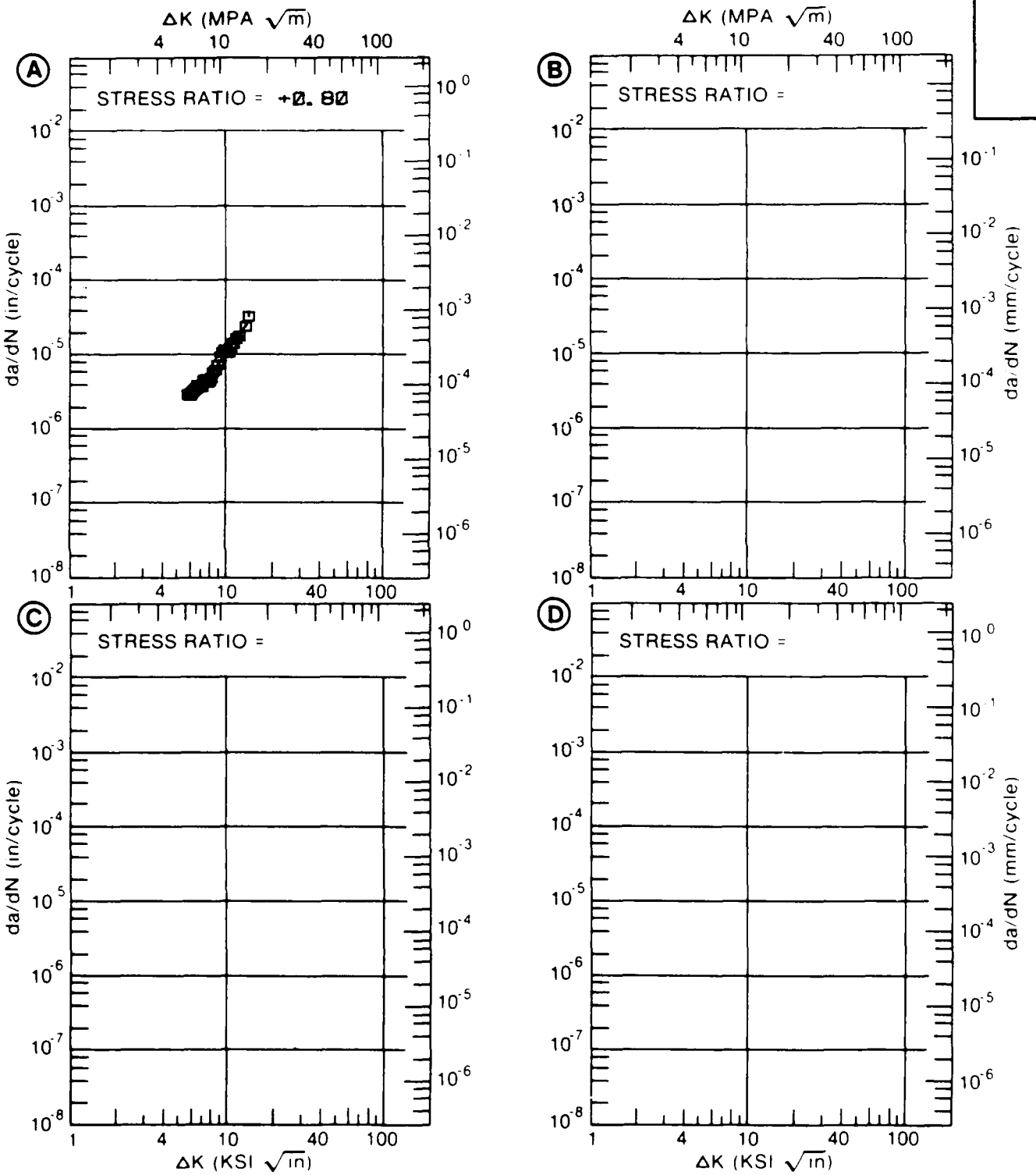


Figure 5.8.3.11

TABLE 5.8.3.12

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.8.3.12 INDICATING EFFECT

OF FREQUENCY

MATERIAL: NICKEL BASE IN100
CONDITION:
ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			F=10 MIN HOLD TRAPEZOIDAL			
DELTA K MIN	A:	23.52	509.			
	B:					
	C:					
	D:					
		25.00	616.			
		30.00	1003.			
		35.00	1416.			
		40.00	1875.			
		50.00	3082.			
		60.00	5076.			
DELTA K MAX	A:	67.89	7719.			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 6.81

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION:
STRESS RATIO: +0.10
ENVIRONMENT: +1200° F, AIR

YIELD STRENGTH: 169.1 KSI
ULT. STRENGTH: 236.5 KSI
SPECIMEN THK: 0.252"
SPECIMEN WIDTH: 2.504"
REFERENCES: PW002

NICKEL BASE

IN100

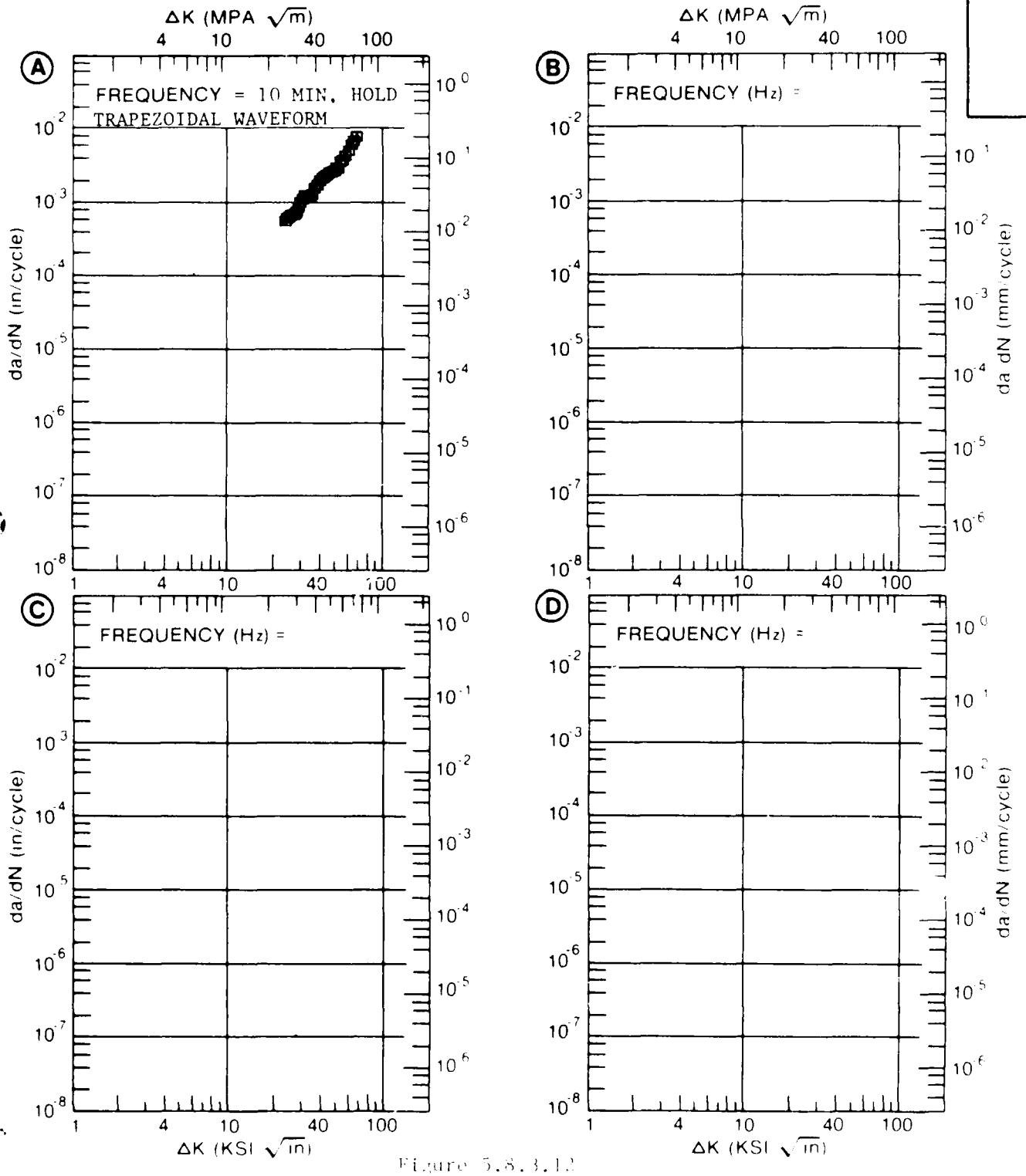


Figure 5.8.3.12

TABLE 5.8.3.13

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.8.3.13 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE IN100
CONDITION:
ENVIRONMENT: +1000F, AIR

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE) A	B	C	D
		R=+0.10			
DELTA K MIN	A: 14.22	9.13			
	B:				
	C:				
	D:				
	16.00	11.9			
	20.00	17.6			
	25.00	24.6			
	30.00	33.2			
	35.00	45.8			
	40.00	65.2			
DELTA K MAX	A: 41.33	72.1			
	B:				
	C:				
	D:				

ROOT MEAN SQUARE PERCENT ERROR 2.53

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: C-R
FREQUENCY: 0.17 HZ
ENVIRONMENT: +1000° F, AIR

YIELD STRENGTH: 169.1 KSI
ULT. STRENGTH: 236.5 KSI
SPECIMEN THK: 0.250"
SPECIMEN WIDTH: 2.502"
REFERENCES: PW002

NICKEL BASE

IN100

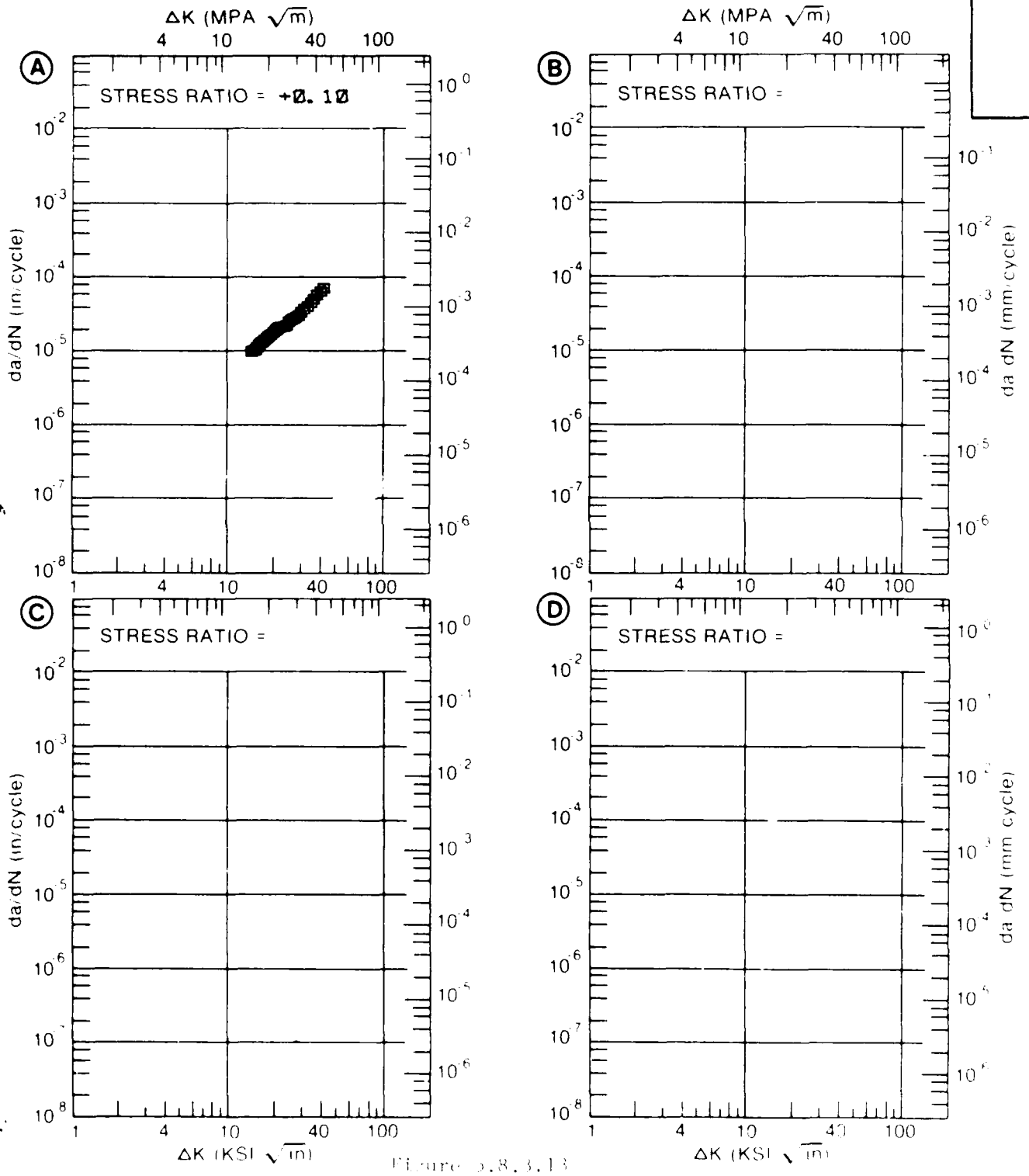


Figure 3.8.3.13

TABLE 5.8.3.14

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.8.3.14 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE IN100
CONDITION:
ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		R=+0.05	R=+0.10		
DELTA K MIN A:	14.03	4.32			
DELTA K MIN B:	13.55		3.94		
DELTA K MIN C:					
DELTA K MIN D:					
	16.00	4.75	4.92		
	20.00	7.10	8.16		
	25.00	12.6	15.2		
	30.00	20.9	25.3		
	35.00	30.8	36.6		
	40.00		46.6		
DELTA K MAX A:	38.78	38.1			
DELTA K MAX B:	41.45		49.0		
DELTA K MAX C:					
DELTA K MAX D:					
ROOT MEAN SQUARE PERCENT ERROR		12.71	17.34		
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5				
	0.5-0.8				
	0.8-1.25	1	2		
	1.25-2.0				
	>2.0				

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: C-R
FREQUENCY: 20.00 HZ
ENVIRONMENT: +1200° F, AIR

YIELD STRENGTH: 169.1 KSI
ULT. STRENGTH: 236.5 KSI
SPECIMEN THK: 0.247- 0.442"
SPECIMEN WIDTH: 2.494- 2.508"
REFERENCES: PW002

NICKEL BASE

IN100

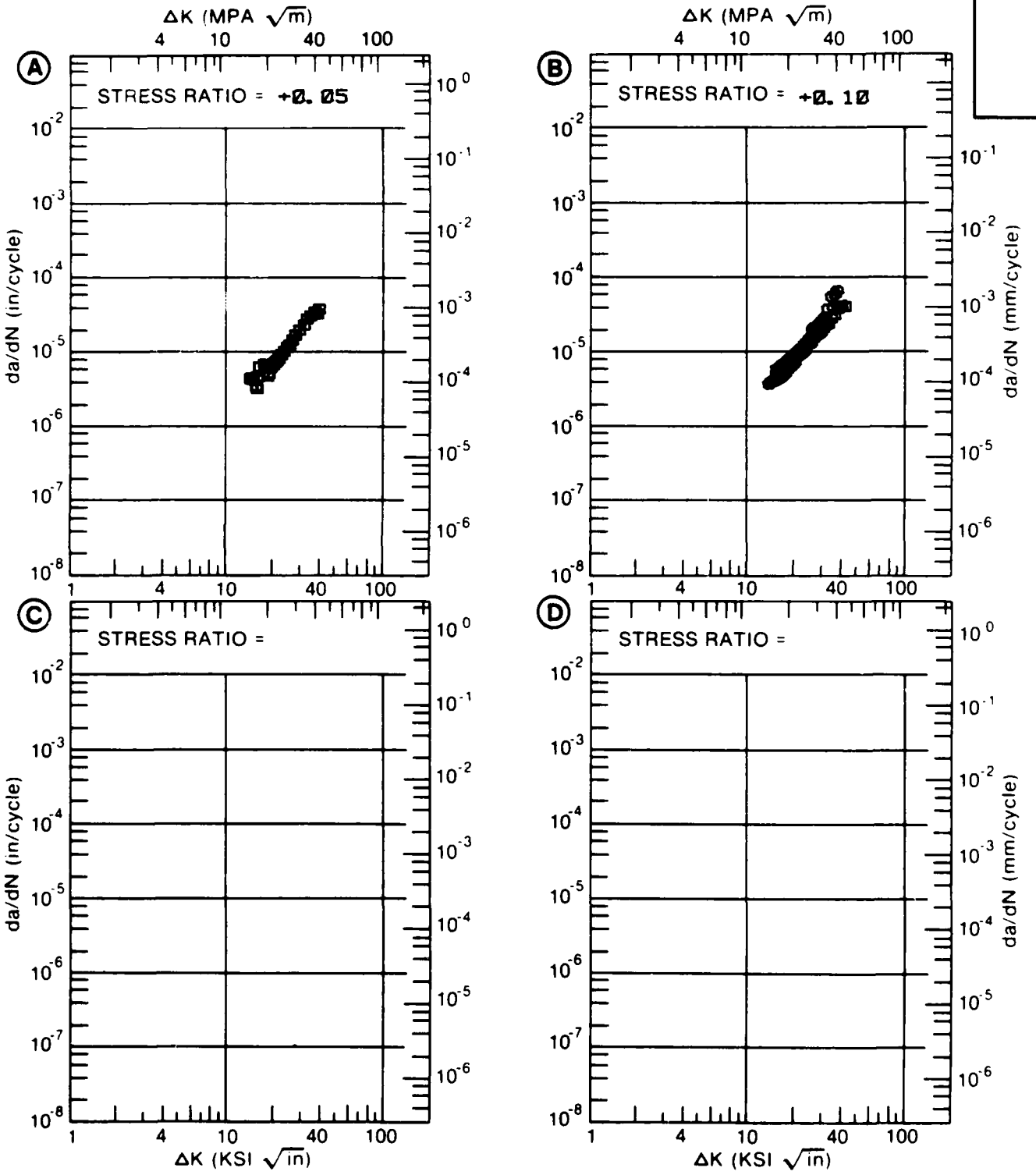


Figure 5.8.3.14

TABLE 5.8.3.15

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.8.3.15 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE IN100
CONDITION:
ENVIRONMENT: +1200F, AIR

	DELTA K (KSI*IN**1/2)	DA/DN (10**-6 IN./CYCLE) A	B	C	D
		R=+0.10			
DELTA K MIN A:	12.89	6.18			
DELTA K MIN B:					
DELTA K MIN C:					
DELTA K MIN D:					
	13.00	6.36			
	16.00	12.3			
	20.00	27.6			
	25.00	65.3			
	30.00	95.5			
DELTA K MAX A:	31.93	95.6			
DELTA K MAX B:					
DELTA K MAX C:					
DELTA K MAX D:					

ROOT MEAN SQUARE PERCENT ERROR		12.43			
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5				
	0.5-0.8				
	0.8-1.25	1			
	1.25-2.0				
	>2.0				

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CCP
ORIENTATION: C-R
FREQUENCY: 0.17 HZ
ENVIRONMENT: +1200° F, AIR

YIELD STRENGTH: 169.1 KSI
ULT. STRENGTH: 236.5 KSI
SPECIMEN THK: 0.296"
SPECIMEN WIDTH: 0.986"
REFERENCES: PW002

NICKEL BASE

IN100

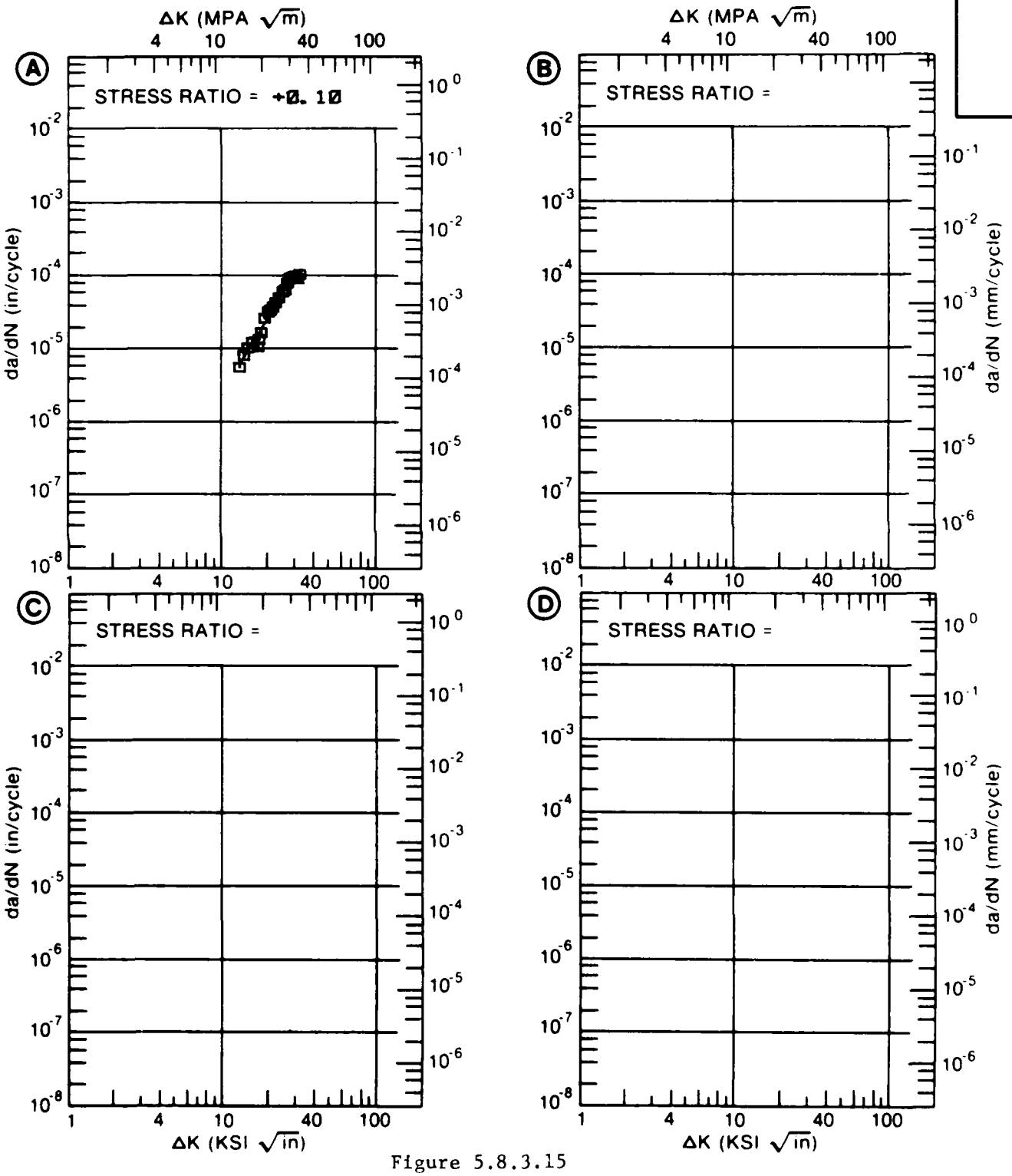


Figure 5.8.3.15

TABLE 5.8.3.16

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.8.3.16 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE IN100
CONDITION:
ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.50			
DELTA K MIN	A:	8.06	2.41			
	B:					
	C:					
	D:					
		9.00	3.31			
		10.00	4.63			
		13.00	11.5			
		16.00	23.4			
		20.00	44.1			
DELTA K MAX	A:	22.91	58.3			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 8.04

LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5	
	0.5-0.8	
	0.8-1.25	2
	1.25-2.0	
	>2.0	

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: C-R
FREQUENCY: 0.17 HZ
ENVIRONMENT: +1200° F, AIR

YIELD STRENGTH: 169.1 KSI
ULT. STRENGTH: 236.5 KSI
SPECIMEN THK: 0.500- 0.501"
SPECIMEN WIDTH: 2.496- 2.505"
REFERENCES: PW002

NICKEL BASE

IN100

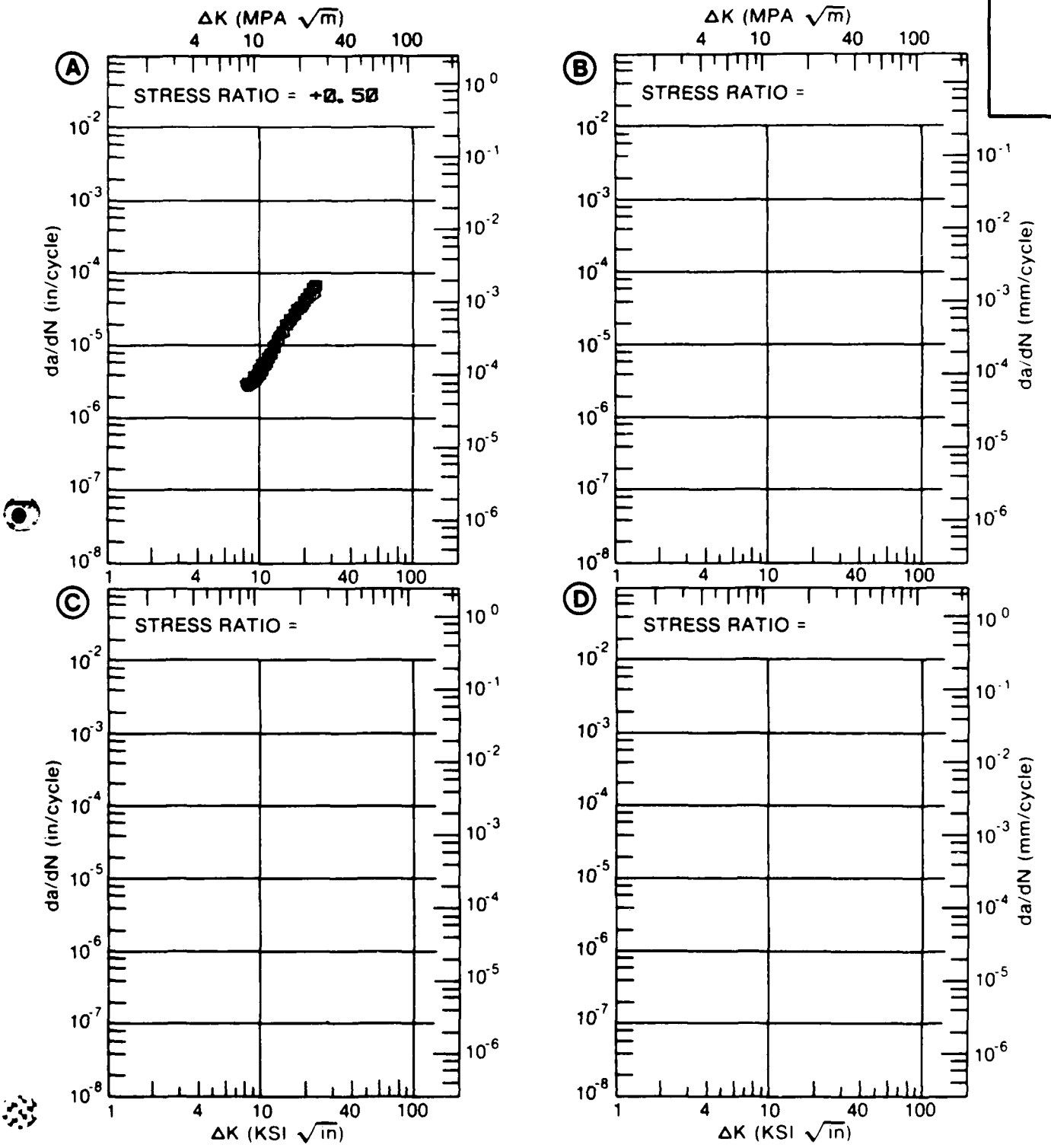


Figure 5.8.3.16

TABLE 5.8.3.17

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.8.3.17 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE IN100
CONDITION:

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+1300F AIR, 0.17HZ	E=+1350F AIR, 0.01HZ	E=+1350F AIR, 0.17HZ	
DELTA K MIN	A:	20.20	39.0			
	B:	27.86		281.		
	C:	14.68			16.2	
	D:					
		16.00			24.1	
		20.00			53.3	
		25.00	70.7		94.7	
		30.00	110.	322.	145.	
		35.00	153.	452.	216.	
		40.00	197.	630.	329.	
		50.00	280.	1117.		
		60.00		1699.		
DELTA K MAX	A:	54.45	313.			
	B:	65.70		2019.		
	C:	41.46			375.	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			4.36	6.81	13.97	
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1	1	
		1.25-2.0				
		>2.0				

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: C-R
STRESS RATIO: +0.10
FREQUENCY:

YIELD STRENGTH: 169.1 KSI
ULT. STRENGTH: 236.5 KSI
SPECIMEN THK: 0.253- 0.502"
SPECIMEN WIDTH: 2.498- 2.511"
REFERENCES:PW002

NICKEL BASE

IN100

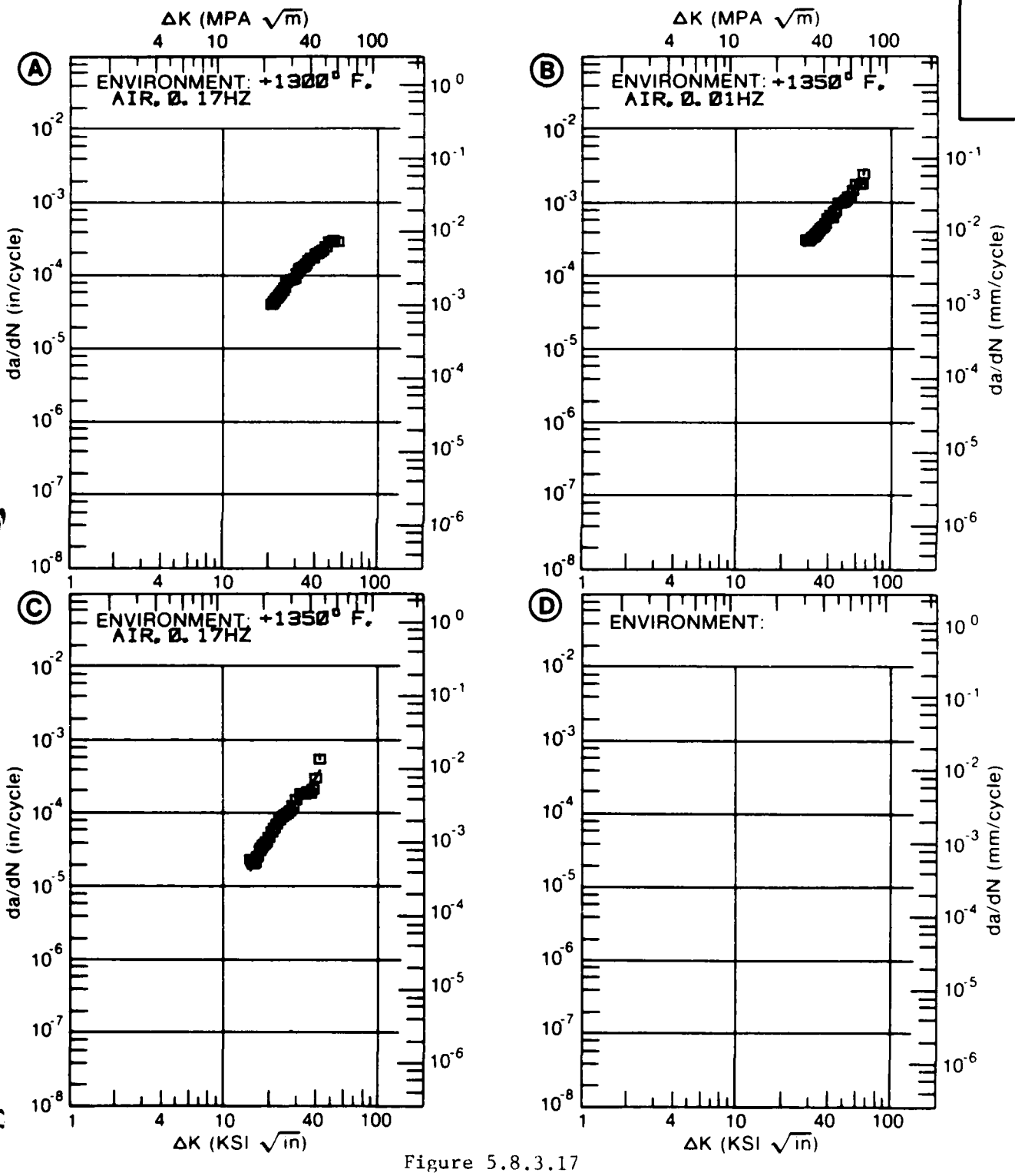


Figure 5.8.3.17

TABLE 5.8.3.18

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.8.3.18 INDICATING EFFECT

OF FREQUENCY

MATERIAL: NICKEL BASE IN100
CONDITION:
ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			F(HZ)= 0.01	F(HZ)= 0.17	F(HZ)= 20.00	
DELTA K MIN	A:	15.43	20.0			
	B:	13.17		7.25		
	C:	13.55			3.94	
	D:					
		16.00	21.5	16.9	4.92	
		20.00	36.9	35.3	8.16	
		25.00	69.8	62.0	15.2	
		30.00	120.	90.0	25.3	
		35.00	188.	120.	36.6	
		40.00	274.	153.	46.6	
		50.00	492.	239.		
		60.00	745.			
		70.00	996.			
		80.00	1214.			
		90.00	1378.			
DELTA K MAX	A:	91.39	1396.			
	B:	57.86		337.		
	C:	41.45			49.0	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			11.27	9.73	17.34	
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	3	5	2	
		1.25-2.0				
		>2.0				

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: C-R
STRESS RATIO: +0.10
ENVIRONMENT: +1200° F, AIR

YIELD STRENGTH: 169.1 KSI
ULT. STRENGTH: 236.5 KSI
SPECIMEN THK: 0.247- 0.870"
SPECIMEN WIDTH: 2.437- 2.511"
REFERENCES: PW006

NICKEL BASE

IN100

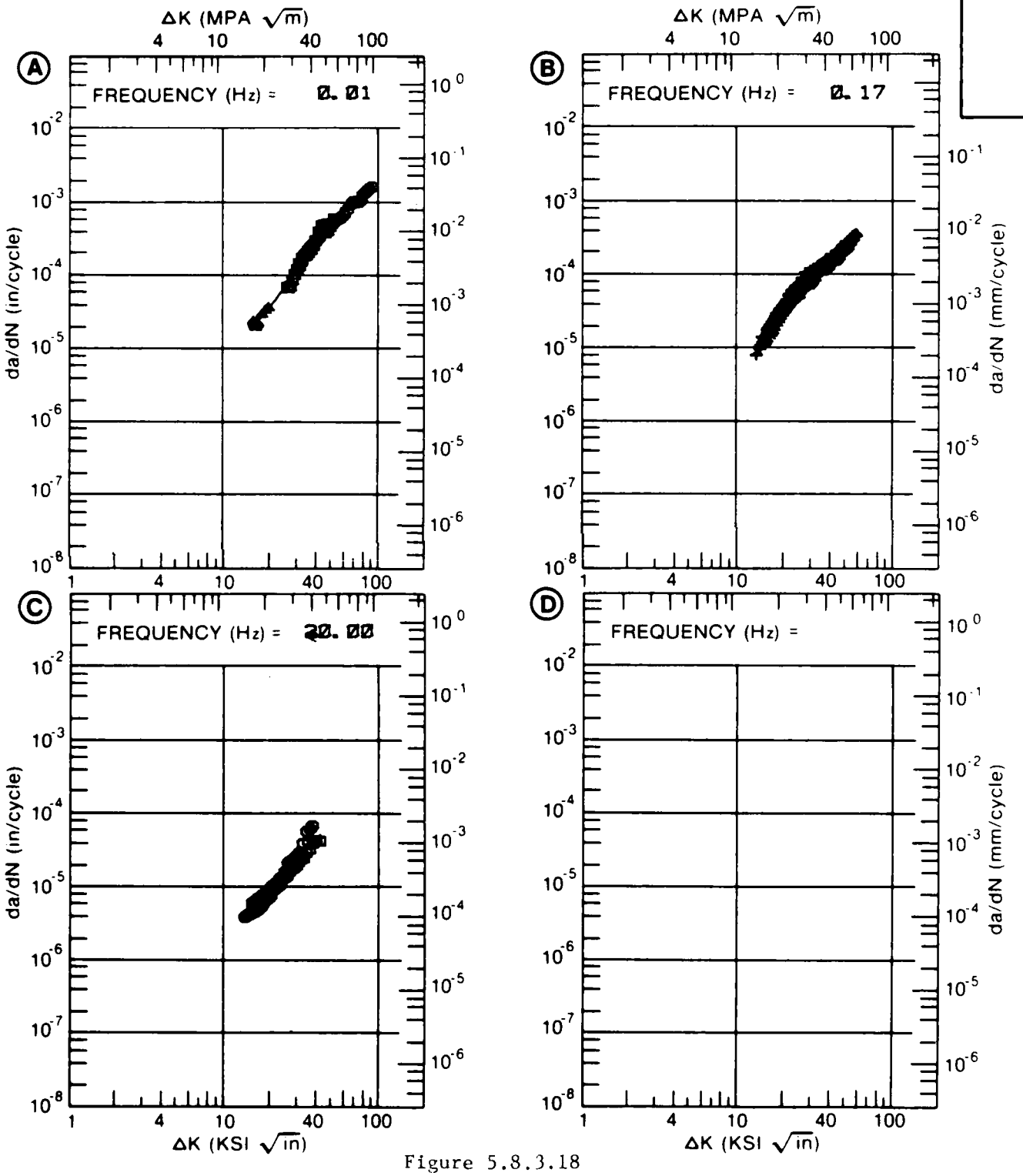


Figure 5.8.3.18

TABLE 5.8.3.19

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.8.3.19 INDICATING EFFECT

OF FREQUENCY

MATERIAL: NICKEL BASE IN100
CONDITION:
ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			F=1 MIN HOLD TRAPEZOIDAL	F=2 MIN HOLD TRAPEZOIDAL	F=10 MIN HOLD TRAPEZOIDAL	F=20 MIN HOLD TRAPEZOIDAL
DELTA K MIN	A:	18.78	52.1			
	B:	15.61		89.6		
	C:	19.39			203.	
	D:	27.08				371.
		16.00		87.0		
		20.00	61.9	93.7	208.	
		25.00	144.	156.	347.	
		30.00	315.	279.	703.	587.
		35.00	559.	462.	1363.	1010.
		40.00	785.	679.	2332.	1466.
		50.00		1006.		2555.
		60.00				4304.
DELTA K MAX	A:	41.45	831.			
	B:	50.80		1018.		
	C:	49.73			4327.	
	D:	67.35				6558.
ROOT MEAN SQUARE PERCENT ERROR			6.62	15.60	7.60	10.08
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	2	1	1
		1.25-2.0				
		>2.0				

CONDITION/HT:
FORM: 1.80"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: C-R
STRESS RATIO: +0.10
ENVIRONMENT: +1200° F, AIR

YIELD STRENGTH: 169.1 KSI
ULT. STRENGTH: 236.5 KSI
SPECIMEN THK: 0.250- 0.856"
SPECIMEN WIDTH: 2.436- 2.510"
REFERENCES: PW002

NICKEL BASE

IN100

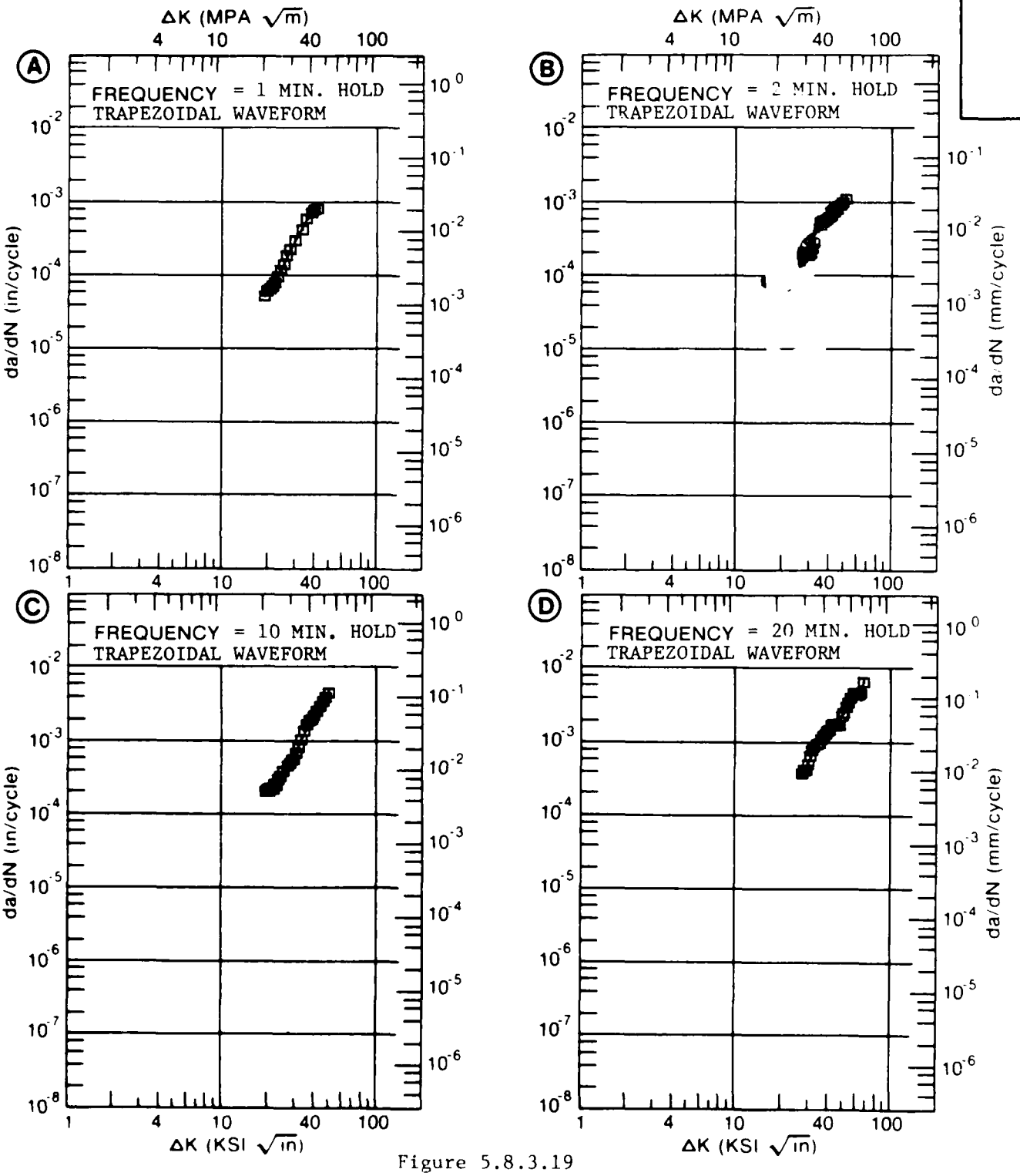


Figure 5.8.3.19

TABLE 5.8.3.20

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.8.3.20 INDICATING EFFECT

OF FREQUENCY

MATERIAL: NICKEL BASE IN100
CONDITION:
ENVIRONMENT: +1350F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			F=2 MIN HOLD TRAPEZOIDAL			
DELTA K MIN	A:	12.93	105.			
	B:					
	C:					
	D:					
		13.00	107.			
		16.00	293.			
		20.00	776.			
DELTA K MAX	A:	21.29	871.			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 13.50

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
0.0-0.5	
0.5-0.8	
0.8-1.25	1
1.25-2.0	
>2.0	

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: C-R
STRESS RATIO: +0.10
ENVIRONMENT: +1350° F, AIR

YIELD STRENGTH: 169.1 KSI
ULT. STRENGTH: 236.5 KSI
SPECIMEN THK: 0.436"
SPECIMEN WIDTH: 2.495"
REFERENCES: PW002

NICKEL BASE

IN100

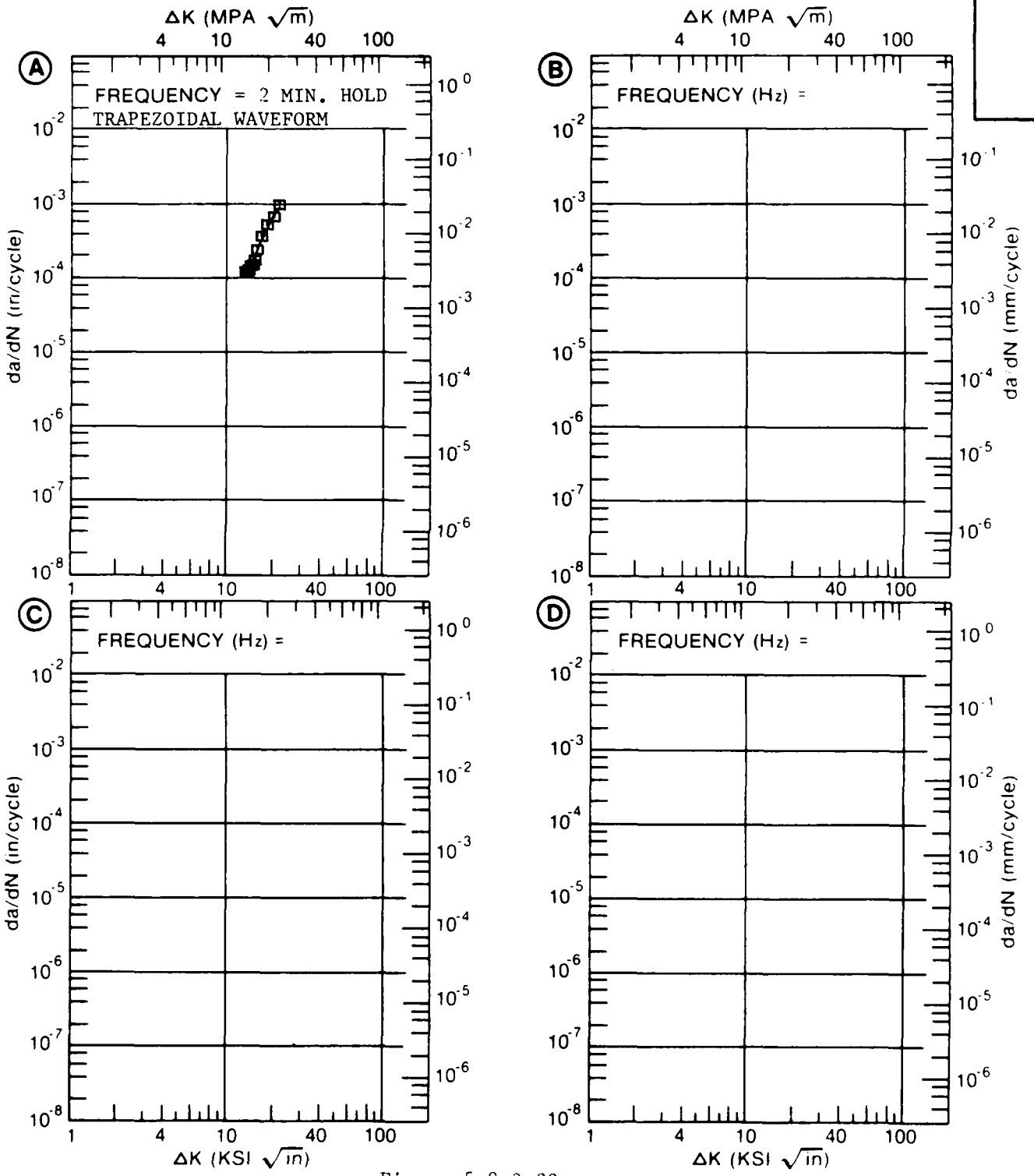


Figure 5.8.3.20

TABLE 5.8.3.21

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.8.3.21 INDICATING EFFECT

OF FREQUENCY

MATERIAL: NICKEL BASE IN100
CONDITION:
ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			F(HZ)= 0.17	F(HZ)= 20.00		
DELTA K MIN	A:	9.28	17.5			
	B:	4.39		.367		
	C:					
	D:					
		5.00		.600		
		6.00		.977		
		7.00		1.32		
		8.00		1.68		
		9.00		2.11		
		10.00	19.5	2.69		
		13.00	31.8			
		16.00	55.2			
DELTA K MAX	A:	18.16	84.6			
	B:	11.78		4.46		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			6.15	6.64		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: C-R
STRESS RATIO: +0.80
ENVIRONMENT: +1200° F, AIR

YIELD STRENGTH: 169.1 KSI
ULT. STRENGTH: 236.5 KSI
SPECIMEN THK: 0.206- 0.503"
SPECIMEN WIDTH: 2.496- 2.498"
REFERENCES:PW002

NICKEL BASE

IN100

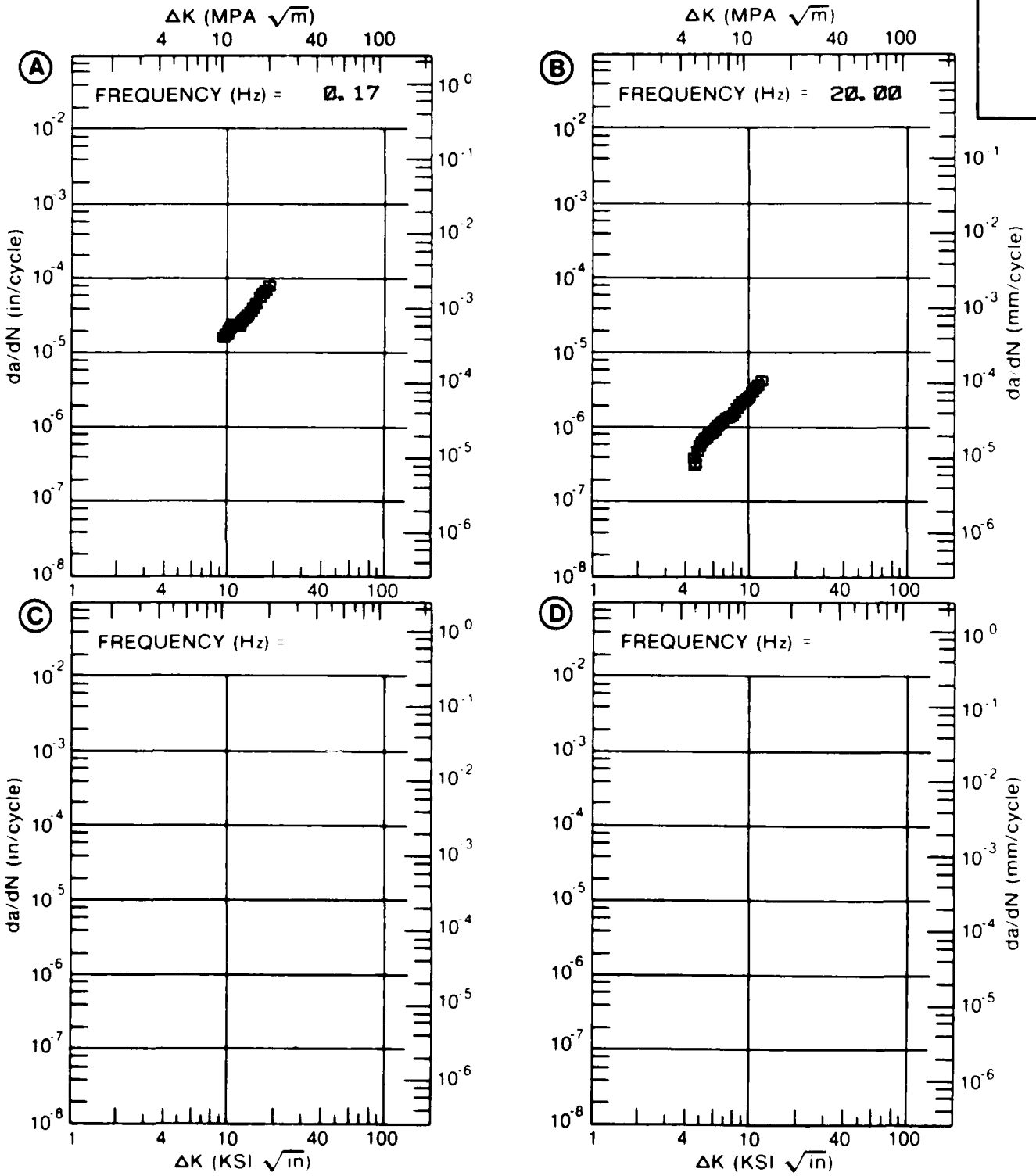


Figure 5.8.3.21

TABLE 5.8.3.22

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE IN100
CONDITION: PRESTRAIN
ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.10			
DELTA K MIN	A:	11.89	2.42			
	B:					
	C:					
	D:					
		13.00	4.10			
		16.00	16.1			
DELTA K MAX	A:	19.36	34.1			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 33.86

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: PRESTRAIN
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CCP
ORIENTATION:
FREQUENCY: 0.17 HZ
ENVIRONMENT: +1200° F, AIR

YIELD STRENGTH: 169.1 KSI
ULT. STRENGTH: 236.5 KSI
SPECIMEN THK: 0.288"
SPECIMEN WIDTH: 0.722"
REFERENCES: PW002

NICKEL BASE

IN100

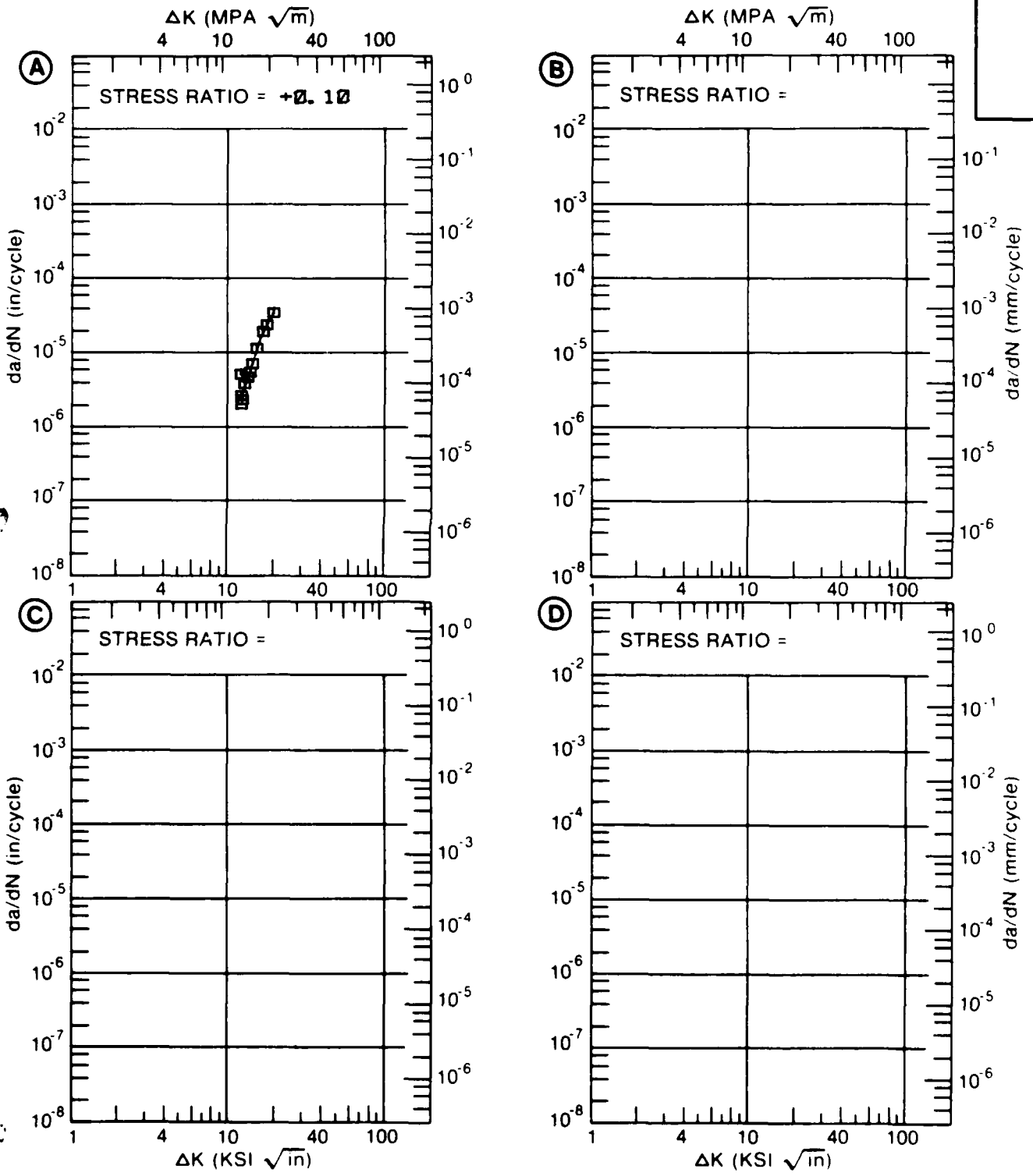


Figure 5.8.3.22

Table 5.9.1.1

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE IN100 P/M-C

TEST CONDITIONS

SPECIMEN ORIENTATION: C-R

ENVIRONMENT: AIR AT 1200 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE)					
					2.5	5	10	20	50	100
2050F 2HR OQ, 1600F 6?HR AC, 1200F 24HR AC, 1400F 4HR AC	DISK	0.05	0.01					26.9		
2050F 2HR OQ, 1600F 6?HR AC, 1200F 24HR AC, 1400F 4HR AC	DISK	0.05	0.33					18.5		
2050F 2HR OQ, 1600F 6?HR AC, 1200F 24HR AC, 1400F 4HR AC	DISK	0.05	20.00					6.16		

TABLE 5.9.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.9.3.1 INDICATING EFFECT

OF FREQUENCY

MATERIAL: NICKEL BASE IN100 P/ M-G
CONDITION: 2050F 2HR OQ, 1600F .67HR AC, 1200F
24HR AC, 1400F 4HR AC

ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			F=15 MIN HOLD TRAPEZOIDAL	F(HZ)= 0.01	F(HZ)= 0.33	F(HZ)= 20.00
DELTA K MIN	A:	24.49	463.			
	B:	13.36		7.57		
	C:	13.44			2.78	
	D:	15.92				4.25
		16.00		9.13	7.49	4.27
		20.00		26.9	18.5	6.16
		25.00	485.	58.6	34.1	10.6
		30.00	773.	87.5	49.2	17.4
		35.00	1226.	114.	64.3	26.2
		40.00	1915.	157.	81.4	35.9
		50.00	4412.			
		60.00	9530.			
		70.00	19994.			
		80.00	40505.			
		90.00	63096.			
DELTA K MAX	A:	97.60	64557.			
	B:	43.75		214.		
	C:	46.90			112.	
	D:	46.70				47.6
ROOT MEAN SQUARE PERCENT ERROR			31.42	15.26	17.71	24.67

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 2050F 2HR OQ, 1600F .67HR AC, 1200F 24HR AC, 1400F 4HR AC
FORM: DISK
SPECIMEN TYPE: WOL
ORIENTATION: C-R
STRESS RATIO: +0.05
ENVIRONMENT: +1200° F, AIR

YIELD STRENGTH: 158.2 KSI
ULT. STRENGTH: 176.9 KSI
SPECIMEN THK: 0.500"
SPECIMEN WIDTH: 2.500"
REFERENCES: PW004

NICKEL BASE

IN100 P/M-G

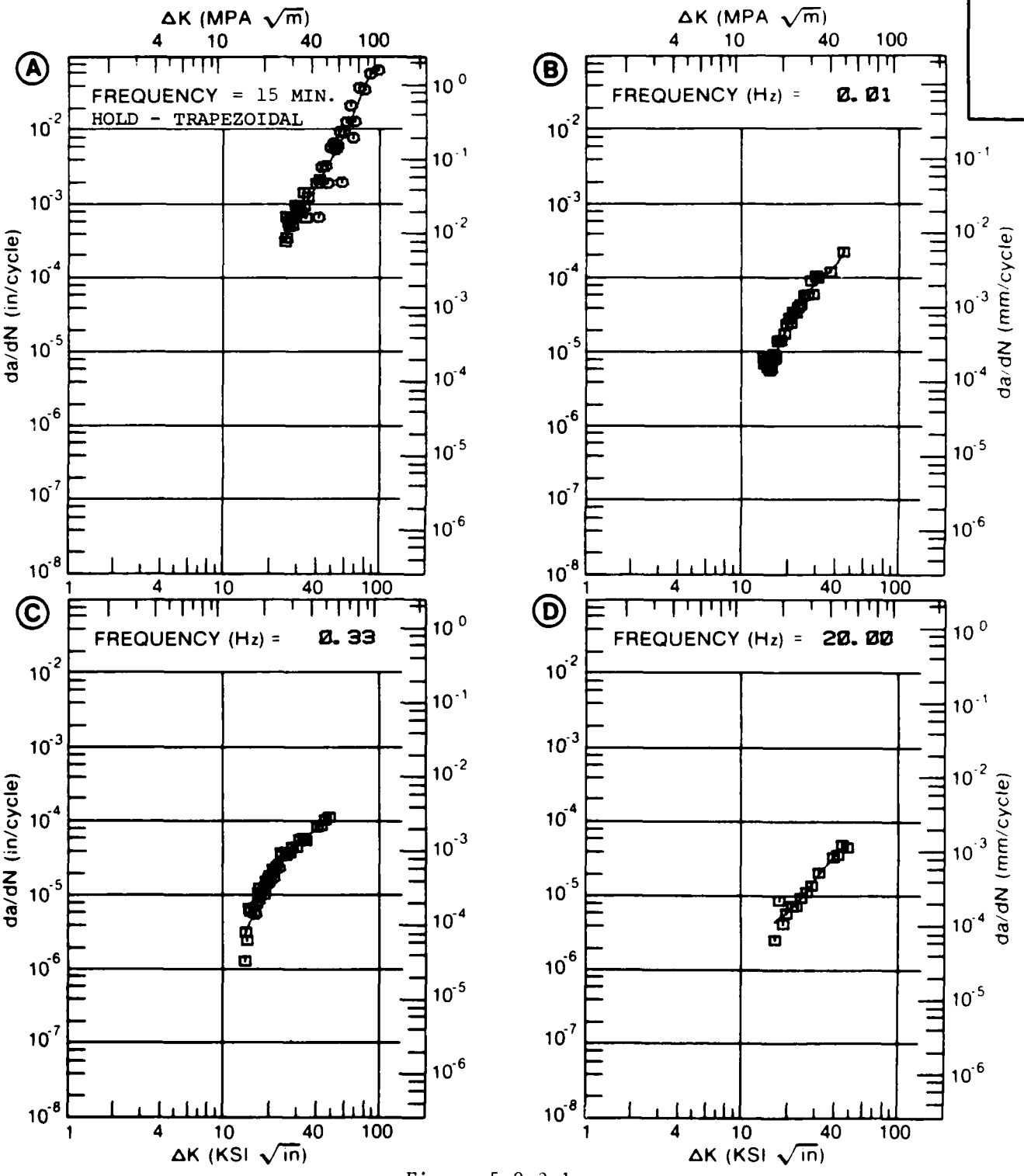


Figure 5.9.3.1

Table 5.10.1

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE NASA IIB-7 P/M

TEST CONDITIONS

SPECIMEN ORIENTATION: C-R

ENVIRONMENT: AIR AT 1200 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1650F 16HRS TO 2000F 1HR OQ, 1400F 16HRS AC	DISK	0.05	15 MIN. HOLDTIME TRAPEZOIDAL WAVEFORM					3992		
1650F 16HRS TO 2000F 1HR OQ, 1400F 16HRS AC	DISK	0.05	0.33					15.8	313	

TABLE 5.10.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.10.3.1 INDICATING EFFECT

OF FREQUENCY

MATERIAL: NICKEL BASE NASA IIB -7 P/M
CONDITION: 1650F 16HRS TO 2000F 1HR OQ, 1400F 16HRS AC
ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			F=15 MIN HOLD F(HZ)= 0.33			
			TRAPEZOIDAL			
DELTA K MIN	A:	13.30	315.			
	B:	14.67		4.87		
	C:					
	D:					
		16.00	1303.	5.96		
		20.00	3593.	15.8		
		25.00	6526.	35.6		
		30.00	10084.	60.3		
		35.00	16495.	92.6		
		40.00	30610.	137.		
		50.00		313.		
DELTA K MAX	A:	45.79	74742.			
	B:	51.24		483.		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			70.69	16.34		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 1650F 16HRS TO 2000F 1HR OQ. 1400F 16HRS AC
FORM: 1.75"TH DISK
SPECIMEN TYPE: WOL
ORIENTATION: C-R
STRESS RATIO: +0.05
ENVIRONMENT: +1200° F, AIR

YIELD STRENGTH: 208.6 KSI
ULT. STRENGTH: 257.1 KSI
SPECIMEN THK: 0.500"
SPECIMEN WIDTH: 2.500"
REFERENCES: PW004

NICKEL BASE

NASA IIB-7 P/M

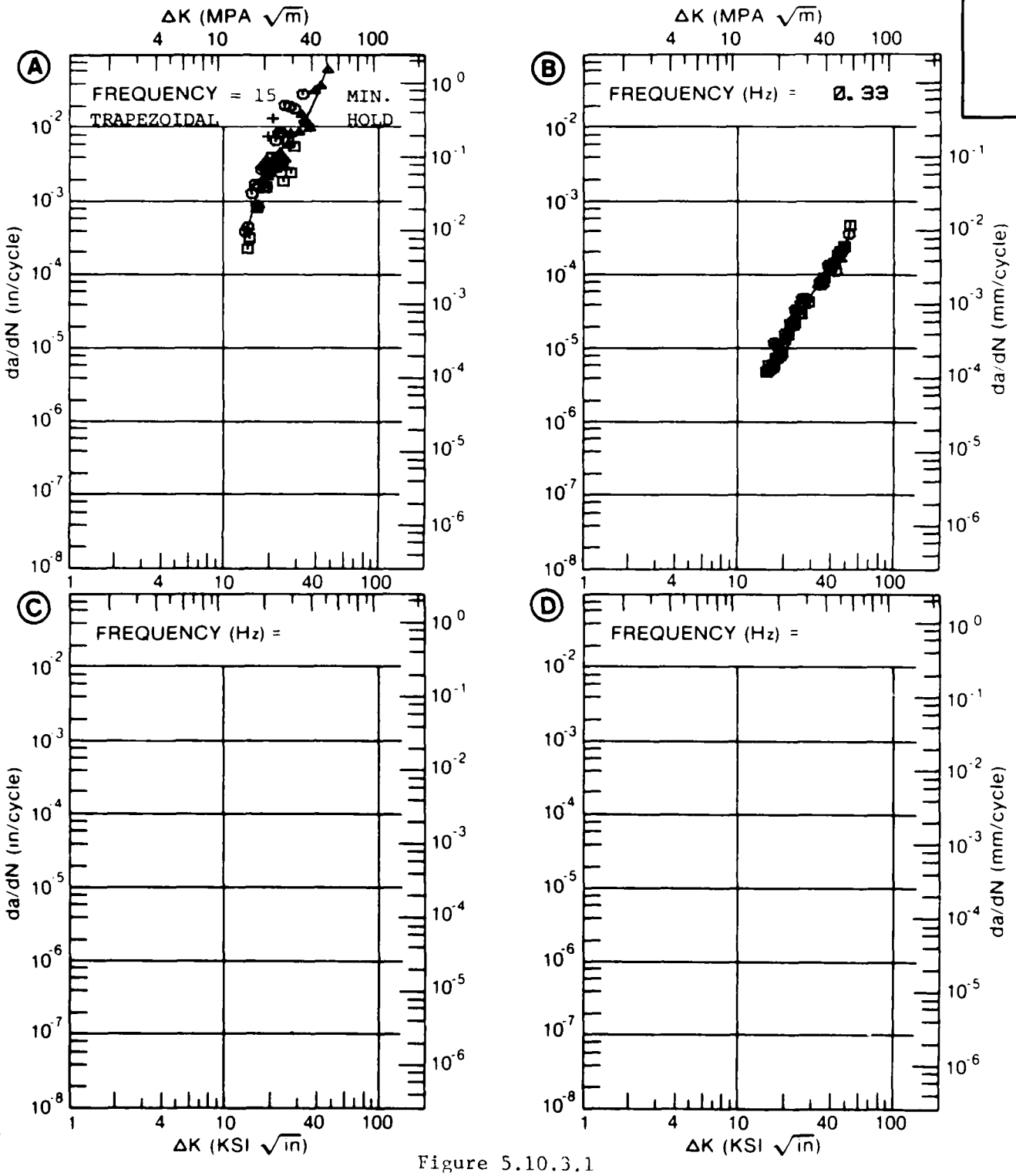


Figure 5.10.3.1

Table 5.11.1.1

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE P/M RENE 95

TEST CONDITIONS

SPECIMEN ORIENTATION C-R

ENVIRONMENT: AIR AT 1200 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE)					
					2.5	5	10	20	50	100
2080F 1HR AC, 1600F 1HR AC, 1200F 24HRS AC	DISK	0.00	0.33					2.61	54.1	
2080F 1HR AC, 1600F 1HR AC, 1200F 24HRS AC	DISK	0.00	0.02					4.03	200	

TABLE 5.11.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.11.3.1 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE RENE 95 (H&F)
CONDITION: 2000F 1HR, SQ AT 1000F, 1400F 16HRS

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+1200F AIR			
DELTA K MIN	A:	13.58	2.15			
	B:					
	C:					
	D:					
		16.00	4.38			
		20.00	10.4			
		25.00	17.9			
		30.00	29.6			
		35.00	49.8			
		40.00	85.6			
DELTA K MAX	A:	45.70	141.			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 16.33

LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 2000F 1HR, SQ AT 1000F, 1400F 16HRS
FORM: 1.23"TH FORGING
SPECIMEN TYPE: KB BAR
ORIENTATION: C-R
STRESS RATIO: +0.05
FREQUENCY: 0.33 HZ

YIELD STRENGTH: 171.0 KSI
ULT. STRENGTH:
SPECIMEN THK: 0.250"
SPECIMEN WIDTH: 0.600"
REFERENCES: GE001

NICKEL BASE

RENE 95 (H&F)

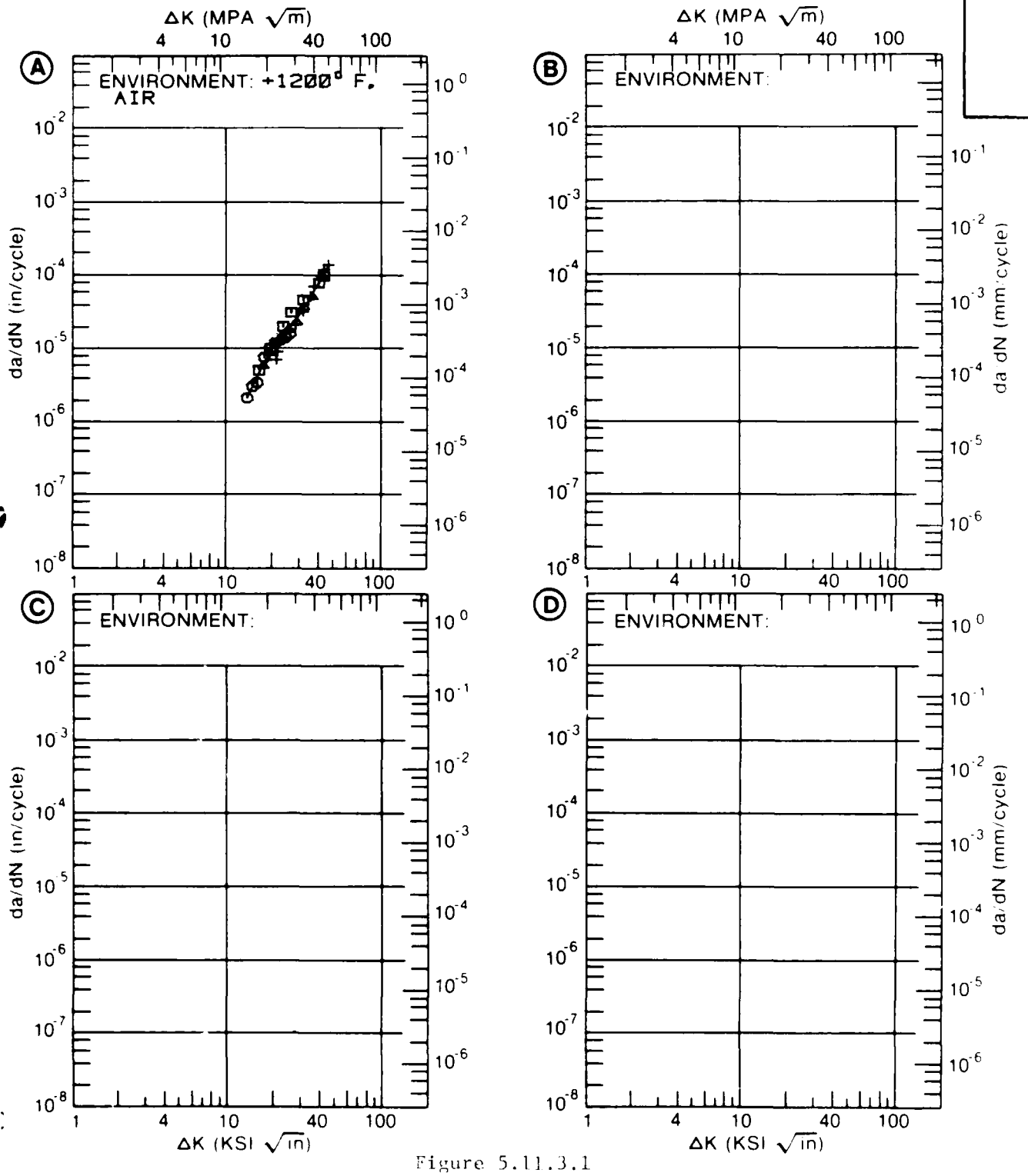


Figure 5.11.3.1

TABLE 5.11.3.2

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.11.3.2 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE P/M RENE 95
CONDITION: 2080F 1HR AC, 1600F 1HR AC, 1200F 24HRS AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. LAB AIR, .33HZ	E=+1200F AIR, .33HZ	E=+1200F AIR, 5 MIN HOLD	
DELTA K MIN	A:	16.68	.216			
	B:	17.22		.840		
	C:	28.18			59.5	
	D:					
		20.00	.394	2.61		
		25.00	1.60	7.87		
		30.00	5.29	13.8	103.	
		35.00	11.8	19.9	250.	
		40.00	18.9	27.2	413.	
		50.00	27.6	54.1	1093.	
		60.00		132.	2403.	
		70.00			4006.	
		80.00			8368.	
DELTA K MAX	A:	56.41	55.2			
	B:	63.62		192.		
	C:	80.21			8535.	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			24.24	27.95	7.78	

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 2080F 1HR AC, 1600F 1HR AC, 1200F 24HRS AC
FORM: 2.50"TH DISK
SPECIMEN TYPE: CCP
ORIENTATION: C-R
STRESS RATIO: +0.00
FREQUENCY:

YIELD STRENGTH: 165.7 KSI
ULT. STRENGTH: 228.6 KSI
SPECIMEN THK: 0.080"
SPECIMEN WIDTH: 2.000"
REFERENCES:GE008

NICKEL BASE

P/M RENE 95

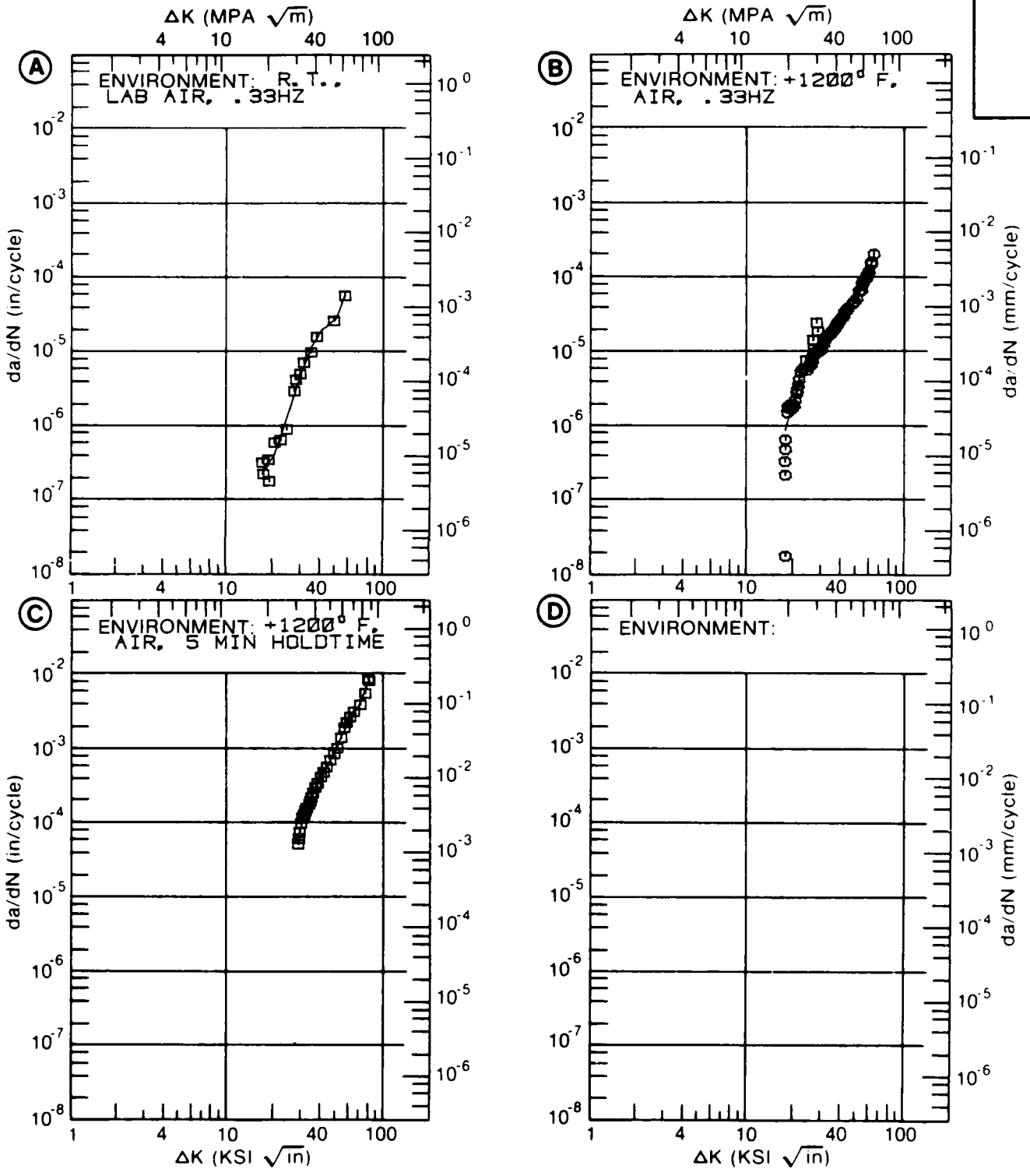


Figure 5.11.3.2

TABLE 5.11.3.3

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.11.3.3 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE P/M RENE 95
CONDITION: 2080F 1HR AC, 1600F 1HR AC, 1200F 24HRS AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+1200F AIR, .33HZ	E=+1200F AIR, 5 MIN HOLD		
DELTA K MIN	A:	15.06	.236			
	B:	24.98		107.		
	C:					
	D:					
		16.00	.531			
		20.00	5.00			
		25.00	20.1	107.		
		30.00	44.5	406.		
		35.00	82.4			
DELTA K MAX	A:	36.31	96.2			
	B:	33.95		2226.		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			15.59	28.98		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 2080F 1HR AC, 1600F 1HR AC, 1200F 24HRS AC
FORM: 2.50"TH DISK
SPECIMEN TYPE: KB BAR
ORIENTATION: C-R
STRESS RATIO: +0.00
FREQUENCY:

YIELD STRENGTH: 185.7 KSI
ULT. STRENGTH: 228.6 KSI
SPECIMEN THK: 0.250"
SPECIMEN WIDTH: 0.600"
REFERENCES: GE008

NICKEL BASE

P/M RENE 95

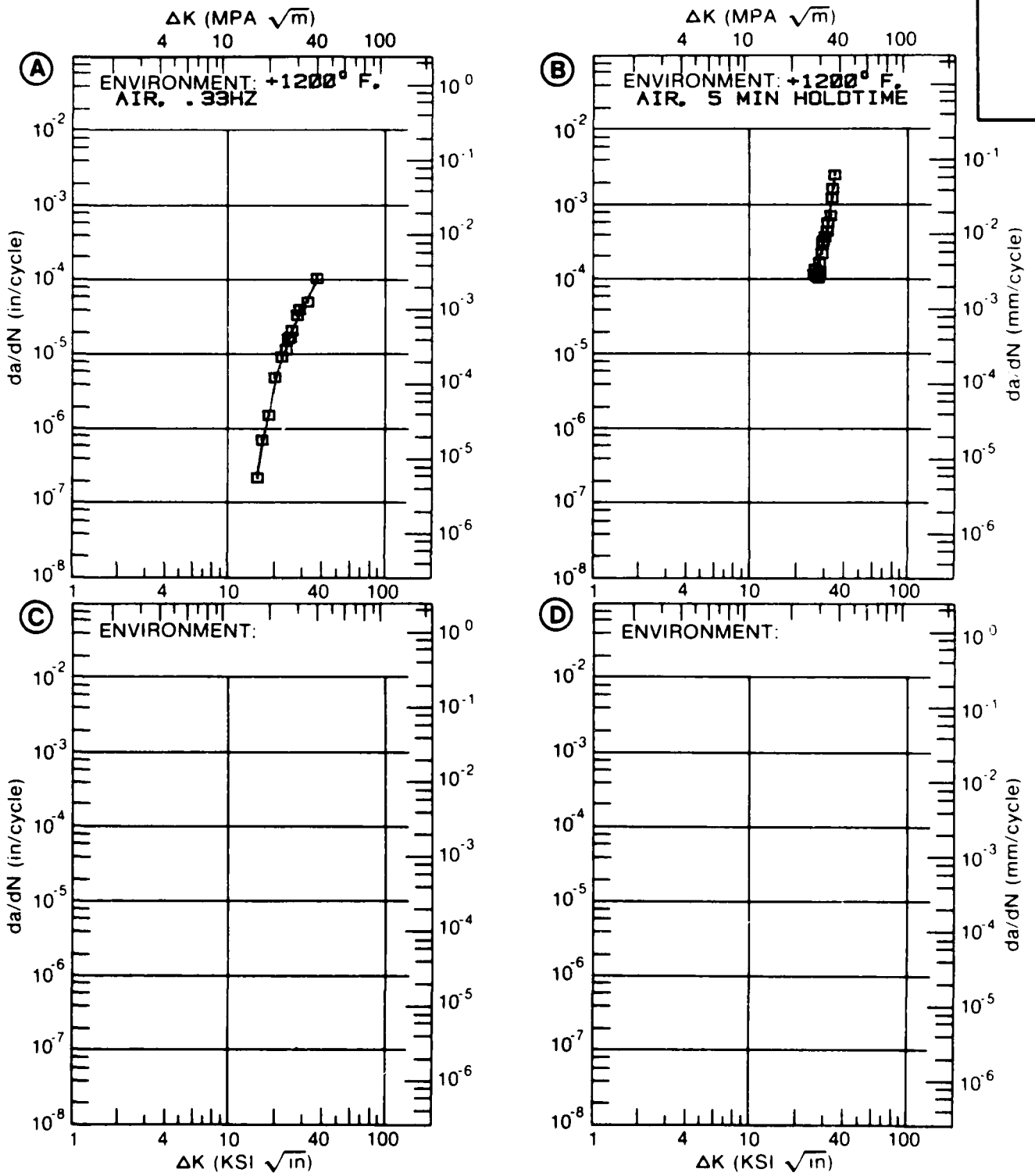


Figure 5.11.3.3

TABLE 5.11.3.4

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.11.3.4 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE P/M RENE 95
CONDITION: 2080F 1HR AC, 1600F 1HR AC, 1200F 24HRS AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+1200F AIR - .02HZ	E=+1200F ARGON - .33HZ		
DELTA K MIN	A:	19.55	3.45			
	B:	17.82		1.29		
	C:					
	D:					
		20.00	4.03	1.94		
		25.00	14.8	3.71		
		30.00	33.9	5.95		
		35.00	61.3	9.11		
		40.00	97.0	14.0		
		50.00	200.	35.3		
		60.00	369.			
		70.00	662.			
DELTA K MAX	A:	76.15	948.			
	B:	51.58		41.3		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			11.36	24.59		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25		1		
		1.25-2.0				
		>2.0				

CONDITION/HT: 2080F 1HR AC. 1600F 1HR AC. 1200F 24HRS AC
FORM: 2.50"TH DISK
SPECIMEN TYPE: CCP
ORIENTATION: C-R
STRESS RATIO: +0.00
FREQUENCY:

YIELD STRENGTH: 165.7 KSI
ULT. STRENGTH: 228.6 KSI
SPECIMEN THK: 0.080"
SPECIMEN WIDTH: 2.000"
REFERENCES: GE008, GE004

NICKEL BASE

P/M RENE 95

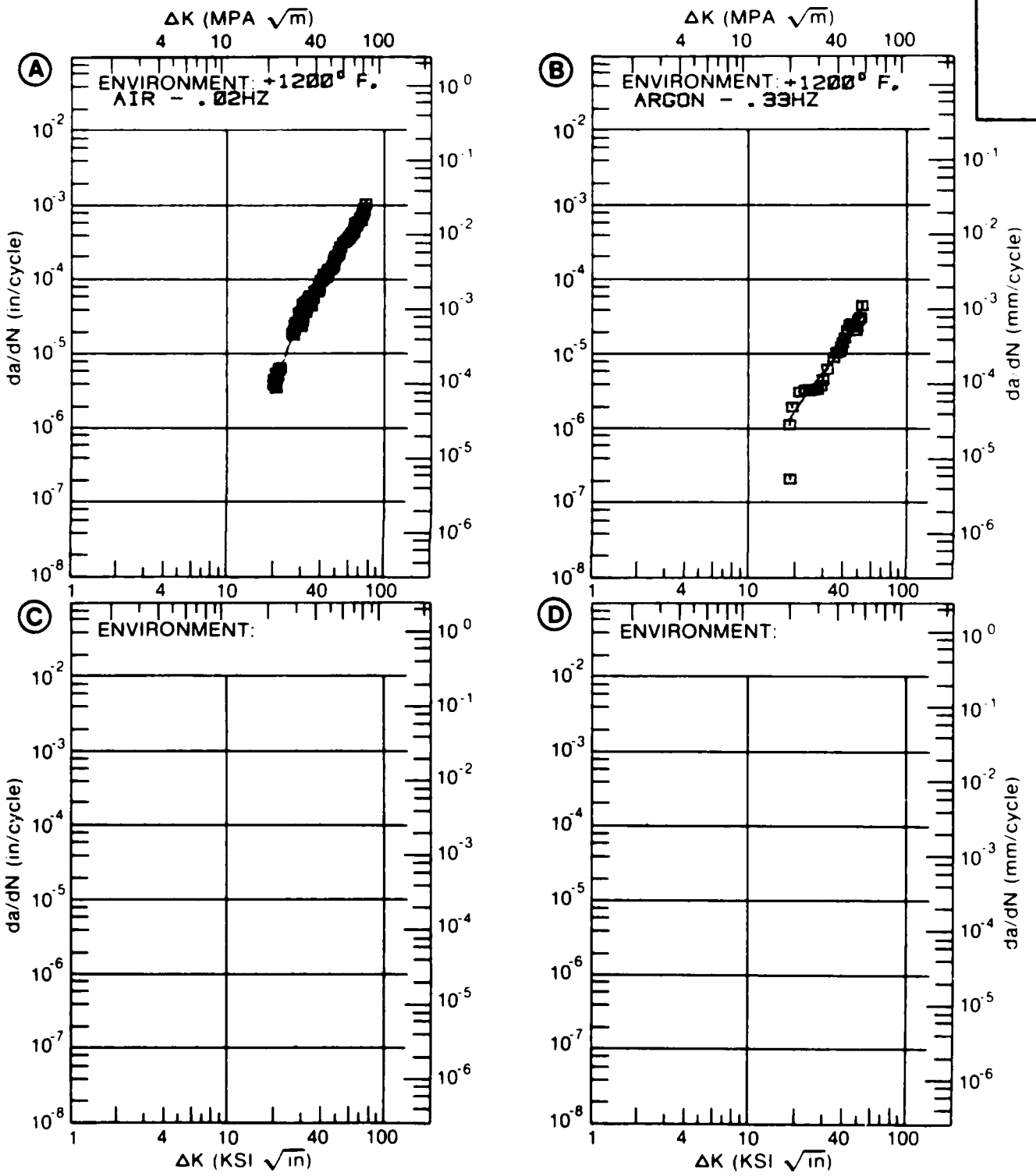


Figure 5.11.3.4

TABLE 5.11.3.5

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.11.3.5 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE P/M RENE 95
CONDITION: 2100F 1HR, SG AT 1000F, 1600F 1HR, 1200F 24HRS, AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+1200F AIR			
DELTA K MIN	A:	12.70	2.95			
	B:					
	C:					
	D:					
		13.00	3.24			
		16.00	6.16			
		20.00	9.97			
		25.00	17.0			
		30.00	31.2			
		35.00	58.7			
		40.00	110.			
		50.00	179.			
DELTA K MAX	A:	56.60	708.			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 24.46

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 2100F 1HR. SQ AT 1000F 1600F 1HR. 1200F 24HRS. AC
FORM: 1.00"TH DISK
SPECIMEN TYPE: KB BAR
ORIENTATION: C-R
STRESS RATIO: +0.05
FREQUENCY: 0.33 HZ

YIELD STRENGTH: 176.1 KSI
ULT. STRENGTH:
SPECIMEN THK: 0.250"
SPECIMEN WIDTH: 0.600"
REFERENCES:GE001

NICKEL BASE

P/M RENE 95

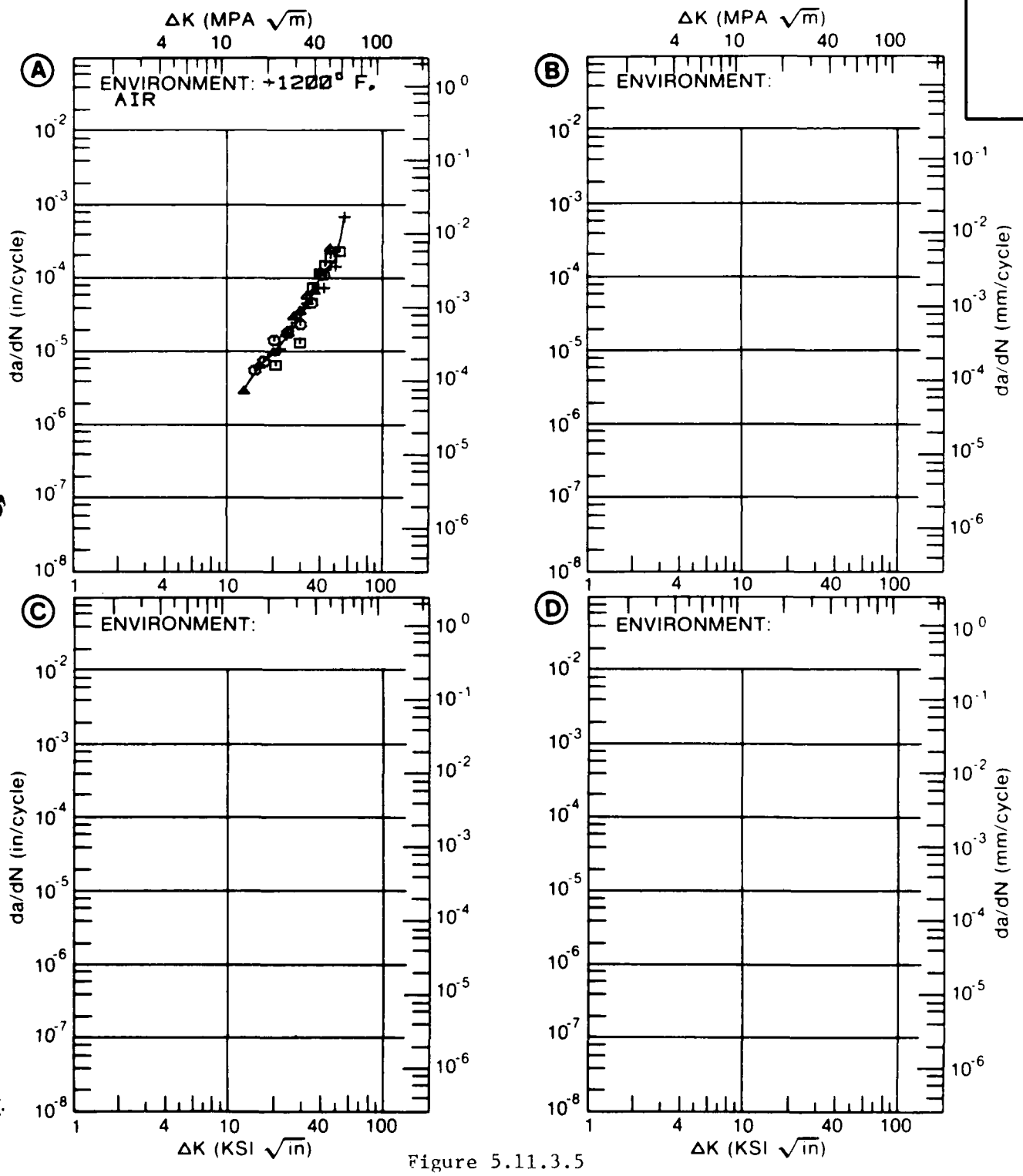


Figure 5.11.3.5

Table 5.12.1.1

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE WASPALOY

TEST CONDITIONS

SPECIMEN ORIENTATION: Unknown

ENVIRONMENT: LAB AIR AT R.T.

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1850F 2HRS, 1350F 6HRS(FINE GS, SMALL PRECIPITATES)	BILLET	0.10	10.00						10.7	
2010F 2HR, 1350F 6HR(COARSE GS, SMALL PRECIPITATES)	BILLET	0.10	10.00						2.84	
2010F 2HR, 1600F 24HR(COARSE GS, LARGE PRECIPITATES)	BILLET	0.10	10.00						9.65	

Table 5.12.1.2

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE WASPALOY

TEST CONDITIONS

SPECIMEN ORIENTATION: Unknown

ENVIRONMENT: AIR AT 800 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
	FORGING	-1.00	0.17					4.87		
	FORGING	-0.50	0.17					5.56		
	FORGING	0.50	0.17					5.93		

Table 5.12.1.3

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE WASPALOY

TEST CONDITIONS

SPECIMEN ORIENTATION: Unknown

ENVIRONMENT: AIR AT 1200 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
	FORGING	-1.00	0.17					10.8		
	FORGING	-0.50	0.17					9.57		
	FORGING	0.10	0.17					12.4	95.8	
	FORGING	0.80	0.17				3.84			

Table 5.12.1.4

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

NICKEL-BASE WASPALOY

TEST CONDITIONS

SPECIMEN ORIENTATION: C-R

ENVIRONMENT: AIR AT 1200 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
	FORGING	0.05	0.17					8.79		
	FORGING	0.05	0.33						49.5	
	FORGING	0.05	20.00					4.36		
	FORGING	0.10	0.17					10.4		
	FORGING	0.10	20.00					3.98		
	FORGING	0.10	20.00					3.71		
	FORGING	0.10	20.00					3.98		
	FORGING	0.80	20.00				1.28			
1875F 4HRS OQ, 1550F 4HRS AC, 1400F 4HRS AC	DISK	0.05	0.33					8.34	44.6	
1875F 4HRS OQ, 1550F 4HRS AC, 1400F 4HRS AC	DISK	0.05	20.00					3.86	29.7	

TABLE 5.12.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.12.3.1 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE WASPALOY
CONDITION:

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+1200F AIR	E=+1200F ARGON		
DELTA K MIN	A:	14.91	5.71			
	B:	33.32		18.2		
	C:					
	D:					
		16.00	6.28			
		20.00	9.44			
		25.00	15.3			
		30.00	22.6			
		35.00	29.8	21.9		
		40.00		29.8		
		50.00		35.3		
DELTA K MAX	A:	35.87	31.0			
	B:	59.56		42.8		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			2.05	9.70		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM:
SPECIMEN TYPE: CT
ORIENTATION: C-R
STRESS RATIO: +0.05
FREQUENCY: 0.33 HZ

YIELD STRENGTH: 154.0 KSI
ULT. STRENGTH: 199.2 KSI
SPECIMEN THK: 0.250- 0.452"
SPECIMEN WIDTH:
REFERENCES: PW006

NICKEL BASE

WASPALOY

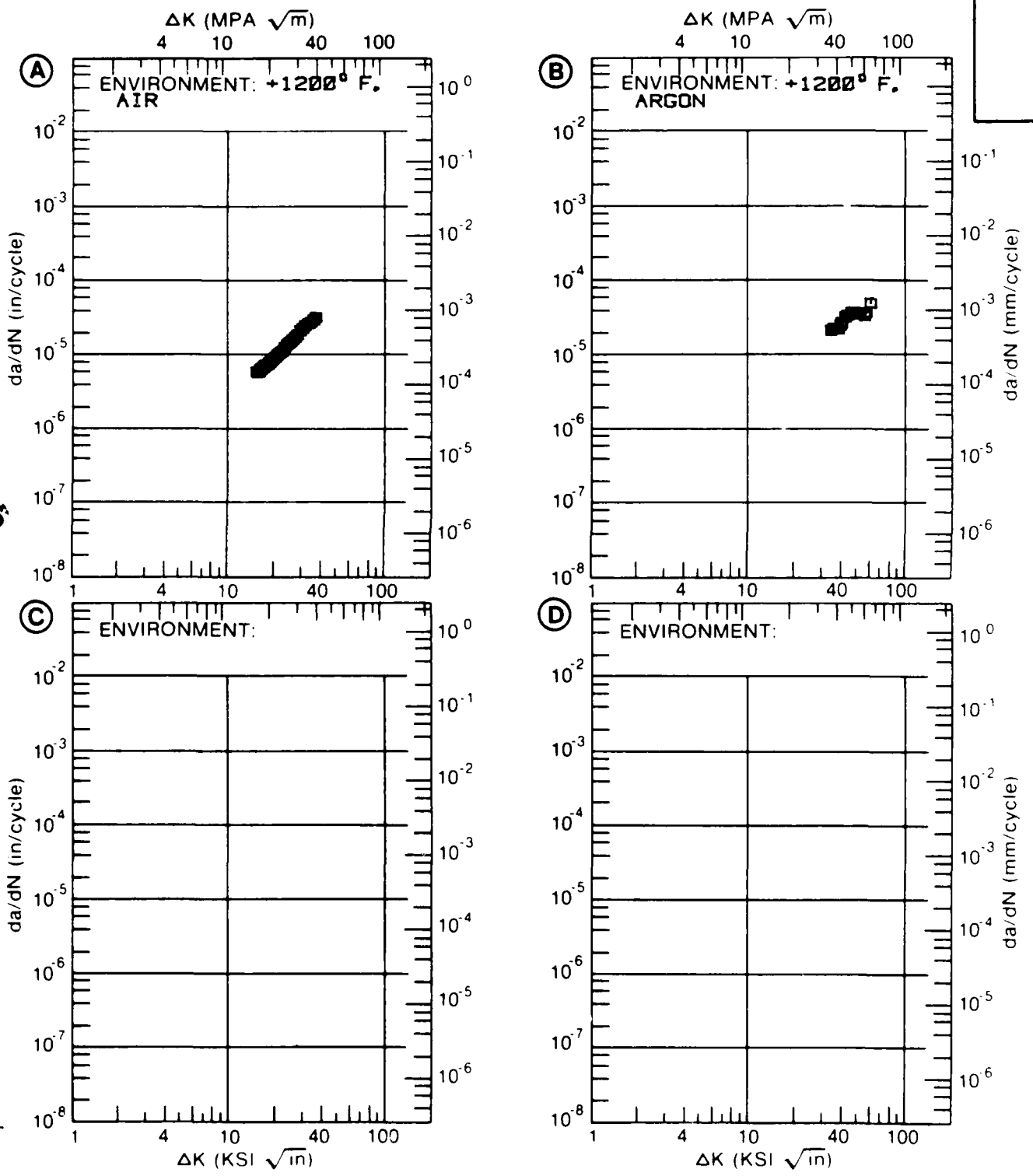


Figure 5.12.3.1

TABLE 5.12.3.2

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.12.3.2INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE WASPALOY
CONDITION:
ENVIRONMENT: + 800F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=-1.00	R=-0.50	R=+0.05	
DELTA K MIN	A:	15.16	1.67			
	B:	16.44		1.37		
	C:	21.55			3.81	
	D:					
		16.00	2.16			
		20.00	4.87	5.56		
		25.00	8.78	9.24	5.56	
		30.00	14.1	14.5	8.66	
		35.00	23.3		13.7	
		40.00			23.2	
DELTA K MAX	A:	37.90	32.1			
	B:	31.61		18.5		
	C:	41.48			27.5	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			7.42	9.14	2.64	
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1	1	
		1.25-2.0				
		>2.0				

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CCP
ORIENTATION:
FREQUENCY: 0.17 HZ
ENVIRONMENT: + 800° F. AIR

YIELD STRENGTH: 154.0 KSI
ULT. STRENGTH: 199.2 KSI
SPECIMEN THK: 0.297- 0.303"
SPECIMEN WIDTH: 0.996- 0.997"
REFERENCES: PW001

NICKEL BASE

WASPALOY

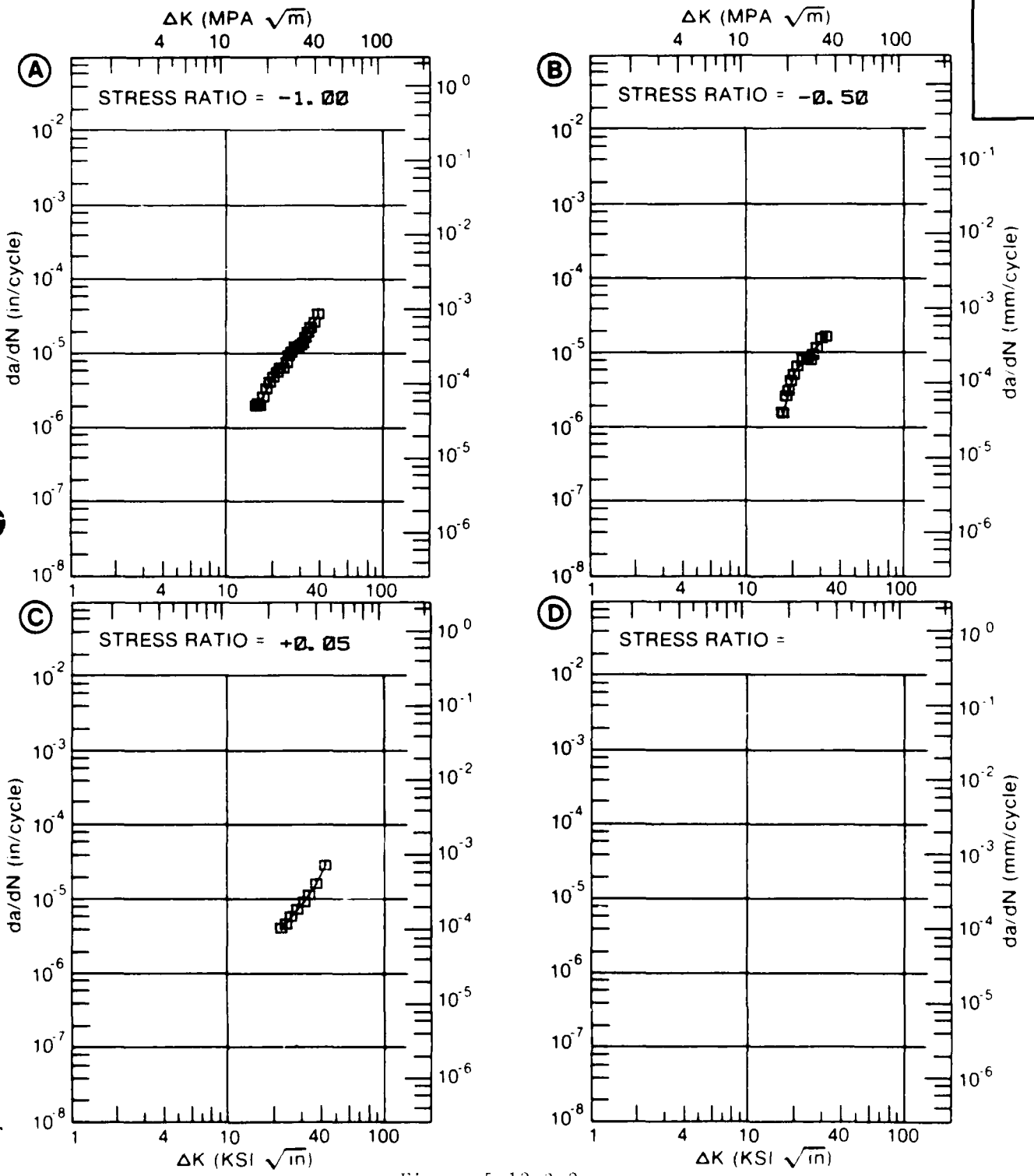


Figure 5.12.3.2

TABLE 5.12.3.3

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.12.3.3 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE WASPALOY
CONDITION:
ENVIRONMENT: + 800F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.50	R=+0.80		
DELTA K MIN	A:	15.92	3.93			
	B:	6.02		.434		
	C:					
	D:					
		7.00		.765		
		8.00				
		9.00				
		10.00				
		13.00				
		16.00	3.96			
		20.00	5.93			
		25.00	10.3			
DELTA K MAX	A:	28.39	14.8			
	B:	7.32		.791		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			2.90	22.36		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CCP
ORIENTATION:
FREQUENCY: 0.17 HZ
ENVIRONMENT: + 800° F, AIR

YIELD STRENGTH: 154.0 KSI
ULT. STRENGTH: 199.2 KSI
SPECIMEN THK: 0.300"
SPECIMEN WIDTH: 0.995- 0.998"
REFERENCES: PW001

NICKEL BASE

WASPALOY

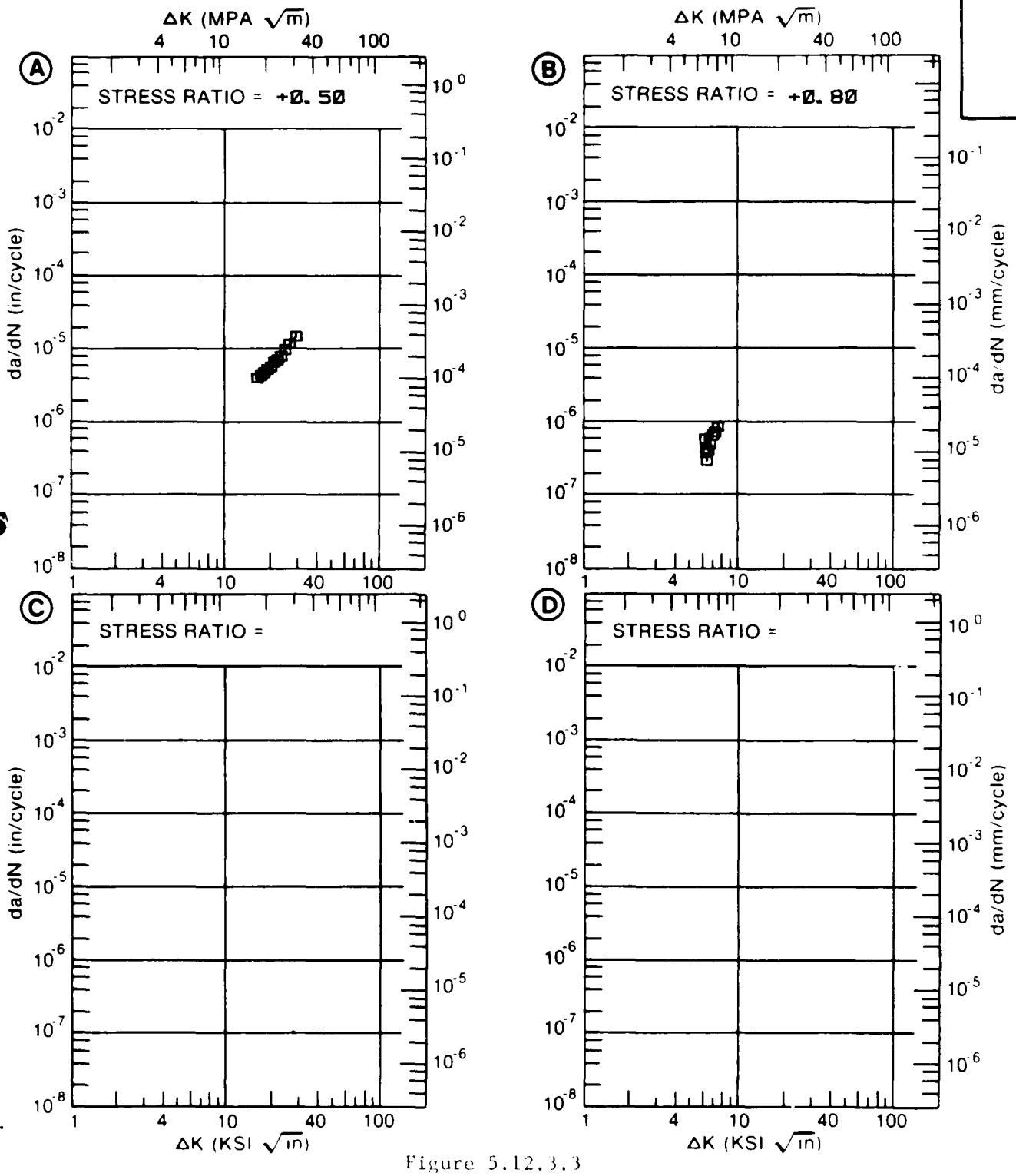


Figure 5.12.3.3

TABLE 5.12.3.4

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.12.3.4 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE WASPALOY
CONDITION:
ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=-1.00	R=-0.50	R=+0.05	
DELTA K MIN	A:	11.63	2.52			
	B:	17.29		7.33		
	C:	23.34			11.6	
	D:					
		13.00	3.66			
		16.00	6.50			
		20.00	10.8	9.57		
		25.00	17.1	11.4	13.6	
		30.00	25.5		20.4	
		35.00			29.8	
		40.00			44.8	
DELTA K MAX	A:	31.47	28.5			
	B:	27.24		18.7		
	C:	43.07			58.7	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			6.60	9.76	3.65	
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1	1	
		1.25-2.0				
		>2.0				

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CCP
ORIENTATION:
FREQUENCY: 0.17 HZ
ENVIRONMENT: +1200° F, AIR

YIELD STRENGTH: 154.0 KSI
ULT. STRENGTH: 199.2 KSI
SPECIMEN THK: 0.298- 0.301"
SPECIMEN WIDTH: 0.997- 0.998"
REFERENCES:PW001

NICKEL BASE

WASPALOY

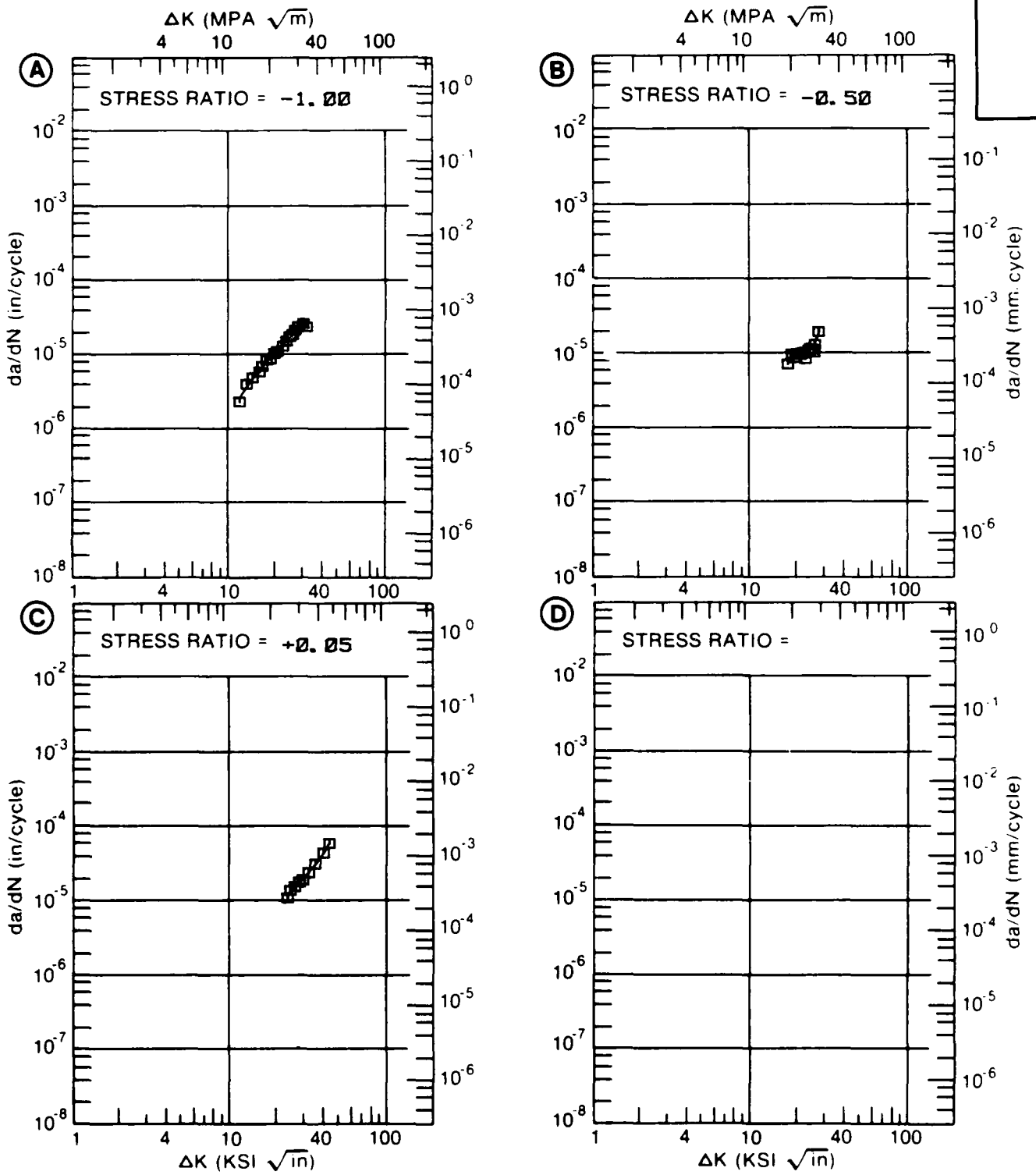


Figure 5.12.3.4

TABLE 5.12.3.5

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.13.3.5 INDICATING EFFECT OF STRESS RATIO

MATERIAL: NICKEL BASE WASPALOY
CONDITION:
ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.10	R=+0.55	R=+0.80	
DELTA K MIN	A:	11.83	2.23			
	B:					
	C:	5.59			.994	
	D:					
		6.00			1.33	
		7.00			2.07	
		8.00			2.68	
		9.00			3.22	
		10.00			3.84	
		13.00	3.36			
		16.00	6.69			
		20.00	12.4			
		25.00	20.4			
		30.00	28.4			
		35.00	42.4			
		40.00	66.1			
		50.00	95.8			
DELTA K MAX	A:	51.07	94.1			
	B:					
	C:	11.87			5.72	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			13.15	0.00	7.13	
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	2		1	
		1.25-2.0				
		>2.0				

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CCP
ORIENTATION:
FREQUENCY: 0.17 HZ
ENVIRONMENT: +1200° F, AIR

YIELD STRENGTH: 154.0 KSI
ULT. STRENGTH: 199.2 KSI
SPECIMEN THK: 0.287- 0.300"
SPECIMEN WIDTH: 0.973- 0.998"
REFERENCES: PW001

NICKEL BASE

WASPALOY

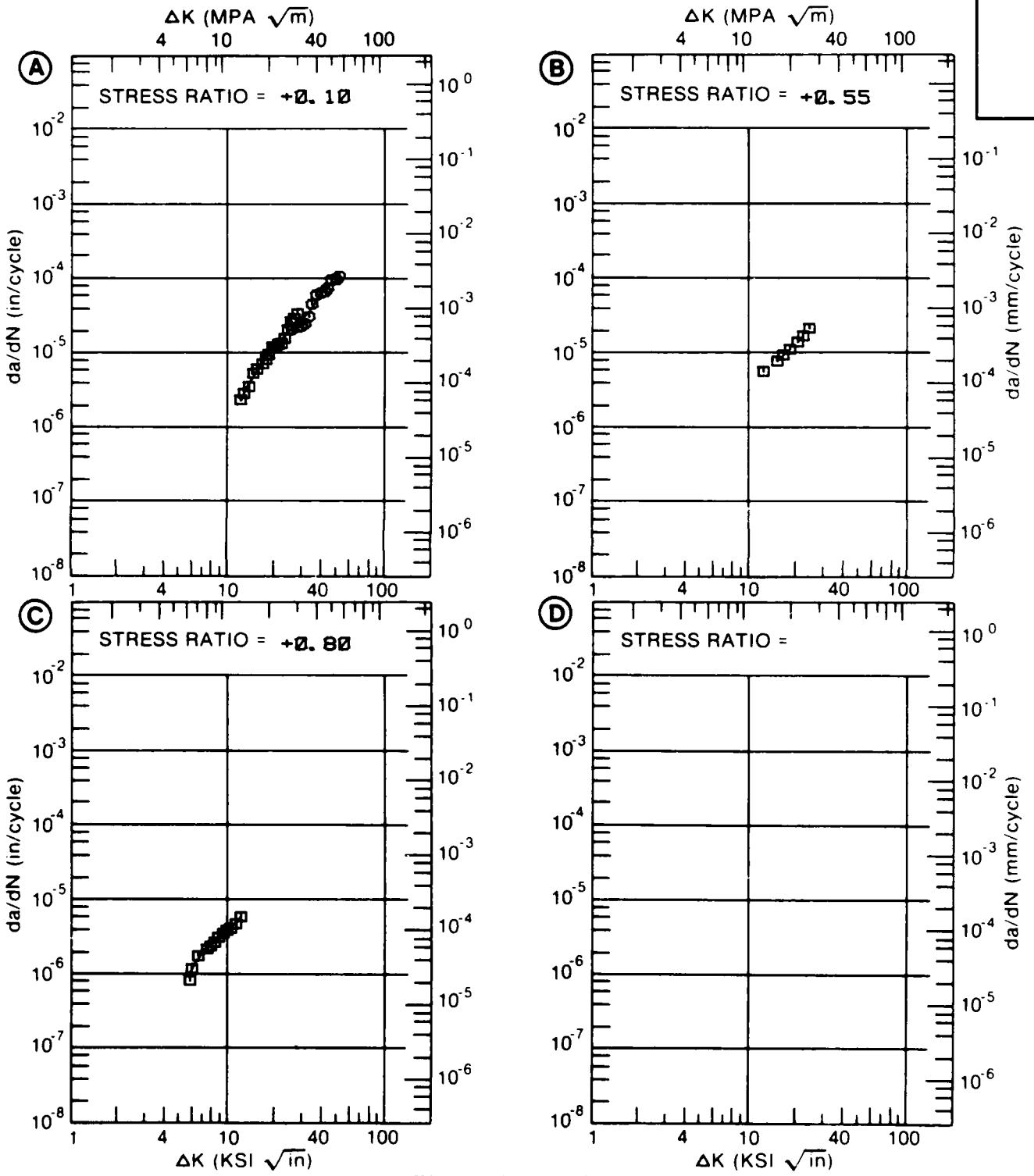


Figure 5.12.3.5

TABLE 5.12.3.6

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.12.3.6 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE WASPALOY
CONDITION:

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+ 800F AIR	E=+1200F AIR	E=+1350F AIR	
DELTA K MIN	A:	21.55	3.81			
	B:	23.34		11.6		
	C:					
	D:					
		25.00	5.56	13.6		
		30.00	8.66	20.4		
		35.00	13.7	29.8		
		40.00	23.2	44.8		
DELTA K MAX	A:	41.48	27.5			
	B:	43.07		58.7		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			2.64	3.65	0.00	
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CCP
ORIENTATION
STRESS RATIO: +0.05
FREQUENCY: 0.17 HZ

YIELD STRENGTH: 154.0 KSI
ULT. STRENGTH: 199.2 KSI
SPECIMEN THK: 0.301- 0.303"
SPECIMEN WIDTH: 0.996- 0.998"
REFERENCES:PW001

NICKEL BASE

WASPALOY

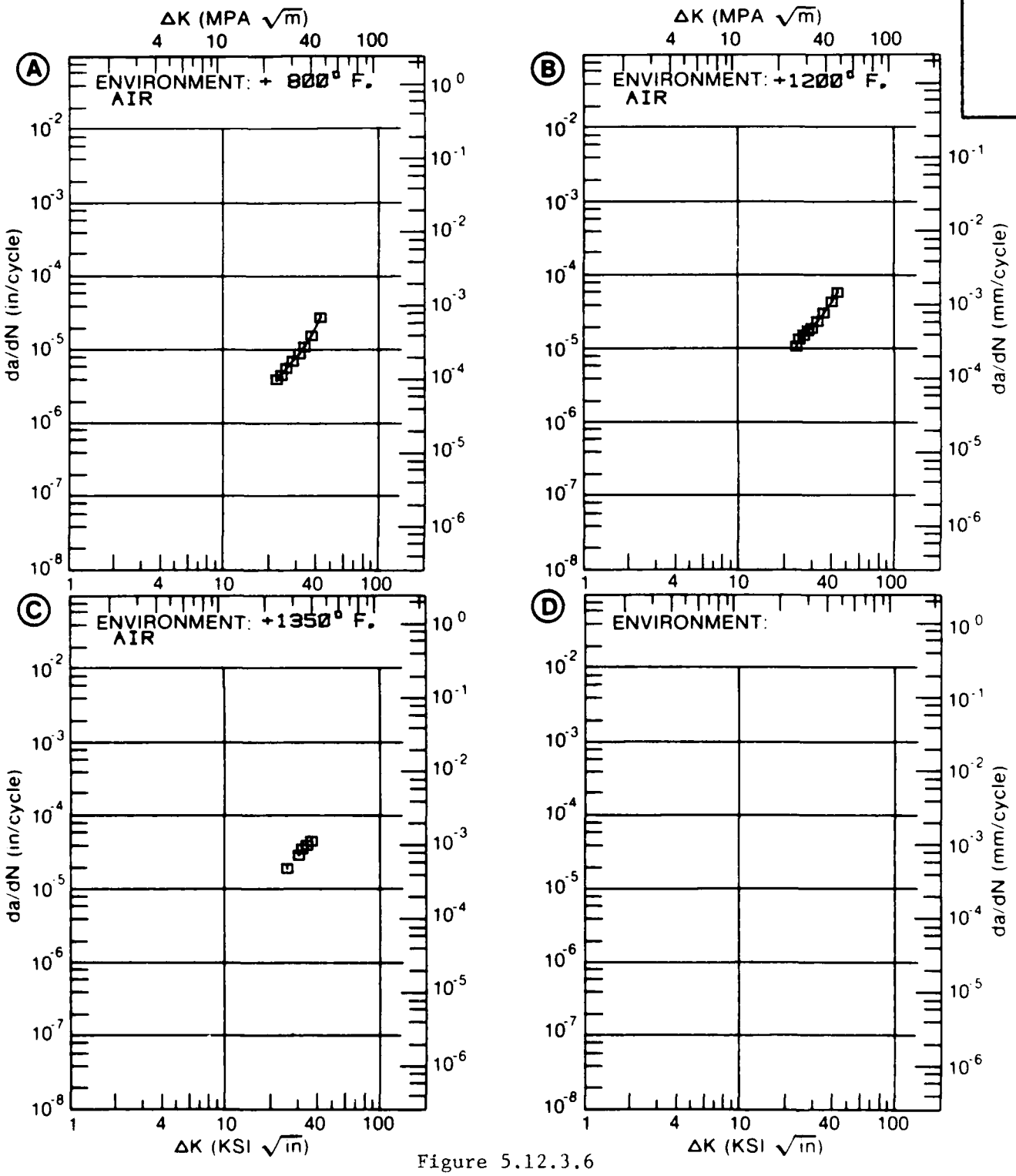


Figure 5.12.3.6

TABLE 5.12.3.7

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.12.3.7 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE WASPALOY
CONDITION:
ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE) A	B	C	D
			R=+0.10	R=+0.80		
DELTA K MIN	A:	16.66	1.93			
	B:	6.75		.761		
	C:					
	D:					
		7.00		.801		
		8.00		.947		
		9.00		1.10		
		10.00		1.28		
		13.00		2.43		
		16.00				
		20.00	3.98			
		25.00	7.43			
		30.00	11.0			
		35.00	15.1			
		40.00	20.4			
DELTA K MAX	A:	42.08	23.2			
	B:	14.64		3.92		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			14.93	7.70		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	2	1		
		1.25-2.0				
		>2.0				

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: C-R
FREQUENCY: 20.00 HZ
ENVIRONMENT: +1200° F, AIR

YIELD STRENGTH: 154.0 KSI
ULT. STRENGTH: 199.2 KSI
SPECIMEN THK: 0.300- 0.500"
SPECIMEN WIDTH: 2.503- 2.518"
REFERENCES: PW001

NICKEL BASE

WASPALOY

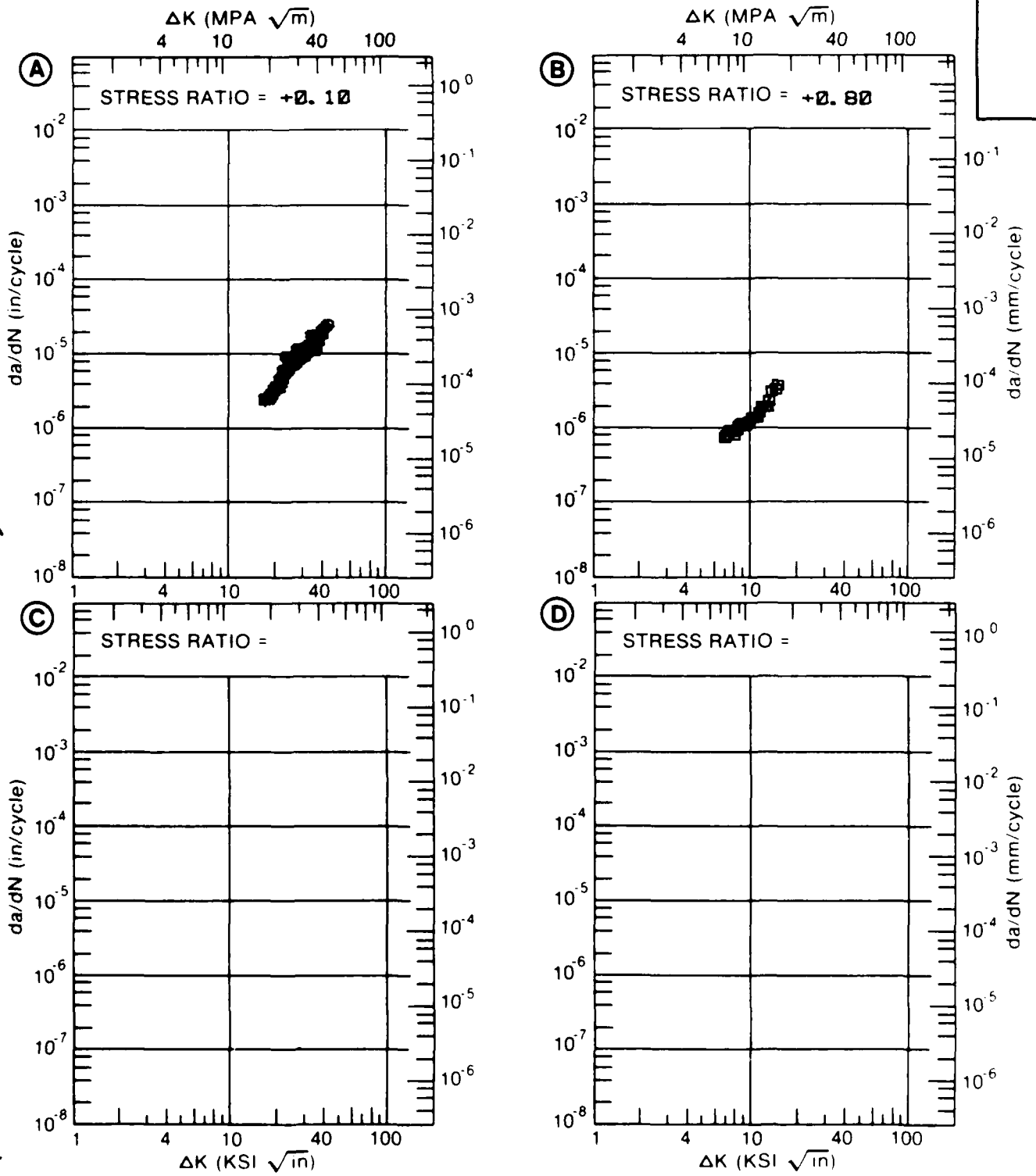


Figure 5.12.3.7

TABLE 5.12.3.8

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.12.3.8 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE WASPALOY
CONDITION:
ENVIRONMENT: +1350F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.10			
DELTA K MIN	A:	31.69	19.0			
	B:					
	C:					
	D:					
		35.00	24.5			
		40.00	39.1			
		50.00	89.5			
		60.00	138.			
DELTA K MAX	A:	60.02	138.			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR	11.96

LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5	
	0.5-0.8	
	0.8-1.25	2
	1.25-2.0	
	>2.0	

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: C-R
FREQUENCY:
ENVIRONMENT: +1350° F, AIR

YIELD STRENGTH: 154.0 KSI
ULT. STRENGTH: 199.2 KSI
SPECIMEN THK: 0.299- 0.300"
SPECIMEN WIDTH: 2.504- 2.511"
REFERENCES: PW001

NICKEL BASE

WASPALOY

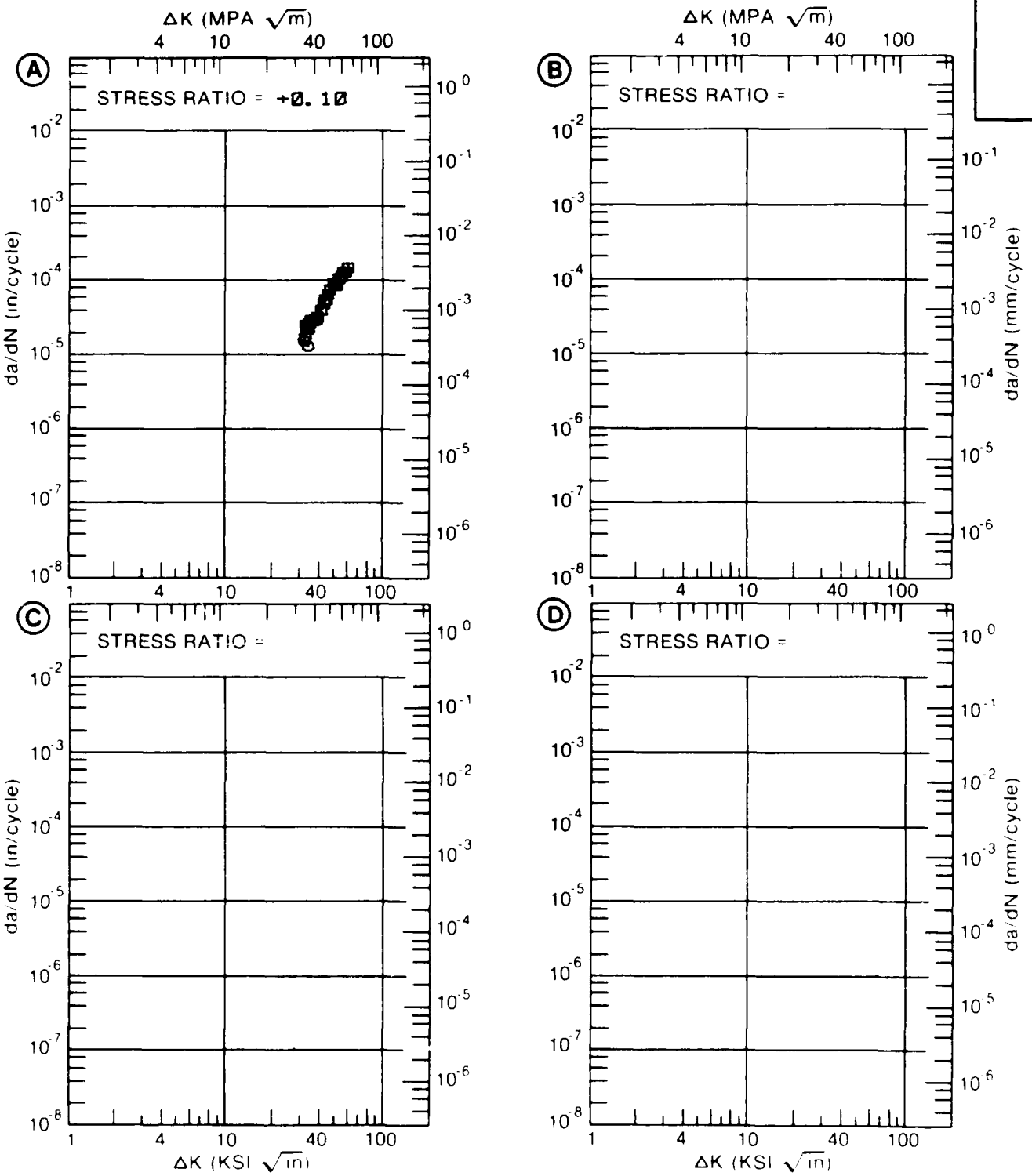


Figure 5.12.3.8

TABLE 5.12.3.9

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.12.3.9 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE WASPALOY
CONDITION:

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE) A E=+ 800F AIR	B E=+1200F AIR	C E=+1350F AIR	D
DELTA K MIN	A: 19.79	1.24			
	B:				
	C: 23.76			17.5	
	D:				
	20.00	1.29			
	25.00	2.69		19.0	
	30.00	4.53		22.5	
	35.00	7.38		24.1	
	40.00	10.3		25.8	
	50.00	11.8		34.3	
DELTA K MAX	A: 57.73	21.1			
	B:				
	C: 56.57			47.4	
	D:				
ROOT MEAN SQUARE PERCENT ERROR		11.40	0.00	10.70	
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5				
	0.5-0.8				
	0.8-1.25	1		1	
	1.25-2.0				
	>2.0				

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: C-R
STRESS RATIO: +0.05
FREQUENCY: 0.17 HZ

YIELD STRENGTH: 154.0 KSI
ULT. STRENGTH: 198.2 KSI
SPECIMEN THK: 0.102- 0.107"
SPECIMEN WIDTH: 2.493- 2.505"
REFERENCES:PW001

NICKEL BASE

WASPALOY

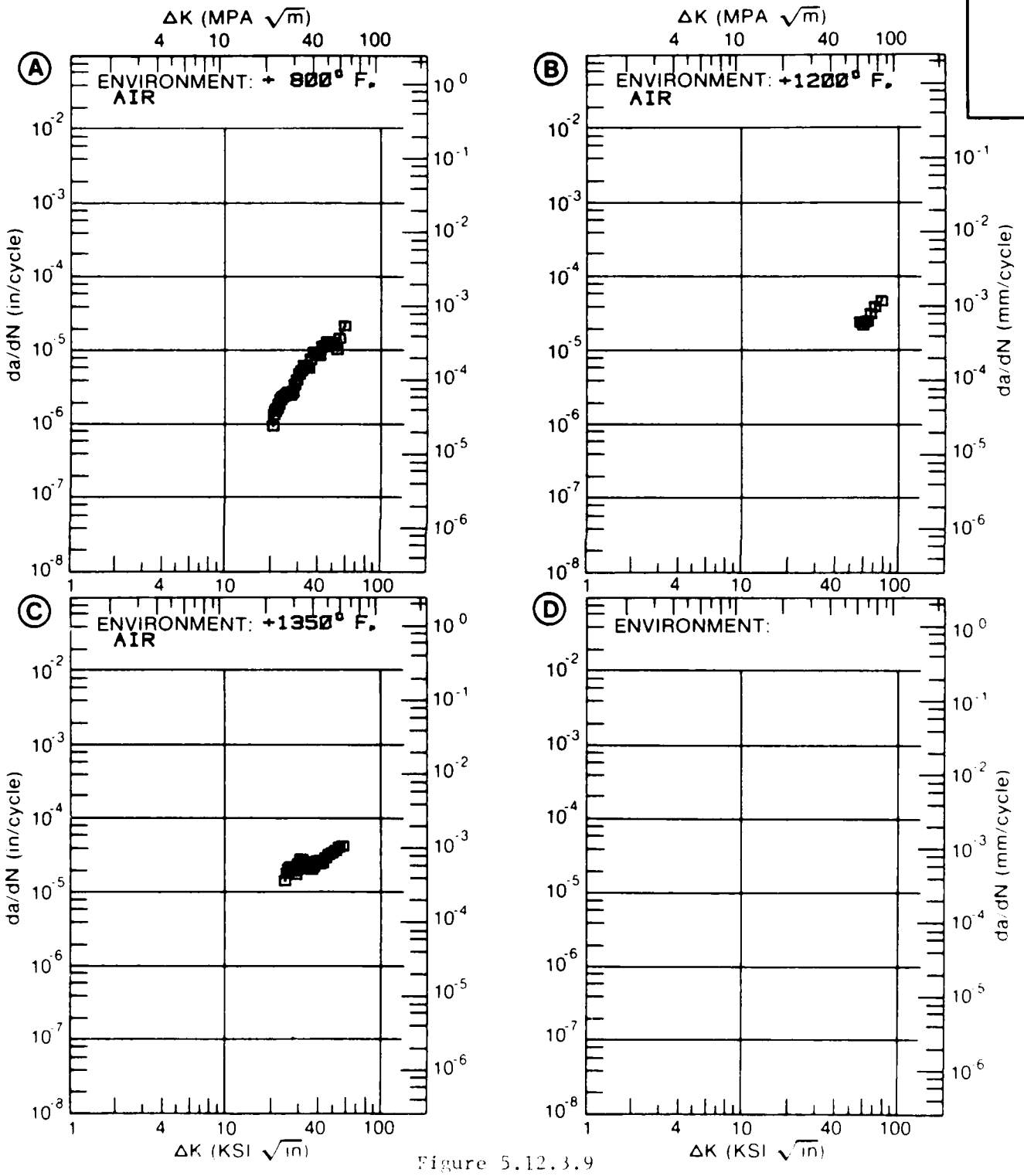


Figure 5.12.3.9

TABLE 5.12.3.10

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.12.3.10 INDICATING EFFECT OF ENVIRONMENT

MATERIAL: NICKEL BASE WASPALOY
CONDITION:

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE) A	B	C	D
			E=+ 800F AIR SP. THK. =. 104"	E=+ 800F AIR SP. THK. =. 298-.499"		
DELTA K MIN	A:	19.79	1.24			
	B:	17.25		1.46		
	C:					
	D:					
		20.00	1.29	3.33		
		25.00	2.69	6.27		
		30.00	4.53	9.39		
		35.00	7.40	13.3		
		40.00	10.3	19.0		
		50.00	11.8	33.1		
DELTA K MAX	A:	57.73	20.9			
	B:	58.47		59.7		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			11.38	17.47		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	3		
		1.25-2.0				
		>2.0				

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: C-R
STRESS RATIO: +0.05
FREQUENCY: 0.17 HZ

YIELD STRENGTH: 154.0 KSI
ULT. STRENGTH: 199.2 KSI
SPECIMEN THK: 0.104- 0.499"
SPECIMEN WIDTH: 2.486- 2.505"
REFERENCES: PW001

NICKEL BASE

WASPALOY

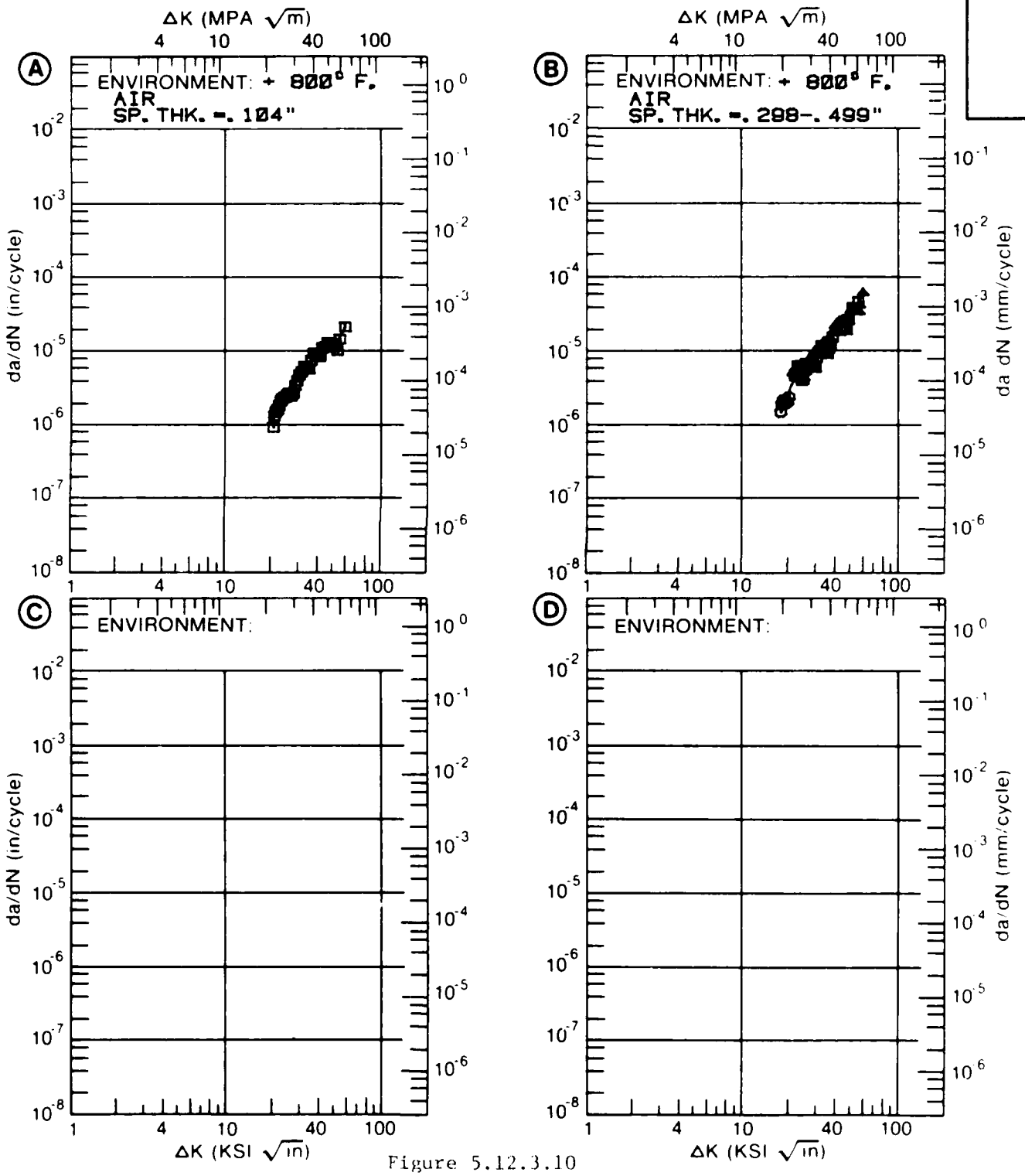


Figure 5.12.3.10

TABLE 5.12.3.11

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.12.3.11INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: NICKEL BASE WASPALOY
CONDITION:

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=+ 800F AIR	E=+1200F AIR		
DELTA K MIN	A:	20.94	2.96			
	B:	16.66		1.93		
	C:					
	D:					
		20.00		3.98		
		25.00	4.45	7.43		
		30.00	6.72	11.0		
		35.00	9.60	15.1		
		40.00	13.3	20.4		
DELTA K MAX	A:	46.62	19.9			
	B:	42.08		23.2		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			5.52	14.93		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	2		
		1.25-2.0				
		>2.0				

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: C-R
STRESS RATIO: +0.10
FREQUENCY: 20.00 HZ

YIELD STRENGTH: 154.0 KSI
ULT. STRENGTH: 199.2 KSI
SPECIMEN THK: 0.302- 0.500"
SPECIMEN WIDTH: 2.508- 2.518"
REFERENCES:PW001

NICKEL BASE

WASPALOY

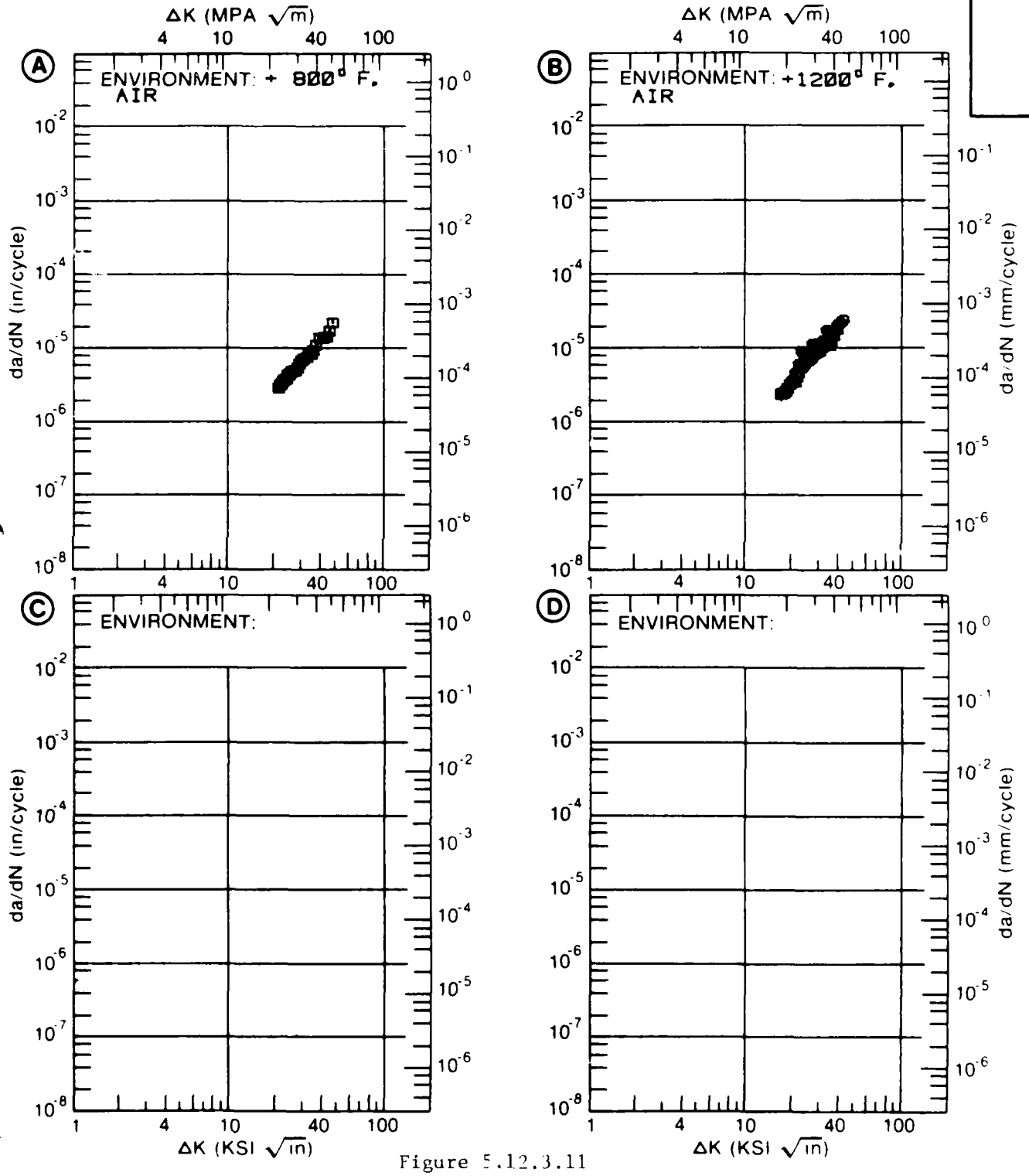


Figure 5.12.3.11

TABLE 5.12.2.12

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.12.3.12 INDICATING EFFECT

OF FREQUENCY

MATERIAL: NICKEL BASE WASPALOY
CONDITION:
ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		F(HZ)= 0.17	F(HZ)= 0.33	F(HZ)= 20.00	
DELTA K MIN	A: 17.60	6.23			
	B: 29.22		17.0		
	C: 18.78			3.64	
	D:				
	20.00	8.79		4.36	
	25.00	13.4		7.38	
	30.00	19.4	18.6	10.6	
	35.00	31.4	27.4	14.6	
	40.00		34.3	19.9	
	50.00		49.5		
	60.00		82.0		
	70.00		169.		
DELTA K MAX	A: 37.21	40.8			
	B: 76.26		299.		
	C: 44.85			27.2	
	D:				
ROOT MEAN SQUARE PERCENT ERROR		5.03	8.60	4.94	
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5				
	0.5-0.8				
	0.8-1.25	1	1	2	
	1.25-2.0				
	>2.0				

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: C-R
STRESS RATIO: +0.05
ENVIRONMENT: +1200° F, AIR

YIELD STRENGTH: 154.0 KSI
ULT. STRENGTH: 199.2 KSI
SPECIMEN THK: 0.432- 0.753"
SPECIMEN WIDTH: 2.502- 2.519"
REFERENCES: PW001

NICKEL BASE

WASPALOY

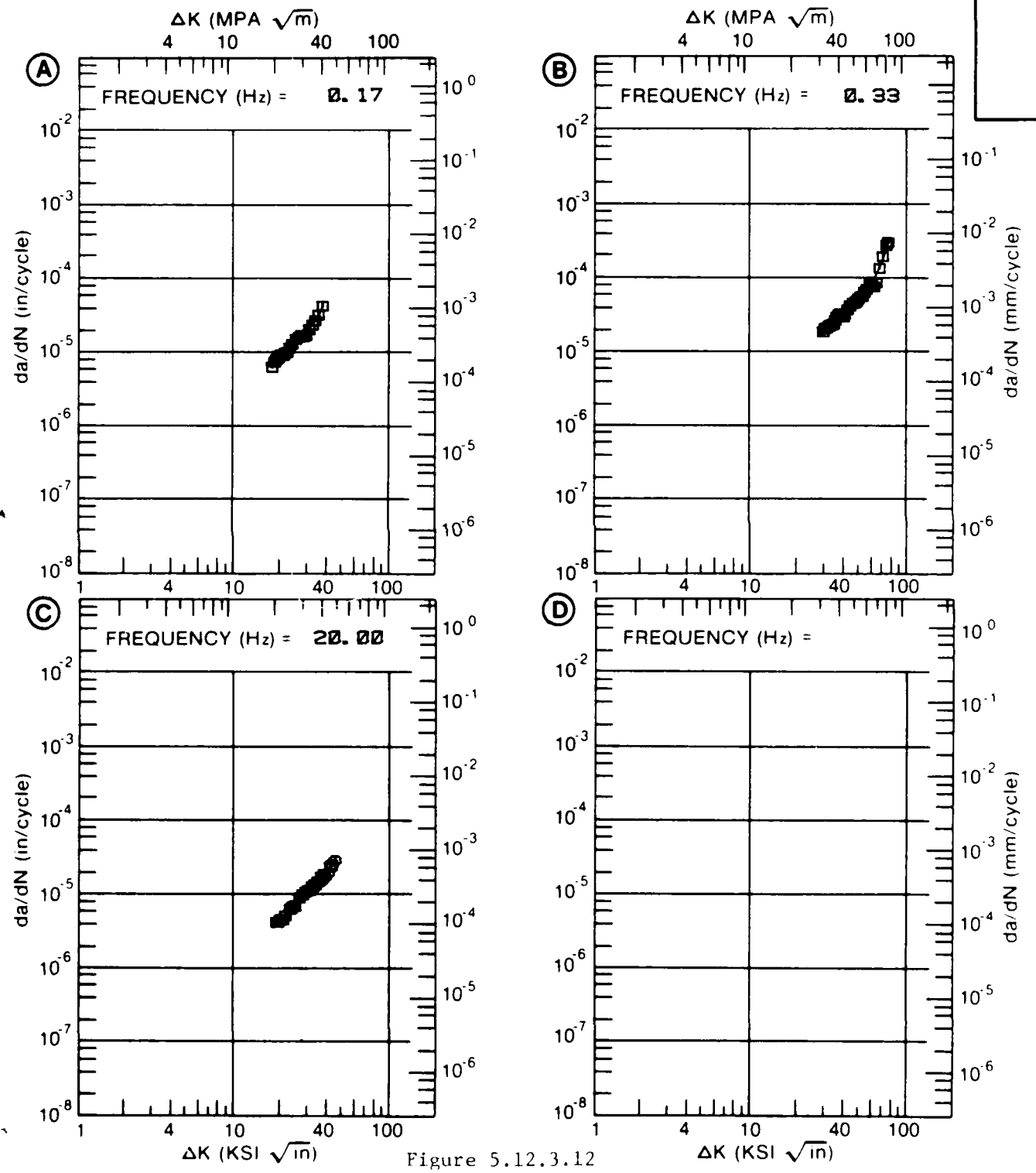


Figure 5.12.3.12

TABLE 5.12.3.13

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.12.3.13INDICATING EFFECT

OF FREQUENCY

MATERIAL: NICKEL BASE WASPALOY
CONDITION:
ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE) A F(HZ)= F=2 MIN HOLD TRAPEZOIDAL	B F(HZ)= F=5 MIN HOLD TRAPEZOIDAL	C F(HZ)= F=15 MIN HOLD TRAPEZOIDAL	D
DELTA K MIN	A: 23.74	18.1			
	B: 44.65		172.		
	C: 23.65			17.2	
	D:				
	25.00	21.8		25.1	
	30.00	39.5		71.8	
	35.00	63.4		145.	
	40.00	96.5		245.	
	50.00	215.	477.	563.	
	60.00	491.	861.	1195.	
	70.00		1259.	2595.	
	80.00			5946.	
DELTA K MAX	A: 67.17	544.			
	B: 78.46		2633.		
	C: 84.43			8749.	
	D:				
ROOT MEAN SQUARE PERCENT ERROR		12.50	10.08	14.05	
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5				
	0.5-0.8				
	0.8-1.25	1	1	3	
	1.25-2.0				
	>2.0				

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: C-R
STRESS RATIO: +0.05
ENVIRONMENT: +1200° F, AIR

YIELD STRENGTH: 154.0 KSI
ULT. STRENGTH: 199.2 KSI
SPECIMEN THK: 0.316- 0.422"
SPECIMEN WIDTH: 2.504- 2.509"
REFERENCES: PW001

NICKEL BASE

WASPALOY

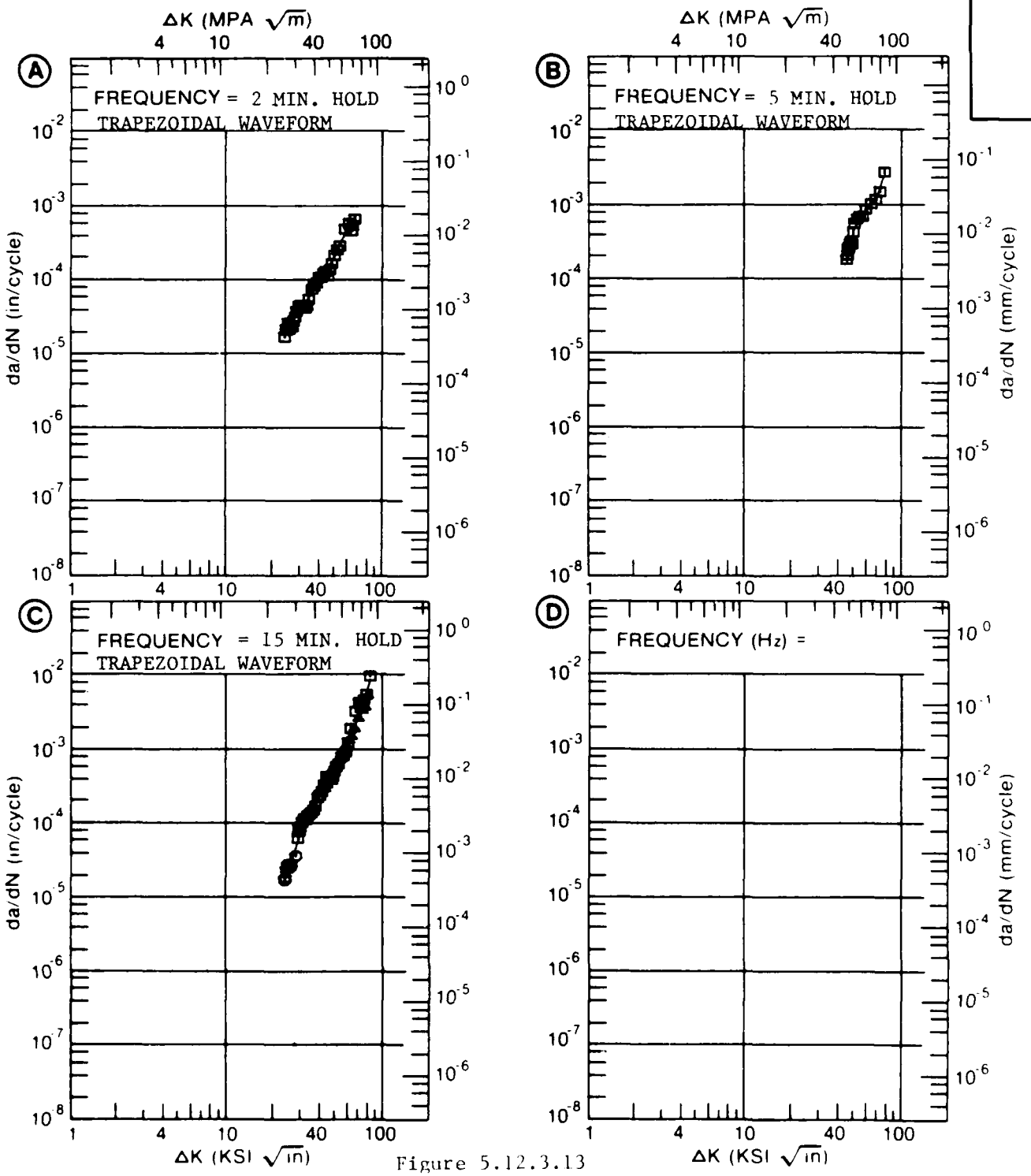


Figure 5.12.3.13

TABLE 5.12.3.14

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.12.3.14INDICATING EFFECT OF FREQUENCY

MATERIAL: NICKEL BASE WASPALOY
CONDITION:
ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			F(HZ)= 0.01	F(HZ)= 0.17	F(HZ)= 20.00	
DELTA K MIN	A:	21.41	13.6			
	B:	16.71		7.03		
	C:	16.66			2.24	
	D:					
		20.00		10.4	3.71	
		25.00	20.9	17.1	7.90	
		30.00	31.4	25.1	11.1	
		35.00	45.6	33.6	14.2	
		40.00	69.5	41.5	20.9	
DELTA K MAX	A:	45.95	127.			
	B:	42.17		44.6		
	C:	42.08			26.1	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			8.12	8.21	13.97	
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1	2	
		1.25-2.0				
		>2.0				

CONDITION/HT:
FORM: 1.60"TH FORGING
SPECIMEN TYPE: CCP
ORIENTATION: C-R
STRESS RATIO: +0.10
ENVIRONMENT: +1200° F, AIR

YIELD STRENGTH: 154.0 KSI
ULT. STRENGTH: 199.2 KSI
SPECIMEN THK: 0.299- 0.500"
SPECIMEN WIDTH: 0.998- 2.518"
REFERENCES: PW001

NICKEL BASE

WASPALOY

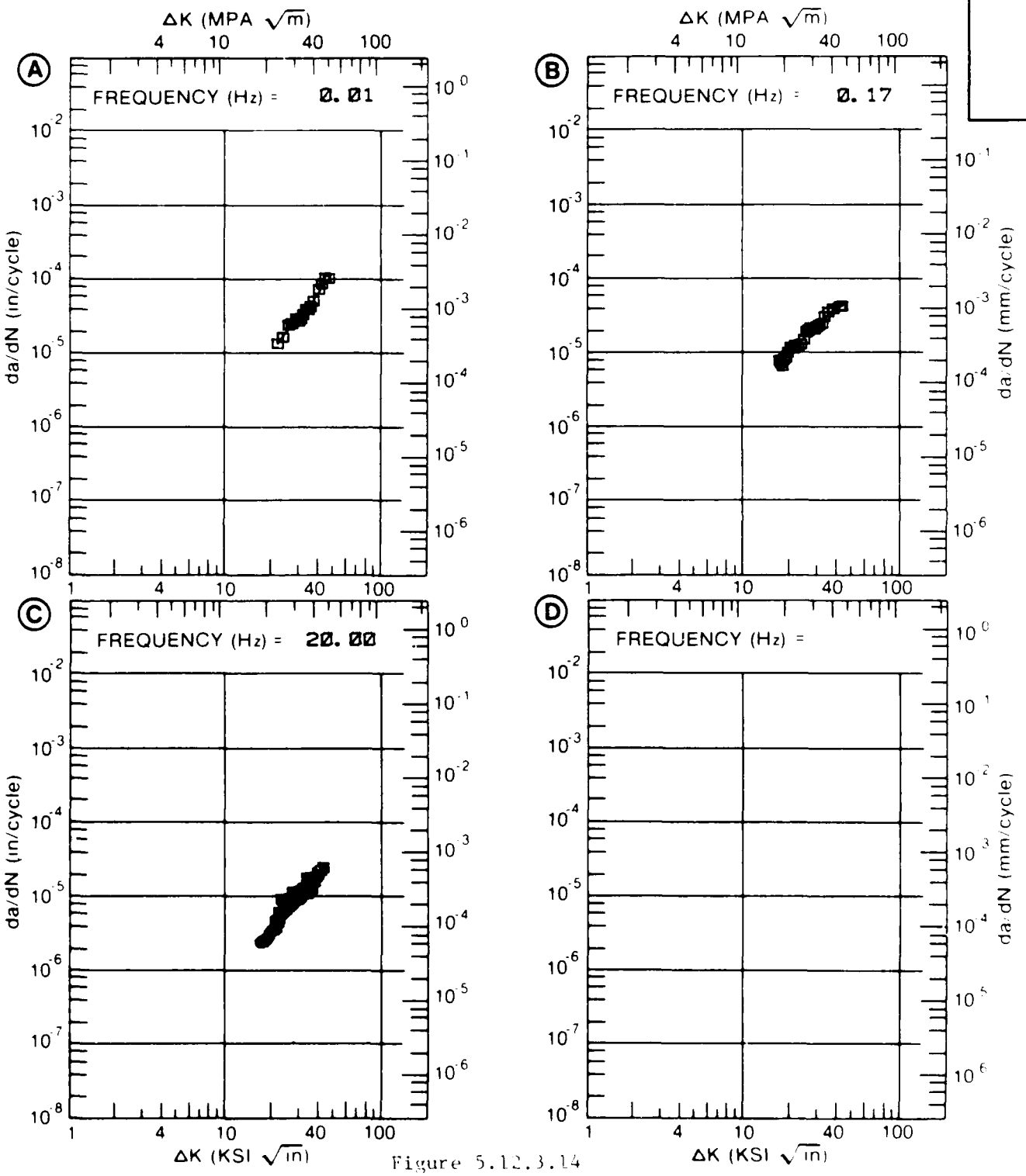


Figure 5.12.3.14

TABLE 5.12.3.15

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.12.3.15INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE WASPALOY
CONDITION: 1850F 2HRS, 1350F 6HRS(FINE GS, SMALL PRECIPITATES)
ENVIRONMENT: R.T., LAB AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.10			
DELTA K MIN	A:	27.75	1.09			
	B:					
	C:					
	D:					
		30.00	1.38			
		35.00	2.76			
		40.00	4.58			
		50.00	10.7			
DELTA K MAX	A:	53.11	14.5			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR	4.51

LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 1850F 2HRS, 1350F 6HRS (FINE GS, SMALL PRECIPITATES)
FORM: 1.18"TH BILLET
SPECIMEN TYPE: CT
ORIENTATION:
FREQUENCY: 10.00 HZ
ENVIRONMENT: R.T., LAB AIR

YIELD STRENGTH: 145.0 KSI
ULT STRENGTH 249.0 KSI
SPECIMEN THK 0.125"
SPECIMEN WIDTH 1.250"
REFERENCES: UC001

NICKEL BASE

WASPALOY

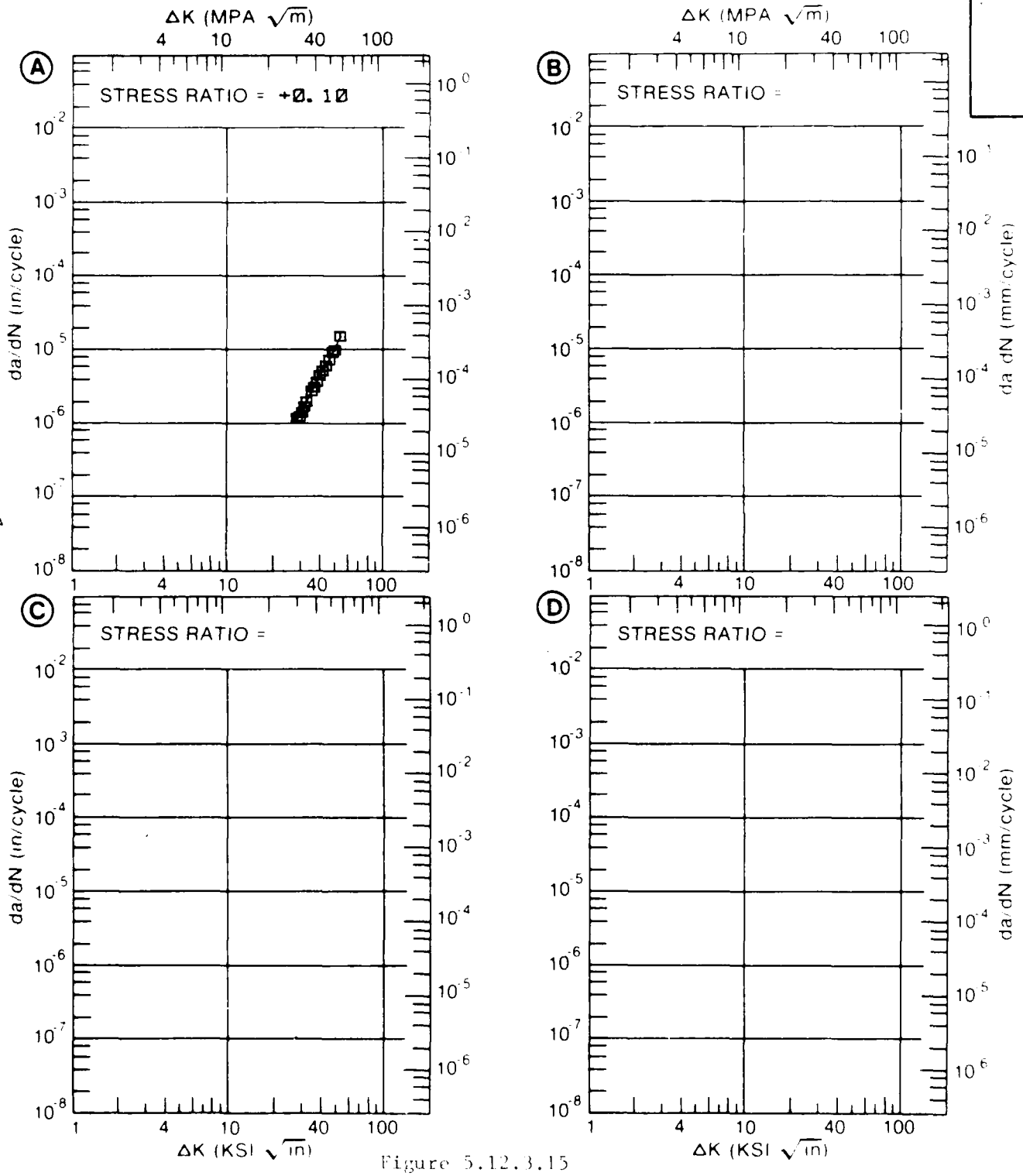


Figure 5.12.3.15

TABLE 5.12.3.16

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.12.3.16 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE WASPALOY
CONDITION: 1850F 2HR, 1600F 24HR(FINE GS, LARGE PRECIPITATES)
ENVIRONMENT: R.T. ,LAB AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.10			
DELTA K MIN	A:	25.47	1.02			
	B:					
	C:					
	D:					
		30.00	2.33			
		35.00	4.39			
		40.00	7.12			
DELTA K MAX	A:	45.09	10.8			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 3.40

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 1850F 2HR. 1600F 24HR (FINE GS. LARGE PRECIPITATES)
FORM: 1.18"TH BILLET
SPECIMEN TYPE: CT
ORIENTATION:
FREQUENCY: 10.00 HZ
ENVIRONMENT: R.T., LAB AIR

YIELD STRENGTH: 111.5 KSI
ULT. STRENGTH: 228.0 KSI
SPECIMEN THK: 0.125"
SPECIMEN WIDTH: 1.250"
REFERENCES: UC001

NICKEL BASE

WASPALOY

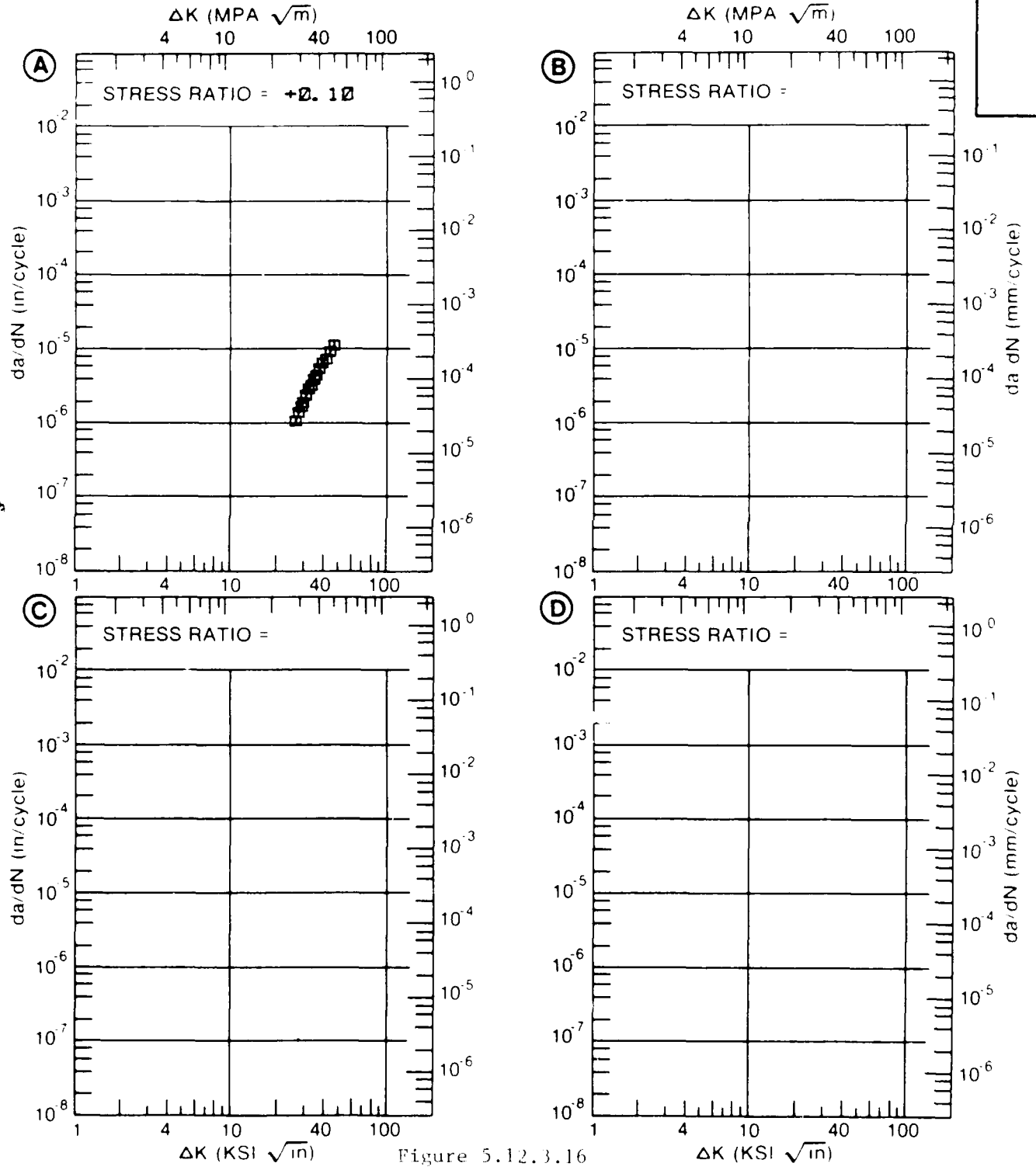


Figure 5.12.3.16

TABLE 5.12.3.17

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.12.3.17 INDICATING EFFECT

OF FREQUENCY

MATERIAL: NICKEL BASE WASPALOY
CONDITION: 1875F 4HRS OQ, 1550F 4HRS AC, 1400F 4HRS AC
ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			F(HZ)= 0.33	F(HZ)= 20.00		
DELTA K MIN	A:	11.78	2.13			
	B:	19.24		3.55		
	C:					
	D:					
		13.00	2.88			
		16.00	5.02			
		20.00	8.34	3.86		
		25.00	12.9	6.37		
		30.00	18.0	9.75		
		35.00	23.5	13.9		
		40.00	29.6	18.8		
		50.00	44.6	29.7		
		60.00	66.0			
		70.00	102.			
		80.00	191.			
DELTA K MAX	A:	89.65	450.			
	B:	50.41		30.2		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			21.40	14.51		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 1875F 4HRS OQ. 1550F 4HRS AC. 1400F 4HRS AC
FORM: DISK
SPECIMEN TYPE: WOL
ORIENTATION: C-R
STRESS RATIO: +0.05
ENVIRONMENT: +1200° F, AIR

YIELD STRENGTH: 153.7 KSI
ULT. STRENGTH: 199.7 KSI
SPECIMEN THK: 0.500"
SPECIMEN WIDTH: 2.500"
REFERENCES: PW004

NICKEL BASE

WASPALOY

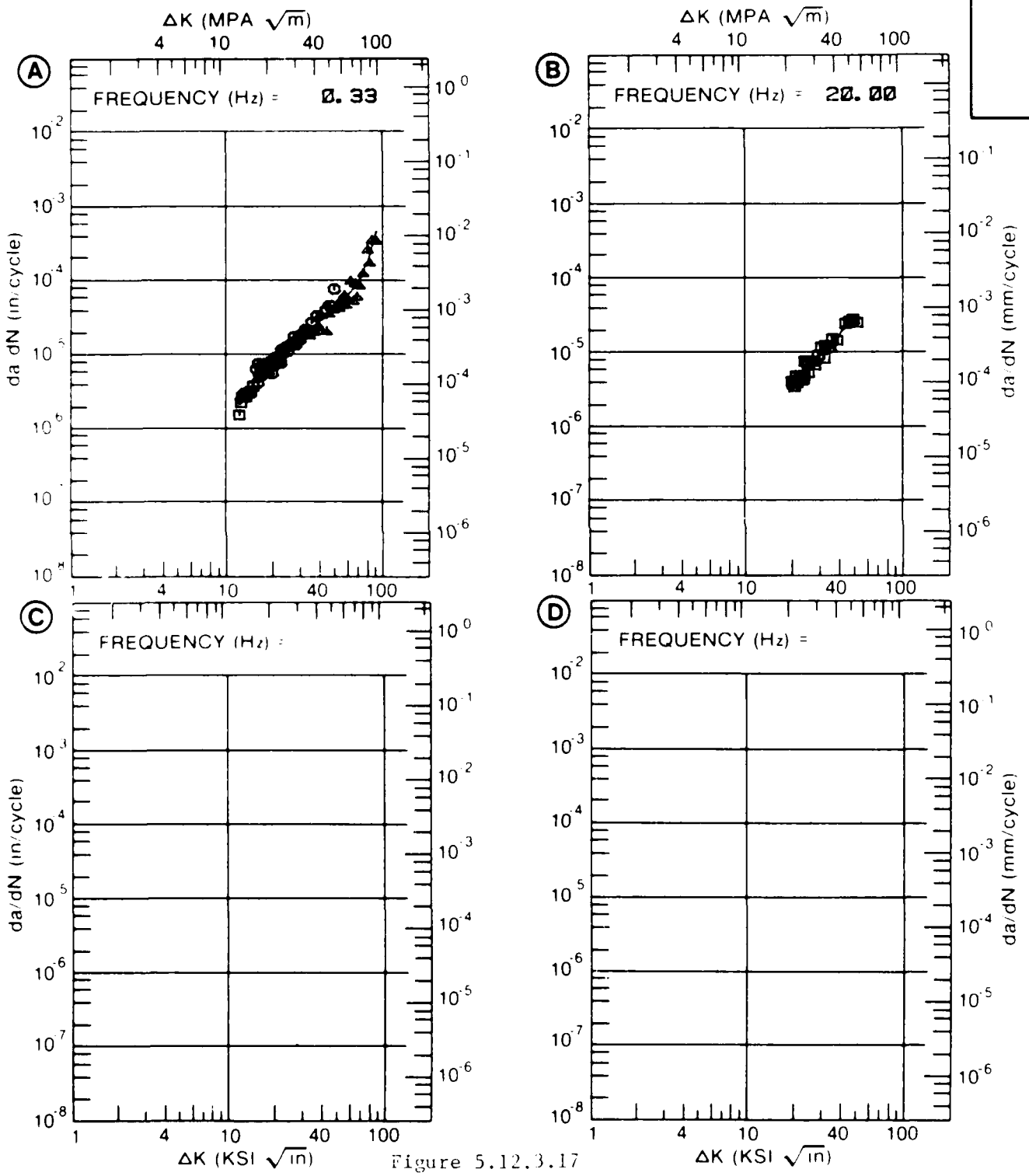


Figure 5.12.3.17

TABLE 5.12.3.18

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.12.3.18INDICATING EFFECT

OF FREQUENCY

MATERIAL: NICKEL BASE WASPALOY
CONDITION: 1875F 4HRS OQ, 1550F 4HRS AC, 1400F 4H RS AC
ENVIRONMENT: +1200F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE) A: F=2 MIN HOLD TRAPEZOIDAL	B: F=5 MIN HOLD TRAPEZOIDAL	C: F=15 MIN HOLD TRAPEZOIDAL	D
DELTA K MIN	A:	24.46	14.4			
	B:	46.10		371.		
	C:	24.76			14.5	
	D:					
		25.00	15.9		15.5	
		30.00	33.8		47.5	
		35.00	59.1		105.	
		40.00	92.8		191.	
		50.00	196.	443.	478.	
		60.00	383.	938.	1008.	
		70.00	734.	1069.	2007.	
		80.00	1410.	1951.	3939.	
		90.00			7765.	
DELTA K MAX	A:	81.37	1544.			
	B:	82.36		2544.		
	C:	95.27			11155.	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			41.89	26.98	33.21	

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 1875F 4HRS OQ. 1550F 4HRS AC. 1400F 4HRS AC
FORM: DISK
SPECIMEN TYPE: WOL
ORIENTATION: C-R
STRESS RATIO: +0.05
ENVIRONMENT: +1200° F. AIR

YIELD STRENGTH: 153.7 KSI
ULT. STRENGTH: 199.7 KSI
SPECIMEN THK: 0.500"
SPECIMEN WIDTH: 2.500"
REFERENCES: PW004

NICKEL BASE

WASPALOY

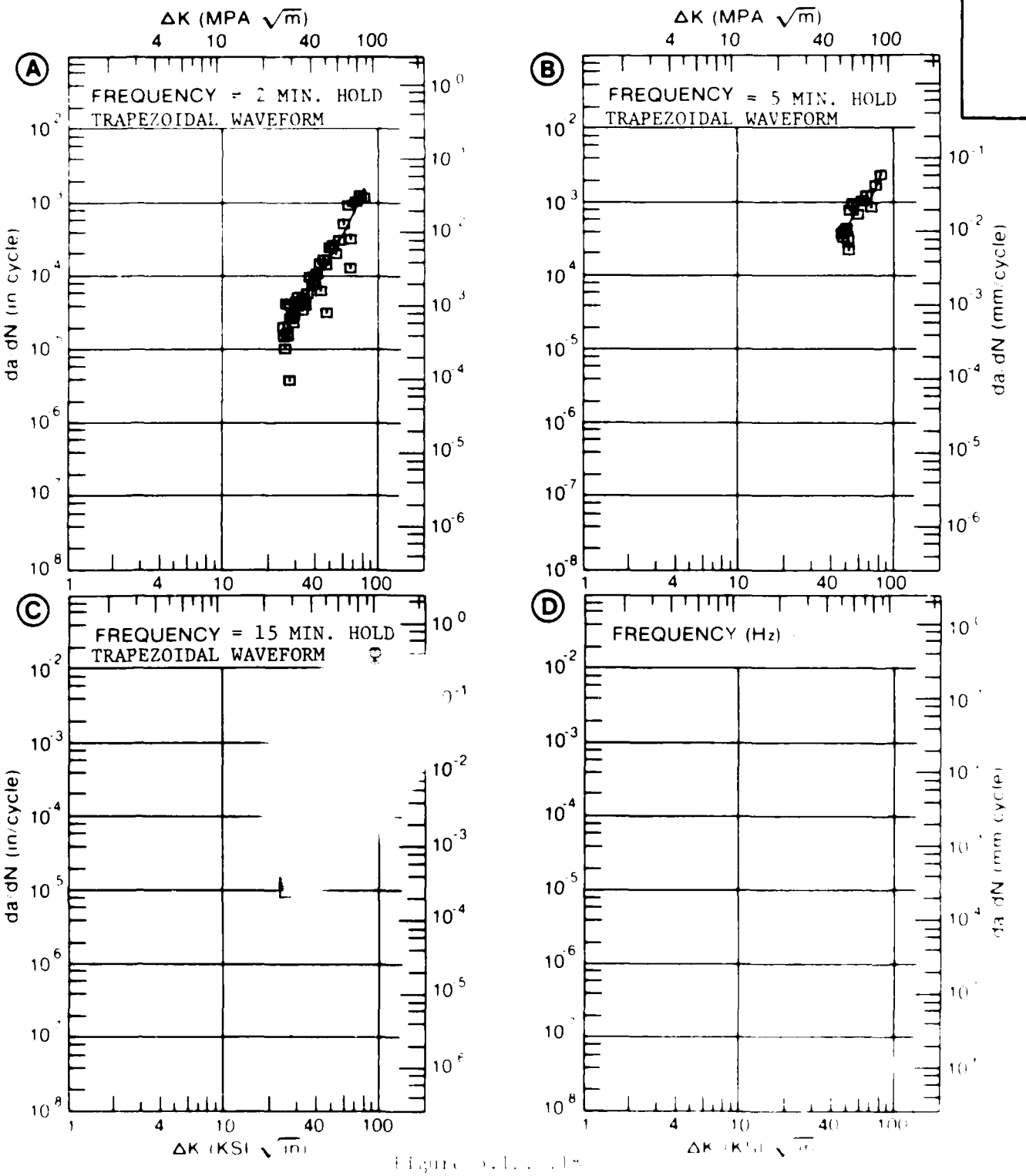


Figure [illegible]

TABLE 5.12.3.19

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 5.12.3.19 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE WASPALOY
CONDITION: 2010F 2HR, 1350F 6HR(COARSE GS, SMALL PRECIPITATES)
ENVIRONMENT: R.T. ,LAB AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.10			
DELTA K MIN	A:	43.83	1.29			
	B:					
	C:					
	D:					
		50.00	2.84			
		60.00	10.1			
		70.00	20.3			
DELTA K MAX	A:	70.45	20.8			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 13.73

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 2010F 2HR. 1350F 6HR (COARSE GS. SMALL PRECIPITATES)
FORM: 1.18"TH BILLET
SPECIMEN TYPE: CT
ORIENTATION:
FREQUENCY: 10.00 HZ
ENVIRONMENT: R.T., LAB AIR

YIELD STRENGTH: 95.0 KSI
ULT. STRENGTH: 230.5 KSI
SPECIMEN THK: 0.125"
SPECIMEN WIDTH: 1.250"
REFERENCES: UC001

NICKEL BASE

WASPALOY

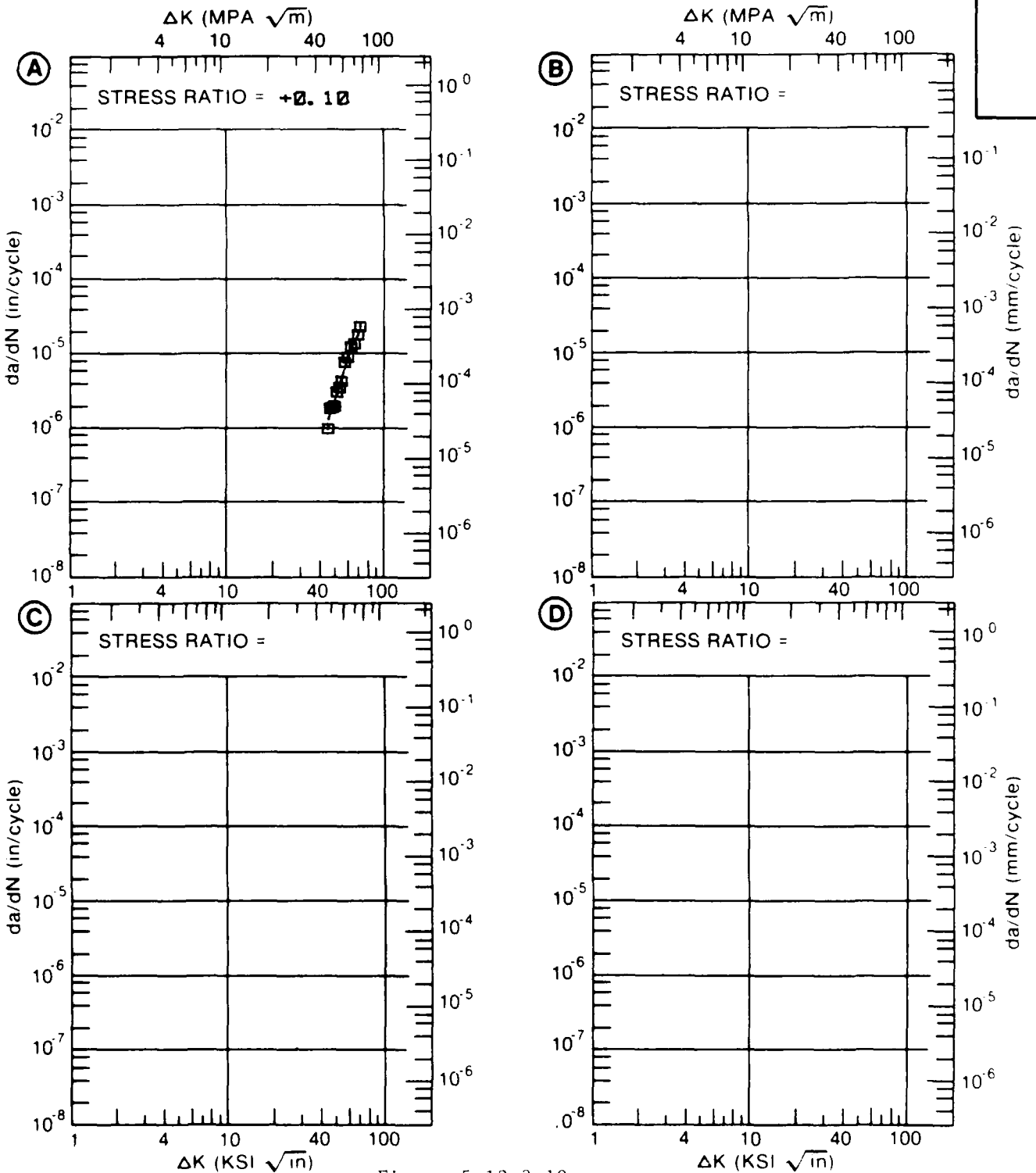


Figure 5.12.3.19

TABLE 5.12.3.20

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE5.12.3.20 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: NICKEL BASE WASPALOY
CONDITION: 2010F 2HR, 1600F 24HR(COARSE GS, LARGE PRECIPITATES)
ENVIRONMENT: R.T. ,LAB AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.10			
DELTA K MIN	A:	30.90	.893			
	B:					
	C:					
	D:					
		35.00	1.66			
		40.00	3.19			
		50.00	9.65			
		60.00	25.5			
DELTA K MAX	A:	62.77	32.9			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 7.17

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 2010F 2HR. 1600F 24HR (COARSE GS. LARGE PRECIPITATES)
FORM: 1.18"TH BILLET
SPECIMEN TYPE: CT
ORIENTATION:
STRESS RATIO: 10.00 HZ
ENVIRONMENT: R.T., LAB AIR

YIELD STRENGTH: 96.5 KSI
ULT. STRENGTH: 227.5 KSI
SPECIMEN THK: 0.125"
SPECIMEN WIDTH: 1.250"
REFERENCES: UC001

NICKEL BASE

WASPALOY

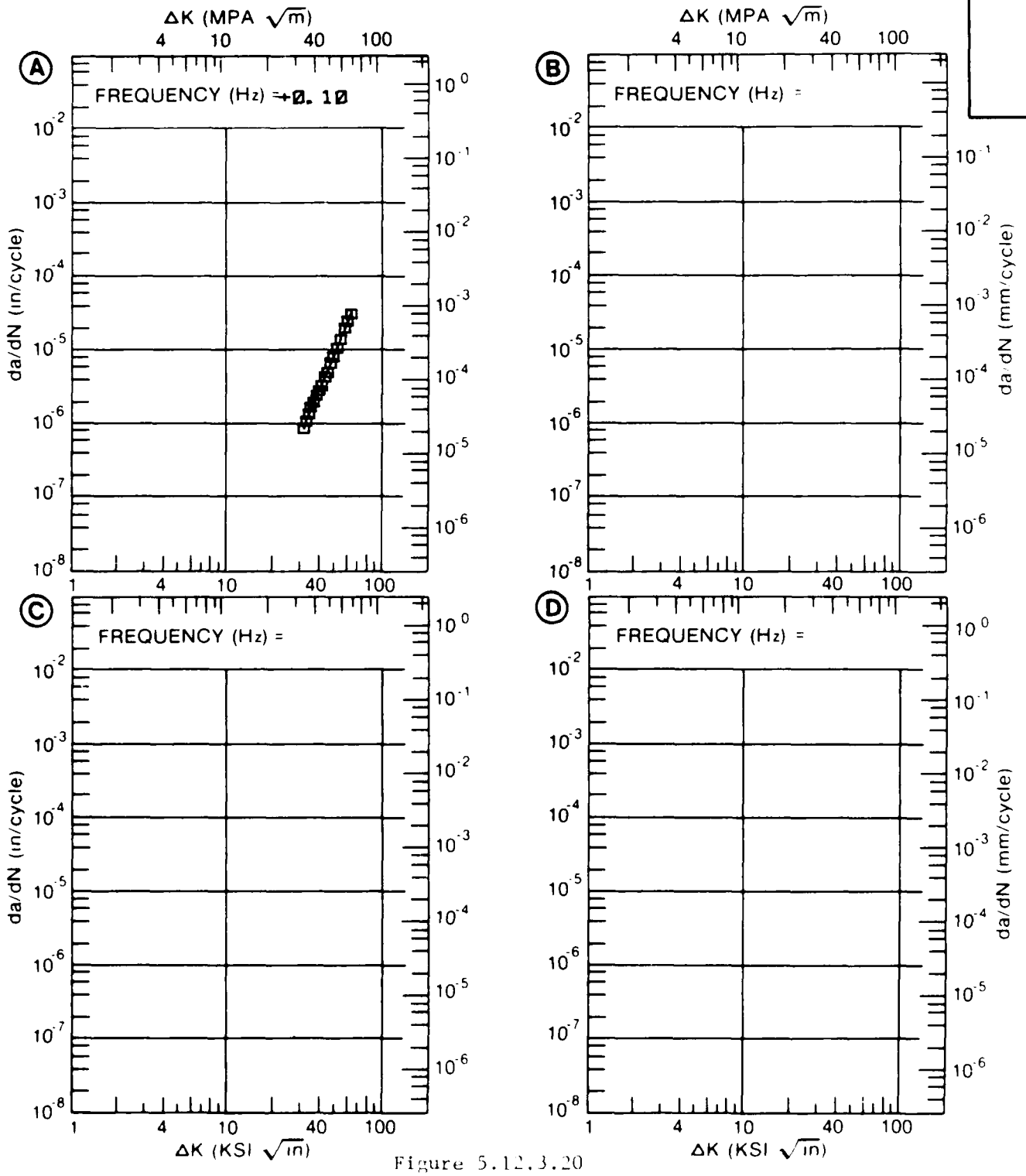


Figure 5.12.3.20

Table 5.13

REFERENCES FOR THE NICKEL BASE ALLOY DATA

60578 Inconel 718 K_c

Christian, J.L., Yang, C.T., and Witzell, W.E., "Physical and Mechanical Properties of Pressure Vessel Materials for Application in a Cryrogenic Environment," ASD-TDR-62-258, Part III, General Dynamics/Astronautics, December 1964.

88187 Inconel 718 K_{Ic}

"Inconel 718 Test Data of September 19, 1973," Shultz Steel Company, South Gate, CA., September 1, 1973.

88579 Inconel 718 da/dN

"B-1 Program da/dN Data for Aluminum Alloys," Rockwell International Corporation; Memorandum to H.D. Moran from E.W. Cawthorne, Battelle's Columbus Laboratories, April 3, 1974.

88700 Inconel 718 K_{Iscc}

Gilbreath, W.P., and Adamson, M.J., "The Stress Corrosion Susceptibility of Several Alloys in Hydrazine Fuels," NASA Technical Note, Report NASA TN D-7604, Ames Research Center, Moffett Field, CA., February 1974.

GE001 Inconel 718 da/dN
P/M Rene 95 da/dN

Shanini, V. and Popp, H.G., "Evaluation of Cyclic Behavior of Aircraft Turbine Disk Alloys," General Electric, Evendale, Ohio, Contract No. NAS3-20368, Report No. NASA-CR-159433, June 1978.

GE004 P/M Rene 95 da/dN

"Argon Environment Testing," Thermal-Mechanical Crack Propagation Program; Data Sheets sent from M.S. Gilbert, General Electric Co., Evendale, Ohio, Contract No. F33615-77-C-5193, November 1980.

GE005 Inconel 718 da/dN

"Fatigue Crack Growth Rate Data on Inconel 718 Using K_B Bar Specimens from the TF34 DTA Effort;" Data sent from M.S. Gilbert, General Electric Co., Evendale, Ohio, October 1982.

GE008 Inconel 718 da/dN
P/M Rene 95 da/dN

Domas, P.A., "Crack Propagation Under Thermal Mechanical Cycling," General Electric Co., Aircraft Engine Group, Evendale, Ohio, Contract No. F33615-77-C-5193, November 1979.

HD003 Inconel 600 da/dN

James, L.A., "Fatigue Crack Propagation Behavior of Inconel 600," International Journal of Pressure Vessels and Piping, Vol. 5, 241-259. 1977.

HD005 Inconel 625 da/dN

James, L.A., "The Effect of Temperatures upon the Fatigue Crack Propagation Behavior of Inconel 625," Report HEDL-TME 77-2, Westinghouse Hanford Co., Richland, WA., March 1977.

HD015 Inconel 718 da/dN

James, L.A., "Fatigue Crack Propagation Behavior of Inconel 718," Report HEDL-TME 75-80 Westinghouse Hanford Co., Richland, WA., September 1975.

Table 5.13 (Continued)

HD016 Inconel 718 da/dN

Mills, W.J., and James, L.A., "Effect of Heat Treatment on Elevated Temperature Fatigue-Crack Growth Behavior of Two Heats of Alloy 718," ASME Paper 78-WA/FVP-2, December 1978.

HD017 Inconel 718 da/dN

James, L.A., "The Effect of Product Form Upon the Fatigue-Crack Growth Behavior in Alloy 718," Journal of Engineering Materials and Technology, Vol. 103, 234-239, 1981.

PW001 Waspaloy da/dN

Larsen, J.M., Schwartz, B.J., Annis, C.G. Jr., "Cummulative Damage Fracture Mechanics Under Engine Spectra," Pratt and Whitney Aircraft Group, Government Product Division, West Palm Beach, Fla., Report No. AFML-TR-77-4159, January 1980.

PW002 IN 100 da/dN

Larsen, J.M., Schwartz, B.J., Annis, C.G. Jr., "Cummulative Damage Fracture Mechanics Under Engine Spectra," Pratt and Whitney Aircraft Group, Government Product Division, West Palm Beach, FL., Report No. AFML-TR-77-4159, January 1980.

PW003 Astroloy 901 da/dN
IN 100 da/dN
Incoloy 901 da/dN

Fatigue Crack Growth Rate Data on Titanium and Nickel Base Alloys from B.S. Schwartz, Pratt and Whitney Aircraft Group, Government Product Division, West Palm Beach, FL., July 1982.

PW004 Astroloy P/M da/dN
IN 100 P/M da/dN
NASAIIB-1 P/M da/dN
Waspaloy da/dN

Cowles, B.A., Sims, D.L., Warren, J.R., "Evaluation of the Cyclic Behavior of Aircraft Turbine Disk Alloys," Pratt and Whitney Aircraft Group, United Technologies Corp., West Palm Beach, FL., Contract No. NAS3-20367, Report No. NASA CR-159409, October 1978.

PW006 IN 100 da/dN
Waspaloy da/dN

Fatigue Crack Growth Rate Data on Nickel Base Alloys from Pratt and Whitney Aircraft Group, Government Product Division, West Palm Beach, FL., July

RI006 Inconel 718 K_{Iscc}

Ferguson, R.R., Berryman, R.C., "Fracture Mechanics Evaluation of B-1 Materials," Rockwell International B-1 Division, Los Angelos, CA., Contract No. F33657-70-C-0800, Report No. AFML-TR-76-137, October 1976.

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Lawless, B., et.al., "The Effect of Microstructure on the FCP and Overload Behavior of Waspaloy at Room Temperature," Dept. of Materials Science and Metallurgical Engineering, University of Cincinnati, December 1980.

CHAPTER 6

ALLOY STEEL SECTIONS

6.0	Alloy Steel Material Summaries
6.1	AF 1410
6.2	AF 1410 (VIM-VAR)
6.3	A286
6.4	D6AC
6.5	HP 9-4-.20
6.6	HP 9-4-.20 (CEVM)
6.7	HP 9-4-.25
6.8	HP 9-4-.30
6.9	HP 9-4-.45
6.10	HY-TUF
6.11	HY-150
6.12	HY-180
6.13	H11
6.14	10Ni Steel
6.15	12-9-2 (MAR)
6.16	12Ni-5Cr-3Mo
6.17	18Ni (180) MAR
6.18	18Ni (200) MAR
6.19	18Ni (250) MAR
6.20	18Ni (280) MAR
6.21	18Ni (300) MAR
6.22	18Ni (350) MAR
6.23	300M
6.24	300M (AM)
6.25	300M (VAR)
6.26	300M (VM)
6.27	4140
6.28	4330V MOD
6.29	4340
6.30	4340 (AM)
6.31	4340 (VAR)
6.32	4340 (VIM)
6.33	4340
6.34	4340 (VAR)
6.35	4340 (MOD)
6.36	[illegible]

TABLE 6.0.1

AVAILABLE DATA FOR ALLOY STEEL

ALLOY	CONDITION/PT	PRODUCT FORM	KIC	KC	R CURVES	DA/DN	DA/DT	KISCC
AF1410	[illegible] 1HR AC 1000F 1HR AC 950F 5HRS AC	ROUND BAR				x		
	1550F 1HR, WQ 1300F 1HR, WQ 950F 5HRS, AC	PLATE	x					
AF1410/1414	1650F 1HR WQ 1500F 1HR WQ 950F 5HRS AC	PLATE				x		
A286	1800F, 0.5-1.0HR, WQ, 1325F, 16HR, AC	PLATE ROUND BAR				x x		
D6AC	HEAT TREATED TO 46 RC HARDNESS	PLATE	x					
	1550F AQ 650F 4HR	SHEET						x
	1550F AQ 950F 4HR	SHEET						x
	1550F 20 MIN OQ 850F 1+1 HR	SHEET						x
	1615F 2.25HR, A-BQ 325F, AC, 915-945F 3HR, 1000F 6-6 5HR	FORGING	x					
	1650F AUS BAY QUENCH 975F, SQ 325F, 1000F 2+2 HR	PLATE	x					
	1650F AUS-BAY QUENCH 975F, SQ 325F, 1000F 2+2 HR	PLATE FORGING	x x			 x		
	1650F A-BQ AT 975F, SQ AT 400F, 1000F 2+2HR	PLATE FORGING	x x			x x		
	1650F, 1 HR FC TO 1400F OQ AT 100F, AC, 1025F 2+2 HR	FORGING	x					
	1650F, 1 HR, FC 1600F 1 HR, OQ, 1025F 2+2 HR	BILLET	x					

TABLE 6.3.1 (con't)

AVAILABLE DATA FOR ALLOY STEEL

ALLOY	CONDITION/HT	PRODUCT FORM	K1C	KC	R CURVES	DA/DN	DA/DT	KISCC
D6AC	1550F, 1 HR, FC TO 960F, OQ AT 150F, AC, 1000F 2+2 HR	BILLET	X					
	1675F AC, 1575F OQ, 400F 2 HR, 1100F 2 HR (RC 42.5)	PLATE	X					
	1675F AC, 1575F OQ, 400F 2 HR, 800F 2 HR (RC 46.5)	PLATE	X					
	1675F, AC, 1575F OQ, 400F 2 HR, 500F 2 HR (RC 50)	PLATE	X					
	1700F A-BQ AT 975F, OQ AT 140F, 1000F 2+2HR	PLATE FORGING	X X			X X		
	1700F, 1 HR, FC TO 960F, OQ AT 150F, AC, 1000F 2+2 HR	BILLET	X					
	1700F, 1 HR, OQ, 1025F 2+2 HR	BILLET	X					
	1725F 1 HR, AC 1700F 1 HR, OQ, 1000F 1 HR, 1015F 1 HR	BILLET	X					
	1725F, 1 HR, AC 1700F 1 HR, OQ, 1100F 2+2 HR	BILLET	X					
	1725F, 1 HR, AC 1700F 1 HR, OQ, 1050F 2+2 HR	BILLET	X					
	1725F, 1 HR, AC 1650F 1 HR, FC TO 960F, SQ 350F, 0.5 HR, AC, 1025F 2+2 HR	BILLET	X					
HP9-4-20	[illegible]	PLATE BAR FORGING	X			X		X
	ANNEALED	FORGING	X					
	GTA WELD WELDMENT	PLATE						X

TABLE 6.0.1 (con't)

AVAILABLE DATA FOR ALLOY STEEL

ALLOY	CONDITION/HT	PRODUCT FORM	KIC	KC	R CURVES	DA/DN	DA/DT	KISCC
HP 9-4-20	HEAT TREATED	FORGING	X					
	WELDED	WELDMENT				X		
	QUENCHED AND TEMPERED	PLATE						X
	1550F OQ, 100F TEMP 1060F 4+4HR	FORGING	X					
	1550F 2HRS AC, 100F 20HRS, 1550F 4HRS	BILLET				X		
	1550F 2HRS OQ, 100F 2HRS, 1025F 4HRS	PLATE BILLET FORGED BAR				X X		X X
	1550F 1-2 HR AC, 1525F 1-2 HR OQ, 100F 2HR, 1050F 4-6HR	FORGING	X					
	1650F 1-2HR AC, 1525F 1-2 HR AC, 100F 1-2HR, 1025F 4HR	FORGING	X					
	1650F 1-2HR AC, 1525F 1-2HR OQ, 100F 2HR, 1025F 4-6HR	PLATE FORGING	X X					
	1550F 1-2HR AC 1525F 1-2HR OQ, 100F 2HR, 1000F 4-6HR	FORGING	X					
	1650F 1-2HR, AC1525F 1-2HR, OQ, 100F 2HR, 1050F 4-6HR	FORGING	X					
	1550F 2HR AC, 1525F 2HR OQ, 1550F 2+2HR AC	FORGING	X					
	1650F 1-2HR AC 1-2HR AC, 100F 1-5HR, 1025F 4HR, 1060F 6HR	PLATE	X					
	1650F 1-2HR, AC 1-2HR, AC, 100F 1-5HR, 1025 1075F 4HR	PLATE	X					
	1650F, 1-2HR, AC 1-5HR OQ, 1025F 12HR	FORGING	X					

TABLE 6.0.1 (con't)

AVAILABLE DATA FOR ALLOY STEEL

ALLOY	CONDITION; HT	PRODUCT FORM	KIC	KC	R CURVES	DA/DN	DA/DT	KISCC
HP9-4-20	1450F 4 5HR; AC TO 950F; HELD 0 5HR; AC + 100F 1 5HR; 1025F 4HR; AC + RQ	FORGING	X					
	1750F 4 5HR; AC 1700F 1 5HR; AC +100F 1 5HR; 1025F 4HRS	FORGING	X					
HP9-4-20(CF;MV)	ANNEALED	FORGING				X		
HP 9 4 25(CF;MV)	1550F 1 HR OQ 1000F 2+2HR AC	FORGING	X					
HP9-4-30	--- -	PLATE BAR FORGING	X			X X X		
	HEAT TREATED TO 42 RC HARDNESS	PLATE	X					
	QUENCHED + TEMPERED AT 950F	PLATE						X
	UTS=220 240KSI	BILLET				X		
	1525F 2HRS OQ; -100F 1HR; 1025F 2+2HR	FORGED BAR				X		
	1525F 2HRS OQ; -100F 2HRS; 1025F 2+2HR	FORGED BAR				X		
	1750F 2HRS OQ; 100F 3HRS; 1000F 2+2HRS	FORGED BAR				X		
	1525F; OQ; -100F 3HR; 1050F 4HR	FORGING	X					
	1450F 1-2HR AC 1025F 1-2HR OQ; 100F 1-3HR; 1000F 4HR	FORGING	X					
	1650F 1 2HR AC 1525F 1-2HR OQ; -100F 1-3HR 1025F 4HR	FORGING	X					

TABLE 6.0.1 (con't)

AVAILABLE DATA FOR ALLOY STEEL

ALLOY	CONDITION/HT	PRODUCT FORM	KIC	KC	R CURVES	DA/DN	DA/DT	KISCC
HP9-4-30	1650F 1-2HR AC 1550F 1-2HR OQ, 100F 1-3HR, 1050F 4HR	FORGING	x					
	1550F 2HRS AC, 1550F 2HR OQ, -100F 2HR AC, 1000F 4HR, AC, 1000F 4HR, AC	FORGING	x					
	1650F, 2HR AC 1550F 2HR OQ 1000F 2+2HR AC	FORGING	x					
	1650F, AC, 1525F 1 2HR, OQ, 100F 1-3HR, 1050F 4HR	FORGING	x					
HP9-4-45	1600F 0.5HR AC 1500F 0.33HR AC	SHEET						x
	475F	PLATE						x
HY-TUF	1700F 1HR AC, 1600F 1HR, 1000F 20 MIN, OQ, 550F 2HR	FORGING	x					
	1700F 1HR, AC, 1600F 1HR, OQ, 550F 2HR	FORGING	x					
HY-150	1500F 1HR WQ	PLATE						x
HY 180	SEA (UTS 180KSI)	FORGED BAR				x		
HY 80	---	----				x		
HY1	-- --	----					x	
	AUSTENITIZED & TEMPERED (TYS = 220KSI)	ROUND BAR				x		
	QUENCHED + TEMPERED AT 1100F	PLATE						x
	1325F, 1850F 0.5HR AC, 1060F 2+2HR	SHEET						x

TABLE 6.0.1 (con't)

AVAILABLE DATA FOR ALLOY STEEL

ALLOY	CONDITION/HT	PRODUCT FORM	K1C	KC	R CURVES	DA/DN	DA/DT	K1SCC
IONI STEEL	-- --	PLATE				x		
12 9 (MAR)	STA 900	ROUND BAR	x			x		
18NI-9CR (MA)	-- -	---						x
		PLATE						x
	ELECTRIC FURNACE	PLATE						x
	STA WELDED	WELDMENT						x
	LOW RESIDUAL	PLATE						x
	TYS-150 OKSI	PLATE						x
	TYS-160 OKSI	PLATE						x
	TYS-170 OKSI	PLATE						x
	TYS-175 OKSI	PLATE						x
	1500F, 900F 20HR AC	PLATE						x
18NI(180)(MAR)	TYS-170KSI	PLATE						x
	TYS-175KSI	PLATE						x
	TYS-180KSI	PLATE						x
	TYS 185KSI	PLATE						x
	TYS-190KSI	PLATE						x
	TYS-195KSI	PLATE						x
	TYS-200KSI	PLATE						x
	1500F 1HR AC 900F 3HR	PLATE						x

TABLE 6.0.1 (con't)

AVAILABLE DATA FOR ALLOY STEEL

ALLOY	CONDITION/HT	PRODUCT FORM	KIC	KC	R CURVES	DA/DN	DA/DT	KISCC
18NI(200)(MAR)	-----	PLATE						X
	TYS=215 KSI	PLATE						X
	WELD CENTER LINE	PLATE						X
	1500F 1HR AC 900F 3HR	PLATE						X
	1650F 4 5 HR, AC, AGED 1000F 6 HR	PLATE	X					
	1650F 4 5 HR, AC, AGED 950F 24 HR	PLATE	X					
	1650F 4 5 HR, AC, AGED 900F 24 HR	PLATE	X					
	1650F 4 5 HR, AC, AGED 900F 6 HR	FORGING	X					
	1650F, 4 5 HR, AC, AGED 850F 24 HR	FORGING	X					
	1650F 900F 3HR AC	PLATE						X
	1675F 2HR AC 500F, 15MIN 850F 4HR COOL 250F/MIN	PLATE						X
18NI(250)(MAR)	----	----						X
		PLATE					X	X
	AGE 900F 3HR	PLATE						X
	AGED 900F 3HR AC	PLATE						X
	TUS=243KSI	BILLET				X		
	TYS=250KSI	PLATE						X
	TYS=260KSI	PLATE						X

TABLE 6.0.1 (con't)

AVAILABLE DATA FOR ALLOY STEEL

ALLOY	CONDITION/HT	PRODUCT FORM	KIC	KC	R CURVES	DA/DN	DA/DT	KISCC
18NI(250)(MAR)	1500F AC, 850F 6 HR	PLATE	X					
	1500F AC, 900F 24 HR	PLATE	X					
	1500F AC, 950F 6 HR	PLATE	X					
	1500F 1HR, AC, AGED 900F 3HR, AC	BILLET	X					
	1500F AC, 900F 6 HR	PLATE	X					
	1650F 1 25HR WQ, 1525F 1 25HR WQ, 900F 3HR AC	PLATE						X
	900F 2HR AC	SHEET						X
18NI(280)(MAR)	1500F 1HR AC 900F 3HR	PLATE						X
18NI(300)(MAR)	-----	-----					X	
		SHEET		X				
		FORGING				X		
	AGED	-----				X		
	ANNEALED	-----				X		
	AGE 900F 6HR	FORGING						X
	AGE 950F 12HR	FORGING						X
	CRACK PRESTRESSED TO 50 PCT KIC	FORGING						X
	CRACK PRESTRESSED TO 25 PCT KIC	FORGING						X
	CRACK PRESTRESSED TO 80 PCT KIC	FORGING						X
	1500F 0 5HR AC 900F 3HR	PLATE						X
	1500F 2HR 800F 10HR	BAR						X
	1500F 2HR 900F 3 5HR	BAR						X

TABLE 6.0.1 (con't)

AVAILABLE DATA FOR ALLOY STEEL

ALLOY	CONDITION/HT	PRODUCT FORM	KIC	KC	R CURVES	DA/DN	DA/DT	KISCC
18NI(300)(MAR)	1500F 2HR 900F 100HR	BAR						X
	1700F, 1500F AGED 900F 6HR	FORGING						X
	2300F 1HR 1700F 4HR, 900F 100HR	BAR						X
	2300F 1HR 1700F 4HR 800F 10HR	BAR						X
	2300F 1HR 1700F 4HR 900F 100HR	BAR						X
	2300F 1HR 1700F 4HR 900F 3 5HR	BAR						X
	900F 3HR 950F 3HR	FORGING						X
	1700F 1HR, AC, 1500F 1 HR, AC, 900F 6 HR	FORGING	X					
	900 F AGED	PLATE	X					
18NI(350)(MAR)	AGED 8HR 800F	----					X	
		FORGED BAR						X
	AGE 900F 3HR	FORGED BAR						X
	AGE 900F 8HR	FORGED BAR						X
	1500F 1HR 800F 8HR	FORGING						X
	1500F 1HR 900F 8HR	FORGING						X
	1500F 1HR 950F 3HR	FORGING						X
300M	----	PLATE						X
		FORGING	X			X		X
		----					X	

TABLE 6.0.1 (con't)

AVAILABLE DATA FOR ALLOY STEEL

ALLOY	CONDITION/HT	PRODUCT FORM	KIC	KC	R CURVES	DA/DN	DA/DT	KISCC
300M	AMS 6434 UTS=220 (240KSI	PLATE		X				
	UTS-260 (280KSI	PLATE		X				
	UTS-280 300KSI	SHEET		X				
		PLATE		X				
	HEAT TREATED TO 54 RC HARDNESS	PLATE	X					
	UTS-280 300KSI	BAR				X		
		BILLET				X		
	1500F 0 5HR OQ 400F 2+2 HR (COARSE GRAINED STRUCTURE)	PLATE						X
	1500F 0 5HR OQ 550F 2+2 HR (COARSE GRAINED STRUCTURE)	PLATE						X
	1500F 0 5HR OQ 550F 2+2 HR (FINE GRAINED STRUCTURE)	PLATE						X
	1500F 0 5HR OQ 400F 2+2 HR (FINE GRAINED STRUCTURE)	PLATE						X
	1550F 0 5HR OQ 550F 2+2 HR (FINE GRAINED STRUCTURE)	PLATE						X
	1550F 0 5HR OQ 400F 2+2 HR (FINE GRAINED STRUCTURE)	PLATE						X
	1550F 0 5HR OQ 550F 2+2 HR (COARSE GRAINED STRUCTURE)	PLATE						X
	1550F 0 5HR OQ 400F 2+2 HR (COARSE GRAINED STRUCTURE)	PLATE						X
	1600F 0 5HR OQ 400F 2+2 HR (COARSE GRAINED STRUCTURE)	PLATE						X
	1600F 0 5HR OQ 550F 2+2 HR (COARSE GRAINED STRUCTURE)	PLATE						X
	1600F 0 5HR OQ 550F 2+2 HR (FINE GRAINED STRUCTURE)	PLATE						X

TABLE 6.0.1 (con't)

AVAILABLE DATA FOR ALLOY STEEL

ALLOY	CONDITION/HT	PRODUCT FORM	KIC	KC	R CURVES	DA/DN	DA/DT	KISCC
300M	1600F OQ, 575F 2+2HR	SHEET					X	
	1600F @ 5 HR, SQ, 1000F @ 5 1.0 HR, OQ 80-180F 25 MIN, 575F 2+2HR	FORGING	X					
	1600F 1.25 HR, OQ, 600F 2+2HR	FORGING	X					
	1600F 1HR, OQ, 475F 1HR	BAR	X					
	1600F 1HR, OQ, 1HR, WQ 475F 1HR	BAR	X					
	1600F 1HR, OQ, 615F 1 HR	BAR	X					
	1600F 1HR, OQ, 575F 1HR	BAR	X					
	1600F 1HR, OQ, 745F 1HR	BAR	X					
	1600F, OQ, 550F 2+2HR	PLATE	X					
	1650F, 1525F OQ, 600F 2+2HR	FORGING						X
	1600F, 1600F 1HR OQ 600F 1+1 HR	FORGING						X
	1675F AC, 1575F OQ, 800F 2HR (RC 47.5)	PLATE	X					
	1675F AC, 1575F OQ, 500F 2HR (RC 51.5)	PLATE	X					
	1675F, AC, 1575F OQ, 1100F 2HR (RC 39)	PLATE	X					
	1700F 1.5HRS AC, 1600F 1.5HRS OQ, 600F 2+2HRS	FORGING				X		X
	1700F 1HR AC, 1600F 1HR OQ, 600F 2HR AC (AMS 6419)	PLATE	X					
	1710F, 1610F, 610F	BAR						X

TABLE 6.0.1 (con't)

AVAILABLE DATA FOR ALLOY STEEL

ALLOY	CONDITION/HT	PRODUCT FORM	KIC	KC	R CURVES	DA/DN	DA/DT	KISCC
300M	2190F 1HR, FC TO 1600F HOLD 0.5HR, OQ, 475F 1HR	BAR	x					
	2190F 1HR, FC TO 1600F, HOLD 0.5HR, OQ, 615F 1HR	BAR	x					
	2190F 1HR, FC TO 1600F, HOLD 0.5HR, OQ, 745F 1HR	BAR	x					
	2190F 1HR, OQ, 400F 1HR	BAR	x					
	2190F 1HR, OQ, 475F 1HR	BAR	x					
	2190F 1HR, OQ, 475F 1HR, WQ, 475F 1HR	BAR	x					
	2190F 1HR, OQ, 615F 1HR	BAR	x					
	2190F 1HR, OQ, 745F 1HR	BAR	x					
300M (AM)	1650F 1 HR, AC, 1550F 1 HR, OQ, -320F 0.5 HR, 600F 2+2HR, AC	FORGING	x					
300M (VAR)	1650F 1 HR, AC, 1550F 1 HR, OQ, -320F 0.5 HR, 600F 2+2HR, AC	FORGING	x					
300M(VM)	1500F, OQ, 400F 2+2HR	PLATE	x					
	1500F, OQ, 550F 2+2HR	PLATE	x					
	1550F, OQ, 400F 2+2HR	PLATE	x					
	1550F, OQ, 550F 2+2HR	PLATE	x					
	1600F, OQ, 400F 2+2HR	PLATE	x					
	1600F, OQ, 550F 2+2HR	PLATE	x					
	1700F, AC, 1600F 1 HR, OQ, 550F 2+2 HR	BILLET	x					

TABLE 6.0.1 (con't)

AVAILABLE DATA FOR ALLOY STEEL

ALLOY	CONDITION/HT	PRODUCT FORM	KIC	KC	R CURVES	DA/DN	DA/DT	KISCC
300M(VM)	1700F, AC, 1600F 1HR, SQ 925F, OQ, 575F 2+2 HR	BILLET	X					
	1700F, AC, 1600F 1 HR, SQ 400F, AC, 550F 2+2 HR	BILLET	X					
4140	1550F 1HR OQ 1250F 1HR AC	PLATE						X
	1550F 1HR OQ 1000F 1HR AC 1125F 1HR AC	PLATE						X
	1600F 1 HR, OQ, 400F 1HR	FORGED BAR	X					
	1600F 1 HR, OQ, 745F 1HR	FORGED BAR	X					
	1600F 1 HR, OQ, 535F 1HR	FORGED BAR	X					
	1600F 1HR, 1550F 1HR, OQ AT 150-175F, 900F 1HR	PLATE	X					
	1600F 1HR, 1550F 1HR, OQ AT 150-175F, 800F 1HR	PLATE	X					
	1700F, 1600F OQ 750F 1+1 HR	PLATE						X
	1700F, 1600F OQ 600F 1+1 HR	PLATE						X
	2010F 1 HR, OQ, 400F 1 HR	FORGED BAR	X					
	2010F 1 HR, OQ, 475F 1 HR	FORGED BAR	X					
	2190F 1 HR, OQ, 400F 1 HR	FORGED BAR	X					
	2190F 1 HR, OQ, 660F 1 HR	FORGED BAR	X					
	2190F 1 HR, OQ, 615F 1 HR	FORGED BAR	X					
	2190F 1 HR, OQ, 475F 1 HR	FORGED BAR	X					
4330V	QUENCHED + TEMPERED AT 500F	PLATE						X

TABLE 6.0.1 (con't)

AVAILABLE DATA FOR ALLOY STEEL

ALLOY	CONDITION/HT	PRODUCT FORM	KIC	KC	R CURVES	DA/DN	DA/DT	KISCC
4340 MOD		BILLET	x			x		
	HEAT TREATED TO 46 RC HARDNESS	PLATE	x					
	[illegible] 1 HR, OQ 400F 2 HR	FORGED BAR	x					
	[illegible] 1 HR, OQ 450F 1 HR	FORGED BAR	x					
	[illegible] 1 HR AC 1525F 1 HR, OQ [illegible] 2 HR	BILLET	x					
	[illegible] 1 HR, AC 1525F 1 HR, OQ [illegible] 2+2 HR	BILLET	x					
9 Ni		[illegible]					x	
		SHEET						x
		PLATE						x
		FORGING					x	x
	HEAT TREATED TO 51 RC HARDNESS	PLATE	x					
	AS TEMPERED	PLATE				x		
	TEMPER 400F 1HR	PLATE					x	
	TEMPERED 400	[illegible]					x	
	[illegible] 125KSI	PLATE						x
	[illegible] 150KSI	PLATE						x
	[illegible] 175KSI	PLATE						x
	[illegible] 200KSI	PLATE						x
	[illegible] 400KSI	EXTRUSION					x	
	[illegible] 5KSI	PLATE						x

TABLE 6.0.1 (con't)

AVAILABLE DATA FOR ALLOY STEEL

ALLOY	CONDITION/HT	PRODUCT FORM	KIC	KC	R CURVES	DA/DN	DA/DT	KISCC
4340	UTS = 160 KSI	ROUND BAR				x		
	UTS = 180 KSI	ROUND BAR	x			x		
	UTS=180 200KSI	BAR PLATE				x x		
	1350F OQ 750F 1 25HR	PLATE						x
	1550F OQ. TEMPERED 800F	PLATE	x					
	1550F OQ. TEMPERED 500F	PLATE	x					
	1550F OQ 750F CRACK PRESTRESSED TO AFFECT KIC	PLATE						x
	1550F OQ 750F 1HR CRACK PRESTRESSED TO 200CT KIC	PLATE						x
	1550F OQ 750F CRACK PRESTRESSED TO AFFECT KIC	PLATE						x
	1550F OQ 750F CRACK PRESTRESSED TO AFFECT KIC	PLATE						x
	1550F OQ 750F CRACK PRESTRESSED TO AFFECT KIC	PLATE						x
	1575F OQ 675F 4HR	PLATE						x
	1575F OQ 800F 4HR	PLATE						x
	1600F 1 HR.OQ.400F 1 HR	FORGED BAR	x					
	1600F 1 HR.OQ 745F 1 HR	FORGED BAR	x					
	1600F 1 HR.OQ.680F 1 HR	FORGED BAR	x					
	1600F 1 HR.OQ 735F 1 HR	FORGED BAR	x					
	1650F 1HR. 1525F . 5HR.OQ AT 150 175F, 200F 1HR	PLATE	x					
	1600F 1HR OQ 500F 1+1HR	FORGING						x
	1525F @ 1525F OQ 400F 2+2HR 1525F @ 1525F OQ	FORGING						x

TABLE 6.0.1 (con't)

AVAILABLE DATA FOR ALLOY STEEL

ALLOY	CONDITION/HT	PRODUCT FORM	KIC	KC	R CURVES	DA/DN	DA/DT	KISCC
4340	1650F 1HR AC 1680F 2HR OQ,LN 0 25HR,400F 1+1HR OQ	BAR						X
	1650F 1HR AC 1480F 2HR OQ,LN 0 25HR,400F 1+1HR OQ	BAR						X
	1650F 1 HR,AC,1525F 1 HR,OQ, 800F 2 HR	BILLET	X					
	1700F 0 25HR AC 1550F OQ 600F 1+1HR	SHEET						X
	1800F 0.600F 1+1HR	FORGING						X
	2190F 1HR, FC TO 1600F,HOLD 0 5HR, 400F 1 HR	FORGED BAR	X					
	2190F 1HR, FC TO 1600F,HOLD 0 5HR, 660F 1 HR	FORGED BAR	X					
	2190F 1HR, FC TO 1600F,HOLD 0 5HR, 535F 1 HR	FORGED BAR	X					
	2190F 1HR,OQ, 475F 1HR	FORGED BAR	X					
	2190F 1HR,OQ, 535F 1HR	FORGED BAR	X					
	450F TEMPER	----				X		
	750F TEMPER	----				X		
4340 (AM)	1600F 1 HR,AC,1550F 1 HR,OQ, 320F 0 5 HR, 400F 2 HR,AC	FORGING	X					
4340 (DII)	1550F,OQ, 900F 1 HR	BILLET	X					
	1600F 1 HR,AC,1550F 1 HR,OQ, 320F 0 5 HR, 400F 2 HR,AC	FORGING	X					
4340 (VAR)	1600F 1 HR,AC,1550F 1 HR,OQ, 320F 0 5 HR, 400F 2 HR,AC	FORGING	X					
4340 (EFM)	1550F 5HR,400F 4HR	PLATE					X	

TABLE 6.0.1 (con't)

AVAILABLE DATA FOR ALLOY STEEL

ALLOY	CONDITION/HT	PRODUCT FORM	KIC	KC	R CURVES	DA/DN	DA/DT	KISCC
4340V		EXTRUSION				X		
4340(MOD)	1650F 1HR, 1600F 1HR OQ 1+1 600F (0.09 SI)	BAR						X
	1650F 1HR, 1600F 1HR OQ 1+1 400F (0.09 SI)	BAR						X
	1800F @ 460F 1+1HR (0.20C)	FORGING						X
	1800F @ 500F 1+1HR (0.21C)	FORGING						X
	1800F @ 600F 1HR (0.20C)	FORGING						X
	1800F @ 650F 1HR (0.24C)	FORGING						X
	1800F @ 650F 1+1HR (0.28C)	FORGING						X
	1800F @ 700F 1HR (0.21C)	FORGING						X
	1800F @ 780F 1+1HR (0.33C)	FORGING						X
	1800F @ 800F 1HR (0.46C)	FORGING						X
	1800F @ 900F 1HR (0.64C)	FORGING						X
	1800F @ 925F 1+1HR (0.53C)	FORGING						X

TABLE 6.0.2

PLANE STRAIN FRACTURE TOUGHNESS VALUES OF ALLOY STEEL AT ROOM TEMPERATURE

ALLOY	CONDITION/ HT	PRODUCT FORM	RANGE OF PRODUCT THICKNESSES (IN)	KIC (KSI SQRT(IN))								
				L-T			T-L			S-L		
				SPECIMEN THICK *	MEAN	STD. DEV.	SPECIMEN THICK *	MEAN	STD. DEV.	SPECIMEN THICK *	MEAN	STD. DEV.
AF1410	1650F 1HR. WQ. 1500F 1HR. WQ. 950F 5HRS. AC	PLATE	2.00	1.75	139.6	11.7	1.75	136.7	7.4	----	----	----
D6AC	HEAT TREATED TO 46 RC HARDNESS	PLATE	-----	----	----	----	0.70	89.8	1.8	----	----	----
	1615F 2.25HR, A-BQ 325F, AC. 310-345F 3HR, 1080F 6-6.5HR	FORGING	-----	----	----	----	1.00	78.4	15.1	0.97	83.9	14.8
	1650F AUS-BAY QUENCH 975F, BQ 325F, 1000F 2+2 HR	PLATE	0.80-1.50	0.75	66.9	18.7	----	----	----	----	----	----
	1650F AUS-BAY QUENCH 975F, BQ 375F, 1000F 2+2 HR	PLATE	1.50	0.60	62.2	14.0	----	----	----	----	----	----
		FORGING	1.50	0.75	46.0	4.2	----	----	----	----	----	----
	1650F, AUS-BAY QUENCH 975F, BQ 400F, 1000F 2+2 HR	PLATE	0.80	0.60	64.4	12.1	----	----	----	----	----	----
		FORGING	0.80-1.50	0.60	66.2	12.3	----	----	----	----	----	----
	1650F, 1 HR, FC 1650F 1 HR, OQ, 1025F 2+2 HR	BILLET	7.00	1.00	78.5	4.7	----	----	----	----	----	----
	1650F, 1 HR, FC TO 960F, OQ AT 150F, AC, 1000F 2+2 HR	BILLET	7.00	1.00	80.3	0.8	----	----	----	----	----	----
	1700F, AUS-BAY QUENCH 975F, OQ 140F, 1000F 2+2 HR	PLATE	0.80-1.50	0.61	92.0	8.2	----	----	----	----	----	----
		FORGING	0.80-1.50	0.75	95.2	6.4	----	----	----	----	----	----

* MINIMUM SPECIMEN THICKNESS (IN.).

TABLE 6.0.2 (con't)

PLANE STRAIN FRACTURE TOUGHNESS VALUES OF ALLOY STEEL AT ROOM TEMPERATURE

ALLOY	CONDITION/ HT	PRODUCT FORM	RANGE OF PRODUCT THICKNESSES (IN)	KIC (KSI SQRT(IN))								
				L-T			T-L			S-L		
				SPECIMEN THICK *	MEAN	STD. DEV.	SPECIMEN THICK *	MEAN	STD. DEV.	SPECIMEN THICK *	MEAN	STD. DEV.
D6AC	1700F, 1 HR, FC TO 960F, OQ AT 150F, AC, 1000F 2+2 HR	BILLET	7.00	1.00	80.3	4.3	----	----	----	----	----	----
	1700F, 1 HR, OQ, 1025F 2+2 HR	BILLET	7.00-10.00	1.00	77.3	2.6	----	----	----	----	----	----
	1725F 1 HR, AC 1700F 1 HR, OQ, 1000F 1 HR, 1015F 1 HR	BILLET	7.00	1.00	77.2	2.7	----	----	----	----	----	----
	1725F, 1 HR, AC 1700F 1 HR, OQ, 1100F 2+2 HR	BILLET	7.00-10.00	1.00	101.2	6.1	----	----	----	----	----	----
	1725F, 1 HR, AC 1700F 1 HR, OQ, 1025F 2+2 HR	BILLET	7.00-10.00	1.00	74.4	6.2	----	----	----	----	----	----
	1725F, 1 HR, AC 1650F 1 HR, FC TO 960F, 9Q 350F 0.5 HR, AC 1025F 2+2 HR	BILLET	7.00	1.00	75.1	10.1	----	----	----	----	----	----
HP 9-4-.20	----	FORGING	1.25	2.00	150.6	4.5	2.00	136.3	16.8	----	----	----
	ANNEALED	FORGING	3.00	1.00	120.6	7.3	2.00	117.7	1.9	----	----	----
	HEAT TREATED	FORGING	3.40-7.00	1.50	140.7	4.5	1.46	132.3	4.6	----	----	----
	1525F OQ, -100F 1HR, 1065F 4+4HR	FORGING	4.00	----	----	----	1.50	111.7	2.0	----	----	----
	1650F 1-2 HR AC, 1525F 1-2 HR OQ, -100F 2HR, 1050F 4-6HR	FORGING	3.00-3.25	1.50	133.2	3.9	----	----	----	----	----	----

* MINIMUM SPECIMEN THICKNESS (IN.).

TABLE 6.0.2 (con't)

PLANE STRAIN FRACTURE TOUGHNESS VALUES OF ALLOY STEEL AT ROOM TEMPERATURE

ALLOY	CONDITION/ HT	PRODUCT FORM	RANGE OF PRODUCT THICKNESSES (IN)	KIC (KSI SQRT(IN))								
				L-T			T-L			S-L		
				SPECIMEN THICK *	MEAN	STD. DEV.	SPECIMEN THICK *	MEAN	STD. DEV.	SPECIMEN THICK *	MEAN	STD. DEV.
HP 9-4-.20	1650F 1-2HR AC, 1525F 1-2 HR AC, -100F 1-2HR, 1025F 4HR	FORGING	4.00-7.00	1.75	134.8	12.3	1.76	109.7	4.7	----	----	----
	1650F 1-2HR AC 1525F 1-2HR OQ, -100F 2HR, 1025F 4-6HR	PLATE	2.50	2.00	121.5	29.0	----	----	----	----	----	----
		FORGING	4.00	2.00	142.8	10.7	----	----	----	----	----	----
	1650F 1-2HR AC 1525F 1-2HR OQ, -100F 2HR, 1025F 4-6HR	FORGING	4.00	1.51	129.1	9.7	1.51	125.3	1.8	----	----	----
	1650F 2HR AC, 1525F 2HR OQ, 1000F 2+2HR AC	FORGING	4.00	1.24	94.4	4.4	----	----	----	----	----	----
	1650F, 1-2HR, AC 1-2HR, AC, -100F 1.5HR, 1025F 4 HR, 1060F 6HR	PLATE	2.50	2.00	123.5	12.0	----	----	----	----	----	----
	1650F, 1-2HR, AC 1.5HR OQ, 1025F 12HR	FORGING	4.00	1.55	125.5	3.5	----	----	----	----	----	----
	1650F, 4.5HR, AC TO 900F, HELD 0.5HR, AC, -100F 1.5HR, 1025F 8 HR, A-BQ	FORGING	4.00	1.59	128.5	0.7	----	----	----	----	----	----
	1700F 4.5HR, AC 1700F 1.5HR, AC -100F 1.5HR, 1 025F 4HRS	FORGING	4.00	1.60	140.5	0.7	----	----	----	----	----	----

* MINIMUM SPECIMEN THICKNESS (IN.).

TABLE 6.0.2 (con't)

PLANE STRAIN FRACTURE TOUGHNESS VALUES OF ALLOY STEEL AT ROOM TEMPERATURE

ALLOY	CONDITION/ HT	PRODUCT FORM	RANGE OF PRODUCT THICKNESSES (IN)	KIC (KSI SQRT(IN))								
				L-T			T-L			S-L		
				SPECIMEN THICK *	MEAN	STD. DEV.	SPECIMEN THICK *	MEAN	STD. DEV.	SPECIMEN THICK *	MEAN	STD. DEV.
HP 9-4-.25(VAR)	1550F 1 HR, OQ 1000F 2+2HR, AC	FORGING	3.00	----	----	----	2.00	98.9	4.5	----	----	----
HP 9-4-.30	HEAT TREATED TO 49 RC HARDNESS	PLATE	3.25	----	----	----	1.01	82.5	5.0	----	----	----
	1650F 1-2HR AC 1525F 1-2HR OQ -100F 1-3HR, 1000F 4HR	FORGING	3.00	1.00	106.0	1.4	1.00	89.0	3.0	----	----	----
	1650F 1-2HR AC 1525F 1-2HR OQ -100F 1-3HR, 1050F 4HR	FORGING	3.00	----	----	----	1.00	87.5	0.8	----	----	----
	1650F 1-2HR AC 1525F 1-2HR OQ -100F 1-3HR 1025F 4HR	FORGING	3.00	----	----	----	1.00	93.5	0.7	----	----	----
	1650F, 2HR AC 1550F 2HR OQ 1000F 2+2HR AC	FORGING	3.25	2.02	82.0	0.0	----	----	----	----	----	----
HY-TUF	1700F 1HR, AC, 1600F 1HR, OQ, 550F 2HR	FORGING	6.50	----	----	----	1.00	111.5	2.1	----	----	----
18NI(200)(MAR)	1650F 4.5 HR, AC, AGED 1000F 6 HR	PLATE	4.25	2.40	102.3	1.2	----	----	----	----	----	----

* MINIMUM SPECIMEN THICKNESS (IN.).

TABLE 6.0.2 (con't)

PLANE STRAIN FRACTURE TOUGHNESS VALUES OF ALLOY STEEL AT ROOM TEMPERATURE

ALLOY	CONDITION/ HT	PRODUCT FORM	RANGE OF PRODUCT THICKNESSES (IN)	KIC (KSI SQRT(IN))								
				L-T			T-L			S-L		
				SPECIMEN THICK *	MEAN	STD. DEV.	SPECIMEN THICK *	MEAN	STD. DEV.	SPECIMEN THICK *	MEAN	STD. DEV.
18NI(200)(MAR)	1650F 4.5 HR, AC, AGED 950F 24 HR	PLATE	4.25	2.40	99.3	1.2	----	----	----	----	----	----
	1650F 4.5 HR, AC, AGED 900F 24 HR	PLATE	4.25	2.40	96.5	0.7	----	----	----	----	----	----
	1650F 4.5 HR, AC, AGED 900F 6 HR	FORGING	3.00	2.40	100.3	0.6	----	----	----	----	----	----
18NI(250)(MAR)	1500F AC, 850F 6 HR	PLATE	4.25	1.80	76.0	1.9	----	----	----	----	----	----
	1500F AC, 900F 24 HR	PLATE	2.00	1.80	80.7	1.2	----	----	----	----	----	----
	1500F AC, 950F 6 HR	PLATE	2.00	1.80	84.0	2.6	----	----	----	----	----	----
	1500F 1HR, AC, AGED 900F 3HR, AC	BILLET	1.00-12.00	0.50	74.3	4.2	0.50	64.1	4.4	----	----	----
	1500F, AC, 900F 6 HR	PLATE	2.00	1.80	82.3	3.2	----	----	----	----	----	----
300M	----	FORGING	1.25	1.25	52.6	2.3	1.25	52.9	2.0	----	----	----
	HEAT TREATED TO 54 RC HARDNESS	PLATE	1.00	----	----	----	0.45	58.6	3.9	----	----	----
	1600F 1.25 HR, OQ. 600F 2+2HR	FORGING	3.00	0.25	54.6	2.5	0.25	50.6	1.7	0.25	54.1	1.1
	1700F 1HR AC. 1600F 1HR OQ. 600F 2HR AC (AMS 6419)	PLATE	1.00	0.50	51.8	0.7	----	----	----	----	----	----

* MINIMUM SPECIMEN THICKNESS (IN.).

TABLE 6.0.2 (con't)

PLANE STRAIN FRACTURE TOUGHNESS VALUES OF ALLOY STEEL AT ROOM TEMPERATURE

ALLOY	CONDITION/ HT	PRODUCT FORM	RANGE OF PRODUCT THICKNESSES (IN)	KIC (KSI SQRT(IN))								
				L-T			T-L			S-L		
				SPECIMEN THICK *	MEAN	STD. DEV.	SPECIMEN THICK *	MEAN	STD. DEV.	SPECIMEN THICK *	MEAN	STD. DEV.
300M	2190F 1HR.FC TO 1600F.HOLD 0.5HR.DQ.475F 1HR	BAR	0.62	0.60	47.9	3.8	----	----	----	----	----	----
300M (AM)	1650F 1 HR.AC. 1550F 1 HR.DQ. -320F 0.5 HR. 600F 2+2HR.AC	FORGING	4.00	0.90	46.5	3.8	----	----	----	----	----	----
300M (VAR)	1650F 1 HR.AC. 1550F 1 HR.DQ. -320F 0.5 HR. 600F 2+2HR.AC	FORGING	4.50	0.90	52.2	1.3	----	----	----	----	----	----
300M(VM)	1500F.DQ.400F 2+2HR	PLATE	0.56	0.50	48.0	17.0	----	----	----	----	----	----
	1500F.DQ.550F 2+2HR	PLATE	0.56	0.50	49.5	10.6	----	----	----	----	----	----
	1550F.DQ.550F 2+2HR	PLATE	0.56	0.50	62.9	3.5	----	----	----	----	----	----
	1700F.AC.1600F 1 HR.DQ.550F 2+2 HR	BILLET	5.50	----	----	----	1.00	55.3	0.3	----	----	----
	1700F.AC.1600F 1 HR.BQ 975F. DQ.575F 2+2 HR	BILLET	5.50	----	----	----	1.00	59.6	2.2	----	----	----
	1700F.AC.1600F 1 HR.BQ 400F. AC.550F 2+2 HR	BILLET	5.50	----	----	----	1.00	58.0	3.4	----	----	----
4140	2010F 1 HR.DQ. 475F 1 HR	FORGED BAR	0.62	0.60	52.1	7.4	----	----	----	----	----	----

* MINIMUM SPECIMEN THICKNESS (IN.).

TABLE 6.0.2 (con't)

PLANE STRAIN FRACTURE TOUGHNESS VALUES OF ALLOY STEEL AT ROOM TEMPERATURE

ALLOY	CONDITION/ HT	PRODUCT FORM	RANGE OF PRODUCT THICKNESSES (IN)	KIC (KSI SQRT(IN))								
				L-T			T-L			S-L		
				SPECIMEN THICK *	MEAN	STD. DEV.	SPECIMEN THICK *	MEAN	STD. DEV.	SPECIMEN THICK *	MEAN	STD. DEV.
4140	2190F 1 HR,OQ, 400F 1 HR	FORGED BAR	0.62	0.60	81.1	13.2	----	----	----	----	----	----
	2190F 1 HR,OQ, 475F 1 HR	FORGED BAR	0.62	0.60	66.1	2.7	----	----	----	----	----	----
4330V MOD	HEAT TREATED TO 46 RC HARDNESS	PLATE	0.62	----	----	----	0.75	74.7	0.8	----	----	----
	1600F 1 HR,OQ, 535F 1 HR	FORGED BAR	0.62	0.60	96.7	3.8	----	----	----	----	----	----
	1650F 1 HR,AC, 1575F 1 HR,OQ, 800F 2+2 HR	BILLET	6.00	1.00	96.1	3.2	----	----	----	----	----	----
	1650F 1 HR,AC, 1575F 1 HR,OQ, 525F 2+2 HR	BILLET	6.00	1.00	81.6	2.3	----	----	----	----	----	----
4340	HEAT TREATED TO 51 RC HARDNESS	PLATE	0.62	----	----	----	0.50	51.7	1.3	----	----	----
	1550F,OQ, TEMPERED 800F	PLATE	1.00	0.80	76.6	4.6	----	----	----	----	----	----
	1550F,OQ, TEMPERED 500F	PLATE	1.00	0.80	45.3	2.9	----	----	----	----	----	----
	1600F 1 HR,OQ, 535F 1 HR	FORGED BAR	0.62	0.60	60.9	0.8	----	----	----	----	----	----
	1600F 1HR, 1525F 2.5HR,OQ AT 150-175F, 900F 1HR	PLATE	1.00	----	----	----	1.01	88.2	1.5	----	----	----
	1650F 1 HR,AC, 1525F 1 HR,OQ, 800F 2 HR	BILLET	10.00	1.00	76.3	3.6	----	----	----	----	----	----

* MINIMUM SPECIMEN THICKNESS (IN.).

TABLE 6.0.2 (con't)

PLANE STRAIN FRACTURE TOUGHNESS VALUES OF ALLOY STEEL AT ROOM TEMPERATURE

ALLOY	CONDITION/ HT	PRODUCT FORM	RANGE OF PRODUCT THICKNESSES (IN)	KIC (KSI SQRT(IN))								
				L-T			T-L			S-L		
				SPECIMEN THICK *	MEAN	STD. DEV.	SPECIMEN THICK *	MEAN	STD. DEV.	SPECIMEN THICK *	MEAN	STD. DEV.
4340	2190F 1HR, FC TO 1600F, HOLD 0.5HR, 400F 1 HR	FORGED BAR	0.62	0.60	76.8	0.1	----	----	----	----	----	----
	2190F 1HR, FC TO 1600F, HOLD 0.5HR, 660F 1 HR	FORGED BAR	0.62	0.60	60.8	0.8	----	----	----	----	----	----
	2190F 1HR, FC TO 1600F, HOLD 0.5HR, 935F 1 HR	FORGED BAR	0.62	0.60	60.1	3.2	----	----	----	----	----	----
4340 (AM)	1600F 1 HR, AC, 1550F 1 HR, OQ, -320F 0.5 HR, 400F 2 HR, AC	FORGING	4.00	0.90	40.5	0.5	----	----	----	----	----	----
4340 (DH)	1550F, OQ, 900F 1 HR	BILLET	1.00	----	----	----	1.00	66.3	6.2	----	----	----
	1600F 1 HR, AC, 1550F 1 HR, OQ, -320F 0.5 HR, 400F 2 HR, AC	FORGING	4.00	0.90	51.0	3.0	----	----	----	----	----	----
4340 (VAR)	1600F 1 HR, AC, 1550F 1 HR, OQ, -320F 0.5HR, 400F 2 HR, AC	FORGING	4.00	0.90	55.0	4.4	----	----	----	----	----	----

* MINIMUM SPECIMEN THICKNESS (IN.).

TABLE 6.0.3

PLANE STRESS AND TRANSITIONAL FRACTURE TOUGHNESS OF
STEEL ALLOYS (WITHOUT BUCKLING CONSTRAINTS)

Alloy	Condition/Ht	Test Temp. (°F)	Specimen Orient	Specimen Width (in)	Yield Strength (Ksi)	Specimen Thickness (in) = 0.025 K_c^* (Ksi $\sqrt{in}$)
18 Ni(300) MAR	----	-423	L-T	4.0	386	86.4/7.3 (5)
		-320	L-T	2.0	336	142.6/7.4 (5)
				4.0	336	124.2/8.0 (5)
		R. T.	L-T	2.0	277	132.1/4.3 (5)
				4.0	277	128.5/3.8 (5)
				18.0	277	110.3/10.9 (3)

* Mean/Standard Deviation (No. of Specimens)

TABLE 6.0.4.1

COMPARISON OF FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS OF THE STRESS INTENSITY FACTOR FOR ALLOY STEEL

TEST CONDITIONS:

SPECIMEN ORIENTATION: L-T

ENVIRONMENT: LAB AIR AT R.T.

STRESS RATIO: 0.02-0.10

FREQUENCY: 0.10-30.00HZ

ALLOY	CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQUENCY	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) FOR DELTA K LEVELS (KSI SQRT(IN)) = 2.5	5.0	10.0	20.0	50.0	100.0
AF1410	1525F 1HR AC, -100F 1HR AC, 950F 5HRS AC	ROUND BAR	0.02	.10- 30.00		.164	.633	4.07	29.8	
	1525F 1HR AC, -100F 1HR AC, 950F 5HRS AC	ROUND BAR	0.02	.10- 30.00		.102	.636	3.60	30.7	139.
AF1410(VIM-VAR)	1650F 1HR WQ, 1500F 1HR WQ, 950F 5HRS AC	PLATE	0.08	30.00			.646	3.88	27.3	
A286	1800F 0.5-1.0HR WQ 1325F 16HR AC	PLATE	0.05	3.00				1.59	31.8	
D6AC	1650F A-BQ AT 975F, BQ AT 400F, 1000F 2+2HR	PLATE	0.10	.10					65.2	
	1650F A-BQ AT 975F, BQ AT 400F, 1000F 2+2HR	PLATE	0.10	1.00				2.85		
	1700F A-BQ AT 975F, OQ AT 140F, 1000F 2+2HR	PLATE	0.10	1.00				5.61	51.3	
HP9-4-20	------	FORGING	0.02	0.10-20.00			.180	1.61	18.9	126
		BAR	0.02	10.00				3.58	33.2	

TABLE 6.0.4.1 (con't)

COMPARISON OF FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS OF THE STRESS INTENSITY FACTOR FOR ALLOY STEEL

TEST CONDITIONS:

SPECIMEN ORIENTATION: L-T

ENVIRONMENT: LAB AIR AT R.T.

STRESS RATIO: 0.02-0.10

FREQUENCY: 0.10-30.00HZ

ALLOY	CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQUENCY	FATIQUE CRACK GROWTH RATES (MICRO IN/CYCLE) FOR DELTA K LEVELS (KSI SQRT(IN)) = 2.5	5.0	10.0	20.0	50.0	100.0
HP9-4-.20(CEVM)	ANNEALED	FORGING	0.10	5.00-10.00				6.19	37.0	
HP9-4-.30		FORGING	0.02	5.00- 20.00			.399	2.99	38.9	
		BAR	0.02	1.00					46.4	
		BAR	0.02	10.00				3.59	46.6	
HY-180	STA (UTS = 180 KSI)	FORGED BAR	0.10	30.00		.0986	.556	3.33		
	STA (UTS = 180 KSI)	FORGED BAR	0.10	10.00				4.29	30.8	
H11	AUSTENIZED & TEMPERED (TYS = 220KSI)	ROUND BAR	0.10	10.00				3.53		
	AUSTENIZED & TEMPERED (TYS = 220KSI)	ROUND BAR	0.10	30.00			.339	2.95		
12-9-2 MAR	STA 900	ROUND BAR	0.10	10.00				8.17		
	STA 900	ROUND BAR	0.10	30.00			.149	8.92		

TABLE 6.0.4.1 (con't)

COMPARISON OF FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS OF THE STRESS INTENSITY FACTOR FOR ALLOY STEEL

TEST CONDITIONS:

SPECIMEN ORIENTATION: L-T

ENVIRONMENT: LAB AIR AT R.T

STRESS RATIO: 0.02-0.10

FREQUENCY: 0.10-30.00HZ

ALLOY	CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQUENCY	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) FOR DELTA K LEVELS (KSI SQRT(IN)) = 2.5	5.0	10.0	20.0	50.0	100.0
300M	-----	FORGING	0.02	.10- 20.00	SP THK=1.25"		.716	3.83	82.7	
	TUS = 280 - 300 KSI	FORGING	0.02	10.00	SP THK=0.25"			3.56	47.0	
4330V(MOD)	------	BILLET	0.02	1.00- 30.00			2.11	7.44	28.4	
4340	MARTEMPERED	PLATE	0.02	----			.492	3.12	23.0	111.
	UTS = 160 KSI	ROUND BAR	0.10	7.00				2.47		
	UTS = 180 KSI	ROUND BAR	0.10	20.00- 30.00			.307	2.96	23.2	

TABLE 6.0.4.2

COMPARISON OF FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS OF THE STRESS INTENSITY FACTOR FOR ALLOY STEEL

TEST CONDITIONS:

SPECIMEN ORIENTATION: T-L

ENVIRONMENT: LAB AIR AT R.T.

STRESS RATIO: 0.02-0.10

FREQUENCY: 0.10-30.00HZ

ALLOY	CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQUENCY	FATIQUE CRACK GROWTH RATES (MICRO IN/CYCLE) FOR DELTA K LEVELS (KSI SQRT(IN)) = 2.5	5.0	10.0	20.0	50.0	100.0
AF1410	1525F 1HR AC, -100F 1HR AC, 950F 5HRS AC	ROUND BAR	0.02	.10- 30.00		.134	.513	4.11	27.2	498.
	1525F 1HR AC, -100F 1HR AC, 950F 5HRS AC	ROUND BAR	0.02	.10- 30.00			.717	4.07	28.1	149.
AF1410(VIM-VAR)	1650F 1HR WQ, 1500F 1HR WQ, 950F 5HRS AC	PLATE	0.08	0.10- 30.00			.711	3.95	29.3	
A286	1800F 0.5-1.0HR WQ, 1325F 16HR AC	PLATE	0.05	3.00				1.82		
HP9-4-.20	-----	FORGING	0.02	0.10- 20.00			.242	2.99	30.7	490.
HP9-4-.20(CEVM)	ANNEALED	FORGING	0.10	10.00- 15.00				6.53	42.9	
HP9-4-.30	-----	FORGING	0.02	0.10- 20.00			.399	3.34	45.8	1883.
18NI(250)MAR	TUS=243KSI	BILLET	0.10	10.00			1.16	5.91	71.0	
300M	-----	FORGING	0.02	.10- 20.00		.118	.749	3.87	117.	

TABLE 6.0.5

STRESS CORROSION CRACKING THRESHOLD DATA FOR STEEL ALLOYS AT ROOM TEMPERATURE

ALLOY	CONDITION/ HT	PRODUCT FORM	SPECIMEN ORIENTATION	K_{ISCC} (Ksi$\sqrt{in}$) ENVIRONMENTS: SIMULATED SEA WATER	SEA WATER	DISTILLED WATER	3.5% NaCl	SUMP TANK WATER
D6AC	1550F AQ 650F 4HR	S	L-T			7.0		
	1550F AQ 950F 4HR	S	L-T			45.2		
HP9-4-.20	GTA Weld	P	---	65.0				
	Quenched and Tempered	P	---				110.0(2)	
	1525F 2HR OQ	P	L-T					105.0(3)
	-100F 2HR		T-L					97.4(5)
	1025F 4HR	FB	L-T					110.0
			T-L					107.0(2)
			S-T					78.3(3)
HP9-4-.45	475F	P	---				20.0	
H-11	Quenched and Tempered at 1100F	P	---				30.0	
12Ni-5Cr-3Mo	Electric Furnace	P	---	40.0				
	GTA Welded	W	---	33.0				
	Low Residual	P	---	108.0				
	1550F, 900F 20HR AC	P	L-S				80.0	
			T-S				70.0	
18Ni(180)(MAR)	TYS=178 KSI	P	---	108.0				
	TYS=195 KSI	P	---				60.0	
	TYS=200 KSI	P	---				105.0	
18Ni(200)(MAR)	TYS=215 KSI	P	---				70.0	
	Weld Center Line	P	L-S				70.0	
	1500F 1HR AC 900F 3HR	P	T-S				39.0	
	1675F 2HR AC	P	T-S				48.0	
	500F 0.25HR 850F 4HR/cool 250F/min	W	T-S				78.0	

TABLE 6.0.5 (con't)

STRESS CORROSION CRACKING THRESHOLD DATA FOR STEEL
ALLOYS AT ROOM TEMPERATURE

ALLOY	CONDITION/ HT	PRODUCT FORM	SPECIMEN ORIENTATION	K_{ISCC}(Ksi$\sqrt{in}$) ENVIRONMENTS: SIMULATED SEA WATER	SEA WATER	DISTILLED WATER	3.5% NaCl	SUMP TANK WATER
18Ni(250)(MAR)	AGE 900F 3HR AC	P	L-S				40.5(2)	
			L-T				45.0	
	TYS=250 KSI	P	---				50.0	
	TYS=260 KSI	P	---				70.0	
	1650F 1.25HR WQ 1525F 1.25HR WQ 900F 3HR AC	P		36.7				
18Ni(280)(MAR)	1500F 1HR AC 900F 3HR	P	---				14.0	
18Ni(300)(MAR)	AGED 900F 6HR	F	L-T				7.0	
			T-L				6.0(2)	
	AGED 950F 12HR	F	T-L				6.0	
	Crack Prestressed to 50PCT KIC	F	T-L				5.0	
	Crack Prestressed to 25 PCT KIC	F	T-L				5.0	
	Crack Prestressed to 80 PCT KIC	F	T-L				10.0	
	1500F 0.5HR AC 900F 3HR	P	L-S			48.0(2)		
	1500F 2HR 800F 10HR	B	L-S			9.0		
	1700F, 1500F AGED 900F 6HR	F	T-L				7.5	
	900F 3HR 950F 3HR	F	T-L				5.0	
18Ni(350)(MAR)	AGE 800F 8HR	FB	---				5.0	
	AGE 900F 3HR	FB	---				10.0	
	AGE 900F 8HR	FB	---				10.0	

TABLE 6.0.5 (con't)

STRESS CORROSION CRACKING THRESHOLD DATA FOR STEEL ALLOYS AT ROOM TEMPERATURE

ALLOY	CONDITION/ HT	PRODUCT FORM	SPECIMEN ORIENTATION	K_{ISCC}(Ksi$\sqrt{in}$) ENVIRONMENTS				
				SIMULATED SEA WATER	SEA WATER	DISTILLED WATER	3.5% NaCl	SUMP TANK WATER
18Ni(350)(MAR)	1500F 1HR 800F 8HR	F	L-S				5.0	
	1500F 1HR 900F 8HR	F	L-S				10.0	
	1500F 1HR 950F 3HR	F	L-S				10.0	
300M	1500F 0.5HR OQ 400F 2+2HR (Coarse Grain)	P	---				12.0	
	1500F 0.5HR OQ 400F 2+2HR (Fine Grain)	P	---				12.0	
	1500F 0.5HR OQ 550F 2+2HR (Coarse Grain)	P	---				15.0	
	1500F 0.5HR OQ 550F 2+2HR (Fine Grain)	P	---				15.0	
	1550F 0.5HR OQ 400F 2+2HR (Coarse Grain)	P	---				15.0	
	1550F 0.5HR OQ 400F 2+2HR (Fine Grain)	P	---				15.0	
	1550F 0.5HR OQ 550F 2+2HR (Coarse Grain)	P	---				15.0	
	1550F 0.5HR OQ 550F 2+2HR (Fine Grain)	P	---				15.0	
	1600F 0.5HR OQ 400F 2+2HR (Coarse Grain)	P	---				12.0	
	1600F 0.5HR OQ 550F 2+2HR (Coarse Grain)	P	---				12.0	
	1600F 0.5HR OQ 550F 2+2HR (Fine Grain)	P	---				12.0	
	1650F, 1600F 1HR OQ 600F 1+1HR	F	L-S				19.6	
	1700F 1.5HR AC 1600F 1.5HR OQ 600F 2+2HR	F	S-L					15.5(2)
	1710F, 1610F 610F	B	L-T T-L				17.4(3) 17.6(4)	

TABLE 6.0.5 (con't)

STRESS CORROSION CRACKING THRESHOLD DATA FOR STEEL ALLOYS AT ROOM TEMPERATURE

ALLOY	CONDITION/ HT	PRODUCT FORM	SPECIMEN ORIENTATION	K_{ISCC}(Ksi$\sqrt{in}$) ENVIRONMENTS				
				SIMULATED SEA WATER	SEA WATER	DISTILLED WATER	3.5% NaCl	SUMP TANK WATER
4140	1700F 1600F OQ 750 1+1HR	P	---			15.0		
	1700F 1600F OQ 600F 1+1HR	P	---			11.0		
4330V	Quenched and Tempered at 500F	P	L-S				25.0	
4340	TYS=150 KSI	P	T-L		59.0			
	TYS=175 KSI	P	T-L		27.0			
	TYS=200 KSI	P	T-L		10.0			
	TYS=225 KSI	P	T-L		5.0			
	1350F OQ 750F 1.25HR	P	T-S		8.5			
	1550F OQ 750F Crack Prestressed to 80 PCT K_{Ic}	P	---				24.0	
	1550F OQ 750F Crack Prestressed to 60 PCT K_{Ic}	P	---				23.0	
	1550F OQ 750F Crack Prestressed to 40 PCT K_{Ic}	P	---				17.0	
	1550F OQ 750F Crack Prestressed to 20 PCT K_{Ic}	P	---				12.0	
	1550F OQ 750F 1HR	P	---				8.0	
	1575F OQ 675F 4HR	P	---			9.8		
	1575F OQ 800F 4HR	P	---			9.8		
	1600F 1HR OQ 600F 1+1HR	F	---				10.0	
	1650F 1HR AC 1680F 2HR OQ LN 0.25HR 400F 1+1HR OQ	B	L-T				15.0	

TABLE 6.0.5 (con't)

STRESS CORROSION CRACKING THRESHOLD DATA FOR STEEL ALLOYS AT ROOM TEMPERATURE

ALLOY	CONDITION/ HT	PRODUCT FORM	SPECIMEN ORIENTATION	K_{ISCC}(Ksi$\sqrt{in}$) ENVIRONMENTS				
				SIMULATED SEA WATER	SEA WATER	DISTILLED WATER	3.5% NaCl	SUMP TANK WATER
4340	1650F 1HR AC 1480F 2HR OQ LN 0.25HR 400F 1+1HR OQ	B	L-T				15.0	
	1700F 0.25HR AC 1550F OQ 600F 1+1HR	S	---				29.0	
	1800F Q 600F 1+1HR	F	L-S				25.2(12)	
4340 MOD	1650F 1HR 1600F 1HR OQ 1+1 600F (0.09 SI)	B	T-L				18.0	
	1650F 1HR 1600F 1HR OQ 1+1 400F (0.09 SI)	B	T-L				13.0	
	1800F Q 460F 1+1 HR (0.20C)	F	L-S				56.0	
	1800F Q 500F 1+1HR (0.21C)	F	L-S				52.0	
	1800F Q 600F 1 HR (0.20C)	F	L-S				72.0	
	1800F Q 650F 1HR (0.24C)	F	L-S				62.0	
	1800F Q 650F 1HR (0.28C)	F	L-S				35.0	
	1800F Q 700F 1HR (0.21C)	F	L-S				42.0	
	1800F Q 780F 1+1HR (0.33C)	F	L-S				32.0	
	1800F Q 800F 1HR (0.46C)	F	L-S				20.0	
	1800F Q 900F 1HR (0.64C)	F	L-S				30.0	
	1800F Q 925F 1+1HR (0.53C)	F	L-S				42.0	

TABLE 6.1.1.1

MEAN PLANE STRAIN FRACTURE TOUGHNESS DATA OF
ALLOY STEEL AF1410 AT ROOM TEMPERATURE

CONDITION/HT	MEAN KIC ± STANDARD DEVIATION (KSI SQRT(IN))		(NUMBER OF SPECIMENS)
	PLATE		
CONDITION/HT	L-T	T-L	S-L
1650F 1HR, WQ. 1500F 1HR, WQ. 950F 5HRS, AC	139.6 ± 11.7 (2)	136.7 ± 7.4 (2)	-----

TABLE 6.1.1.2

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL AF1410

TEST CONDITIONS

SPECIMEN ORIENTATION: L-T

ENVIRONMENT: LAR AIR AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE)					
					2.5	5	10	20	50	100
1525F 1HR AC, -100F 1HR AC, 950F 5HRS AC	ROUND BAR	0.02	0.10-30.00			0.10	0.63	3.60	30.7	139
1525F 1HR AC, -100F 1HR AC, 950F 5HRS AC	ROUND BAR	0.02	0.10-30.00			0.16	0.63	4.07	29.5	

TABLE 6.1.1.3

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL AF1410

TEST CONDITIONS

SPECIMEN ORIENTATION: T-L

ENVIRONMENT: LAB AIR AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1525F 1HR AC, -100F 1HR AC, 950F 5HRS AC	ROUND BAR	0.02	0.10-30.00			0.13	0.51	4.11	27.2	498
1525F 1HR AC, -100F 1HR AC, 950F 5HRS AC	ROUND BAR	0.02	0.10-30.00				0.71	4.07	28.1	149

TABLE 6.1.2.1

ALLOY STEEL AF1410 K(IC)

CONDITION	PRODUCT FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
1650F 1HR, WQ, 1500F 1HR, WQ, 950F 5HRS, AC	P	2.00	- 65	L-T	235.7	3.500	1.750	CT	----	0.54	109.90			1977	RI001
1650F 1HR, WQ, 1500F 1HR, WQ, 950F 5HRS, AC	P	2.00	R.T	L-T	228.4	3.500	1.750	CT	----	0.82	131.30			1977	RI001
		2.00			228.4	3.500	1.750	CT	----	1.04	147.80			1977	RI001
												139.6/	11.7		
1650F 1HR, WQ, 1500F 1HR, WQ, 950F 5HRS, AC	P	2.00	- 65	T-L	248.6	3.500	1.750	CT	----	0.49	111.10			1977	RI001
1650F 1HR, WQ, 1500F 1HR, WQ, 950F 5HRS, AC	P	2.00	R.T.	T-L	228.4	3.500	1.750	CT	----	0.96	141.90			1977	RI001
		2.00			228.4	3.500	1.750	CT	----	0.82	131.40			1977	RI001
												136.7/	7.4		

TABLE 6.1.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.1.3.1 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL AF1410
CONDITION: 1525F 1HR AC, -100F 1HR AC, 950F 5HRS AC
ENVIRONMENT: R.T. ,LAB AIR

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE) A	B	C	D
		R=+0.02			
DELTA K MIN A:	3.88	.0513			
B:					
C:					
D:					
	4.00	.0558			
	5.00	.102			
	6.00	.167			
	7.00	.252			
	8.00	.357			
	9.00	.485			
	10.00	.636			
	13.00	1.24			
	16.00	2.08			
	20.00	3.60			
	25.00	6.16			
	30.00	9.49			
	35.00	13.6			
	40.00	18.5			
	50.00	30.7			
	60.00	46.1			
	70.00	64.7			
	80.00	86.4			
	90.00	111.			
	100.00	139.			
	130.00	240.			
DELTA K MAX A:	152.83	334.			
B:					
C:					
D:					

ROOT MEAN SQUARE PERCENT ERROR 18.40

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	4
	1.25-2.0	
	>2.0	

CONDITION/HT: 1525F 1HR AC. -100F 1HR AC. 950F 5HRS AC
FORM: 4.25"TH ROUND BAR
SPECIMEN TYPE: WOL
ORIENTATION: L-T
FREQUENCY: 0.10- 30.00 HZ
ENVIRONMENT: R.T., LAB AIR
YIELD STRENGTH: 209.0- 222.0 KSI
ULT. STRENGTH: 243.0- 247.0 KSI
SPECIMEN THK: 0.499- 0.506"
SPECIMEN WIDTH: 2.989- 3.006"
REFERENCES: MA004

ALLOY STEEL

AF1410

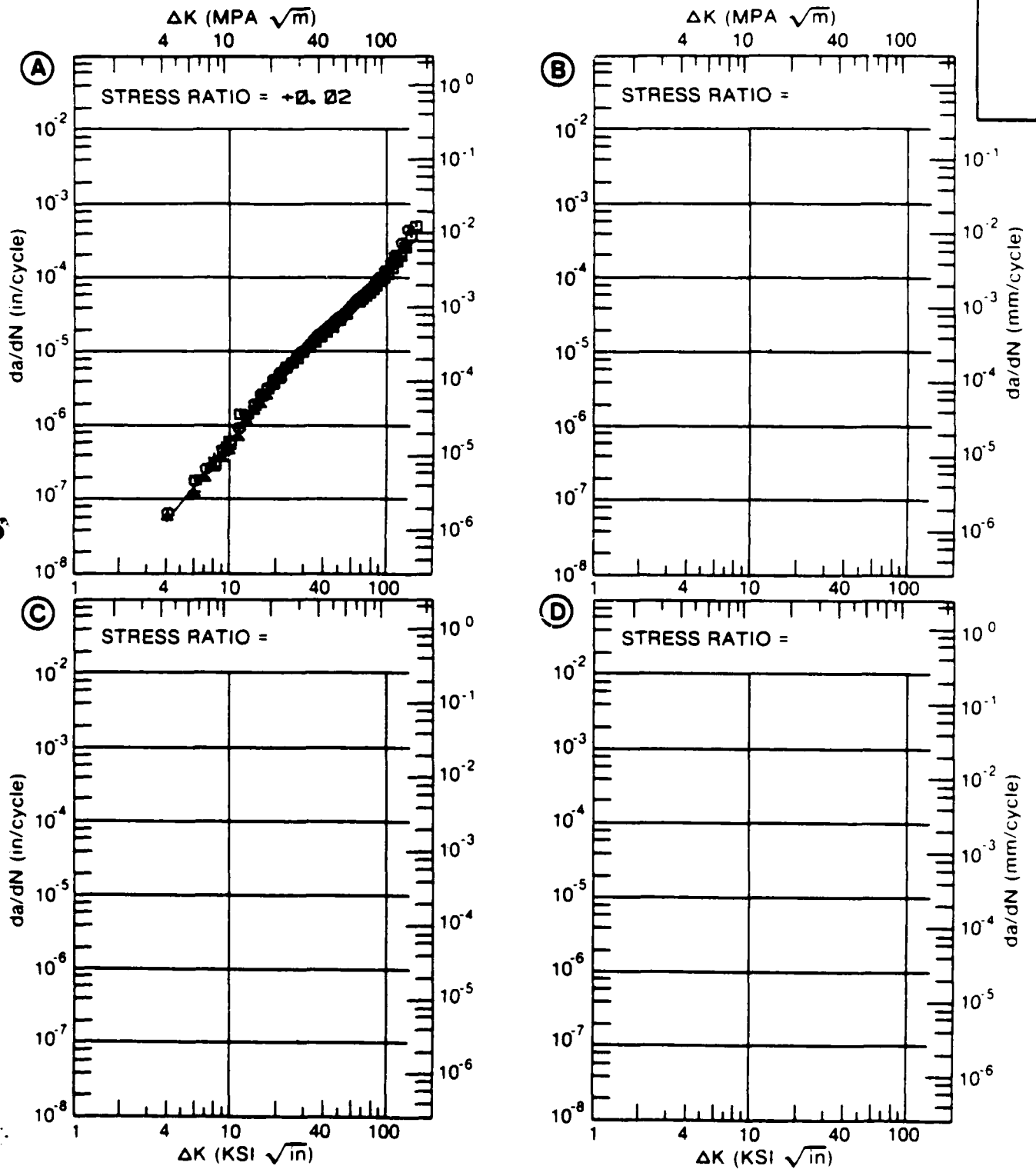


Figure 6.1.3.1

TABLE 6.1.3.2

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.1.3.2 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL AF1410
CONDITION: 1525F 1HR AC, -100F 1HR AC, 950F 5HRS AC
ENVIRONMENT: R.T. ,LAB AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE) A	B	C	D
			R=+0.02			
DELTA K MIN	A:	5.79	.117			
	B:					
	C:					
	D:					
		6.00	.134			
		7.00	.233			
		8.00	.363			
		9.00	.525			
		10.00	.717			
		13.00	1.46			
		16.00	2.44			
		20.00	4.07			
		25.00	6.60			
		30.00	9.66			
		35.00	13.3			
		40.00	17.5			
		50.00	28.1			
		60.00	42.0			
		70.00	60.1			
		80.00	83.1			
		90.00	112.			
		100.00	149.			
		130.00	320.			
DELTA K MAX	A:	135.83	368.			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR: 13.68

LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5	
	0.5-0.8	
	0.8-1.25	4
	1.25-2.0	
	>2.0	

CONDITION/HT: 1525F 1HR AC, -100F 1HR AC, 950F 5HRS AC
FORM: 4.25"TH ROUND BAR
SPECIMEN TYPE: WOL
ORIENTATION: T-L
FREQUENCY: 0.10- 30.00 HZ
ENVIRONMENT: R.T., LAB AIR
YIELD STRENGTH: 211.0- 221.0 KSI
ULT. STRENGTH: 243.0- 249.0 KSI
SPECIMEN THK: 0.498- 0.506"
SPECIMEN WIDTH: 2.979- 2.995"
REFERENCES: MA004

ALLOY STEEL

AF1410

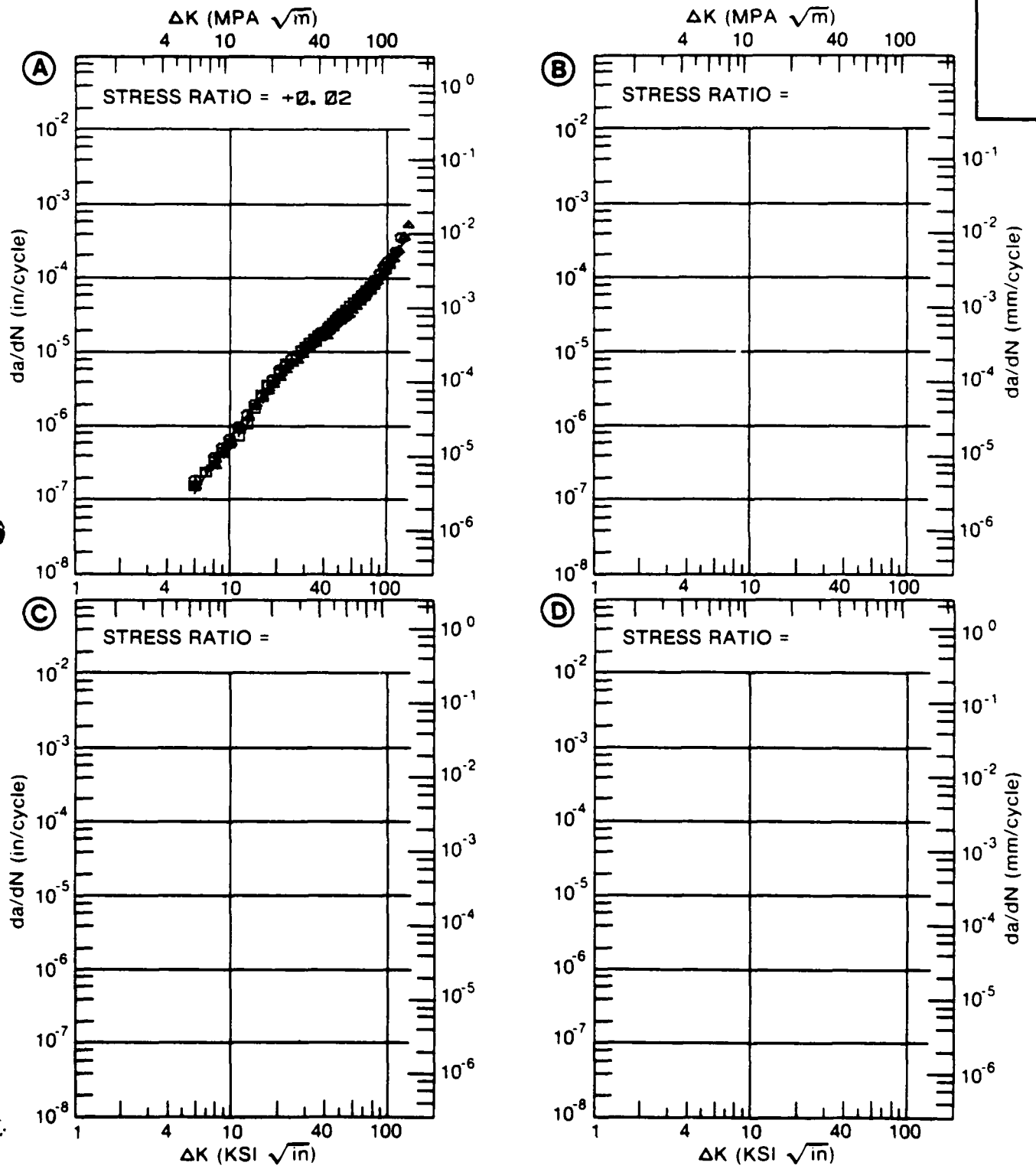


Figure 6.1.3.2

TABLE 6.1.3.3

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.1.3.3 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL AF1410
CONDITION: 1525F 1HR AC, -100F 1HR AC, 950F 5HRS AC
ENVIRONMENT: R.T. ,LAB AIR

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE) A	B	C	D
		R=+0.02			
DELTA K MIN	A: 3.95	.08			
	B: 5				
	C:				
	D:				
	4.00	.0906			
	5.00	.164			
	6.00	.194			
	7.00	.237			
	8.00	.322			
	9.00	.452			
	10.00	.633			
	13.00	1.45			
	16.00	2.50			
	20.00	4.07			
	25.00	6.31			
	30.00	8.97			
	35.00	12.3			
	40.00	16.6			
	50.00	29.5			
	60.00	52.4			
	70.00	93.5			
	80.00	167.			
	90.00	289.			
DELTA K MAX	A: 96.86	395.			
	B:				
	C:				
	D:				

ROOT MEAN SQUARE PERCENT ERROR 9.95

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	2
	1.25-2.0	
	>2.0	

CONDITION/HT: 1525F 1HR AC, -100F 1HR AC, 950F 5HRS AC
FORM: 4.50"TH ROUND BAR
SPECIMEN TYPE: WOL
ORIENTATION: L-T
FREQUENCY: 0.10- 30.00 HZ
ENVIRONMENT: R.T., LAB AIR
YIELD STRENGTH: 212.0 KSI
ULT. STRENGTH: 240.0 KSI
SPECIMEN THK: 0.501"
SPECIMEN WIDTH: 2.981- 2.983"
REFERENCES: MA004

ALLOY STEEL

AF1410

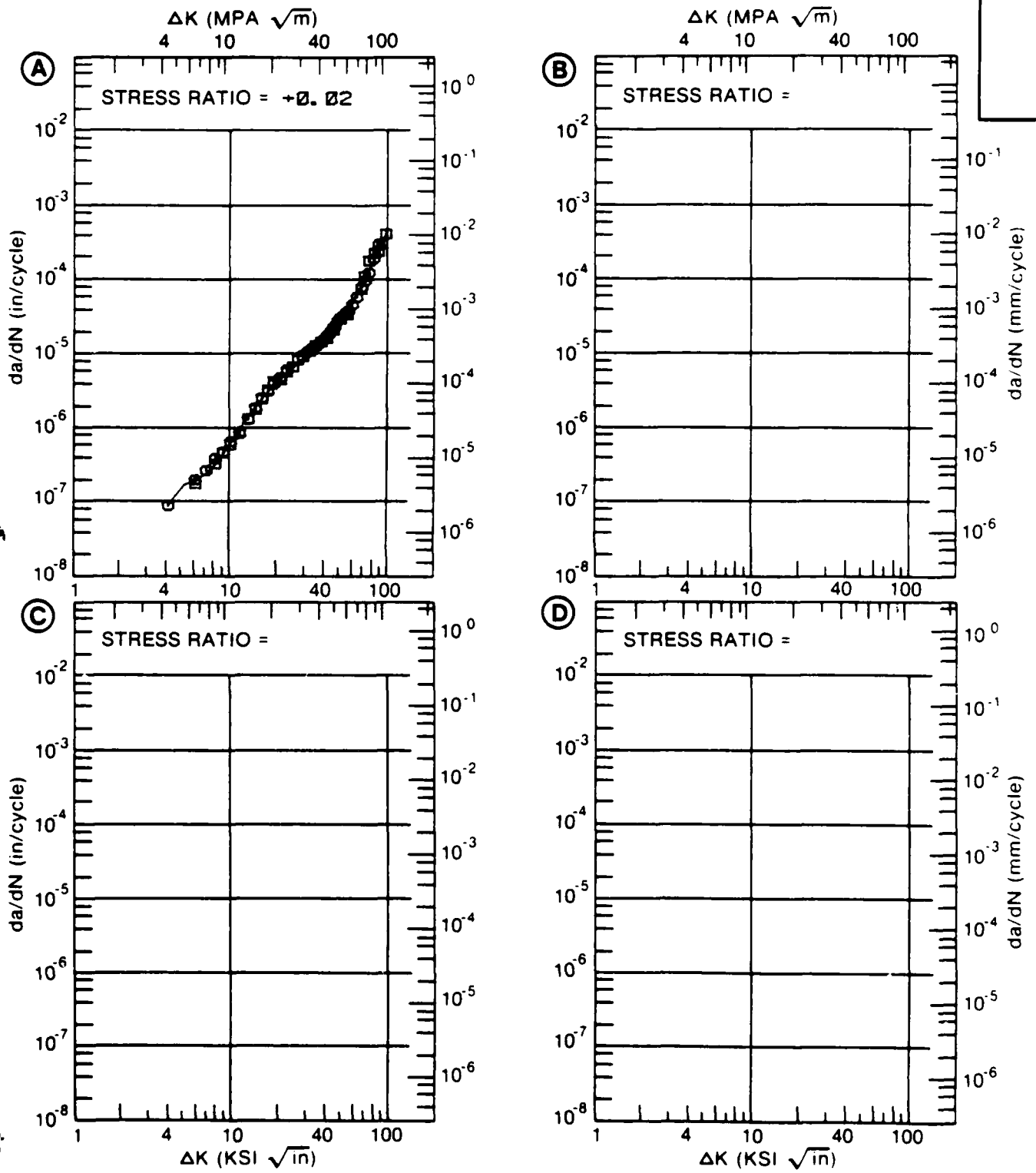


Figure 6.1.3.3

TABLE 6.1.3.4

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.1.3.4 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL AF1410
CONDITION: 1525F 1HR AC, -100F 1HR AC, 950F 5HRS AC
ENVIRONMENT: R.T. ,LAB AIR

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		R=+0.02			
DELTA K MIN A:	3.92	.071			
DELTA K MIN B:	6				
DELTA K MIN C:					
DELTA K MIN D:					
	4.00	.0762			
	5.00	.134			
	6.00	.187			
	7.00	.242			
	8.00	.308			
	9.00	.393			
	10.00	.513			
	13.00	1.23			
	16.00	2.37			
	20.00	4.11			
	25.00	6.47			
	30.00	9.07			
	35.00	12.1			
	40.00	15.9			
	50.00	27.2			
	60.00	46.9			
	70.00	82.7			
	80.00	148.			
	90.00	270.			
	100.00	498.			
DELTA K MAX A:	110.17	934.			
DELTA K MAX B:					
DELTA K MAX C:					
DELTA K MAX D:					

ROOT MEAN SQUARE PERCENT ERROR: 6.95

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
0.0-0.5	
0.5-0.8	
0.8-1.25	2
1.25-2.0	
>2.0	

CONDITION/HT: 1525F 1HR AC. -100F 1HR AC. 950F 5HRS AC
FORM: 4.50"TH ROUND BAR
SPECIMEN TYPE: WOL
ORIENTATION: T-L
FREQUENCY: 0.10- 30.00 HZ
ENVIRONMENT: R.T.. LAB AIR

YIELD STRENGTH: 214.0 KSI
ULT. STRENGTH: 243.0 KSI
SPECIMEN THK: 0.500- 0.505"
SPECIMEN WIDTH: 2.983- 2.984"
REFERENCES: MA004

ALLOY STEEL

AF1410

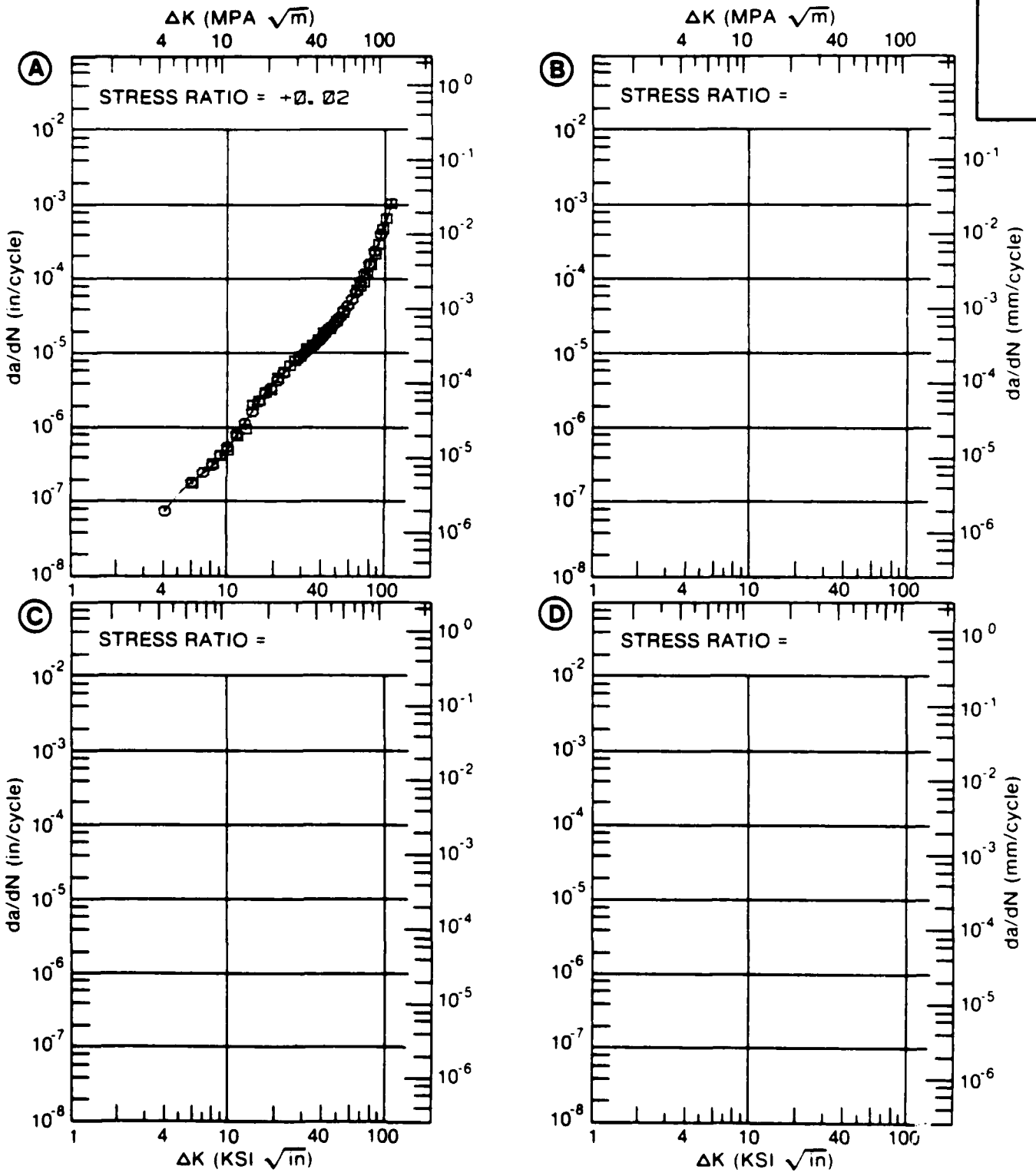


Figure 6.1.3.4

TABLE 6.2.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.2.3.1 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL AF1410(VIM-VAR)
CONDITION: 1650F 1HR WQ, 1500F 1HR WQ, 950F 5HRS AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. LAB AIR 30HZ	E= R.T. S.T.W. 1-30HZ		
DELTA K MIN	A:	8.60	.409			
	B:	13.62		2.29		
	C:					
	D:					
		9.00	.471			
		10.00	.646			
		13.00	1.34			
		16.00	2.28	3.40		
		20.00	3.88	5.49		
		25.00	6.39	8.40		
		30.00	9.45	11.7		
		35.00	13.1	15.4		
		40.00	17.2	19.8		
		50.00	27.3	31.1		
		60.00	39.9	47.4		
DELTA K MAX	A:	65.69	48.3			
	B:	62.59		52.7		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			4.86	9.34		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	2		
		1.25-2.0				
		>2.0				

CONDITION/HT: 1650F 1HR WQ. 1500F 1HR WQ. 950F 5HRS AC
FORM: 1.75"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.08
FREQUENCY:

YIELD STRENGTH: 234.0 KSI
ULT. STRENGTH: 248.1 KSI
SPECIMEN THK: 0.997- 0.998"
SPECIMEN WIDTH: 4.940"
REFERENCES: R1001

ALLOY STEEL

AF1410 (VIM-VAR)

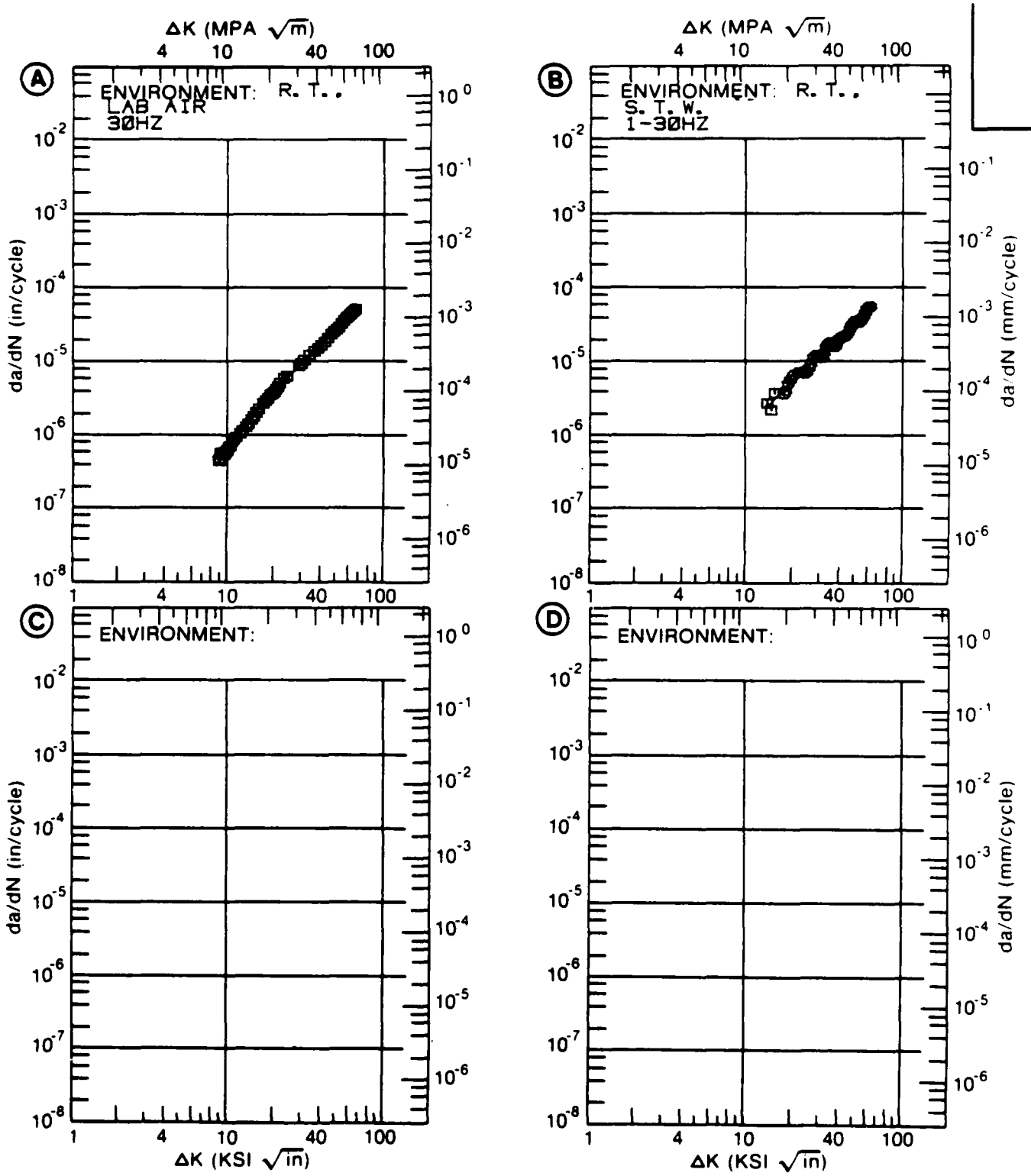


Figure 6.2.3.1

TABLE 6.2.3.2

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.2.3.2 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL AF1410(VIM-VAR)
CONDITION: 1650F 1HR WQ, 1500F 1HR WQ, 950F 5HRS AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=- 65F AIR 30HZ	E= R.T. LAB AIR 1-30HZ	E= R.T. 3.5% NACL 1-30HZ	
DELTA K MIN	A:	11.30	.684			
	B:	9.31		.575		
	C:	15.28			2.78	
	D:					
		10.00		.711		
		13.00	.947	1.45		
		16.00	1.53	2.40	3.09	
		20.00	2.55	3.95	4.97	
		25.00	4.23	6.37	7.57	
		30.00	6.33	9.36	10.5	
		35.00	8.85	13.0	14.0	
		40.00	11.8	17.5	18.1	
		50.00		29.3	29.5	
		60.00		46.5	47.1	
		70.00		71.1	74.5	
		80.00		106.		
		90.00		154.		
DELTA K MAX	A:	49.56	18.3			
	B:	93.58		176.		
	C:	70.51			76.2	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			4.10	9.36	16.05	
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8			1	
		0.8-1.25	1	3	2	
		1.25-2.0				
		>2.0				

CONDITION/HT: 1650F 1HR WQ. 1500F 1HR WQ. 950F 5HRS AC
FORM: 1.75"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: T-L
STRESS RATIO: +0.08
FREQUENCY:

YIELD STRENGTH: 234.0- 240.0 KSI
ULT. STRENGTH: 247.8- 258.2 KSI
SPECIMEN THK: 0.997- 1.002"
SPECIMEN WIDTH: 4.940- 4.950"
REFERENCES: R1001

ALLOY STEEL

AF1410 (VIM-VAR)

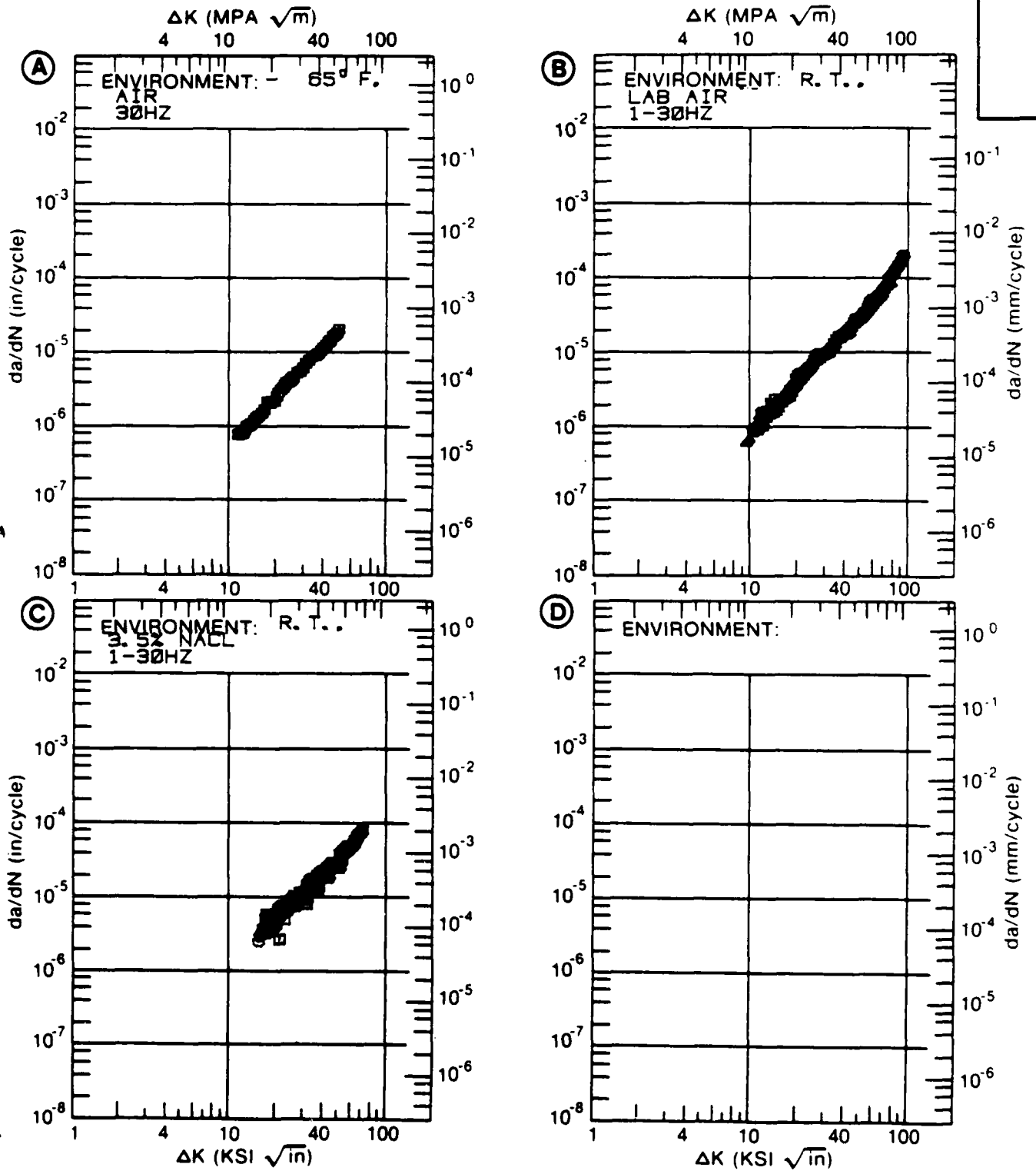


Figure 6.2.3.2

TABLE 6.2.3.3

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.2.3.3 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL AF1410(VIM-VAR)
CONDITION: 1650F 1HR WQ, 1500F 1HR WQ, 950F 5HRS AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. LAB AIR 10-30HZ	E= R.T. 3.5% NACL 1-30HZ		
DELTA K MIN	A:	8.38	.683			
	B:	19.33		5.72		
	C:					
	D:					
		9.00	.835			
		10.00	1.11			
		13.00	2.11			
		16.00	3.36			
		20.00	5.35	6.08		
		25.00	8.40	8.95		
		30.00	12.1	12.9		
		35.00	16.6	18.9		
		40.00	22.0	25.5		
		50.00	36.1	37.8		
		60.00	56.1			
DELTA K MAX	A:	68.03	77.7			
	B:	56.41		52.5		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			5.74	12.24		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: 1650F 1HR WQ. 1500F 1HR WQ. 950F 5HRS AC
FORM: 1.75"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: T-L
STRESS RATIO: +0.30
FREQUENCY:

YIELD STRENGTH: 234.0 KSI
ULT. STRENGTH: 247.8 KSI
SPECIMEN THK: 0.998"
SPECIMEN WIDTH: 4.940"
REFERENCES: R1001

ALLOY STEEL

AF1410 (VIM-VAR)

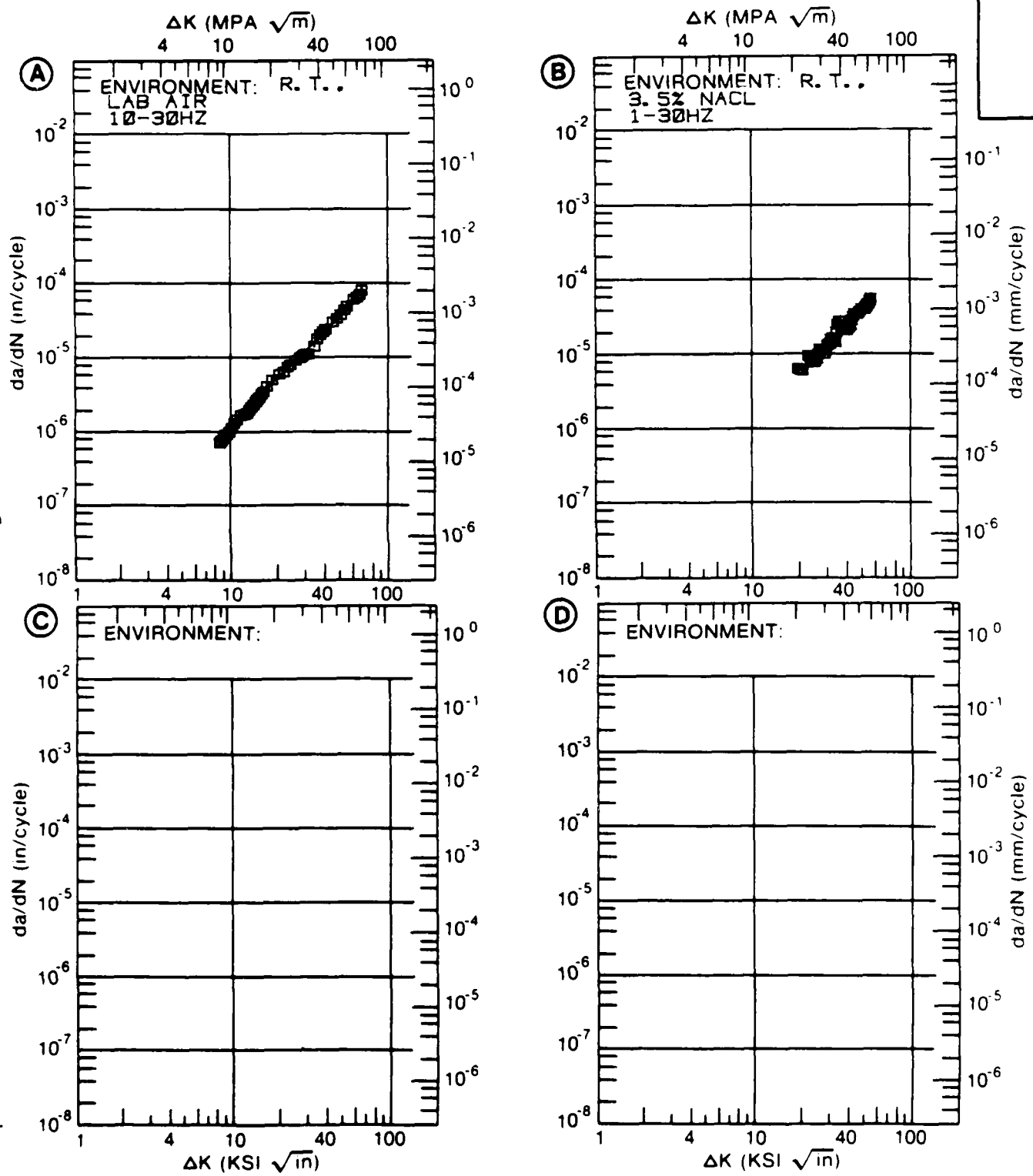


Figure 6.2.3.3

TABLE 6.3.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.3.3.1 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL A286
CONDITION: 1800F, 0.5-1.0HR, WQ, 1325F, 16HR, AC

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		E= R.T. LAB AIR, 3HZ	E=+ 600F AIR, .67HZ	E=+ 800F AIR, .67HZ	E=+1000F AIR, .67HZ
DELTA K MIN	A: 14.92	.474			
	B: 15.66		1.70		
	C: 15.62			2.39	
	D: 15.26				3.96
	16.00	.650	1.84	2.57	4.66
	20.00	1.59	3.94	5.01	8.86
	25.00	3.43	7.96	9.68	14.7
	30.00	6.09	13.9	16.7	21.6
	35.00	9.79	22.2	26.6	30.5
	40.00	14.9	33.8	40.1	42.8
	50.00	31.5			
DELTA K MAX	A: 53.83	41.2			
	B: 48.91		66.5		
	C: 48.76			75.7	
	D: 49.18				82.1
ROOT MEAN SQUARE PERCENT ERROR		4.21	3.95	4.12	2.90
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5				
	0.5-0.8				
	0.8-1.25	1	1	1	1
	1.25-2.0				
	>2.0				

CONDITION/HT: 1800F. 0.5-1.0HR. WQ. 1325F. 16HR. AC
FORM: 0.50"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.05
FREQUENCY:

YIELD STRENGTH: 100.0 KSI
ULT. STRENGTH: 159.5 KSI
SPECIMEN THK: 0.484- 0.487"
SPECIMEN WIDTH: 1.997- 2.001"
REFERENCES:HD006

ALLOY STEEL

A286

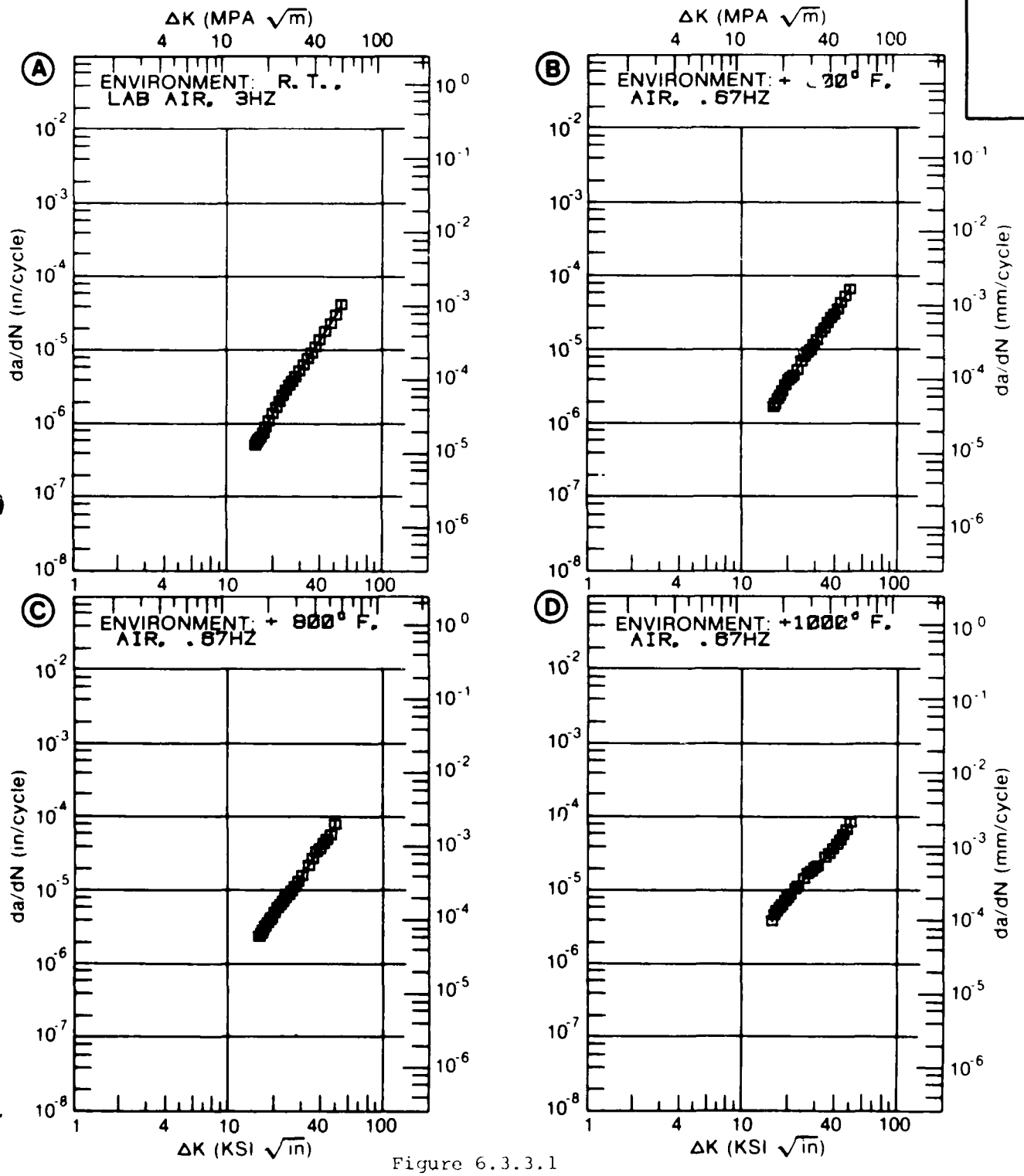


Figure 6.3.3.1

TABLE 6.3.3.2

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.3.3.2 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL A286
CONDITION: 1800F, 0.5-1.0HR, WQ, 1325F, 16HR, AC

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. LAB AIR, 3HZ	E=+ 600F AIR, .67HZ	E=+ 800F AIR, .67HZ	E=+1000F AIR, .67HZ
DELTA K MIN	A:	15.19	.638			
	B:	16.25		2.02		
	C:	16.59			1.93	
	D:	15.89				6.04
		16.00	.785			6.12
		20.00	1.82	3.69	3.54	9.69
		25.00	3.86	7.06	6.89	15.7
		30.00	6.76	12.3	11.7	24.1
		35.00	10.5	20.3	18.3	36.2
		40.00	15.0	32.3	27.5	53.5
		50.00		76.6	57.6	
DELTA K MAX	A:	45.10	20.4			
	B:	52.49		94.0		
	C:	54.51			78.9	
	D:	48.72				104.
ROOT MEAN SQUARE PERCENT ERROR			4.62	5.51	6.21	3.93
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1	1	1
		1.25-2.0				
		>2.0				

CONDITION/HT: 1800F. 0.5-1.0HR. WQ. 1325F. 16HR. AC
FORM: 0.50"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: T-L
STRESS RATIO: +0.05
FREQUENCY:

YIELD STRENGTH: 100.0 KSI
ULT. STRENGTH: 159.5 KSI
SPECIMEN THK: 0.486- 0.488"
SPECIMEN WIDTH: 1.999- 2.002"
REFERENCES:HD006

ALLOY STEEL

A286

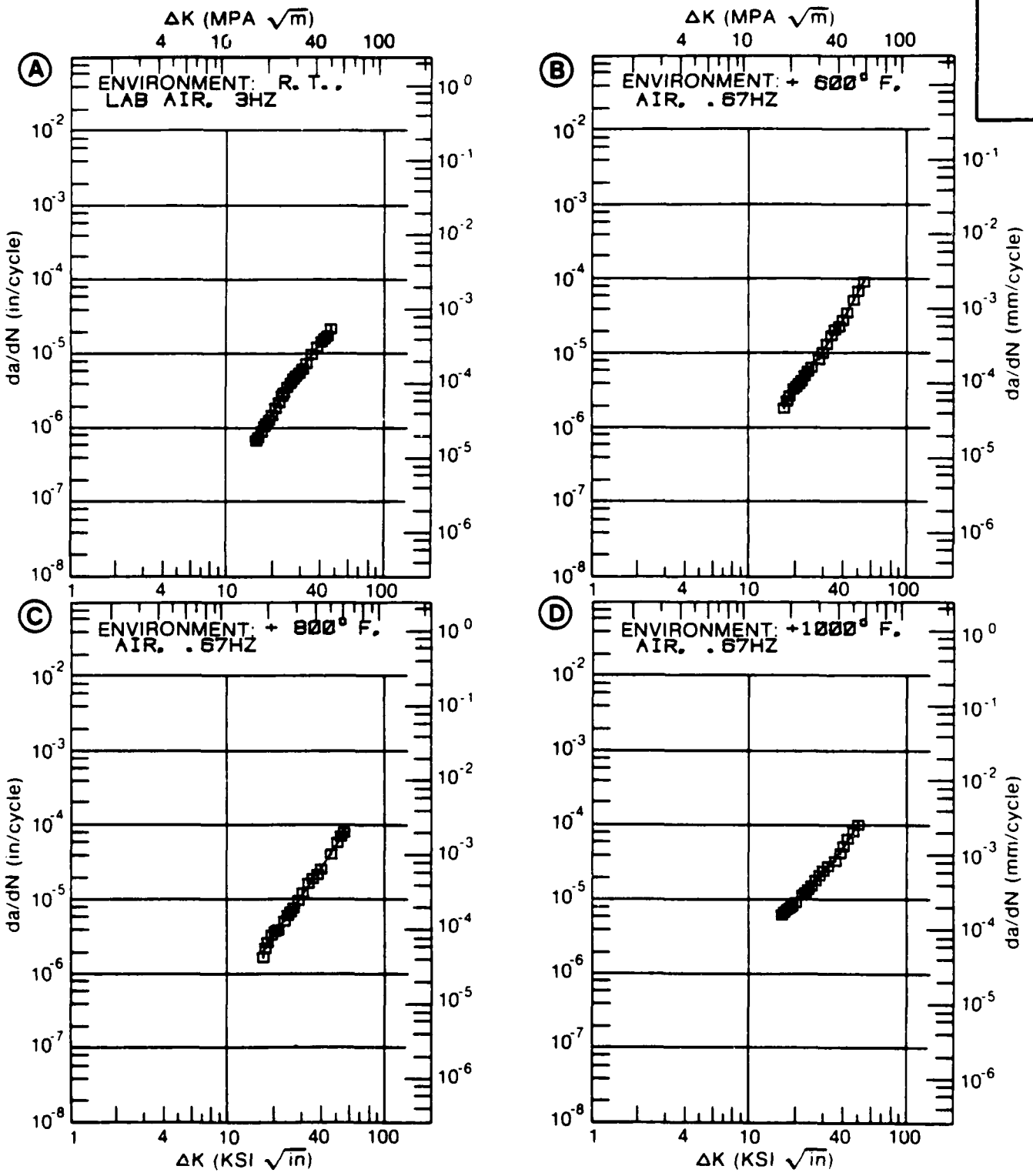


Figure 6.3.3.2

TABLE 6.3.3.3

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.3.3.3 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL A286
CONDITION: 1800F, 0.5-1.0HR, WQ, 1325F, 16HR, AC

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		E=+1000F AIR			
DELTA K MIN	A:				
	B:				
	C:				
	D:				
	200.00				
DELTA K MAX	A:				
	B:				
	C:				
	D:				

ROOT MEAN SQUARE PERCENT ERROR 0.00

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 1800F. 0.5-1.0HR. WQ. 1325F. 16HR. AC
FORM: 1.50"TH ROUND BAR
SPECIMEN TYPE: CT
ORIENTATION: R-L
STRESS RATIO: +0.05
FREQUENCY: 0.67 HZ

YIELD STRENGTH: 136.4 KSI
ULT. STRENGTH: 188.3 KSI
SPECIMEN THK: 0.290"
SPECIMEN WIDTH: 1.153"
REFERENCES: HD006

ALLOY STEEL

A286

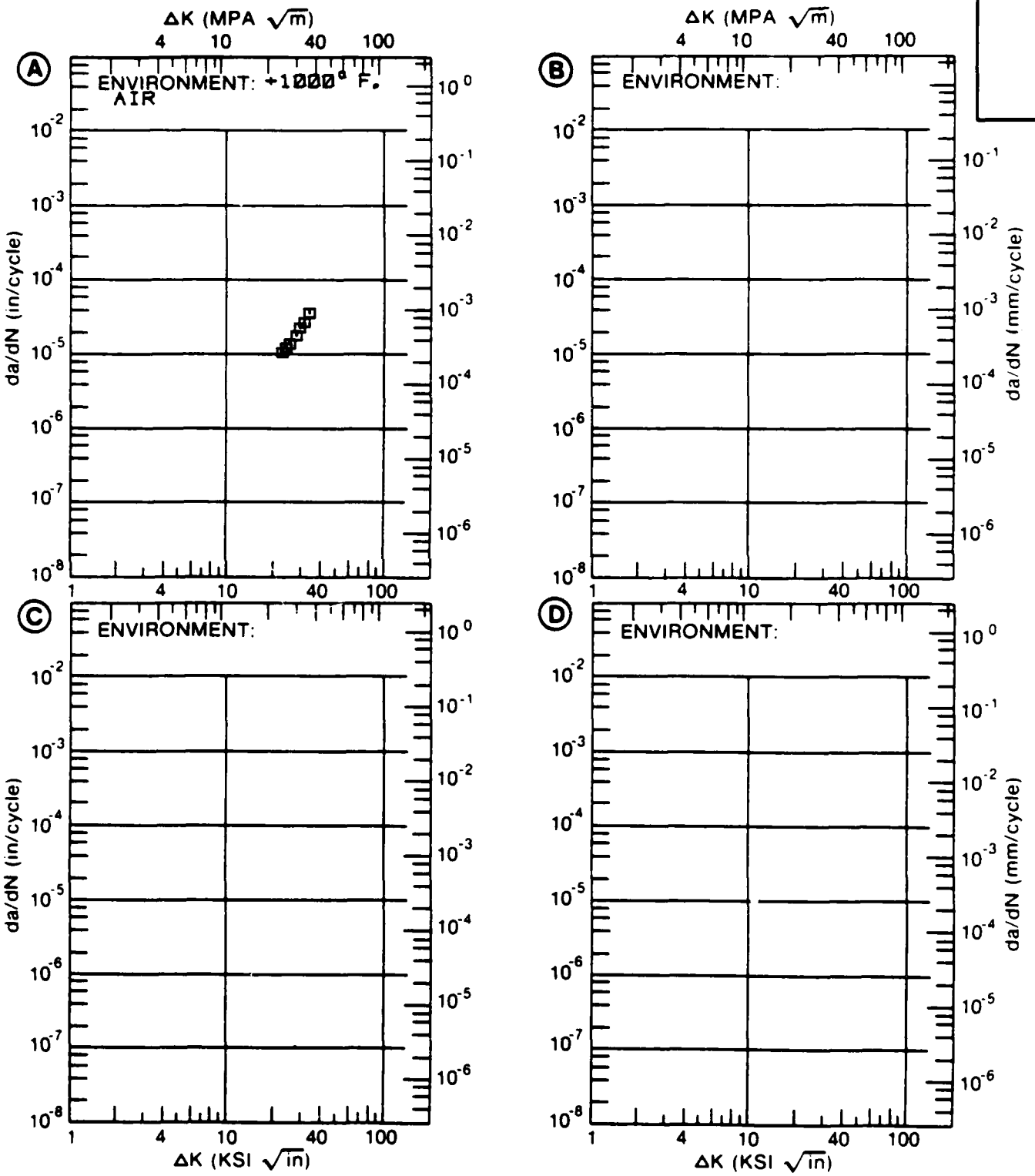


Figure 6.3.3.3

TABLE 6.3.3.4

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.3.3.4 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL A286
CONDITION: 1800F, 0.5-1.0HR, WQ, 1325F, 16HR, AC

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		E= R.T. LAB AIR, 3HZ	E=+ 600F AIR, .67HZ		
DELTA K MIN	A:				
	B:				
	C:				
	D:				
	200.00				
DELTA K MAX	A:				
	B:				
	C:				
	D:				
ROOT MEAN SQUARE PERCENT ERROR		0.00	0.00		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 1800F. 0.5-1.0HR. WQ. 1325F. 16HR. AC
FORM: 1.50"TH ROUND BAR
SPECIMEN TYPE: CT
ORIENTATION: R-C
STRESS RATIO: +0.05
FREQUENCY:

YIELD STRENGTH: 136.4 KSI
ULT. STRENGTH: 168.3 KSI
SPECIMEN THK: 0.401- 0.403"
SPECIMEN WIDTH: 0.795- 0.804"
REFERENCES:HD006

ALLOY STEEL

A286

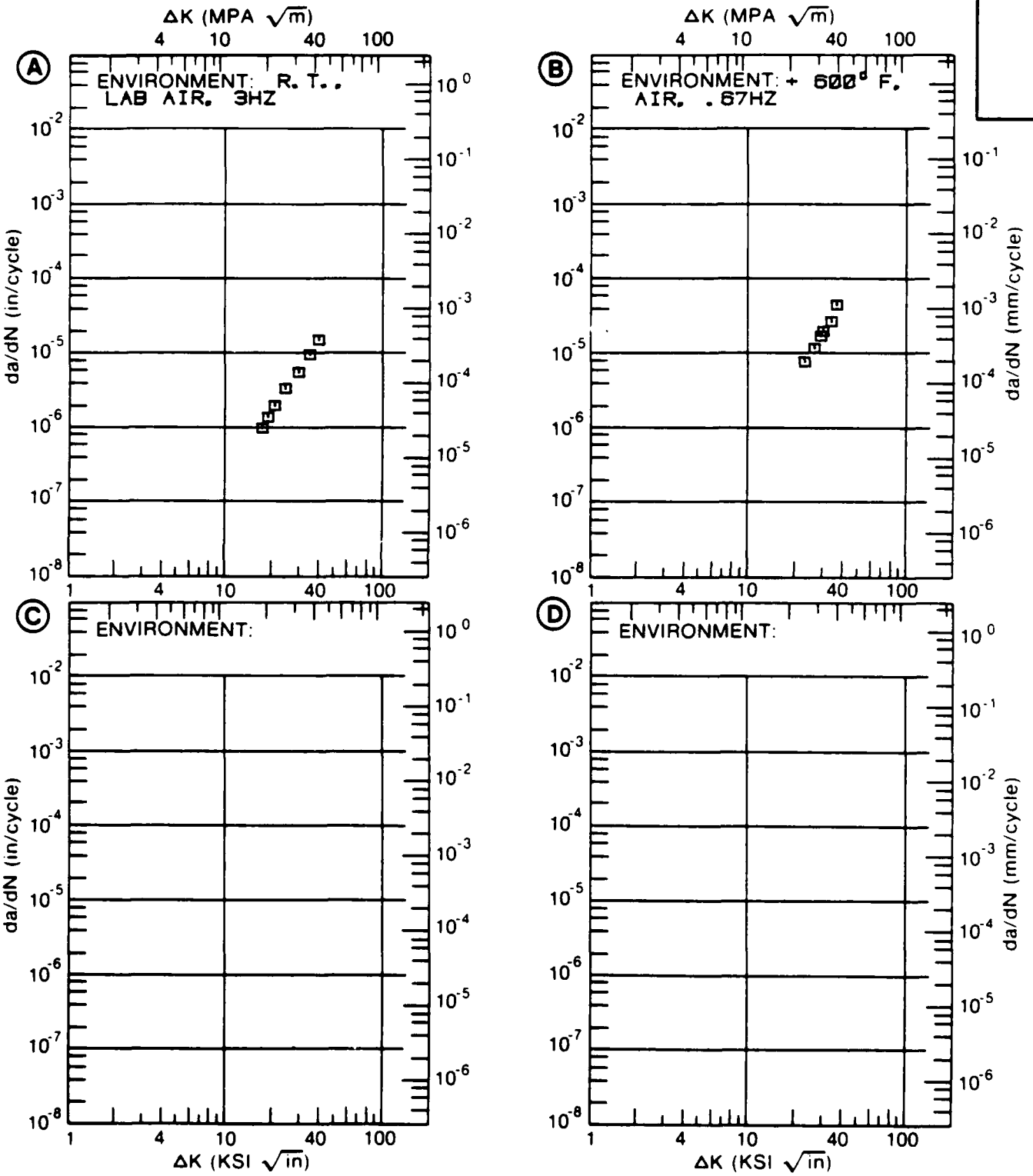


Figure 6.3.3.4

TABLE 6.4.1.1

MEAN PLANE STRAIN FRACTURE TOUGHNESS DATA OF
ALLOY STEEL D6AC AT ROOM TEMPERATURE

CONDITION/HT	MEAN KIC ± STANDARD DEVIATION (KSI SQRT(IN))		(NUMBER OF SPECIMENS)
PLATE			
CONDITION/HT	L-T	T-L	S-L
HEAT TREATED TO 46 RC HARDNESS	-----	85.8 ± 1.8 (2)	-----
1650F AUS-BAY QUENCH 975F, SQ 325F, 1000F 2+2 HR	66.9 ±18.7 (7)	-----	-----
1650F AUS-BAY QUENCH 975F, SQ 375F, 1000F 2+2 HR	62.2 ±14.0 (19)	-----	-----
1650F, AUS-BAY QUENCH 975F, SQ 400F, 1000F 2+2 HR	64.4 ±12.1 (103)	-----	-----
1700F, AUS-BAY QUENCH 975F, OQ 140F, 1000F 2+2 HR	92.0 ± 8.2 (30)	-----	-----
FORGING			
CONDITION/HT	L-T	T-L	S-L
1615F 2.25HR, A-SQ 325F, AC, 310-345F 3HR, 1080F 6-6.5HR	-----	78.4 ±15.1 (6)	83.9 ±14.8 (52)
1650F AUS-BAY QUENCH 975F, SQ 375F, 1000F 2+2 HR	46.0 ± 4.2 (8)	-----	-----

TABLE 6.4.1.1 (Con't)

MEAN PLANE STRAIN FRACTURE TOUGHNESS DATA OF
ALLOY STEEL D6AC AT ROOM TEMPERATURE

CONDITION/HT	MEAN KIC ± STANDARD (KSI SQRT(IN)) DEVIATION	(NUMBER OF SPECIMENS)

FORGING

CONDITION/HT	L-T	T-L	S-L
1650F, AUS-BAY QUENCH 975F, SQ 400F, 1000F 2+2 HR	66.2 ±12.3 (53)	-----	-----
1700F, AUS-BAY QUENCH 975F, OQ 140F, 1000F 2+2 HR	95.2 ± 6.4 (34)	-----	-----

BILLET

CONDITION/HT	L-T	T-L	S-L
1650F, 1 HR, FC 1650F 1 HR, OQ, 1025F 2+2 HR	78.5 ± 4.7 (2)	-----	-----
1650F, 1 HR, FC TO 960F, OQ AT 150F, AC, 1000F 2+2 HR	80.3 ± 0.8 (2)	-----	-----
1700F, 1 HR, FC TO 960F, OQ AT 150F, AC, 1000F 2+2 HR	80.3 ± 4.3 (3)	-----	-----
1700F, 1 HR, OQ, 1025F 2+2 HR	77.3 ± 2.6 (6)	-----	-----
1725F 1 HR, AC 1700F 1 HR, OQ, 1000F 1 HR, 1015F 1 HR	77.2 ± 2.7 (3)	-----	-----
1725F, 1 HR, AC 1700F 1 HR, OQ, 1100F 2+2 HR	101.2 ± 6.1 (6)	-----	-----

TABLE 6.4.1.1 (Con't)

MEAN PLANE STRAIN FRACTURE TOUGHNESS DATA OF
ALLOY STEEL D6AC AT ROOM TEMPERATURE

CONDITION/HT	MEAN KIC ± STANDARD DEVIATION (KSI SQRT(IN))	(NUMBER OF SPECIMENS)

BILLET

CONDITION/HT	L-I	T-L	S-L
1725F, 1 HR, AC 1700F 1 HR, OQ, 1025F 2+2 HR	74.4 ± 6.2 (6)	-----	-----
1725F, 1 HR, AC 1650F 1 HR, FC TO 960F, SQ 350F 0.5 HR, AC 1025F 2+2 HR	75.1 ±10.1 (3)	-----	-----

TABLE 6.4.1.2

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL D6AC

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT: DRY AIR AT R T.

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1650F A-BQ AT 975F, SQ AT 400F, 1000F 2+2HR	PLATE	0.09	0.10					5.58		
1650F A-BQ AT 975F, SQ AT 400F, 1000F 2+2HR	PLATE	0.09	1.00					5.24		
1650F A-BQ AT 975F, SQ AT 400F, 1000F 2+2HR	PLATE	0.09	3.00					5.43		
1700F A-BQ AT 975F, OQ AT 1400F, 1000F 2+2HR	PLATE	0.10	0.10					5.28	43.9	
1700F A-BQ AT 975F, OQ AT 1400F, 1000F 2+2HR	PLATE	0.10	1.00					5.88	43.4	
1700F A-BQ AT 975F, OQ AT 1400F, 1000F 2+2HR	PLATE	0.10	3.00					4.86	43.3	
1700F A-BQ, 975F OQ AT 140F, 1000F 2+2HRS	PLATE	0.50	0.10- 3.00					6.18		

TABLE 6.4.1.3

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL D6AC

TEST CONDITIONS

SPECIMEN ORIENTATION: L-T

ENVIRONMENT: LAB AIR AT R.T.

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1650F A-BQ AT 975F,SQ AT 400F, 1000F 2+2HR	PLATE	0.10	0.10						65.2	
1650F A-BQ AT 975F,SQ AT 400F, 1000F 2+2HR	PLATE	0.10	1.00					2.85		
1650F A-BQ AT 975F,SQ AT 400F, 1000F 2+2HR	PLATE	0.50	1.00					9.29		
1700F A-BQ AT 975F,OQ AT 140F, 1000F 2+2HR	PLATE	0.10	1.00					5.61	51.3	

TABLE 6.4.1.4

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL D6AC

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT: JP-4 FUEL AT R.T.

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1650F A-BQ AT 975F, SQ AT 400F, 1000F 2+2HR	PLATE	0.10	0.10					10.4		
1650F A-BQ AT 975F, SQ AT 400F, 1000F 2+2HR	PLATE	0.10	1.00					7.44		
1650F A-BQ AT 975F, SQ AT 400F, 1000F 2+2HR	PLATE	0.10	3.00				0.73	5.31		
1650F A-BQ AT 975F, SQ AT 400F, 1000F 2+2HR	PLATE	0.50	1.00				2.14	9.06		
1650F A-BQ AT 975F, SQ AT 400F, 1000F 2+2HR	PLATE	0.50	3.00				1.09	6.45		
1650F A-BQ AT 975F, SQ AT 375F, 1000F 2+2HR	FORGING	0.10	1.00				0.47	6.36		
1650F A-BQ AT 975F, SQ AT 400F, 1000F 2+2HR	FORGING	0.50	1.00					5.38		

TABLE 6.4.1.4 (Con't)

FATIQUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL D6AC

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT JP-4 FUEL AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIQUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2 5	5	10	20	50	100
1700F A-BQ AT 975F, OQ AT 140F, 1000F 2+2HR	PLATE	0 50	1 00					8 95		
1700F A-BQ AT 975F, OQ AT 140F, 1000F 2+2HR	PLATE	0 50	3 00					6 73		
1700F A-BQ AT 975F, OQ AT 140F, 1000F 2+2HR	FORGING	0 10	0 10					14 8	87 6	
1700F A-BQ AT 975F, OQ AT 140F, 1000F 2+2HR	FORGING	0 10	1 00					8 37	37 4	
1700F A-BQ AT 975F, OQ AT 140F, 1000F 2+2HR	FORGING	0 10	3 00					3 73	38 7	

TABLE 6.4.1.5

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL D6AC

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT DIST H2O AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1650F A-BQ AT 975F, SQ AT 375F, 1000F 2+2HR	FORGING	0.10	1.00				932	7.55		
1650F A-BQ AT 975F, SQ AT 375F, 1000F 2+2HR	FORGING	0.50	1.00					13.9		
1700F A-BQ AT 975F, OQ AT 140F, 1000F 2+2HR	PLATE	0.50	1.00				2.33	12.2		
1700F A-BQ AT 975F, OQ AT 140F, 1000F 2+2HR	PLATE	0.50	3.00				1.43	8.56		
1700F A-BQ AT 975F, OQ AT 140F, 1000F 2+2HR	PLATE	0.11	0.10					23.4		
1700F A-BQ AT 975F, OQ AT 140F, 1000F 2+2HR	PLATE	0.11	1.00					10.7		
1700F A-BQ AT 975F, OQ AT 140F, 1000F 2+2HR	PLATE	0.11	3.00					5.88		

TABLE 6.4.1.5 (Con't)

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL D6AC

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT DIST H20 AT R.T.

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1700F A-BQ AT 975F, OQ AT 140F, 1000F 2+2HR	FORGING	0.10	0.10					15.7		
1700F A-BQ AT 975F, OQ AT 140F, 1000F 2+2HR	FORGING	0.10	1.00					9.51		
1700F A-BQ AT 975F, OQ AT 140F, 1000F 2+2HR	FORGING	0.10	3.00					6.47		
1700F A-BQ AT 975F, OQ AT 140F, 1000F 2+2HR	FORGING	0.48	1.00					11.4		

TABLE 6.4.2.1

ALLOY STEEL D6AC K(IC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5*(K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
HEAT TREATED	P	- --	R T	T-L	206.0	1 401	0 700	NB	0 711	0.42	84.50			1971	B4029
TO 46 RC		- --			206.0	1 400	0.700	NB	0.717	0.45	87.00			1971	B4029
HARDNESS												85 8/	1.8		
1615F 2.25HR,	F	- ---	R T	L-S	197.9	2 000	1.006	CT	1.046	0.28	67 37			1979	MD001
A-BQ 325F, AC,		--- -			198.0	2.000	1.001	CT	1.061	0.29	68.26			1979	MD001
310-345F 3HR,		----			199.8	1 997	1.001	CT	1.041	0.21	58.33			1980	MD001
10P0F 6-6 5HR												64.7/	5.5		
1615F 2.25HR,	F	----	R T.	T-L	198.1	2.001	1.005	CT	1.048	0.33	72.62			1979	MD001
A-BQ 325F, AC,		-- -			198.1	2.000	1.005	CT	1.072	0.55	93.00			1979	MD001
310-345F 3HR,		-- -			198.5	2.000	1.005	CT	1.069	0.55	93.67			1979	MD001
10P0F 6-6 5HR		----			198.5	2.000	1.001	CT	1.060	0.49	87.89			1979	MD001
		----			207.5	1.998	1.002	CT	1.024	0.20	59.04			1980	MD001
		----			207.5	1.997	1.000	CT	1.035	0.23	64.27	78.4/	15.1	1980	MD001
1615F 2.25HR,	F	----	R T	S-L	186.7	1.999	1.005	CT	1.042	0.71	99.54			1978	MD001
A-BQ 325F, AC,		--- -			186.7	2.000	1.005	CT	1.030	0.36	71.78			1978	MD001
310-345F 3HR,		----			186.7	2.000	1.005	CT	1.045	0.55	88.32			1978	MD001
10P0F 6-6 5HR		----			187.2	1.987	0.996	CT	1.040	0.76	103.67			1979	MD001
		----			187.2	1.989	0.996	CT	1.003	0.81	106.64			1978	MD001
		-- -			187.2	1.990	1.002	CT	1.021	0.76	103.25			1978	MD001
		----			189.5	1.992	0.994	CT	1.016	0.63	95.25			1978	MD001
		--- -			189.5	1.996	0.995	CT	1.034	0.61	93.78			1978	MD001
		----			189.5	1.994	0.994	CT	1.023	0.63	95.37			1978	MD001
		----			189.5	1.997	0.993	CT	1.033	0.31	67.12			1978	MD001
		----			189.5	1.996	1.003	CT	1.024	0.35	71.23			1978	MD001
		----			189.5	1.993	0.994	CT	1.012	0.34	70.02			1978	MD001
		----			191.0	2.001	0.990	CT	1.028	0.37	73.64			1979	MD001
		----			191.0	1.995	0.992	CT	1.021	0.45	81.67			1979	MD001
		--- -			191.0	2.002	0.991	CT	1.027	0.46	82.63			1979	MD001
		----			191.9	1.988	1.003	CT	1.033	0 57	92.34			1978	MD001
		----			191.9	1.996	1.003	CT	1.043	0.54	89.64			1978	MD001
		-- -			191.9	1.994	1.002	CT	1 035	0.50	86 37			1978	MD001
		--			192.8	2.004	0 991	CT	1.015	0 18	53 02			1979	MD001
		----			192.8	2 000	0 991	CT	1.019	0 17	51.11			1979	MD001
		--- -			192.8	2.000	0.991	CT	1.037	0.16	48.96			1979	MD001

TABLE 6.4.2.1 (Con't)

ALLOY STEEL D6AC K(IC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5*(K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) STAN MEAN	K(IC) STAN DEV	DATE	REFER
1615F 2.25HR,	F	- -	R.T.	S-L	193.0	2.000	1.000	CT	1.044	0.34	71.92			1979	MD001
A-BQ 225F, AC,		- -			193.0	1.999	0.965	CT	1.023	0.54	89.71			1979	MD001
310 345F 3HR,		- -			193.8	2.000	0.992	CT	1.024	0.30	68.14			1977	MD001
1080F 6-A 5HR		- -			193.8	2.000	1.001	CT	1.049	0.31	69.12			1977	MD001
		- -			193.8	1.998	1.000	CT	1.031	0.27	64.19			1978	MD001
		- - -			194.1	2.001	0.997	CT	1.036	0.61	96.00			1980	MD001
		- -			194.1	1.999	0.999	CT	1.076	0.41	78.90			1980	MD001
		- - -			194.1	1.999	0.996	CT	1.037	0.47	84.17			1980	MD001
		- - -			194.4	1.998	1.000	CT	1.026	0.43	80.69			1978	MD001
		- -			194.5	2.000	1.004	CT	1.050	0.55	91.67			1977	MD001
		- - -			194.5	2.000	1.004	CT	1.062	0.55	91.59			1977	MD001
		- -			195.5	1.999	1.002	CT	1.057	0.30	68.54			1979	MD001
		- - -			195.5	2.000	1.004	CT	1.025	0.29	67.40			1979	MD001
		- - -			196.3	1.999	1.003	CT	1.057	0.45	83.50			1979	MD001
		- -			196.3	2.000	1.005	CT	1.040	0.55	92.69			1979	MD001
		- - -			196.3	1.998	1.000	CT	1.045	0.36	75.10			1978	MD001
		- - -			196.3	2.001	1.000	CT	1.058	0.60	96.67			1977	MD001
		- -			196.9	1.999	1.002	CT	1.011	0.65	101.04			1978	MD001
		- - -			196.9	1.999	1.002	CT	1.017	0.67	102.31			1979	MD001
		- -			196.9	1.999	1.002	CT	1.034	0.63	99.31			1978	MD001
		- -			200.2	1.999	1.007	CT	1.014	0.38	78.63			1978	MD001
		- -			200.2	1.999	1.007	CT	1.025	0.35	75.67			1978	MD001
		- - -			200.2	1.999	1.007	CT	1.027	0.35	75.91			1978	MD001
		- - -			201.5	1.997	0.999	CT	1.037	0.67	104.62			1978	MD001
		- - -			201.5	1.997	0.999	CT	1.052	0.60	99.19			1978	MD001
		- - -			201.5	1.997	1.000	CT	1.036	0.65	103.09			1978	MD001
		- - -			202.3	2.001	0.999	CT	1.042	0.55	95.58			1977	MD001
		- - -			202.3	2.000	1.000	CT	1.042	0.56	95.80			1977	MD001
		- - -			202.3	2.003	1.000	CT	1.038	0.55	95.21			1977	MD001
		- - -			202.7	2.000	1.002	CT	1.037	0.32	73.46			1980	MD001
		- - -			202.7	1.998	1.001	CT	1.037	0.25	65.34	83.9/	14.8	1980	MD001
1650F AUS-BAY	P	1.50	- 65	L-T	228.0	1.499	0.750	CT	0.760	0.06	35.80			1972	82543
QUENCH 975F,50		0.00			228.0	1.502	0.757	CT	0.759	0.11	47.00			1972	82543
325F,1000F		1.50			228.0	1.501	0.750	CT	0.790	0.05	31.20			1972	82543
2+2 HR		1.50			228.0	1.499	0.750	CT	0.854	0.05	34.10	37.0/	6.9	1972	82543

TABLE 6.4.2.1 (Con't)

ALLOY STEEL D6AC K(IC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5*(K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
1650F AUS-BAY	F	1.50	- 40	L-T	227.0	1.500	0.750	CT	0.771	0.05	32.00			1972	82543
QUENCH 975F,SQ		1.50			227.0	1.502	0.750	CT	0.781	0.06	36.10			1972	82543
325F,1000F 2+2 HR												34.1/	2.9		
1650F AUS-BAY	P	0.80	- 20	L-T	226.0	1.503	0.757	CT	0.765	0.15	54.60			1972	82543
QUENCH 975F,SQ		1.50			226.0	1.499	0.749	CT	0.811	0.06	34.50			1972	82543
325F,1000F		1.50			226.0	1.500	0.750	CT	0.786	0.06	34.60			1972	82543
2+2 HR		0.80			226.0	1.502	0.757	CT	0.769	0.15	55.70			1972	82543
		1.50			226.0	1.500	0.750	CT	0.777	0.07	37.20	43.3/	10.9	1972	82543
1650F AUS-BAY	P	1.50	0	L-T	224.0	1.499	0.750	CT	0.789	0.10	45.60			1972	82543
QUENCH 975F,SQ		1.50			224.0	1.499	0.750	CT	0.784	0.08	40.70			1972	82543
325F,1000F		1.50			224.0	1.499	0.750	CT	0.817	0.08	39.60			1972	82543
2+2 HR												42.0/	3.2		
1650F AUS-BAY	P	1.50	20	L-T	222.0	1.503	0.750	CT	0.768	0.10	44.60			1972	82543
QUENCH 975F,SQ		1.50			222.0	1.500	0.750	CT	0.837	0.08	39.60			1972	82543
325F,1000F		1.50			222.0	1.499	0.750	CT	0.780	0.06	35.80			1972	82543
2+2 HR												40.0/	4.4		
1650F AUS-BAY	P	1.50	40	L-T	220.0	1.499	0.751	CT	0.787	0.13	50.00			1972	82543
QUENCH 975F,SQ		1.50			220.0	1.503	0.750	CT	0.777	0.08	38.70			1972	82543
325F,1000F		1.50			220.0	1.502	0.748	CT	0.815	0.11	45.50			1972	82543
2+2 HR												44.7/	5.7		
1650F AUS-BAY	P	1.50	R.T.	L-T	217.0	1.498	0.755	CT	0.790	0.13	48.70			1972	82543
QUENCH 975F,SQ		0.80			217.0	1.504	0.757	CT	0.767	0.35	81.00			1972	82543
325F,1000F		0.80			217.0	1.502	0.757	CT	0.750	0.34	80.10			1972	82543
2+2 HR		0.80			217.0	1.502	0.755	CT	0.765	0.37	83.60			1972	82543
		1.50			217.0	1.501	0.755	CT	0.815	0.12	46.50			1972	82543
		1.50			217.0	1.502	0.756	CT	0.777	0.11	45.80			1972	82543
		0.80			217.0	1.499	0.750	CT	0.769	0.36	82.70	66.9/	18.7	1972	82543
1650F AUS-BAY	P	1.50	175	L-T	211.0	1.499	0.750	CT	0.768	0.32	76.30			1972	82543
QUENCH 975F,SQ		1.50			211.0	1.502	0.750	CT	0.823	0.32	75.40			1972	82543
325F,1000F		1.50			211.0	1.498	0.750	CT	0.763	0.30	72.50			1972	82543
2+2 HR												74.7/	2.0		
1650F AUS-BAY	P	1.50	300	L-T	204.0	1.496	0.751	CT	0.763	0.61	100.80			1972	82543
QUENCH 975F,SQ 325F,1000F 2+2 HR															

TABLE 6.4.2.1 (Con't)

ALLOY STEEL D6AC K(IC)

CONDITION	PRODUCT FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5*(K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
1650F AUS-BAY	P	1.50	300	L-T	204.0	1.501	0.750	CT	0.798	0.67	105.40			1972	82543
QUENCH 975F,SO		1.50			204.0	1.503	0.750	CT	0.772	0.68	106.40			1972	82543
375F,1000F 2+2 HR												104.2/	3.0		
1650F AUS-BAY	P	1.50	R.T	L-T	217.0	1.199	0.599	CT	0.625	0.35	81.10			1972	82543
QUENCH 975F,SO		1.50			217.0	1.202	0.608	CT	0.645	0.17	56.80			1972	82543
375F,1000F		1.50			217.0	1.200	0.605	CT	0.619	0.12	47.40			1972	82543
2+2 HR		1.50			217.0	1.205	0.605	CT	0.641	0.30	75.10			1972	82543
		1.50			217.0	1.204	0.605	CT	0.648	0.21	62.60			1972	82543
		1.50			217.0	1.199	0.608	CT	0.612	0.14	50.40			1972	82543
		1.50			217.0	1.200	0.605	CT	0.630	0.41	87.90			1972	82543
		1.50			217.0	1.193	0.604	CT	0.610	0.12	46.80			1972	82543
		1.50			217.0	1.195	0.605	CT	0.621	0.26	69.40			1972	82543
		1.50			217.0	1.211	0.607	CT	0.632	0.14	50.40			1972	82543
		1.50			217.0	1.201	0.600	CT	0.599	0.23	66.30			1972	82543
		1.50			217.0	1.203	0.608	CT	0.623	0.12	47.70			1972	82543
		1.50			217.0	1.204	0.607	CT	0.628	0.25	68.20			1972	82543
		1.50			217.0	1.197	0.604	CT	0.644	0.28	72.20			1972	82543
		1.50			217.0	1.198	0.605	CT	0.636	0.18	57.80			1972	82543
		1.50			217.0	1.202	0.604	CT	0.641	0.31	76.50			1972	82543
		1.50			217.0	1.201	0.602	CT	0.618	0.32	77.90			1972	82543
		1.50			217.0	1.196	0.608	CT	0.642	0.09	40.20			1972	82543
		1.50			217.0	1.201	0.599	CT	0.618	0.12	48.00	62.2/	14.0	1972	82543
1650F AUS-BAY	F	1.50	- 65	L-T	225.0	1.507	0.756	CT	0.773	0.05	31.80			1972	82543
QUENCH 975F,SO		1.50			225.0	1.507	0.756	CT	0.773	0.05	31.80			1972	82543
375F,1000F 2+2 HR												31.8/	0.0		
1650F AUS-BAY	F	1.50	- 20	L-T	222.0	1.506	0.755	CT	0.768	0.06	35.50			1972	82543
QUENCH 975F,SO		1.50			222.0	1.506	0.755	CT	0.758	0.06	34.50			1972	82543
375F,1000F		1.50			222.0	1.504	0.753	CT	0.755	0.06	34.50			1972	82543
2+2 HR												34.8/	0.6		
1650F AUS BAY	F	1.50	0	L-T	220.0	1.504	0.755	CT	0.791	0.06	34.60			1972	82543
QUENCH 975F,SO 375F,1000F 2+2 HR															
1650F AUS-BAY	F	1.50	20	L-T	218.0	1.506	0.755	CT	0.782	0.08	39.00			1972	82543
QUENCH 975F,SO 375F,1000F 2+2 HR															

TABLE 6.4.2.1 (Con't)

ALLOY STEEL D6AC K(IC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5*(K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
1650F AUS BAY	F	1.50	20	L-T	218.0	1.503	0.751	CT	0.785	0.06	33.50			1972	82543
QUENCH 975F,SQ		1.50			218.0	1.506	0.756	CT	0.773	0.08	39.90			1972	82543
375F,1000F 2+2 HR												37.5/	3.5		
1650F AUS-BAY	F	1.50	R T	L-T	214.0	1.503	0.755	CT	0.794	0.11	44.70			1972	82543
QUENCH 975F,SQ		1.50			214.0	1.501	0.753	CT	0.771	0.13	48.40			1972	82543
375F,1000F		1.50			214.0	1.504	0.750	CT	0.783	0.10	42.40			1972	82543
2+2 HR		1.50			214.0	1.514	0.755	CT	0.764	0.12	46.10			1972	82543
		1.50			214.0	1.497	0.753	CT	0.762	0.16	54.40			1972	82543
		1.50			214.0	1.508	0.755	CT	0.766	0.11	45.10			1972	82543
		1.50			214.0	1.502	0.750	CT	0.768	0.12	46.80			1972	82543
		1.50			214.0	1.502	0.753	CT	0.767	0.09	40.30	46.0/	4.2	1972	82543
1650F AUS-BAY	F	1.50	175	L-T	208.0	1.501	0.755	CT	0.780	0.19	57.30			1972	82543
QUENCH 975F,SQ		1.50			208.0	1.503	0.750	CT	0.775	0.33	75.60			1972	82543
375F,1000F		1.50			208.0	1.497	0.750	CT	0.773	0.20	59.40			1972	82543
2+2 HR												64.1/	10.0		
1650F AUS-BAY	F	1.50	300	L-T	201.0	1.501	0.753	CT	0.762	0.51	90.50			1972	82543
QUENCH 975F,SQ		1.50			201.0	1.502	0.755	CT	0.779	0.54	93.40			1972	82543
375F,1000F 2+2 HR												92.0/	2.1		
1650F,AUS-BAY	P	0.80	- 65	L-T	228.0	1.501	0.755	CT	0.743	0.04	30.40			1972	82543
QUENCH 975F,SQ		0.80			228.0	1.503	0.751	CT	0.748	0.06	34.70			1972	82543
400F,1000F		0.80			228.0	1.504	0.755	CT	0.763	0.05	31.90			1972	82543
2+2 HR		0.80			228.0	1.504	0.758	CT	0.763	0.05	31.80			1972	82543
		0.80			228.0	1.507	0.759	CT	0.758	0.07	37.30	33.2/	2.8	1972	82543
1650F,AUS-BAY	P	0.80	- 40	L-T	227.0	1.499	0.758	CT	0.770	0.06	36.70			1972	82543
QUENCH 975F,SQ		0.80			227.0	1.502	0.693	CT	0.750	0.07	37.00			1972	82543
400F,1000F		0.80			227.0	1.498	0.757	CT	0.758	0.07	37.60			1972	82543
2+2 HR		0.80			227.0	1.496	0.757	CT	0.760	0.07	38.50			1972	82543
		0.80			227.0	1.503	0.693	CT	0.765	0.07	37.30			1972	82543
		0.80			228.0	1.201	0.599	CT	0.624	0.08	41.20			1972	82543
		0.80			228.0	1.201	0.599	CT	0.608	0.08	41.40	38.5/	2.0	1972	82543
1650F,AUS-BAY	P	0.80	- 20	L-T	226.0	1.501	0.757	CT	0.748	0.08	39.10			1972	82543
QUENCH 975F,SQ 400F,1000F 2+2 HR															

TABLE 6.4.2.1 (Con't)

ALLOY STEEL D6AC K(IC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
1650F,AUS-BAY	P	0.80	- 20	L-T	226.0	1.498	0.757	CT	0.755	0.08	39.60			1972	82543
QUENCH 975F,SQ		0.80			226.0	1.501	0.755	CT	0.756	0.08	40.80			1972	82543
400F,1000F		0.80			226.0	1.501	0.757	CT	0.756	0.08	37.90			1972	82543
2+2 HR		0.80			226.0	1.502	0.757	CT	0.754	0.07	42.30	40.3/	1.3	1972	82543
1650F,AUS-BAY	P	0.80	0	L-T	224.0	1.496	0.757	CT	0.781	0.09	42.40			1972	82543
QUENCH 975F,SQ		0.80			224.0	1.498	0.758	CT	0.772	0.10	44.50			1972	82543
400F,1000F		0.80			224.0	1.497	0.757	CT	0.746	0.08	40.20			1972	82543
2+2 HR												42.4/	2.2		
1650F,AUS-BAY	P	0.80	20	L-T	222.0	1.500	0.757	CT	0.764	0.12	47.70			1972	82543
QUENCH 975F,SQ		0.80			222.0	1.502	0.758	CT	0.769	0.12	47.60			1972	82543
400F,1000F		0.80			222.0	1.503	0.758	CT	0.778	0.08	40.90			1972	82543
2+2 HR												45.4/	3.9		
1650F,AUS-BAY	P	0.80	40	L-T	220.0	1.502	0.758	CT	0.770	0.15	54.30			1972	82543
QUENCH 975F,SQ		0.80			220.0	1.501	0.758	CT	0.773	0.14	51.30			1972	82543
400F,1000F 2+2 HR												52.8/	2.1		
1650F,AUS-BAY	P	0.80	R.T.	L-T	217.0	1.504	0.749	CT	0.767	0.39	86.10			1972	82543
QUENCH 975F,SQ		0.80			217.0	1.502	0.747	CT	0.771	0.42	89.40			1972	82543
400F,1000F		0.80			217.0	1.197	0.608	CT	0.622	0.16	54.20			1972	82543
2+2 HR		0.80			217.0	1.504	0.692	CT	0.752	0.16	56.00			1972	82543
		0.80			217.0	1.197	0.606	CT	0.622	0.28	56.10			1972	82543
		0.80			217.0	1.505	0.671	CT	0.755	0.15	53.90			1972	82543
		0.80			217.0	1.503	0.750	CT	0.768	0.14	52.00			1972	82543
		0.80			217.0	1.505	0.692	CT	0.765	0.18	59.00			1972	82543
		0.80			217.0	1.498	0.757	CT	0.756	0.24	66.60			1972	82543
		0.80			217.0	1.500	0.754	CT	0.762	0.36	81.70			1972	82543
		0.80			217.0	1.198	0.605	CT	0.623	0.20	61.90			1972	82543
		0.80			217.0	1.505	0.692	CT	0.747	0.18	57.70			1972	82543
		0.80			217.0	1.501	0.750	CT	0.756	0.16	54.00			1972	82543
		0.80			217.0	1.202	0.604	CT	0.633	0.35	80.80			1972	82543
		0.80			217.0	1.199	0.608	CT	0.617	0.34	79.60			1972	82543
		0.80			217.0	1.200	0.607	CT	0.624	0.35	81.50			1972	82543
		0.80			217.0	1.200	0.607	CT	0.622	0.28	73.30			1972	82543
		0.80			217.0	1.505	0.694	CT	0.770	0.16	55.70			1972	82543
		0.80			217.0	1.199	0.607	CT	0.624	0.36	81.90			1972	82543
		0.80			217.0	1.500	0.755	CT	0.762	0.24	66.70			1972	82543

TABLE 6.4.2.1 (Con't)

ALLOY STEEL D6AC K(IC)

CONDITION	-PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	------SPECIMEN------ WIDTH (IN) W	THICK (IN) B	DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	STAN DEV	DATE	REFER
1650F, AUS-BAY	P	0.80	R.T.	L-T	217.0	1.505	0.692	CT	0.762	0.19	60.20			1972	82543
QUENCH 975F, 5@		0.80			217.0	1.498	0.757	CT	0.771	0.29	70.60			1972	82543
400F, 1000F		0.80			217.0	1.202	0.607	CT	0.621	0.21	63.40			1972	82543
2+2 HR		0.80			217.0	1.505	0.694	CT	0.753	0.20	61.80			1972	82543
		0.80			217.0	1.496	0.756	CT	0.747	0.45	92.30			1972	82543
		0.80			217.0	1.502	0.692	CT	0.779	0.20	61.90			1972	82543
		0.80			217.0	1.501	0.692	CT	0.755	0.10	43.90			1972	82543
		0.80			217.0	1.203	0.608	CT	0.625	0.29	73.40			1972	82543
		0.80			217.0	1.193	0.605	CT	0.613	0.17	57.50			1972	82543
		0.80			217.0	1.501	0.752	CT	0.765	0.11	46.40			1972	82543
		0.80			217.0	1.502	0.695	CT	0.762	0.10	44.50			1972	82543
		0.80			217.0	1.197	0.607	CT	0.625	0.42	88.80			1972	82543
		0.80			217.0	1.505	0.694	CT	0.755	0.19	59.40			1972	82543
		0.80			217.0	1.203	0.600	CT	0.635	0.18	58.90			1972	82543
		0.80			217.0	1.200	0.608	CT	0.616	0.18	58.60			1972	82543
		0.80			217.0	1.198	0.603	CT	0.636	0.17	56.00			1972	82543
		0.80			217.0	1.500	0.751	CT	0.729	0.32	77.10			1972	82543
		0.80			217.0	1.201	0.600	CT	0.622	0.19	59.50			1972	82543
		0.80			217.0	1.199	0.605	CT	0.621	0.44	91.00			1972	82543
		0.80			217.0	1.198	0.606	CT	0.619	0.18	58.00			1972	82543
		0.80			217.0	1.501	0.759	CT	0.756	0.18	48.50			1972	82543
		0.80			217.0	1.198	0.608	CT	0.622	0.14	52.10			1972	82543
		0.80			217.0	1.494	0.756	CT	0.755	0.18	58.60			1972	82543
		0.80			217.0	1.200	0.607	CT	0.620	0.31	76.80			1972	82543
		0.80			217.0	1.197	0.608	CT	0.617	0.31	76.60			1972	82543
		0.80			217.0	1.505	0.694	CT	0.758	0.21	62.90			1972	82543
		0.80			217.0	1.502	0.754	CT	0.766	0.37	83.60			1972	82543
		0.80			217.0	1.505	0.692	CT	0.759	0.16	55.40			1972	82543
		0.80			217.0	1.496	0.748	CT	0.744	0.20	60.80			1972	82543
		0.80			217.0	1.504	0.693	CT	0.776	0.17	57.20			1972	82543
		0.80			217.0	1.505	0.691	CT	0.747	0.18	59.00			1972	82543
		0.80			217.0	1.199	0.606	CT	0.613	0.33	79.30			1972	82543
		0.80			217.0	1.505	0.753	CT	0.765	0.14	50.60			1972	82543
		0.80			217.0	1.203	0.608	CT	0.619	0.42	88.90			1972	82543
		0.80			217.0	1.201	0.608	CT	0.615	0.19	60.70			1972	82543
		0.80			217.0	1.498	0.753	CT	0.781	0.13	50.00			1972	82543
		0.80			217.0	1.508	0.749	CT	0.779	0.19	59.50			1972	82543
		0.80			217.0	1.199	0.605	CT	0.630	0.33	78.40			1972	82543
		0.80			217.0	1.199	0.605	CT	0.630	0.18	57.80			1972	82543

TABLE 6.4.2.1 (Con't)

ALLOY STEEL D6AC K(IC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
1650F, AUS-BAY	P	0.80	R T	L-T	217.0	1.203	0.606	CT	0.621	0.24	52.80			1972	82543
QUENCH 975F, 50		0.80			217.0	1.505	0.694	CT	0.753	0.20	60.90			1972	82543
400F, 1000F		0.80			217.0	1.504	0.692	CT	0.741	0.16	54.50			1972	82543
2+2 HR		0.80			217.0	1.202	0.605	CT	0.630	0.32	78.00			1972	82543
		0.80			217.0	1.498	0.749	CT	0.766	0.27	71.40			1972	82543
		0.80			217.0	1.502	0.755	CT	0.751	0.16	54.00			1972	82543
		0.80			217.0	1.497	0.757	CT	0.749	0.18	57.90			1972	82543
		0.80			217.0	1.198	0.605	CT	0.630	0.31	76.20			1972	82543
		0.80			217.0	1.199	0.606	CT	0.617	0.14	50.60			1972	82543
		0.80			217.0	1.500	0.758	CT	0.777	0.32	77.70			1972	82543
		0.80			217.0	1.504	0.692	CT	0.774	0.16	55.20			1972	82543
		0.80			217.0	1.504	0.692	CT	0.764	0.17	57.00			1972	82543
		0.80			217.0	1.196	0.605	CT	0.620	0.22	64.20			1972	82543
		0.80			217.0	1.458	0.749	CT	0.838	0.23	66.00			1972	82543
		0.80			217.0	1.200	0.607	CT	0.625	0.30	75.40			1972	82543
		0.80			217.0	1.500	0.750	CT	0.764	0.15	52.80			1972	82543
		0.80			217.0	1.201	0.604	CT	0.641	0.18	58.00			1972	82543
		0.80			217.0	1.198	0.603	CT	0.624	0.20	61.80			1972	82543
		0.80			217.0	1.501	0.750	CT	0.766	0.12	48.60			1972	82543
		0.80			217.0	1.199	0.604	CT	0.612	0.40	86.90			1972	82543
		0.80			217.0	1.498	0.754	CT	0.768	0.23	65.40			1972	82543
		0.80			217.0	1.201	0.606	CT	0.640	0.24	66.70			1972	82543
		0.80			217.0	1.504	0.693	CT	0.765	0.15	53.30			1972	82543
		0.80			217.0	1.500	0.757	CT	0.787	0.16	54.60			1972	82543
		0.80			217.0	1.199	0.602	CT	0.619	0.19	60.30			1972	82543
		0.80			217.0	1.500	0.749	CT	0.768	0.37	83.50			1972	82543
		0.80			217.0	1.504	0.692	CT	0.762	0.15	53.50			1972	82543
		0.80			217.0	1.199	0.603	CT	0.625	0.18	59.00			1972	82543
		0.80			217.0	1.200	0.607	CT	0.618	0.31	76.40			1972	82543
		0.80			217.0	1.199	0.603	CT	0.629	0.15	52.40			1972	82543
		0.80			217.0	1.497	0.750	CT	0.774	0.19	60.00			1972	82543
		0.80			217.0	1.199	0.600	CT	0.638	0.31	76.60			1972	82543
		0.80			217.0	1.199	0.606	CT	0.638	0.12	47.70			1972	82543
		0.80			217.0	1.500	0.758	CT	0.784	0.26	70.50			1972	82543
		0.80			217.0	1.505	0.759	CT	0.770	0.19	59.20			1972	82543
		0.80			217.0	1.504	0.749	CT	0.769	0.28	72.70			1972	82543
		0.80			217.0	1.494	0.753	CT	0.773	0.16	54.70			1972	82543
		0.80			217.0	1.501	0.755	CT	0.746	0.16	55.60			1972	82543
		0.80			217.0	1.203	0.608	CT	0.621	0.27	71.60			1972	82543

TABLE 6.4.2.1 (Con't)

ALLOY STEEL D6AC K(IC)

CONDITION	PRODUCT FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5*(K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN (KSI*SQRT IN)	K(IC) STAN DEV (KSI*SQRT IN)	DATE	REFER
1650F,AUS BAY	P	0.80	R T	L-T	217.0	1.200	0.605	CT	0.621	0.21	62.30			1972	82543
QUENCH 975F,SQ		0.80			217.0	1.199	0.605	CT	0.630	0.20	60.80			1972	82543
400F,1000F		0.80			217.0	1.199	0.608	CT	0.635	0.20	61.60			1972	82543
2+2 HR		0.80			217.0	1.501	0.753	CT	0.773	0.13	50.30			1972	82543
		0.80			217.0	1.198	0.605	CT	0.625	0.42	89.00	64.4/	12.1	1972	82543
1650F,AUS BAY	P	0.80	120	L-T	211.0	1.499	0.757	CT	0.761	0.42	85.90			1972	82543
QUENCH 975F,SQ		0.80			211.0	1.500	0.757	CT	0.770	0.46	90.10			1972	82543
400F,1000F 2+2 HR												88.0/	3.0		
1650F,AUS BAY	P	0.80	175	L-T	211.0	1.505	0.758	CT	0.775	0.47	91.90			1972	82543
QUENCH 975F,SQ		0.80			211.0	1.502	0.758	CT	0.784	0.44	88.60			1972	82543
400F,1000F		0.80			211.0	1.506	0.758	CT	0.779	0.44	88.10			1972	82543
2+2 HR												89.5/	2.1		
1650F,AUS-BAY	P	0.80	300	L-T	204.0	1.505	0.759	CT	0.771	0.47	88.80			1972	82543
QUENCH 975F,SQ		0.80			204.0	1.501	0.759	CT	0.782	0.47	88.10			1972	82543
400F,1000F		0.80			204.0	1.501	0.750	CT	0.770	0.41	82.90			1972	82543
2+2 HR												86.6/	3.2		
1650F,AUS-BAY	F	1.50	- 65	L-T	225.0	1.502	0.756	CT	0.784	0.06	34.00			1972	82543
QUENCH 975F,SQ		0.80			225.0	1.500	0.749	CT	0.760	0.06	35.70			1972	82543
400F,1000F		1.50			225.0	1.502	0.756	CT	0.790	0.04	29.00			1972	82543
2+2 HR		0.80			225.0	1.500	0.750	CT	0.757	0.06	33.60	33.1/	2.9	1972	82543
1650F,AUS-BAY	F	0.80	- 40	L-T	224.0	1.495	0.694	CT	0.753	0.09	41.60			1972	82543
QUENCH 975F,SQ		0.80			224.0	1.497	0.693	CT	0.776	0.08	39.80			1972	82543
400F,1000F 2+2 HR												40.7/	1.3		
1650F,AUS-BAY	F	0.80	- 20	L-T	222.0	1.497	0.749	CT	0.769	0.08	41.10			1972	82543
QUENCH 975F,SQ		0.80			222.0	1.494	0.749	CT	0.765	0.07	38.10			1972	82543
400F,1000F		0.80			222.0	1.498	0.750	CT	0.759	0.10	44.40			1972	82543
2+2 HR												41.2/	3.2		
1650F,AUS-BAY	F	1.50	0	L-T	220.0	1.502	0.750	CT	0.769	0.07	36.50			1972	82543
QUENCH 975F,SQ 400F,1000F 2+2 HR															
1650F,AUS-BAY	F	0.80	20	L-T	218.0	1.499	0.750	CT	0.757	0.10	44.60			1972	82543
QUENCH 975F,SQ 400F,1000F 2+2 HR															

TABLE 6.4.2.1 (Con't)

ALLOY STEEL D6AC K(IC)

CONDITION	PRODUCT FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
1650F,AUS-BAY	F	0.80	20	L-T	218.0	1.490	0.750	CT	0.751	0.11	45.60			1972	82543
QUENCH,875F,5Q		0.80			218.0	1.499	0.750	CT	0.761	0.11	40.00			1972	82543
400F,1000F,2+2 HR												43.4/	3.0		
1650F,AUS-BAY	F	0.80	R.T.	L-T	214.0	1.200	0.607	CT	0.618	0.24	66.10			1972	82543
QUENCH,875F,5Q		0.80			214.0	1.200	0.607	CT	0.625	0.34	78.60			1972	82543
400F,1000F		0.80			214.0	1.199	0.602	CT	0.618	0.17	55.80			1972	82543
2+2 HR		0.80			214.0	1.199	0.607	CT	0.623	0.29	73.10			1972	82543
		0.80			214.0	1.503	0.692	CT	0.775	0.51	96.30			1972	82543
		0.80			214.0	1.198	0.695	CT	0.628	0.14	50.30			1972	82543
		0.80			214.0	1.201	0.603	CT	0.619	0.28	72.30			1972	82543
		0.80			214.0	1.202	0.602	CT	0.618	0.16	55.10			1972	82543
		0.80			214.0	1.201	0.599	CT	0.623	0.29	73.20			1972	82543
		0.80			214.0	1.498	0.757	CT	0.754	0.20	60.60			1972	82543
		0.80			214.0	1.200	0.604	CT	0.620	0.35	79.70			1972	82543
		0.80			214.0	1.499	0.750	CT	0.762	0.18	57.90			1972	82543
		0.80			214.0	1.198	0.607	CT	0.645	0.39	84.10			1972	82543
		0.80			214.0	1.202	0.605	CT	0.631	0.26	68.70			1972	82543
		0.80			214.0	1.202	0.603	CT	0.624	0.37	82.30			1972	82543
		0.80			214.0	1.200	0.607	CT	0.634	0.34	79.50			1972	82543
		0.80			214.0	1.202	0.602	CT	0.620	0.15	52.00			1972	82543
		0.80			214.0	1.199	0.602	CT	0.621	0.30	73.60			1972	82543
		0.80			214.0	1.500	0.750	CT	0.766	0.31	75.50			1972	82543
		0.80			214.0	1.498	0.696	CT	0.747	0.18	57.40			1972	82543
		0.80			214.0	1.195	0.606	CT	0.634	0.49	94.40			1972	82543
		0.80			214.0	1.203	0.604	CT	0.627	0.22	64.20			1972	82543
		0.80			214.0	1.199	0.603	CT	0.618	0.34	78.40			1972	82543
		0.80			214.0	1.499	0.749	CT	0.755	0.20	59.80			1972	82543
		0.80			214.0	1.201	0.603	CT	0.633	0.20	60.80			1972	82543
		0.80			214.0	1.199	0.603	CT	0.617	0.34	78.40			1972	82543
		0.80			214.0	1.200	0.599	CT	0.618	0.23	65.20			1972	82543
		0.80			214.0	1.200	0.605	CT	0.626	0.20	60.40			1972	82543
		0.80			214.0	1.199	0.603	CT	0.623	0.17	56.20			1972	82543
		0.80			214.0	1.200	0.604	CT	0.622	0.27	70.00			1972	82543
		1.50			214.0	1.499	0.756	CT	0.866	0.08	39.30			1972	82543
		0.80			214.0	1.201	0.603	CT	0.615	0.15	53.10			1972	82543
		0.80			214.0	1.200	0.606	CT	0.627	0.20	61.00			1972	82543
		0.80			214.0	1.499	0.752	CT	0.760	0.24	66.50			1972	82543
		0.80			214.0	1.502	0.749	CT	0.784	0.22	63.10			1972	82543

TABLE 6.4.2.1 (Con't)

ALLOY STEEL D6AC K(IC)

CONDITION	PRODUCT FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5*(K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
1650F, AUS-BAY	F	0.80	R.T.	L-T	214.0	1.198	0.608	CT	0.626	0.36	81.00			1972	82543
QUENCH 975F, SQ		0.80			214.0	1.499	0.750	CT	0.766	0.20	61.00			1972	82543
400F, 1000F		0.80			214.0	1.502	0.692	CT	0.767	0.48	93.60			1972	82543
2+2 HR		0.80			214.0	1.200	0.603	CT	0.631	0.24	65.70			1972	82543
		0.80			214.0	1.200	0.607	CT	0.631	0.25	67.60			1972	82543
		0.80			214.0	1.497	0.694	CT	0.761	0.20	60.10			1972	82543
		0.80			214.0	1.197	0.607	CT	0.635	0.20	61.20			1972	82543
		0.80			214.0	1.501	0.750	CT	0.769	0.33	77.60			1972	82543
		0.80			214.0	1.499	0.753	CT	0.756	0.23	64.40			1972	82543
		0.80			214.0	1.202	0.603	CT	0.626	0.15	52.90			1972	82543
		0.80			214.0	1.198	0.608	CT	0.598	0.32	76.30			1972	82543
		0.80			214.0	1.200	0.605	CT	0.620	0.14	51.30			1972	82543
		0.80			214.0	1.199	0.608	CT	0.617	0.24	65.60			1972	82543
		0.80			214.0	1.201	0.603	CT	0.623	0.16	54.60			1972	82543
		0.80			214.0	1.502	0.750	CT	0.775	0.16	54.50			1972	82543
		0.80			214.0	1.200	0.605	CT	0.620	0.14	51.20			1972	82543
		0.80			214.0	1.502	0.750	CT	0.762	0.17	55.50			1972	82543
		0.80			214.0	1.497	0.750	CT	0.751	0.16	53.60	66.2/	12.3	1972	82543
1650F, AUS-BAY	F	0.80	175	L-T	208.0	1.500	0.750	CT	0.762	0.37	80.30			1972	82543
QUENCH 975F, SQ		0.80			208.0	1.504	0.750	CT	0.771	0.34	77.10			1972	82543
400F, 1000F		0.80			208.0	1.498	0.750	CT	0.757	0.32	74.30			1972	82543
2+2 HR												77.2/	3.0		
1650F, 1 HR, FC	F	1.50	R.T.	--	219.0	1.000	0.500	CT	0.500	0.39	86.90			1972	84277
TO 960F, OQ AT		1.50			219.0	1.000	0.500	CT	0.500	0.41	88.30			1972	84277
180F, AC, 1025F		1.50			219.0	1.000	0.500	CT	0.500	0.40	88.00			1972	84277
2+2 HR												87.7/	0.7		
1650F, 1 HR, FC	BT	7.00	R.T.	L-T	210.0	2.500	1.000	CT	1.400	0.38	81.80			1972	84277
1650F 1 HR, OQ,		7.00			210.0	2.500	1.000	CT	1.400	0.32	75.10			1972	84277
1025F 2+2 HR												78.5/	4.7		
1650F, 1 HR, FC	BT	7.00	R.T.	L-T	211.0	2.500	1.000	CT	1.400	0.36	79.70			1972	84277
TO 960F, OQ AT		7.00			211.0	2.500	1.000	CT	1.400	0.37	80.90			1972	84277
150F, AC, 1000F 2+2 HR												80.3/	0.8		

TABLE 6.4.2.1 (Con't)

ALLOY STEEL D6AC K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	------SPECIMEN------ WIDTH (IN) W	THICK (IN) B	DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	STAN DEV	DATE	REFER
1675F AC 1575F	P	1.00	R.T.	--	----	1.999	1.008	CT	1.105	0.42	78.30			1973	85883 (1)
QQ,400F 2 HR,		1.00			----	1.995	1.008	CT	1.076	0.40	76.20			1973	85883 (1)
1100F 2 HR		1.00			----	1.997	1.007	CT	1.075	0.42	77.60			1973	85883 (1)
(RC 42.5)		1.00			----	2.002	1.006	CT	1.069	0.40	76.50			1973	85883 (1)
												77.2/	1.0		
1675F AC,1575F	P	1.00	R.T.	--	----	1.996	1.006	CT	1.118	0.15	53.10			1973	85883 (2)
QQ,400F 2 HR,		1.00			----	1.995	1.006	CT	1.139	0.15	53.50			1973	85883 (2)
800F 2 HR		1.00			----	1.995	1.006	CT	1.116	0.16	55.90			1973	85883 (2)
(RC 46.5)		1.00			----	1.992	1.006	CT	1.097	0.14	52.20			1973	85883 (2)
												53.7/	1.6		
1675F,AC,1575F	P	1.00	R.T.	--	----	1.996	1.007	CT	1.059	0.05	35.80			1973	85883 (3)
QQ,400F 2 HR,		1.00			----	2.001	1.007	CT	1.031	0.05	34.00			1973	85883 (3)
500F 2 HR		1.00			----	1.999	1.007	CT	1.046	0.04	33.00			1973	85883 (3)
(RC 50)		1.00			----	1.996	1.007	CT	1.032	0.05	35.10			1973	85883 (3)
												34.5/	1.2		
1700F,AUS-BAY	P	0.80	- 65	L-T	228.0	1.502	0.759	CT	0.774	0.13	51.40			1972	82543
QUENCH 975F,QQ		0.80			228.0	1.499	0.749	CT	0.755	0.16	58.50			1972	82543
140F,1000F		0.80			228.0	1.502	0.749	CT	0.748	0.13	52.80			1972	82543
2+2 HR		1.50			228.0	1.502	0.755	CT	0.763	0.11	48.70			1972	82543
		1.50			228.0	1.502	0.750	CT	0.759	0.10	46.40			1972	82543
		0.80			228.0	1.501	0.759	CT	0.780	0.17	59.80			1972	82543
		1.50			228.0	1.506	0.750	CT	0.753	0.09	42.20			1972	82543
		1.50			228.0	1.502	0.750	CT	0.759	0.10	46.40			1972	82543
		0.80			228.0	1.506	0.759	CT	0.774	0.15	56.40	51.4/	6.0	1972	82543
1700F,AUS-BAY	P	1.50	- 40	L-T	227.0	1.501	0.750	CT	0.768	0.09	43.70			1972	82543
QUENCH 975F,QQ		1.50			227.0	1.499	0.754	CT	0.772	0.11	47.90			1972	82543
140F,1000F		1.50			227.0	1.503	0.749	CT	0.768	0.10	44.60			1972	82543
2+2 HR												45.4/	2.2		
1700F,AUS-BAY	P	1.50	- 20	L-T	226.0	1.502	0.752	CT	0.779	0.14	54.00			1972	82543
QUENCH 975F,QQ		0.80			226.0	1.500	0.755	CT	0.759	0.28	79.20			1972	82543
140F,1000F 2+2 HR															

NOTES
(1) TYS APPROX 120
(2) TYS APPROX 220
(3) TYS APPROX 250

TABLE 6.4.2.1 (Con't)

ALLOY STEEL D6AC K(IC)

CONDITION	PROD FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
1700F, AUS-BAY	P	0.80	-20	L-T	226.0	1.504	0.749	CT	0.756	0.24	69.30			1972	82543
QUENCH 975F, DQ		0.80			226.0	1.504	0.754	CT	0.773	0.27	74.00			1972	82543
140F, 1000F		1.50			226.0	1.501	0.750	CT	0.763	0.12	50.40			1972	82543
2+2 HR		0.80			226.0	1.506	0.749	CT	0.756	0.27	74.40			1972	82543
		1.50			226.0	1.501	0.750	CT	0.763	0.12	50.40			1972	82543
		0.80			226.0	1.502	0.755	CT	0.760	0.23	67.90			1972	82543
		1.50			226.0	1.499	0.749	CT	0.754	0.10	45.90	62.4/	12.0	1972	82543
1700F, AUS-BAY	P	1.50	0	L-T	224.0	1.502	0.750	CT	0.768	0.14	53.60			1972	82543
QUENCH 975F, DQ		1.50			224.0	1.499	0.755	CT	0.799	0.16	56.50			1972	82543
140F, 1000F		1.50			225.0	1.503	0.750	CT	0.767	0.15	54.80			1972	82543
2+2 HR												55.0/	1.5		
1700F, AUS-BAY	P	1.50	20	L-T	222.0	1.500	0.755	CT	0.788	0.17	59.10			1972	82543
QUENCH 975F, DQ		1.50			222.0	1.501	0.750	CT	0.778	0.17	58.40			1972	82543
140F, 1000F		0.80			222.0	1.502	0.754	CT	0.770	0.41	89.90			1972	82543
2+2 HR		0.80			222.0	1.504	0.755	CT	0.770	0.35	83.70			1972	82543
		0.80			222.0	1.501	0.753	CT	0.753	0.37	85.70			1972	82543
		1.50			222.0	1.500	0.748	CT	0.762	0.26	71.30			1972	82543
		0.80			222.0	1.504	0.754	CT	0.765	0.39	87.20	76.5/	13.5	1972	82543
1700F, AUS-BAY	P	1.50	40	L-T	220.0	1.501	0.750	CT	0.790	0.22	66.10			1972	82543
QUENCH 975F, DQ		1.50			220.0	1.501	0.749	CT	0.767	0.33	80.50			1972	82543
140F, 1000F		1.50			220.0	1.499	0.752	CT	0.779	0.21	64.50			1972	82543
2+2 HR												70.4/	8.8		
1700F, AUS-BAY	P	0.80	R T	L-T	217.0	1.499	0.749	CT	0.761	0.55	101.70			1972	82543
QUENCH 975F, DQ		0.80			217.0	1.506	0.752	CT	0.759	0.44	90.60			1972	82543
140F, 1000F		0.80			217.0	1.478	0.756	CT	0.773	0.50	97.20			1972	82543
2+2 HR		0.80			217.0	1.500	0.749	CT	0.755	0.48	95.10			1972	82543
		0.80			217.0	1.502	0.757	CT	0.779	0.47	94.20			1972	82543
		0.80			217.0	1.504	0.757	CT	0.790	0.50	97.00			1972	82543
		0.80			217.0	1.202	0.607	CT	0.624	0.46	92.80			1972	82543
		1.50			217.0	1.497	0.757	CT	0.781	0.32	77.40			1972	82543
		1.50			217.0	1.497	0.758	CT	0.782	0.27	70.80			1972	82543
		0.80			217.0	1.503	0.758	CT	0.766	0.45	92.50			1972	82543
		0.80			217.0	1.504	0.750	CT	0.791	0.49	96.30			1972	82543
		0.80			217.0	1.502	0.756	CT	0.786	0.37	83.30			1972	82543
		0.80			217.0	1.501	0.757	CT	0.759	0.52	99.10			1972	82543

TABLE 6.4.2.1 (Con't)

ALLOY STEEL D6AC K(IC)

CONDITION	PRODUCT FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5*(K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
1700F,AUS-BAY	P	0.80	R.T.	L-T	217.0	1.501	0.757	CT	0.773	0.48	95.40			1972	82543
QUENCH 975F,OQ		1.50			217.0	1.503	0.758	CT	0.779	0.45	91.70			1972	82543
140F,1000F		0.80			217.0	1.495	0.752	CT	0.767	0.44	91.00			1972	82543
2+2 HR		0.80			217.0	1.498	0.692	CT	0.747	0.47	93.90			1972	82543
		0.80			217.0	1.539	0.752	CT	0.817	0.49	96.50			1972	82543
		0.80			217.0	1.201	0.607	CT	0.621	0.44	91.40			1972	82543
		0.80			217.0	1.498	0.674	CT	0.759	0.49	96.10			1972	82543
		1.50			217.0	1.497	0.758	CT	0.769	0.45	92.60			1972	82543
		0.80			217.0	1.503	0.756	CT	0.755	0.49	96.30			1972	82543
		0.80			217.0	1.500	0.753	CT	0.754	0.46	93.20			1972	82543
		0.80			217.0	1.502	0.749	CT	0.759	0.45	91.90			1972	82543
		0.80			217.0	1.495	0.757	CT	0.802	0.47	94.20			1972	82543
		0.80			217.0	1.500	0.758	CT	0.792	0.44	91.20			1972	82543
		0.80			217.0	1.500	0.751	CT	0.756	0.51	98.20			1972	82543
		1.50			217.0	1.504	0.750	CT	0.765	0.22	64.10			1972	82543
		0.80			217.0	1.496	0.757	CT	0.803	0.53	100.50			1972	82543
		0.80			217.0	1.497	0.758	CT	0.776	0.48	94.70	92.0/	8.2	1972	82543
1700F,AUS-BAY	P	1.50	175	L-T	211.0	1.501	0.750	CT	0.763	0.51	95.20			1972	82543
QUENCH 975F,OQ		1.50			211.0	1.500	0.749	CT	0.760	0.44	89.20			1972	82543
140F,1000F		0.80			211.0	1.499	0.752	CT	0.752	0.45	89.30			1972	82543
2+2 HR		1.50			211.0	1.501	0.752	CT	0.785	0.48	92.70			1972	82543
		0.80			211.0	1.501	0.754	CT	0.779	0.52	96.50			1972	82543
		0.80			211.0	1.506	0.753	CT	0.761	0.46	90.70	92.3/	3.1	1972	82543
1700F,AUS-BAY	P	1.50	300	L-T	204.0	1.499	0.750	CT	0.779	0.45	86.40			1972	82543
QUENCH 975F,OQ		1.50			204.0	1.499	0.754	CT	0.790	0.50	91.30			1972	82543
140F,1000F		1.50			204.0	1.499	0.749	CT	0.758	0.47	88.00			1972	82543
2+2 HR												88.6/	2.5		
1700F,AUS-BAY	F	1.50	-65	L-T	225.0	1.501	0.749	CT	0.762	0.14	52.80			1972	82543
QUENCH 975F,OQ		1.50			225.0	1.500	0.753	CT	0.758	0.08	41.10			1972	82543
140F,1000F		1.50			225.0	1.500	0.751	CT	0.789	0.11	47.50			1972	82543
2+2 HR		1.50			225.0	1.501	0.752	CT	0.760	0.09	42.60			1972	82543
		1.50			225.0	1.501	0.752	CT	0.760	0.09	41.90			1972	82543
		1.50			225.0	1.502	0.751	CT	0.783	0.11	47.30	45.5/	4.5	1972	82543
1700F,AUS-BAY	F	1.50	-20	L-T	222.0	1.501	0.750	CT	0.752	0.16	55.70			1972	82543
QUENCH 975F,OQ 140F,1000F 2+2 HR															

TABLE 6.4.2.1 (Con't)

ALLOY STEEL D6AC K(IC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5*(K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
1700F, AUS-BAY	F	1.50	- 20	L-T	222.0	1.501	0.750	CT	0.777	0.25	69.60			1972	82543
QUENCH 975F, OQ		1.50			222.0	1.498	0.751	CT	0.765	0.12	49.60			1972	82543
140F, 1000F 2+2 HR												58.3/	10.3		
1700F, AUS-BAY	F	1.50	20	L-T	218.0	1.499	0.750	CT	0.741	0.19	60.00			1972	82543
QUENCH 975F, OQ		1.50			218.0	1.500	0.750	CT	0.778	0.31	76.50			1972	82543
140F, 1000F		1.50			218.0	1.503	0.752	CT	0.770	0.21	63.10			1972	82543
2+2 HR												66.5/	8.8		
1700F, AUS-BAY	F	0.80	R.T.	L-T	214.0	1.501	0.750	CT	0.759	0.46	91.80			1972	82543
QUENCH 975F, OQ		0.80			214.0	1.499	0.757	CT	0.760	0.49	95.30			1972	82543
140F, 1000F		0.80			214.0	1.501	0.748	CT	0.755	0.57	102.40			1972	82543
2+2 HR		0.80			214.0	1.494	0.757	CT	0.758	0.47	93.00			1972	82543
		0.80			214.0	1.500	0.750	CT	0.771	0.57	102.00			1972	82543
		0.80			214.0	1.497	0.748	CT	0.774	0.65	109.40			1972	82543
		0.80			214.0	1.500	0.752	CT	0.769	0.56	101.70			1972	82543
		0.80			214.0	1.493	0.748	CT	0.758	0.60	105.30			1972	82543
		0.80			214.0	1.500	0.751	CT	0.781	0.57	102.20			1972	82543
		0.80			214.0	1.497	0.750	CT	0.755	0.53	98.60			1972	82543
		0.80			214.0	1.499	0.750	CT	0.753	0.47	92.80			1972	82543
		0.80			214.0	1.500	0.748	CT	0.757	0.56	100.90			1972	82543
		1.50			214.0	1.504	0.751	CT	0.770	0.39	84.90			1972	82543
		1.50			214.0	1.503	0.751	CT	0.771	0.36	81.70			1972	82543
		1.50			214.0	1.501	0.752	CT	0.765	0.39	84.90			1972	82543
		1.50			214.0	1.498	0.750	CT	0.762	0.53	98.50			1972	82543
		0.80			214.0	1.498	0.749	CT	0.759	0.45	91.00			1972	82543
		0.80			214.0	1.503	0.750	CT	0.778	0.45	90.40			1972	82543
		0.80			214.0	1.498	0.757	CT	0.767	0.53	98.50			1972	82543
		0.80			214.0	1.499	0.750	CT	0.762	0.47	93.00			1972	82543
		1.50			214.0	1.503	0.753	CT	0.759	0.46	92.00			1972	82543
		0.80			214.0	1.500	0.751	CT	0.814	0.50	95.80			1972	82543
		0.80			214.0	1.499	0.750	CT	0.753	0.47	92.80			1972	82543
		1.50			214.0	1.501	0.751	CT	0.757	0.48	93.60			1972	82543
		0.80			214.0	1.500	0.749	CT	0.759	0.46	91.60			1972	82543
		1.50			214.0	1.501	0.752	CT	0.774	0.44	89.70			1972	82543
		0.80			214.0	1.501	0.749	CT	0.789	0.47	92.60			1972	82543
		1.50			214.0	1.500	0.752	CT	0.763	0.46	91.50			1972	82543
		0.80			214.0	1.497	0.756	CT	0.762	0.49	94.30			1972	82543
		0.80			214.0	1.500	0.750	CT	0.768	0.39	84.80			1972	82543

TABLE 6.4.2.1 (Con't)

ALLOY STEEL D6AC K(IC)

CONDITION	PRODUCT FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
1700F, AUS BAY	F	0.80	R.T	L-T	214.0	1.504	0.748	CT	0.743	0.58	102.90			1972	82543
QUENCH 975F, 0Q		0.80			214.0	1.501	0.749	CT	0.779	0.52	97.60			1972	82543
140F, 1000F		0.80			214.0	1.501	0.750	CT	0.758	0.51	96.50			1972	82543
2+2 HR		0.80			214.0	1.500	0.756	CT	0.782	0.58	103.10	95.2/	6.4	1972	82543
1700F, AUS-BAY	F	1.50	175	L-T	208.0	1.501	0.756	CT	0.778	0.57	99.50			1972	82543
QUENCH 975F, 0Q		1.50			208.0	1.501	0.756	CT	0.774	0.54	96.30			1972	82543
140F, 1000F		1.50			208.0	1.500	0.755	CT	0.762	0.54	96.70			1972	82543
2+2 HR												97.5/	1.7		
1700F, 1 HR, FC	BT	7.00	R.T.	L-T	215.0	2.500	1.000	CT	1.400	0.31	75.70			1972	84277
TO 960F, 0Q AT		7.00			215.0	2.500	1.000	CT	1.400	0.38	84.30			1972	84277
150F, AC, 1000F		7.00			215.0	2.500	1.000	CT	1.400	0.35	80.80			1972	84277
2+2 HR												80.3/	4.3		
1700F, 1 HR, 0Q,	BT	7.00	R.T	L-T	214.0	2.500	1.000	CT	1.400	0.33	78.40			1972	84277
1025F 2+2 HR		7.00			214.0	2.500	1.000	CT	1.400	0.36	81.10			1972	84277
		7.00			214.0	2.500	1.000	CT	1.400	0.33	78.10			1972	84277
		10.00			216.0	2.500	1.000	CT	1.400	0.30	75.30			1972	84277
		10.00			216.0	2.500	1.000	CT	1.400	0.32	77.10			1972	84277
		10.00			216.0	2.500	1.000	CT	1.400	0.29	73.70	77.3/	2.6	1972	84277
1725F 1 HR, AC	BT	7.00	R.T.	L-T	213.0	2.500	1.000	CT	1.400	0.35	80.10			1972	84277
1700F 1 HR, 0Q,		7.00			213.0	2.500	1.000	CT	1.400	0.33	76.90			1972	84277
1000F 1 HR,		7.00			213.0	2.500	1.000	CT	1.400	0.31	74.70			1972	84277
1015F 1 HR												77.2/	2.7		
1725F, 1 HR, AC	BT	7.00	R.T.	L-T	200.0	2.500	1.000	CT	1.400	0.52	91.20			1972	84277
1700F 1 HR, 0Q,		7.00			200.0	2.500	1.000	CT	1.400	0.60	97.70			1972	84277
1100F 2+2 HR		7.00			200.0	2.500	1.000	CT	1.400	0.74	109.00			1972	84277
		10.00			205.0	2.500	1.000	CT	1.400	0.63	103.00			1972	84277

TABLE 6.4.2.1 (Con't)

ALLOY STEEL D6AC K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	------SPECIMEN------ WIDTH (IN) W	THICK (IN) B	DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	STAN DEV	DATE	REFER
1725F, 1 HR, AC	BT	10.00	R.T.	L-T	205.0	2.500	1.000	CT	1.400	0.62	102.00			1972	84277
1700F 1 HR, OQ,		10.00			205.0	2.500	1.000	CT	1.400	0.65	104.00			1972	84277
1100F 2+2 HR												101.2/	6.1		
1725F, 1 HR, AC	BT	7.00	R.T.	L-T	213.0	2.500	1.000	CT	1.400	0.38	83.10			1972	84277
1700F 1 HR, OQ,		7.00			213.0	2.500	1.000	CT	1.400	0.31	75.90			1972	84277
1025F 2+2 HR		7.00			213.0	2.500	1.000	CT	1.400	0.30	73.20			1972	84277
		10.00			217.0	2.500	1.000	CT	1.400	0.22	64.60			1972	84277
		10.00			217.0	2.500	1.000	CT	1.400	0.32	77.90			1972	84277
		10.00			217.0	2.500	1.000	CT	1.400	0.27	71.90	74.4/	6.2	1972	84277
1725F, 1 HR, AC	BT	7.00	R.T.	L-T	221.0	2.500	1.000	CT	1.400	0.32	78.80			1972	84277
1650F 1 HR, FC		7.00			221.0	2.500	1.000	CT	1.400	0.21	63.70			1972	84277
TO 960F, SQ		7.00			221.0	2.500	1.000	CT	1.400	0.35	82.80			1972	84277
350F 0.5 HR, AC, 1025F 2+2 HR												75.1/	10.1		

TABLE 6.4.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.4.3.1 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL D6AC
CONDITION: 1650F A-BQ AT 975F, SQ AT 375F, 1000F 2+2HR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. JP-4 FUEL 3HZ	E= R.T. DIST H20 1HZ		
DELTA K MIN	A:	10.07	.963			
	B:	9.70		.930		
	C:					
	D:					
		10.00		.932		
		13.00	1.83	2.25		
		16.00		4.27		
		20.00		7.55		
		25.00		12.2		
		30.00		17.4		
DELTA K MAX	A:	14.40	3.49			
	B:	30.90		18.3		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			17.19	14.86		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: 1650F A-BQ AT 975F, SQ AT 375F, 1000F 2+2HR
FORM: 1.80"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.10
FREQUENCY:

YIELD STRENGTH: 220.0 KSI
ULT. STRENGTH: 238.0 KSI
SPECIMEN THK: 0.507"
SPECIMEN WIDTH: 2.500"
REFERENCES: 82543

ALLOY STEEL

D6AC

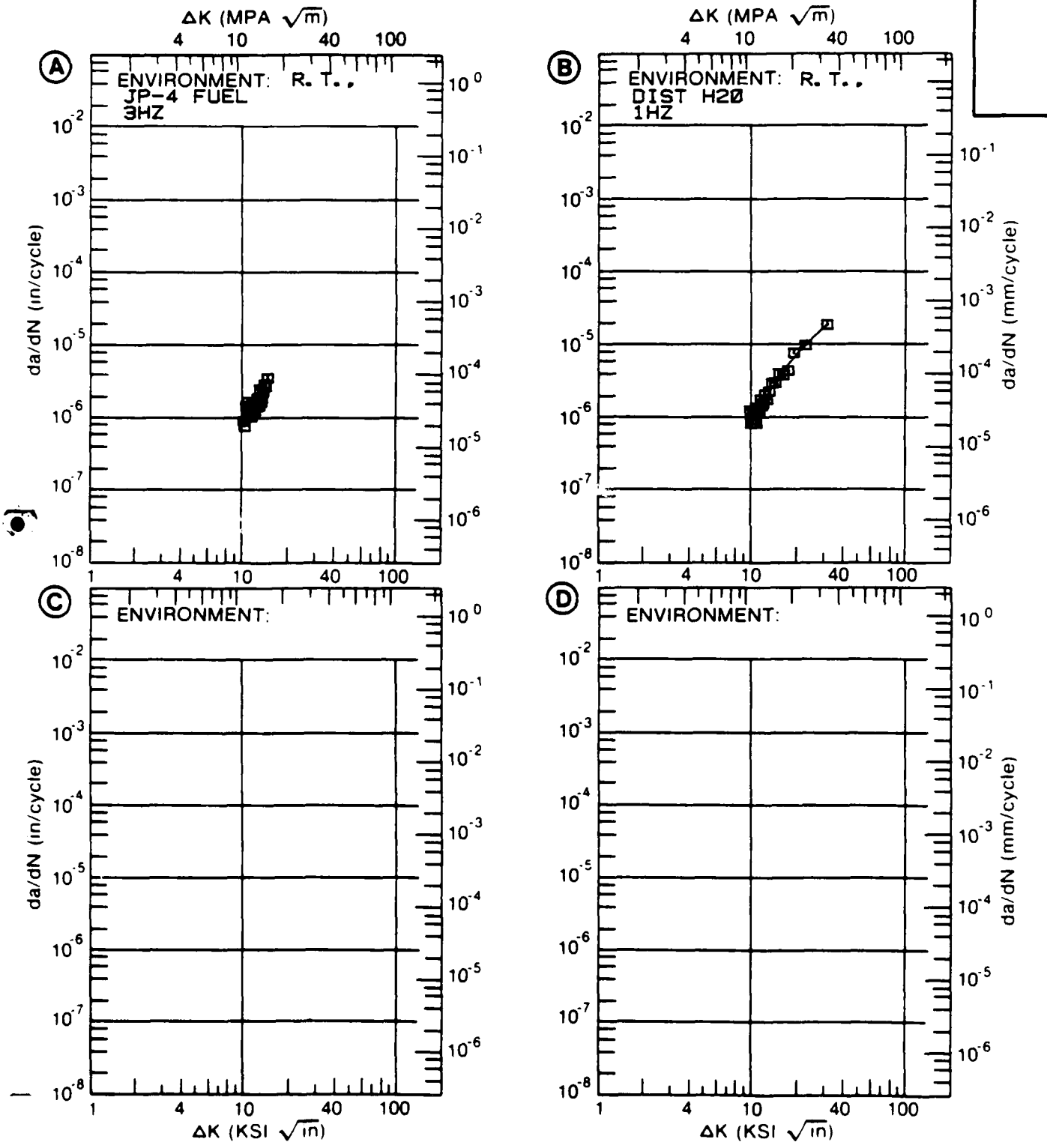


Figure 6.4.3.1

TABLE 6.4.3.2

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.4.3.2 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL D6AC
CONDITION: 1650F A-BG AT 975F, SQ AT 375F, 1000F 2+2HR

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE) A	B	C	D
		E= R.T. JP-4 FUEL			
DELTA K MIN	A: 8.99	.241			
	B:				
	C:				
	D:				
	9.00	.243			
	10.00	.471			
	13.00	1.81			
	16.00	3.85			
	20.00	6.36			
DELTA K MAX	A: 24.55	7.62			
	B:				
	C:				
	D:				

ROOT MEAN SQUARE PERCENT ERROR 17.15

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: 1650F A-BQ AT 975F, SQ AT 375F, 1000F 2+2HR
FORM: 1.80"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.10
FREQUENCY: 1.00 HZ

YIELD STRENGTH: 220.0 KSI
ULT. STRENGTH: 238.0 KSI
SPECIMEN THK: 0.507"
SPECIMEN WIDTH: 2.500"
REFERENCES: 82543

ALLOY STEEL

D6AC

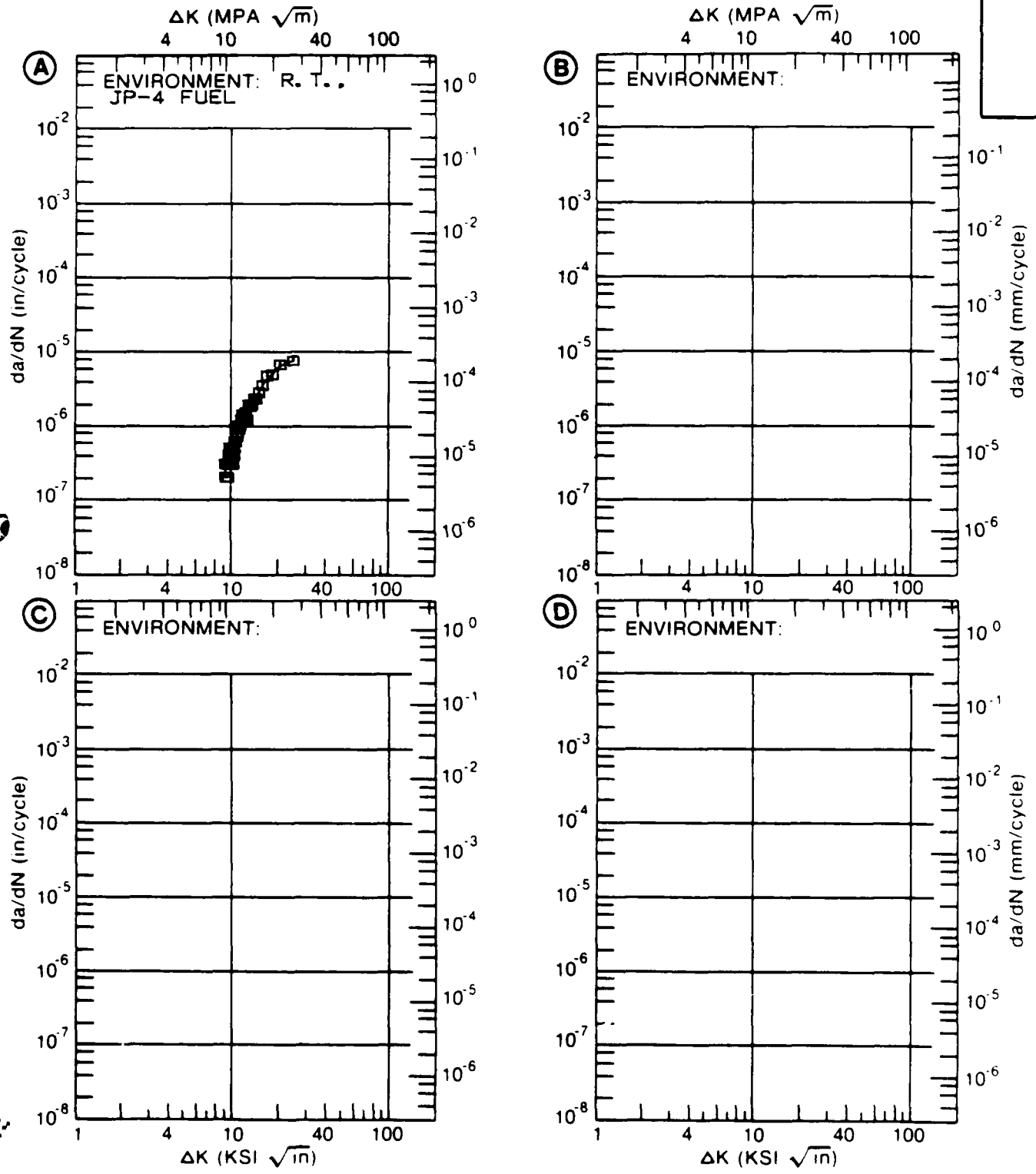


Figure 6.4.3.2

TABLE 6.4.3.3

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.4.3.3 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL D6AC
CONDITION: 1650F A-BQ AT 975F, SQ AT 375F, 1000F 2+2HR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. JP-4 FUEL	E= R.T. DIST H2O		
DELTA K MIN	A:	10.86	1.84			
	B:	10.78		3.22		
	C:					
	D:					
		13.00	2.05	3.99		
		16.00	5.70	7.97		
		20.00		13.9		
DELTA K MAX	A:	19.86	18.8			
	B:	22.37		40.5		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			23.17	18.87		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: 1650F A-BQ AT 975F, SQ AT 375F, 1000F 2+2HR
FORM: 1.80"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.50
FREQUENCY: 1.00 HZ

YIELD STRENGTH: 220.0 KSI
ULT. STRENGTH: 238.0 KSI
SPECIMEN THK: 0.506- 0.507"
SPECIMEN WIDTH: 2.500"
REFERENCES: 82543

ALLOY STEEL

D6AC

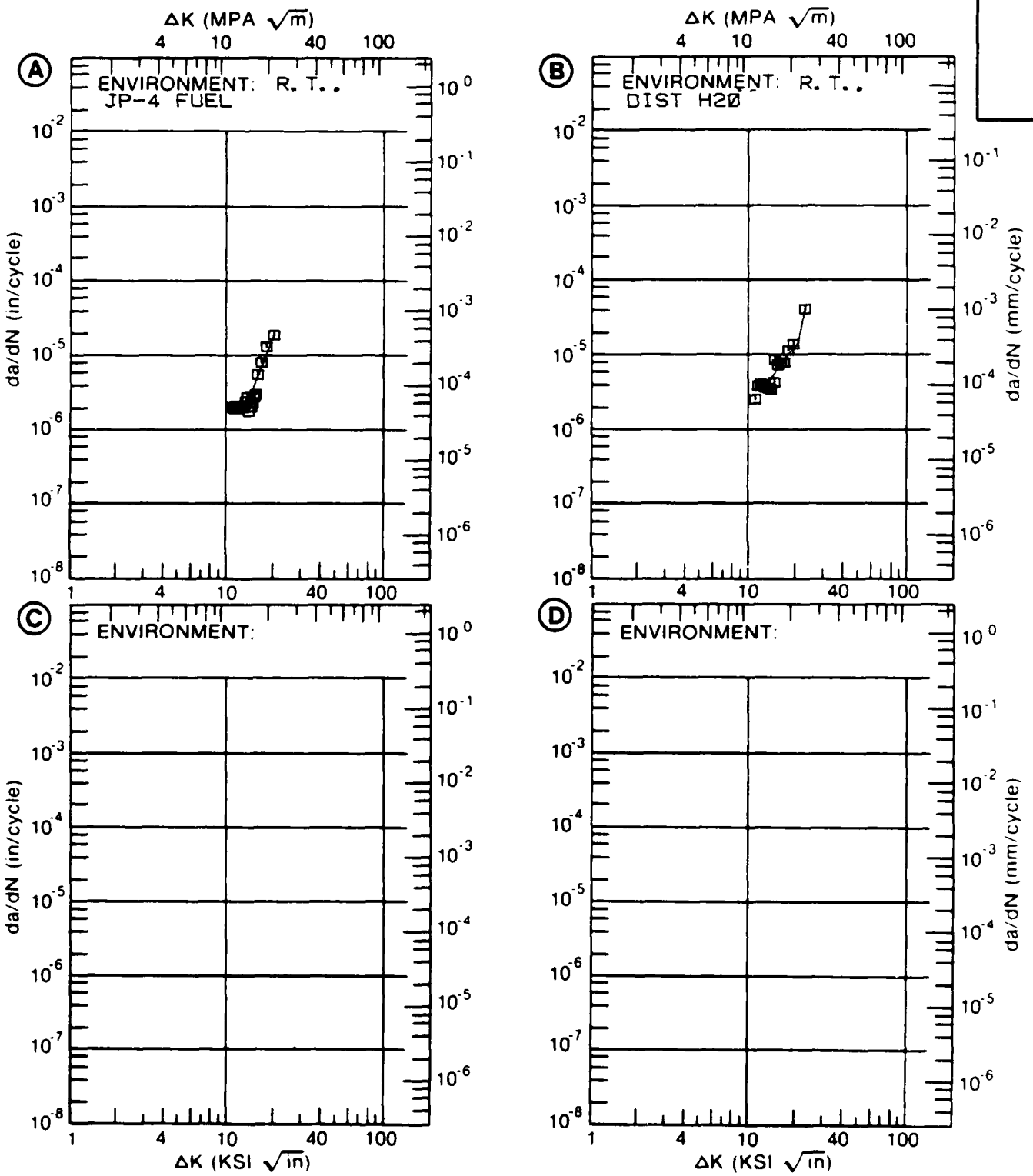


Figure 6.4.3.3

TABLE 6.4.3.4

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.4.3.4 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL D6AC
CONDITION: 1650F A-BQ AT 975F, SQ AT 400F, 1000F
2+2HR
ENVIRONMENT: R.T. , LAB AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.10	R=+0.50		
DELTA K MIN	A:	37.20	25.7			
	B:	22.01		14.0		
	C:					
	D:					
		25.00		14.0		
		30.00		21.7		
		35.00				
		40.00	28.5			
		50.00	65.2			
DELTA K MAX	A:	52.74	71.2			
	B:	31.32		25.5		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			8.34	9.73		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: 1650F A-BQ AT 975F, SQ AT 400F, 1000F 2+2HR
FORM: 0.80"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 0.10 HZ
ENVIRONMENT: R.T., LAB AIR
YIELD STRENGTH: 220.0 KSI
ULT. STRENGTH: 238.0 KSI
SPECIMEN THK: 0.690"
SPECIMEN WIDTH: 1.500"
REFERENCES: 82543

ALLOY STEEL

D6AC

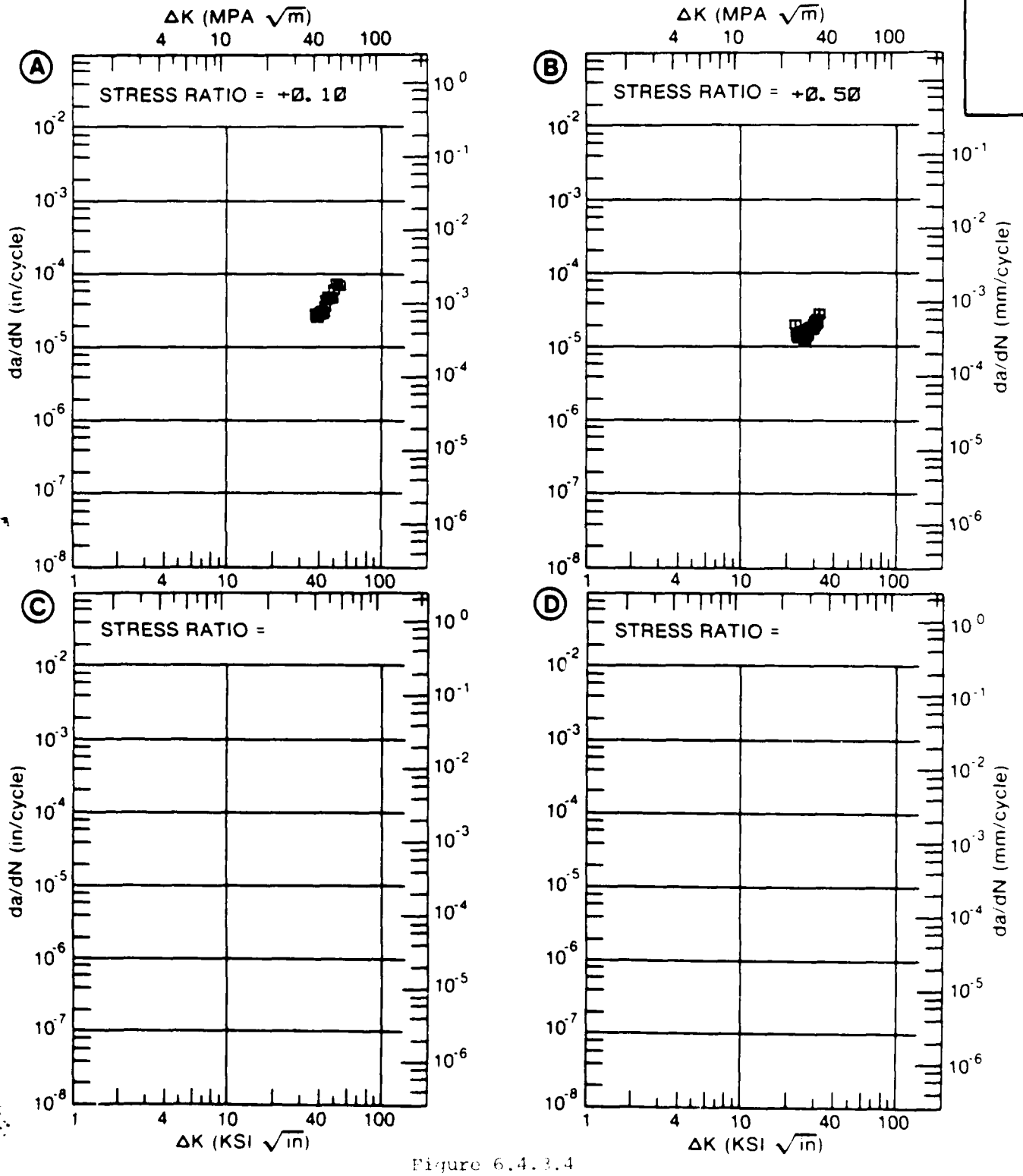


Figure 6.4.3.4

TABLE 6.4.3.5

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.4.3.5 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL D6AC
CONDITION: 1650F A-BQ AT 975F, SQ AT 400F, 1000F
2+2HR
ENVIRONMENT: R.T. , LAB AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.10	R=+0.50		
DELTA K MIN	A:	19.32	2.28			
	B:	18.50		9.46		
	C:					
	D:					
		20.00	2.85	9.29		
		25.00	8.21	14.2		
		30.00	13.8			
		35.00	19.1			
		40.00	25.5			
DELTA K MAX	A:	47.75	42.0			
	B:	26.21		16.8		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			17.60	11.10		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5	1	1		
		0.5-0.8	1			
		0.8-1.25	1			
		1.25-2.0				
		>2.0				

CONDITION/HT: 1650F A-BQ AT 975F, SQ AT 400F, 1000F 2+2HR
FORM: 0.80"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 1.00 HZ
ENVIRONMENT: R.T., LAB AIR

YIELD STRENGTH: 217.0- 220.0 KSI
ULT. STRENGTH: 238.0 KSI
SPECIMEN THK: 0.690"
SPECIMEN WIDTH: 1.500"
REFERENCES: 82543

ALLOY STEEL

D6AC

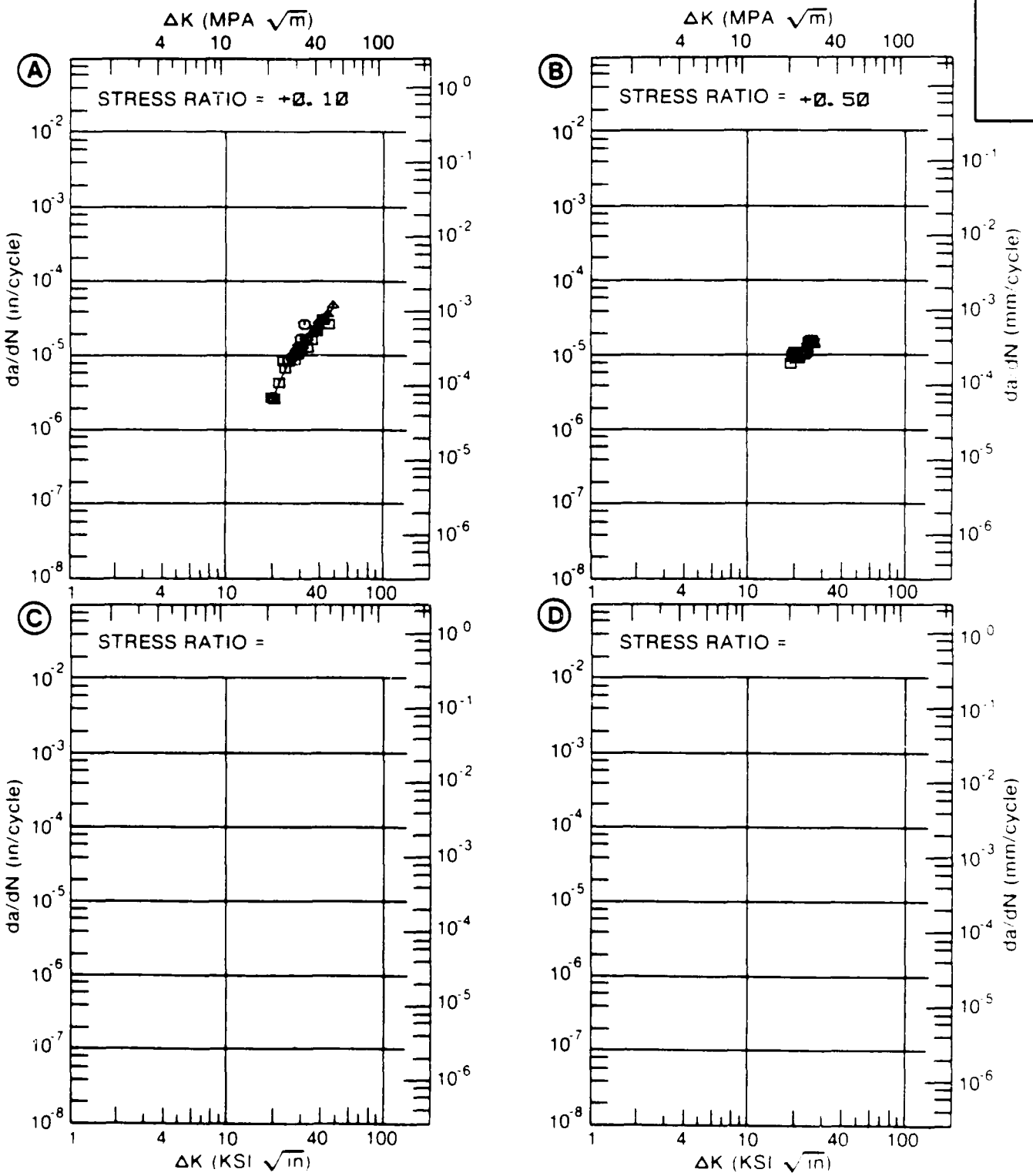


Figure 4.1.1

TABLE 6.4.3.6

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.4.3.6 INDICATING EFFECT

OF FREQUENCY

MATERIAL: ALLOY STEEL D6AC
CONDITION: 1650F A-BQ AT 975F, SQ AT 400F, 1000F
2+2HR
ENVIRONMENT: R.T. ,DIST H2O

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		F(HZ)= 0.10	F(HZ)= 1.00		
DELTA K MIN	A:				
	B:				
	C:				
	D:				
200.00					
DELTA K MAX	A:				
	B:				
	C:				
	D:				
ROOT MEAN SQUARE PERCENT ERROR		0.00	0.00		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 1650F A-BQ AT 975F, SQ AT 400F, 1000F 2+2HR
FORM: 0.80"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.08
ENVIRONMENT: R.T., DIST H20

YIELD STRENGTH: 220.0 KSI
ULT. STRENGTH: 238.0 KSI
SPECIMEN THK: 0.750"
SPECIMEN WIDTH: 5.000"
REFERENCES: 82543

ALLOY STEEL

D6AC

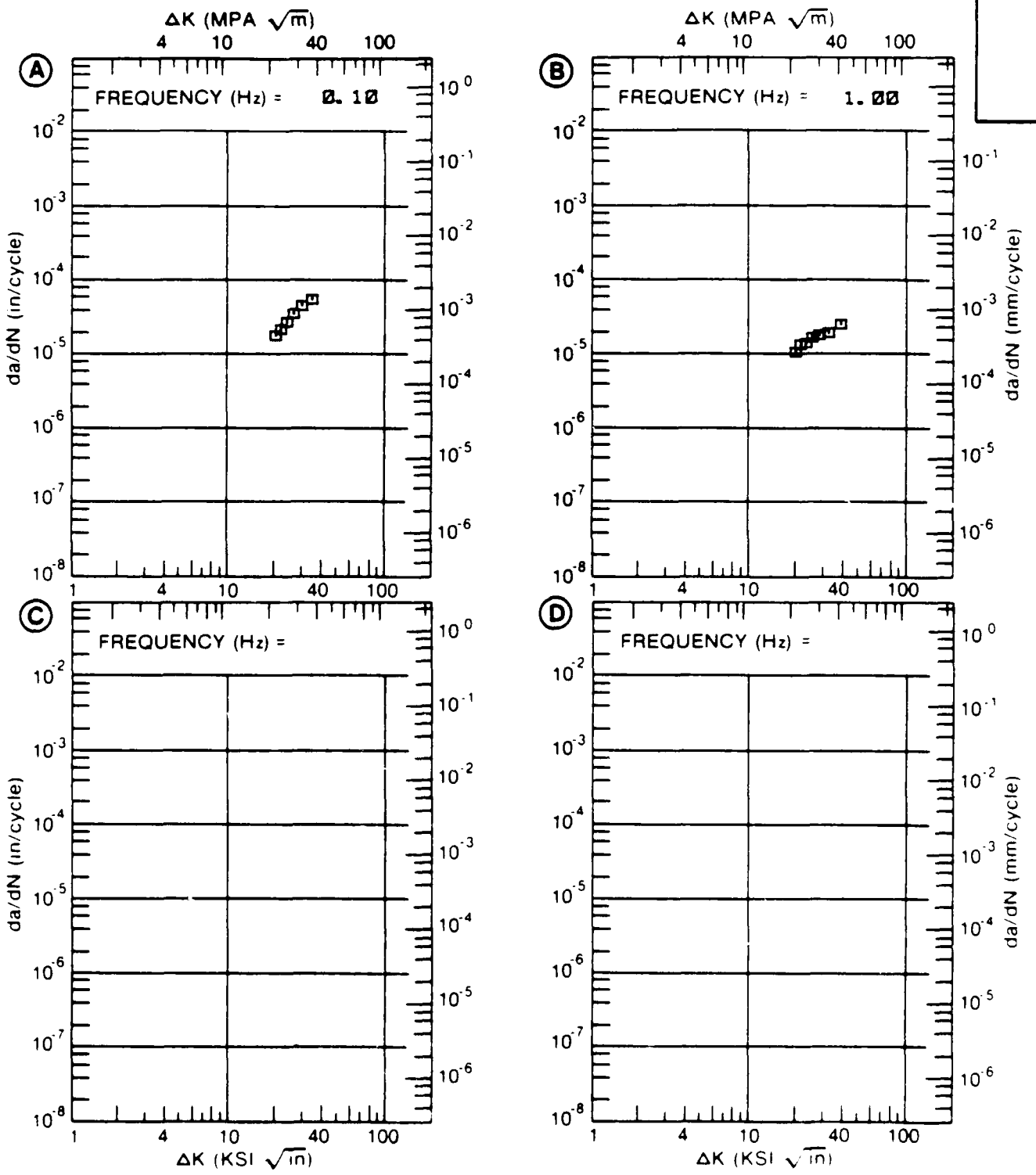


TABLE 6.4.3.7

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.4.3.7 INDICATING EFFECT

OF FREQUENCY

MATERIAL: ALLOY STEEL D6AC
CONDITION: 1650F A-BQ AT 975F, SQ AT 400F, 1000F
2+2HR
ENVIRONMENT: R.T. ,DRY AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE) A	B	C	D
			F(HZ)= 0.10	F(HZ)= 1.00	F(HZ)= 3.00	
DELTA K MIN	A:	13.47	1.39			
	B:	13.43		1.07		
	C:	13.52			1.11	
	D:					
		16.00	2.79	2.45	2.59	
		20.00	5.58	5.24	5.43	
		25.00	9.39	8.84	8.61	
		30.00	13.3	12.2	11.5	
		35.00	17.5	15.6		
DELTA K MAX	A:	36.15	18.6			
	B:	35.22		15.7		
	C:	34.37			14.4	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			7.09	8.90	6.09	
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1	1	
		1.25-2.0				
		>2.0				

CONDITION/HT: 1650F A-BQ AT 975F. SQ AT 400F. 1000F 2+2HR
FORM: 0.80"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.09
ENVIRONMENT: R.T., DRY AIR

YIELD STRENGTH: 220.0 KSI
ULT. STRENGTH: 238.0 KSI
SPECIMEN THK: 0.750"
SPECIMEN WIDTH: 5.000"
REFERENCES: 82543

ALLOY STEEL

D6AC

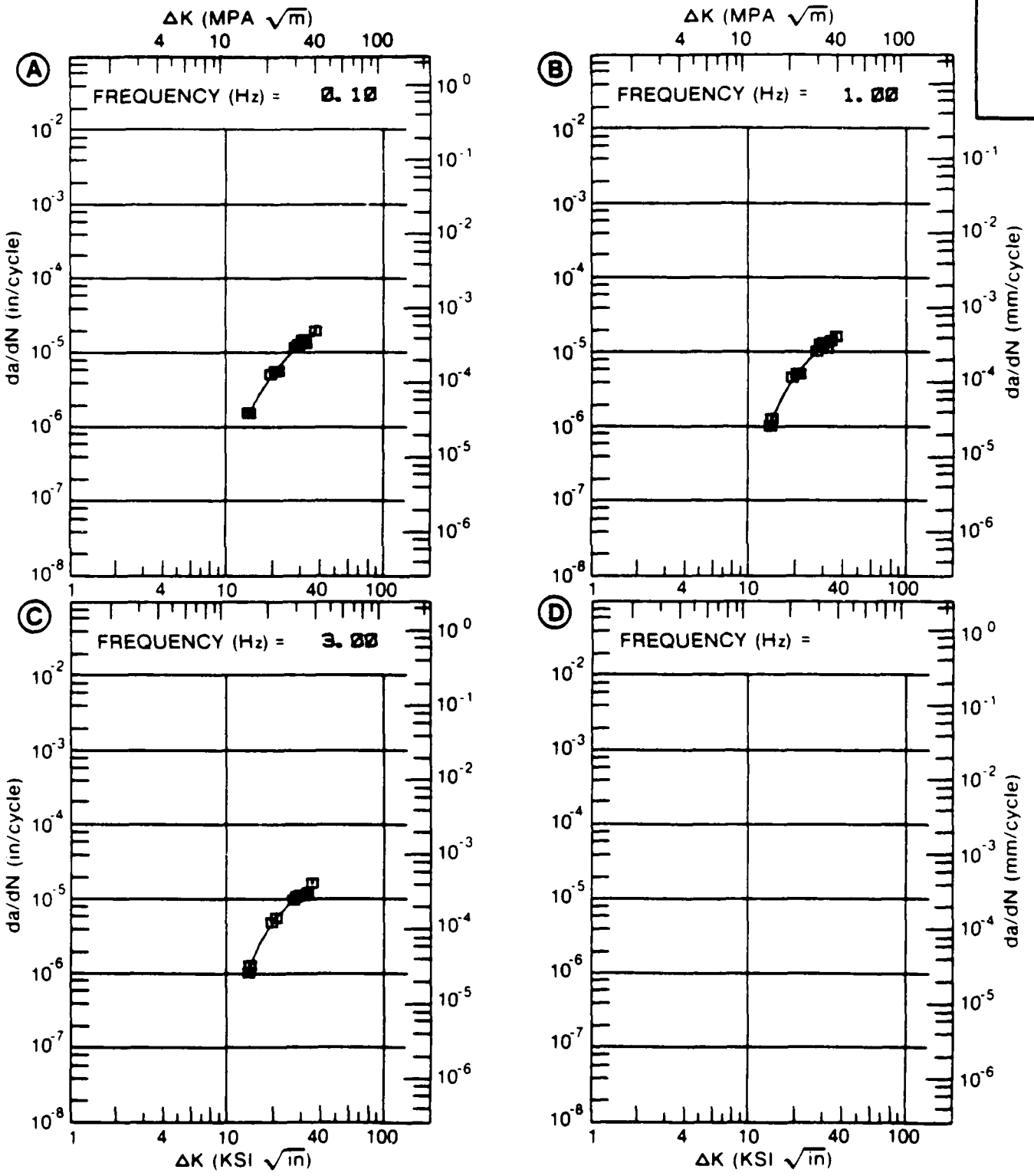


Figure 6.4.3.7

TABLE 6.4.3.8

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.4.3.8 INDICATING EFFECT

OF FREQUENCY

MATERIAL: ALLOY STEEL D6AC
CONDITION: 1650F A-BQ AT 975F, SQ AT 400F, 1000F
2+2HR
ENVIRONMENT: R.T. , JP-4 FUEL

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			F(HZ)= 0.10	F(HZ)= 1.00	F(HZ)= 3.00	
	A:	10.28	2.31			
DELTA K	B:	10.19		1.01		
MIN	C:	9.80			.639	
	D:					
		10.00			.736	
		13.00	3.32	2.86	2.64	
		16.00	5.48	5.05	4.21	
		20.00	10.4	7.44	5.31	
		25.00	20.2	9.60	6.64	
		30.00	33.1	11.5	9.58	
		35.00	46.7	13.7		
		40.00	58.2			
	A:	49.58	67.9			
DELTA K	B:	36.95		14.8		
MAX	C:	34.21			15.1	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			21.60	13.73	15.78	
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1	1	
		1.25-2.0				
		>2.0				

CONDITION/HT: 1650F A-BQ AT 975F, SQ AT 400F, 1000F 2+2HR
FORM: 0.80"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.10
ENVIRONMENT: R.T., JP-4 FUEL

YIELD STRENGTH: 220.0 KSI
ULT. STRENGTH: 238.0 KSI
SPECIMEN THK: 0.751"
SPECIMEN WIDTH: 5.000"
REFERENCES: 82543

ALLOY STEEL

D6AC

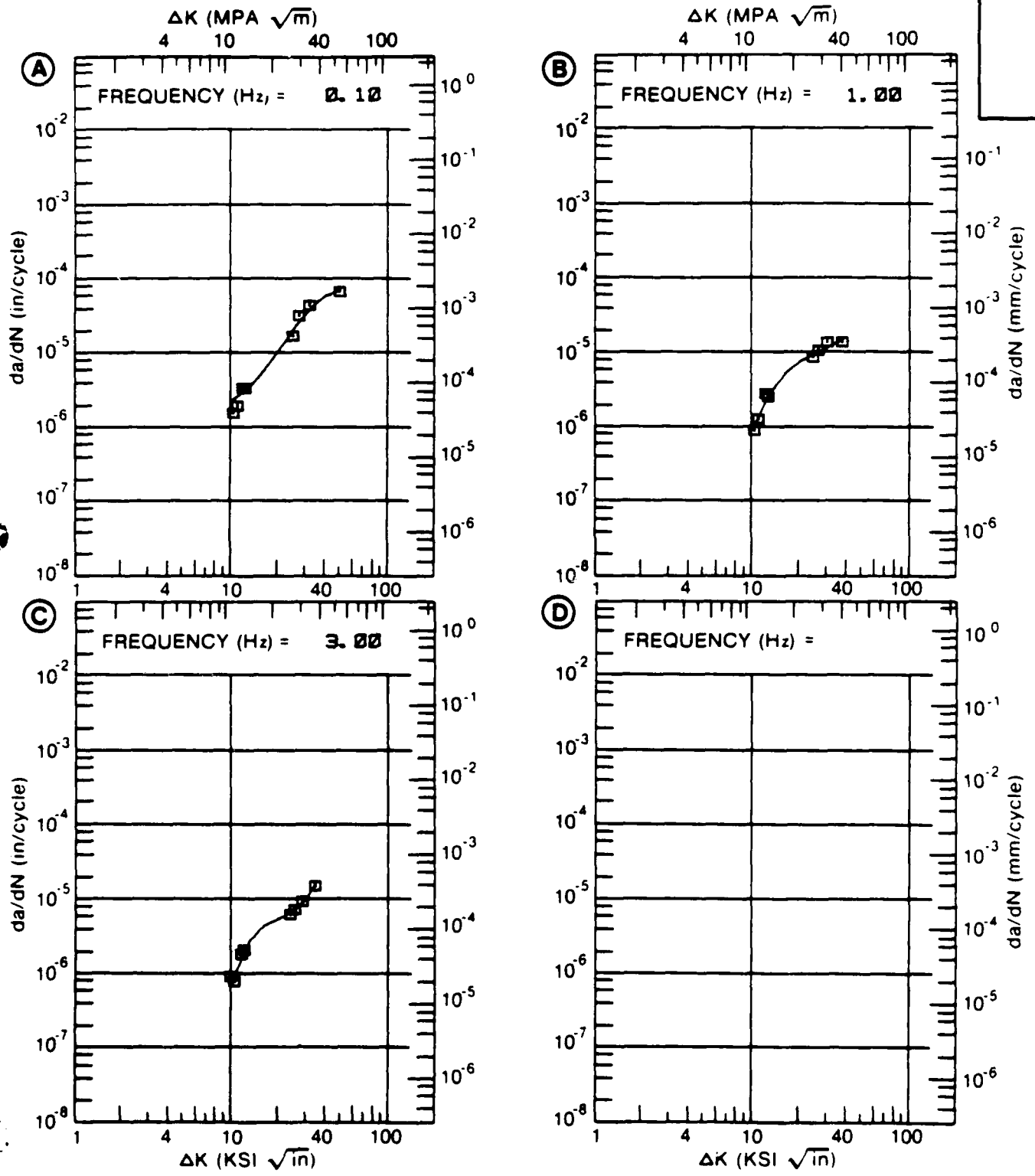


Figure 6.4.3.8

TABLE 6.4.3.9

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.4.3.9 INDICATING EFFECT

OF FREQUENCY

MATERIAL: ALLOY STEEL D6AC
CONDITION: 1650F A-BQ AT 975F, SQ AT 400F, 1000F 2+2HR
ENVIRONMENT: R.T. , JP-4 FUEL

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		F(HZ)= 0.10	F(HZ)= 1.00	F(HZ)= 3.00	
DELTA K MIN	A:				
	B: 9.99		2.13		
	C: 9.80			.980	
	D:				
	10.00		2.14	1.09	
	13.00		4.58	2.83	
	16.00		6.39	4.38	
	20.00		9.06	6.45	
	25.00		16.4	11.0	
DELTA K MAX	A:				
	B: 29.90		37.2		
	C: 27.00			14.2	
	D:				
ROOT MEAN SQUARE PERCENT ERROR		0.00	8.91	12.64	
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5				
	0.5-0.8				
	0.8-1.25		1	1	
	1.25-2.0				
	>2.0				

CONDITION/HT: 1650F A-BQ AT 975F, SQ AT 400F, 1000F 2+2HR
FORM: 0.80"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.50
ENVIRONMENT: R.T., JP-4 FUEL

YIELD STRENGTH: 220.0 KSI
ULT. STRENGTH: 238.0 KSI
SPECIMEN THK: 0.758"
SPECIMEN WIDTH: 5.000"
REFERENCES:82543

ALLOY STEEL

D6AC

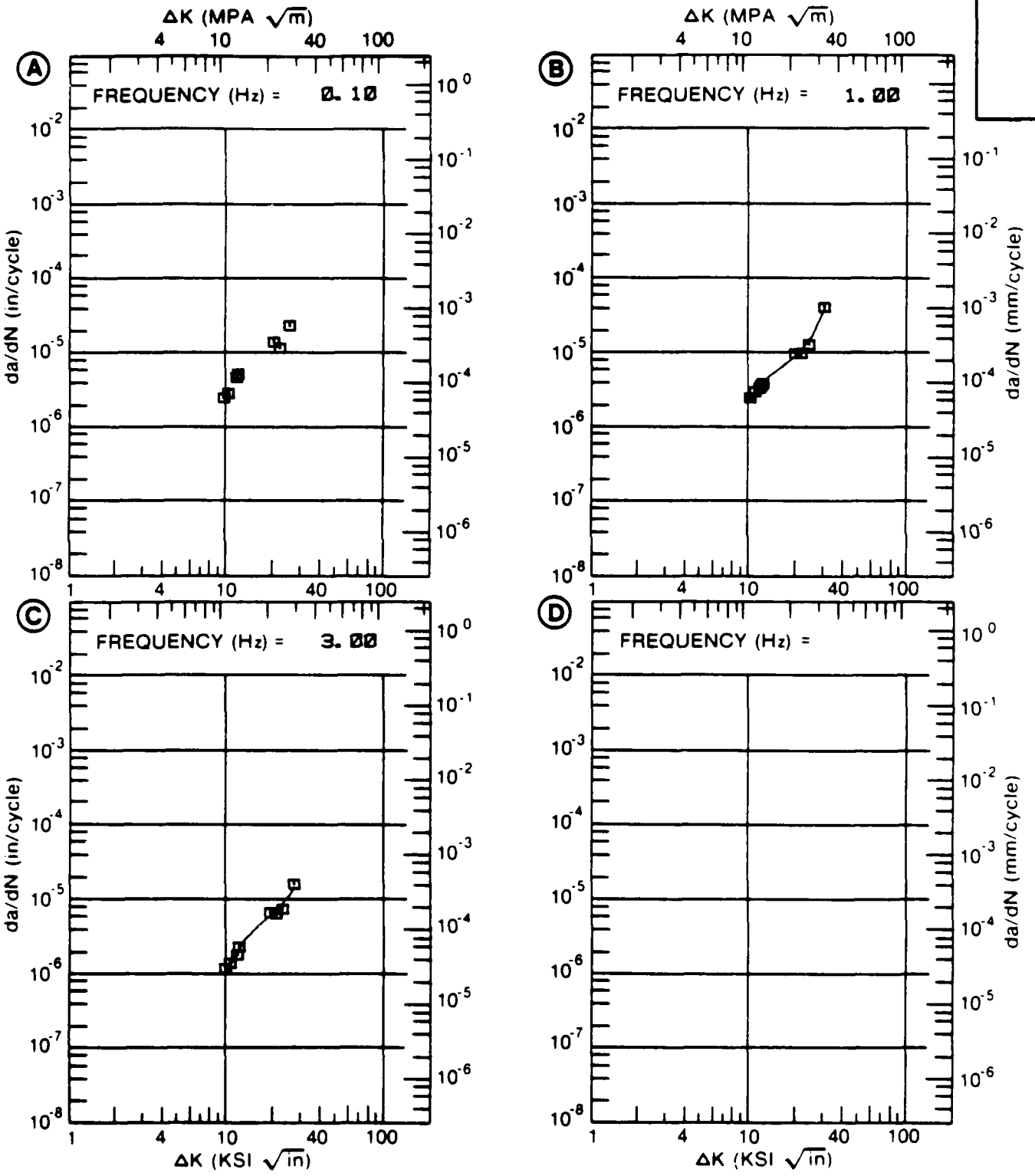


Figure 6.4.3.9

TABLE 6.4.3.10

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.4.3.10 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL D6AC
CONDITION: 1650F A-BQ AT 975F, SQ AT 400F, 1000F
2+2HR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. JP-4 FUEL			
DELTA K MIN	A:	14.94	3.56			
	B:					
	C:					
	D:					
		16.00	3.15			
		20.00	5.38			
		25.00	11.2			
DELTA K MAX	A:	25.91	11.5			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR	16.96

LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: 1650F A-BQ AT 975F, SQ AT 400F, 1000F 2+2HR
FORM: 0.80"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.50
FREQUENCY: 1.00 HZ

YIELD STRENGTH: 220.0 KSI
ULT. STRENGTH: 238.0 KSI
SPECIMEN THK: 0.500"
SPECIMEN WIDTH: 2.500"
REFERENCES:82543

ALLOY STEEL

D6AC

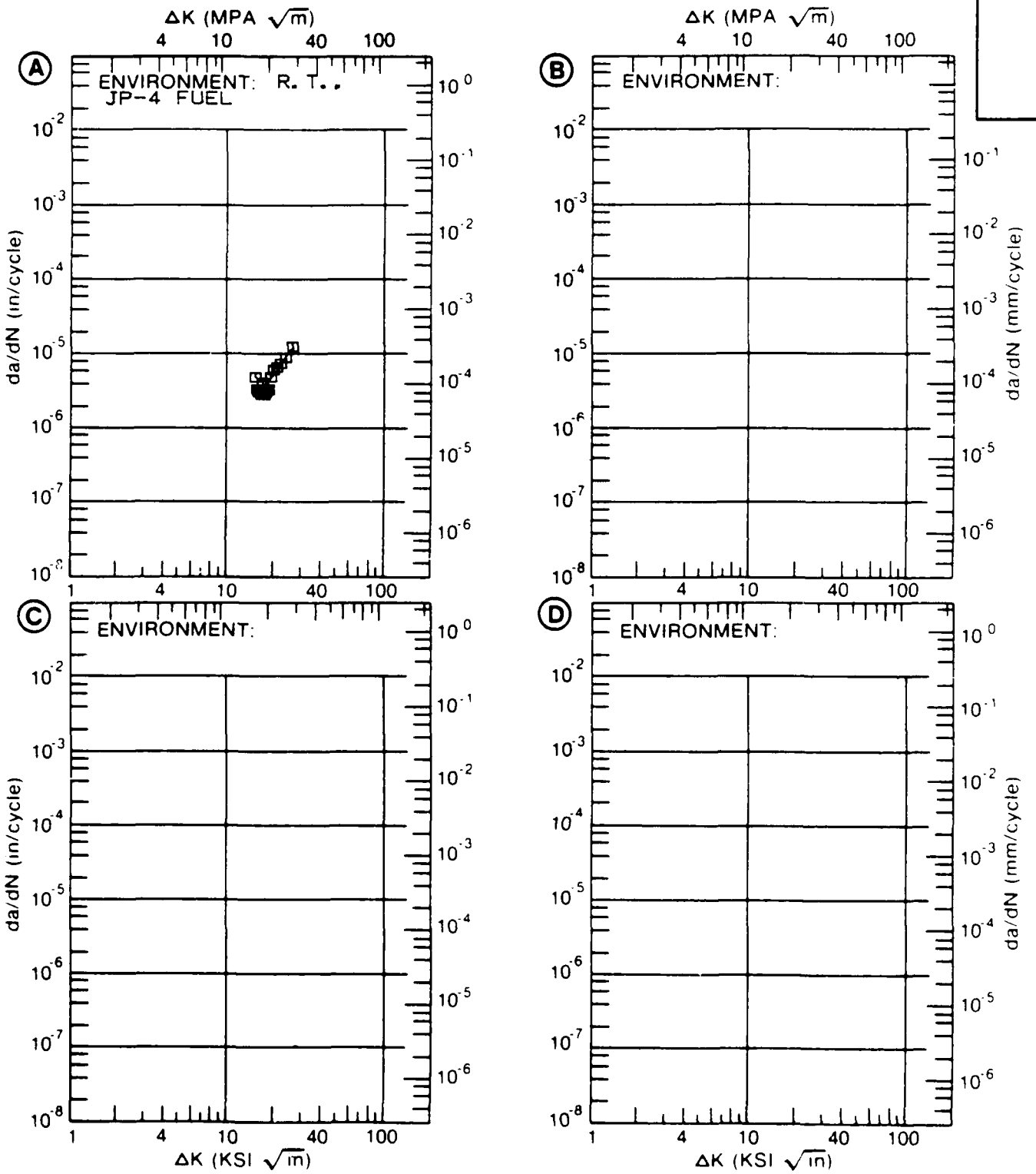


Figure 6.4.3.10

TABLE 6.4.3.11

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.4.3.11 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL D6AC
CONDITION: 1700F A-BQ AT 975F, OQ AT 140F, 1000F
2+2HR
ENVIRONMENT: R.T. , LAB AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.10			
DELTA K MIN	A:	19.72	5.50			
	B:					
	C:					
	D:					
		20.00	5.61			
		25.00	8.34			
		30.00	12.8			
		35.00	19.2			
		40.00	27.7			
		50.00	51.3			
		60.00	81.9			
DELTA K MAX	A:	66.91	105.			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR	25.51

LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5	
	0.5-0.8	1
	0.8-1.25	2
	1.25-2.0	
	>2.0	

CONDITION/HT: 1700F A-BQ AT 975F, OQ AT 140F, 1000F 2+2HR
FORM: Ø.8Ø"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 1.ØØ HZ
ENVIRONMENT: R.T., LAB AIR
YIELD STRENGTH: 22Ø.Ø KSI
ULT. STRENGTH: 238.Ø KSI
SPECIMEN THK: Ø.69Ø"
SPECIMEN WIDTH: 1.5ØØ"
REFERENCES: 82543

ALLOY STEEL

D6AC

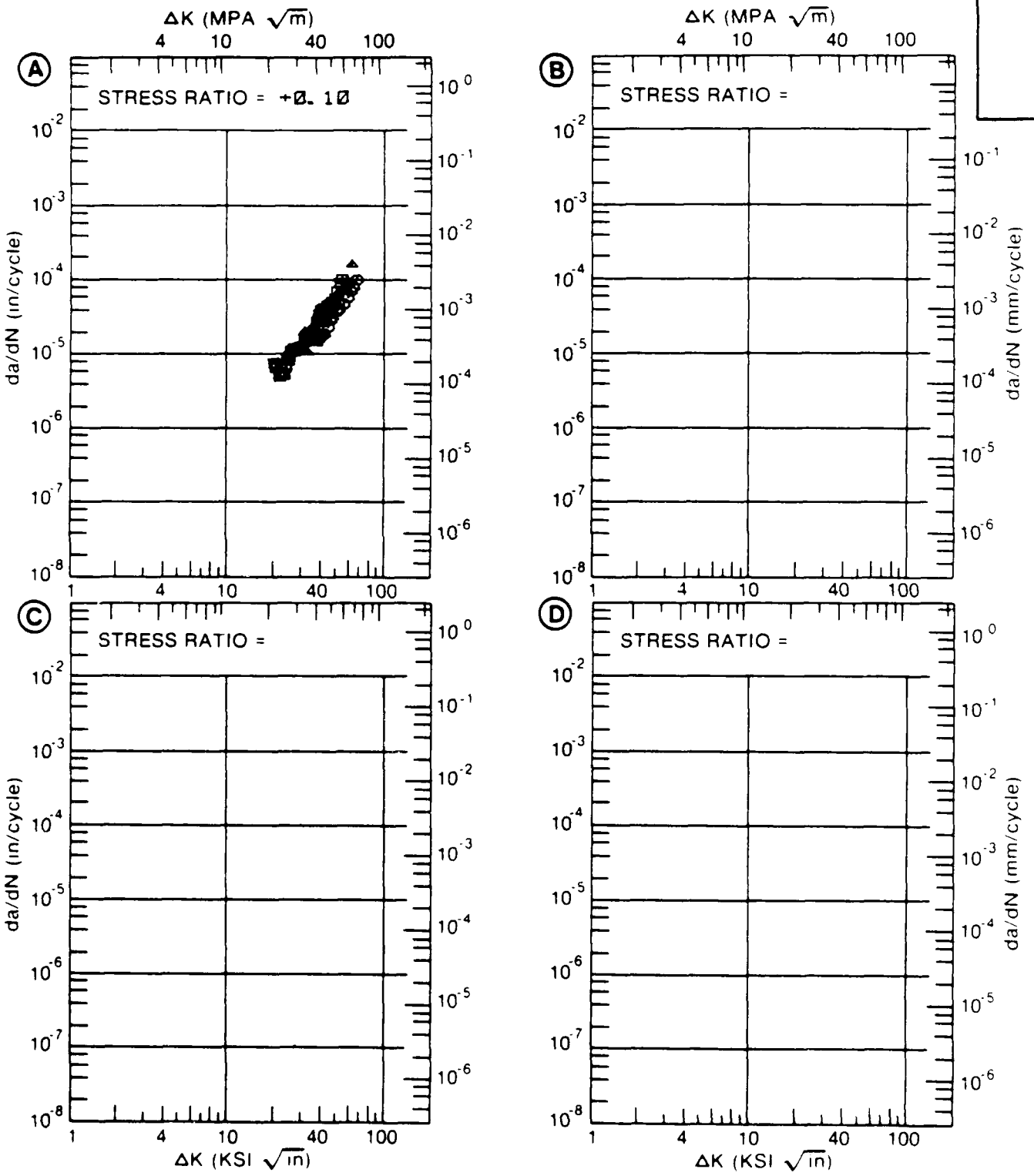


Figure 6.4.3.11

TABLE 6.4.3.12

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.4.3.12 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL D6AC
CONDITION: 1700F A-BQ, 975F OQ AT 140F, 1000F 2+2HRS
ENVIRONMENT: R.T. , DRY AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.50			
DELTA K MIN	A:	15.55	3.63			
	B:					
	C:					
	D:					
		16.00	3.76			
		20.00	6.18			
DELTA K MAX	A:	21.35	7.29			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR	8.68

LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5	
	0.5-0.8	
	0.8-1.25	2
	1.25-2.0	1
	>2.0	

CONDITION/HT: 1700F A-BQ, 975F OQ AT 140F, 1000F 2+2HRS
FORM: 0.80"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 0.10- 3.00 HZ
ENVIRONMENT: R.T., DRY AIR

YIELD STRENGTH: 220.0 KSI
ULT. STRENGTH: 238.0 KSI
SPECIMEN THK: 0.751"
SPECIMEN WIDTH: 5.000"
REFERENCES: 82543

ALLOY STEEL

D6AC

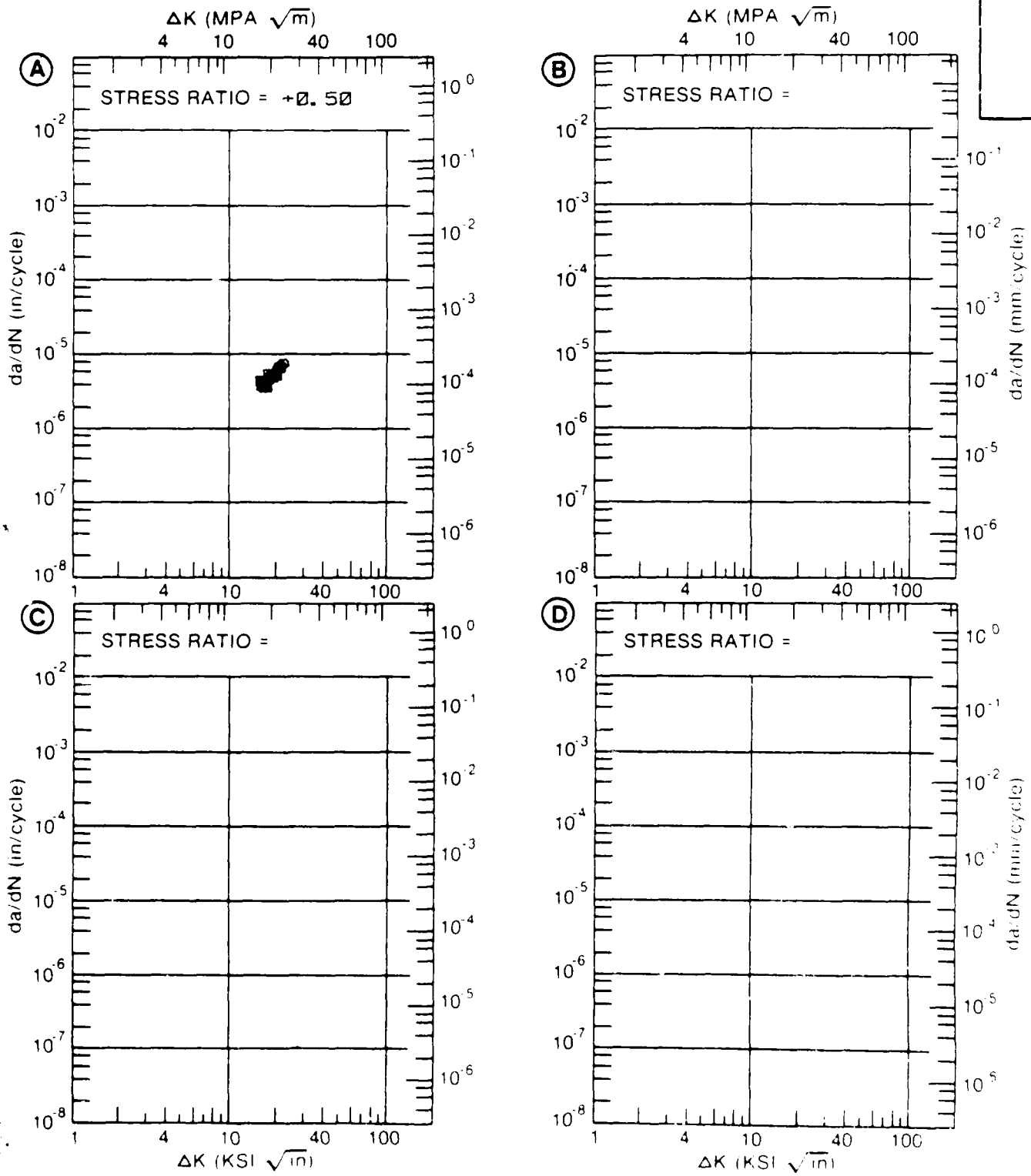


TABLE 6.4.3.13

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.4.3.13 INDICATING EFFECT

OF FREQUENCY

MATERIAL: ALLOY STEEL D6AC
CONDITION: 1700F A-BQ AT 975F, OQ AT 140F, 1000F
2+2HR
ENVIRONMENT: R.T. ,DIST H20

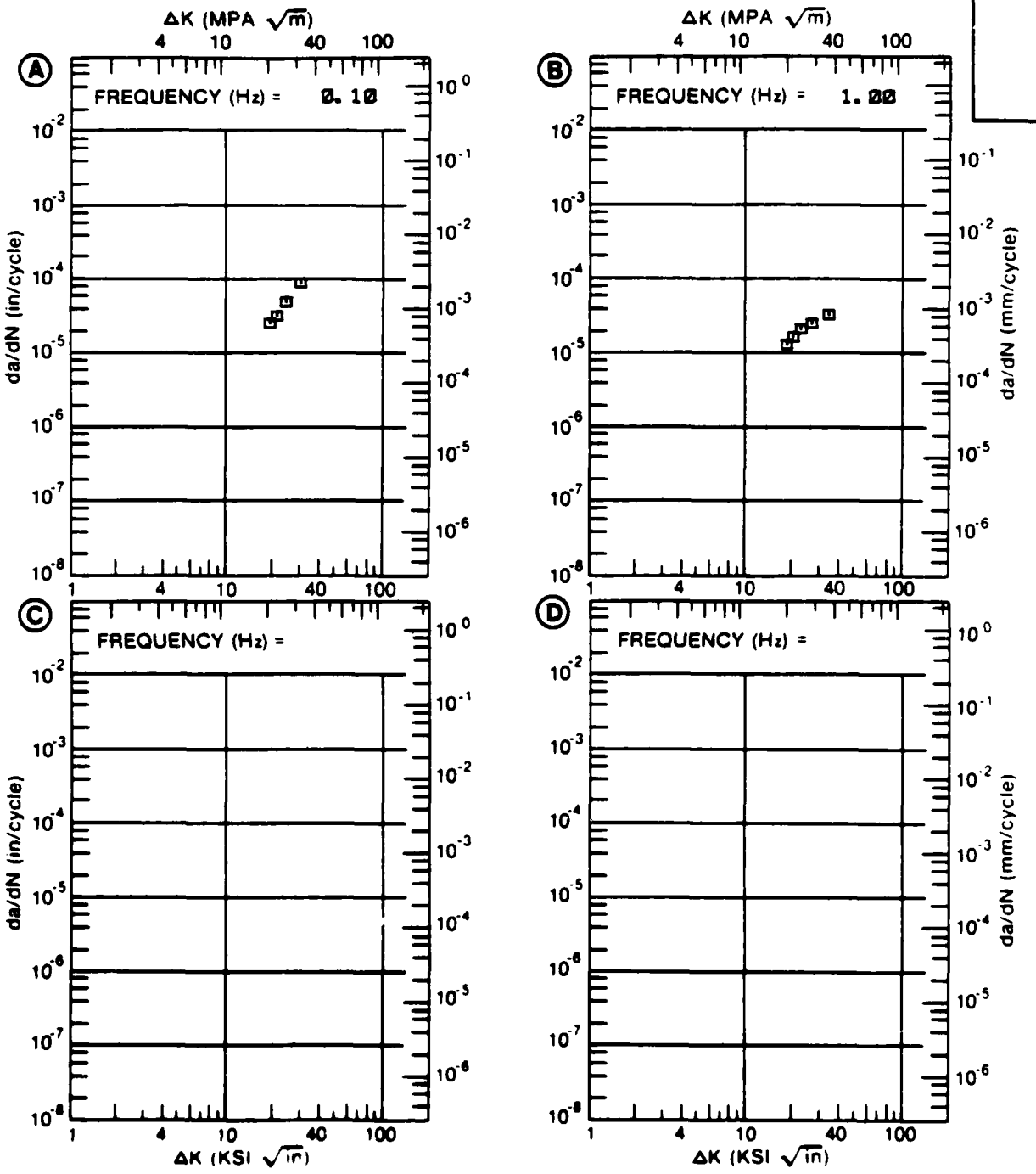
DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		F(HZ)= 0.10	F(HZ)= 1.00		
DELTA K MIN	A:				
	B:				
	C:				
	D:				
	200.00				
DELTA K MAX	A:				
	B:				
	C:				
	D:				
ROOT MEAN SQUARE PERCENT ERROR		0.00	0.00		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 1700F A-BQ AT 975F. OQ AT 140F. 1000F 2+2HR
FORM: 0.80"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.08
ENVIRONMENT: R.T.. DIST H20
YIELD STRENGTH: 220.0 KSI
ULT. STRENGTH: 238.0 KSI
SPECIMEN THK: 0.754"
SPECIMEN WIDTH: 5.000"
REFERENCES:82543

ALLOY STEEL

D6AC



CONDITION/HT 1700F A-BQ AT 975F. OQ AT 140F. 1000F 2+2HR
FORM 0.80"TH FORGING
SPECIMEN TYPE CT
YIELD STRENGTH 220.0 KSI
ULT STRENGTH 238.0 KSI

ALLOY STEEL

TABLE 6.4.3.14

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.4.3.14 INDICATING EFFECT

OF FREQUENCY

MATERIAL: ALLOY STEEL D6AC
CONDITION: 1700F A-BQ AT 975F, OQ AT 140F, 1000F
2+2HR
ENVIRONMENT: R.T. , DRY AIR

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)		
		A	B	C	D
		F(HZ)= 0.10	F(HZ)= 1.00	F(HZ)= 3.00	
DELTA K MIN	A: 19.47	4.95			
	B: 12.94		1.27		
	C: 12.88			1.09	
	D:				
	13.00		1.26	1.14	
	16.00		2.61	2.52	
	20.00	5.28	5.88	4.86	
	25.00	8.52	9.94	8.22	
	30.00	12.3	13.6	12.1	
	35.00	17.0	17.6	16.9	
	40.00	23.2	23.0	23.2	
	50.00	43.9	43.4	43.3	
	60.00		96.3	83.0	
	70.00		128.		
DELTA K MAX	A: 57.66	73.2			
	B: 70.52		114.		
	C: 63.32			104.	
	D:				
ROOT MEAN SQUARE PERCENT ERROR		4.94	11.47	6.89	
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5				
	0.5-0.8				
	0.8-1.25	1	1	1	
	1.25-2.0				
	>2.0				

CONDITION/HT: 1700F A-BQ AT 975F, OQ AT 140F, 1000F 2+2HR
FORM: 0.80"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.10
ENVIRONMENT: R.T., DRY AIR

YIELD STRENGTH: 220.0 KSI
ULT. STRENGTH: 238.0 KSI
SPECIMEN THK: 0.752"
SPECIMEN WIDTH: 5.000"
REFERENCES: 82543

ALLOY STEEL

D6AC

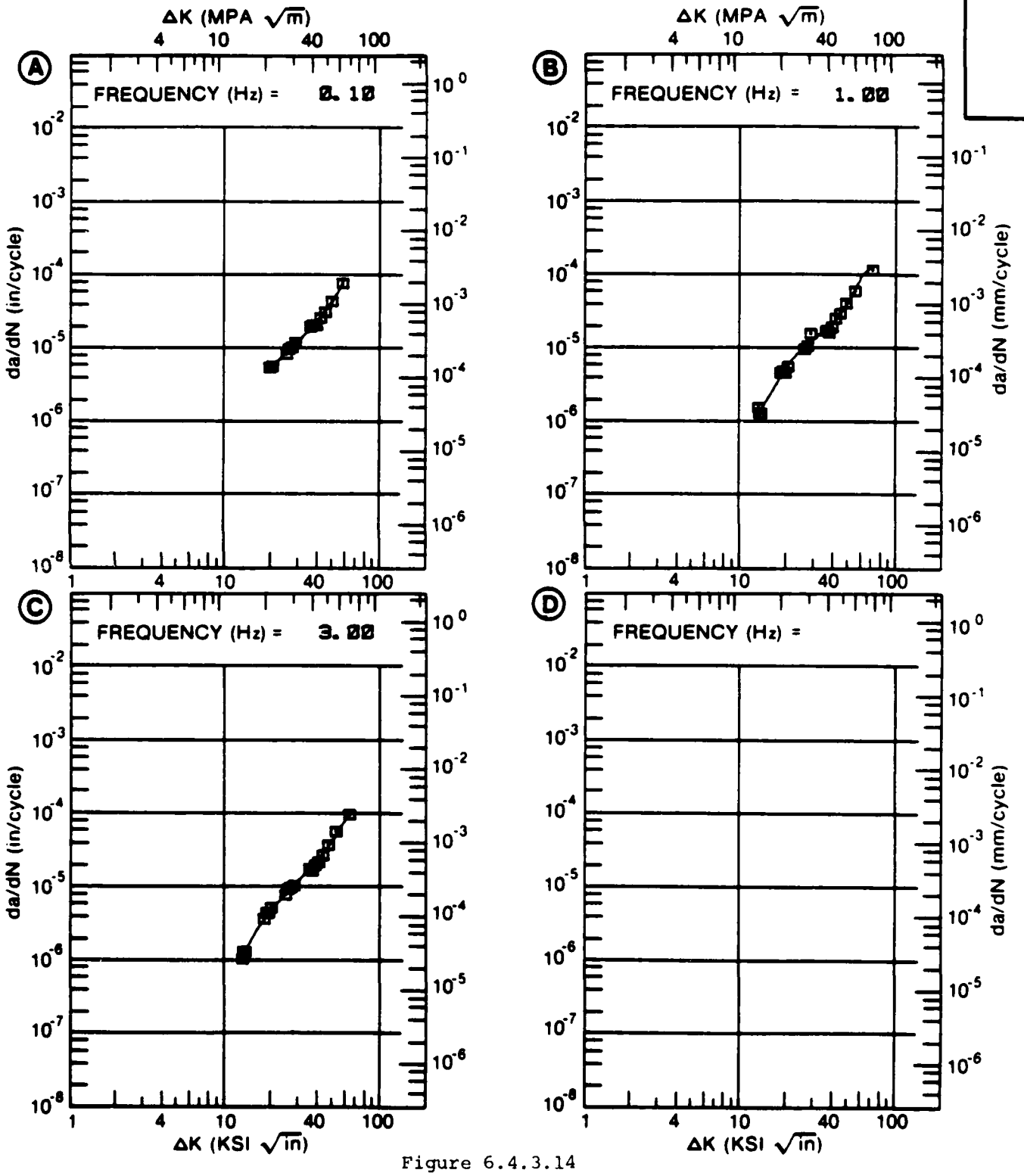


Figure 6.4.3.14

TABLE 6.4.3.15

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.4.3.15 INDICATING EFFECT

OF FREQUENCY

MATERIAL: ALLOY STEEL D6AC
CONDITION: 1700F A-BQ AT 975F, OQ AT 140F, 1000F
2+2HR
ENVIRONMENT: R.T. , JP4/H20

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		F(HZ)= 0.10	F(HZ)= 1.00	F(HZ)= 3.00	
DELTA K MIN	A:				
	B:				
	C:				
	D:				
200.00					
DELTA K MAX	A:				
	B:				
	C:				
	D:				
ROOT MEAN SQUARE PERCENT ERROR		0.00	0.00	0.00	

LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 1700F A-BQ AT 975F. OQ AT 140F. 1000F 2+2HR
FORM: 0.80"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.10
ENVIRONMENT: R.T., JP4/H20
YIELD STRENGTH: 220.0 KSI
ULT. STRENGTH: 238.0 KSI
SPECIMEN THK: 0.741"
SPECIMEN WIDTH: 5.000"
REFERENCES: 62543

ALLOY STEEL

D6AC

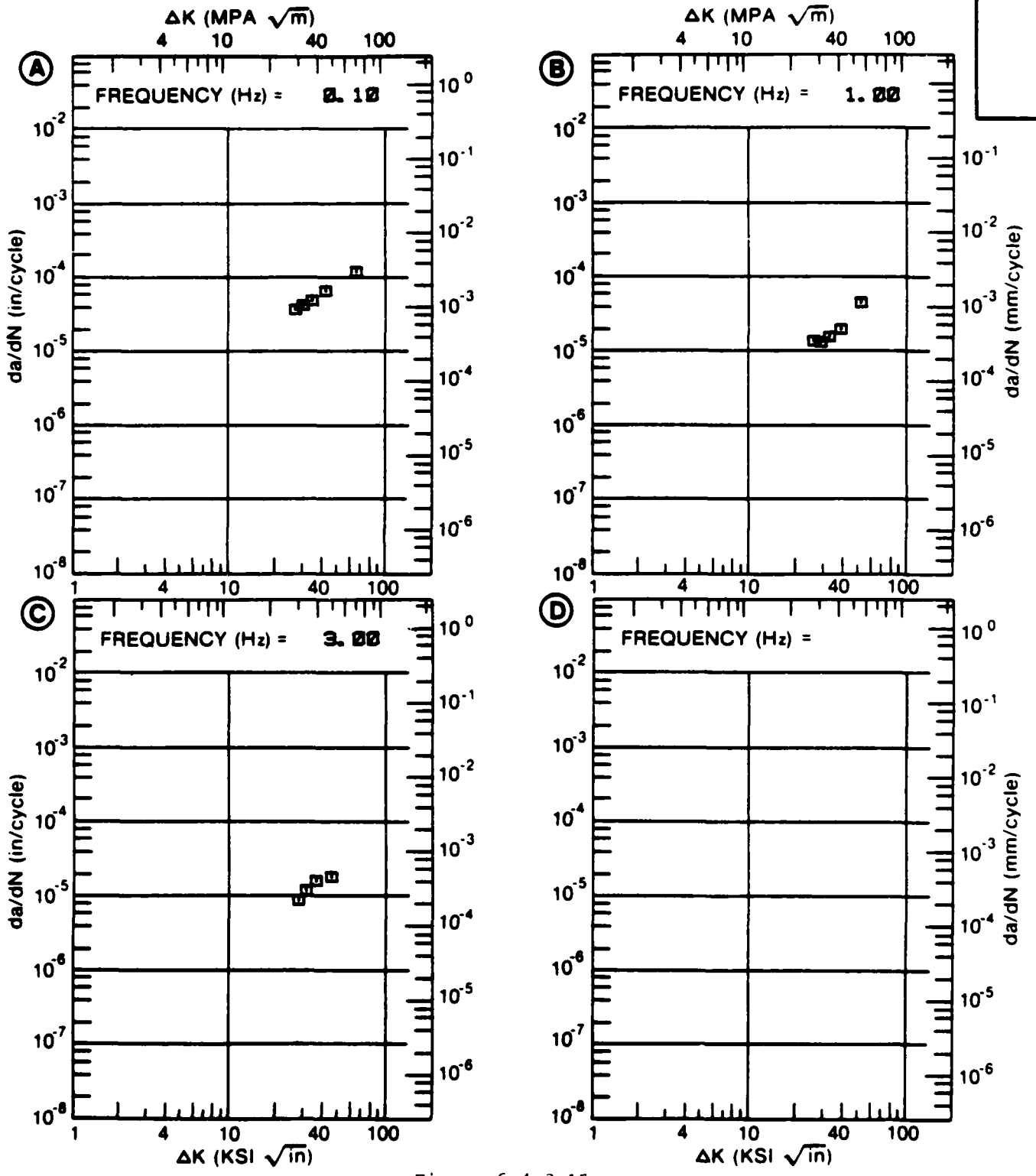


Figure 6.4.3.15

TABLE 6.4.3.16

FATIQUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIQURE 6.4.3.16 INDICATING EFFECT

OF FREQUENCY

MATERIAL: ALLOY STEEL D6AC
CONDITION: 1700F A-BQ AT 975F, OQ AT 140F, 1000F
2+2HR
ENVIRONMENT: R. T. , DIST H2O

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			F(HZ)= 1.00	F(HZ)= 3.00		
DELTA K MIN	A:	9.81	2.20			
	B:	9.86		1.32		
	C:					
	D:					
		10.00	2.33	1.43		
		13.00	4.71	4.18		
		16.00	7.69	6.44		
		20.00	12.2	8.56		
		25.00	18.4	11.8		
		30.00	24.9	18.6		
DELTA K MAX	A:	33.23	29.1			
	B:	30.17		18.9		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			16.48	19.47		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0		1		
		>2.0	1			

CONDITION/HT: 1700F A-BQ AT 975F.0Q AT 140F.1000F 2+2HR
FORM: 0.80"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.50
ENVIRONMENT: R.T., DIST H20

YIELD STRENGTH: 220.0 KSI
ULT. STRENGTH: 238.0 KSI
SPECIMEN THK: 0.751"
SPECIMEN WIDTH: 5.000"
REFERENCES: 82543

ALLOY STEEL

D6AC

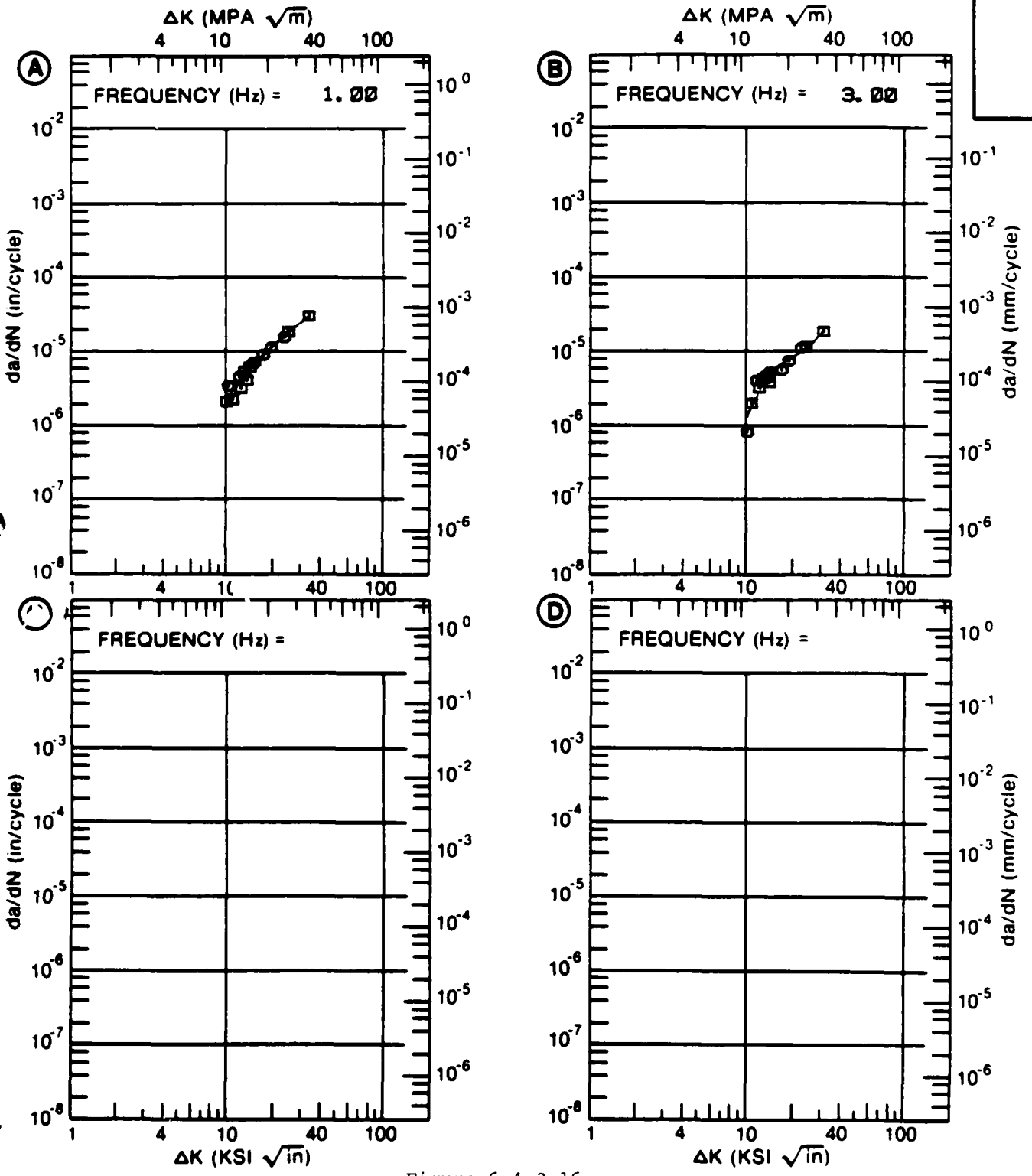


Figure 6.4.3.16

TABLE 6.4.3.17

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.4.3.17 INDICATING EFFECT

OF FREQUENCY

MATERIAL: ALLOY STEEL D6AC
CONDITION: 1700F A-BQ AT 975F, OQ AT 140F, 1000F
2+2HR
ENVIRONMENT: R.T. , JP-4 FUEL

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		F(HZ)= 0.10	F(HZ)= 1.00	F(HZ)= 3.00	
DELTA K MIN	A:				
	B: 10.80		2.19		
	C: 10.58			1.20	
	D:				
	13.00		3.02	2.29	
	16.00		4.92	3.93	
	20.00		8.95	6.73	
	25.00		15.9	12.0	
	30.00		23.4	21.0	
	35.00		29.2		
DELTA K MAX	A:				
	B: 39.01		31.7		
	C: 33.66			31.9	
	D:				
ROOT MEAN SQUARE PERCENT ERROR		0.00	15.29	13.65	
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5				
	0.5-0.8				
	0.8-1.25		1	1	
	1.25-2.0				
	>2.0				

CONDITION/HT: 1700F A-BQ AT 975F OQ AT 140F, 1000F 2+2HR
FORM: 0.80"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.50
ENVIRONMENT: R.T., JP-4 FUEL
YIELD STRENGTH: 220.0 KSI
ULT. STRENGTH: 238.0 KSI
SPECIMEN THK: 0.750"
SPECIMEN WIDTH: 5.000"
REFERENCES: 82543

ALLOY STEEL

D6AC

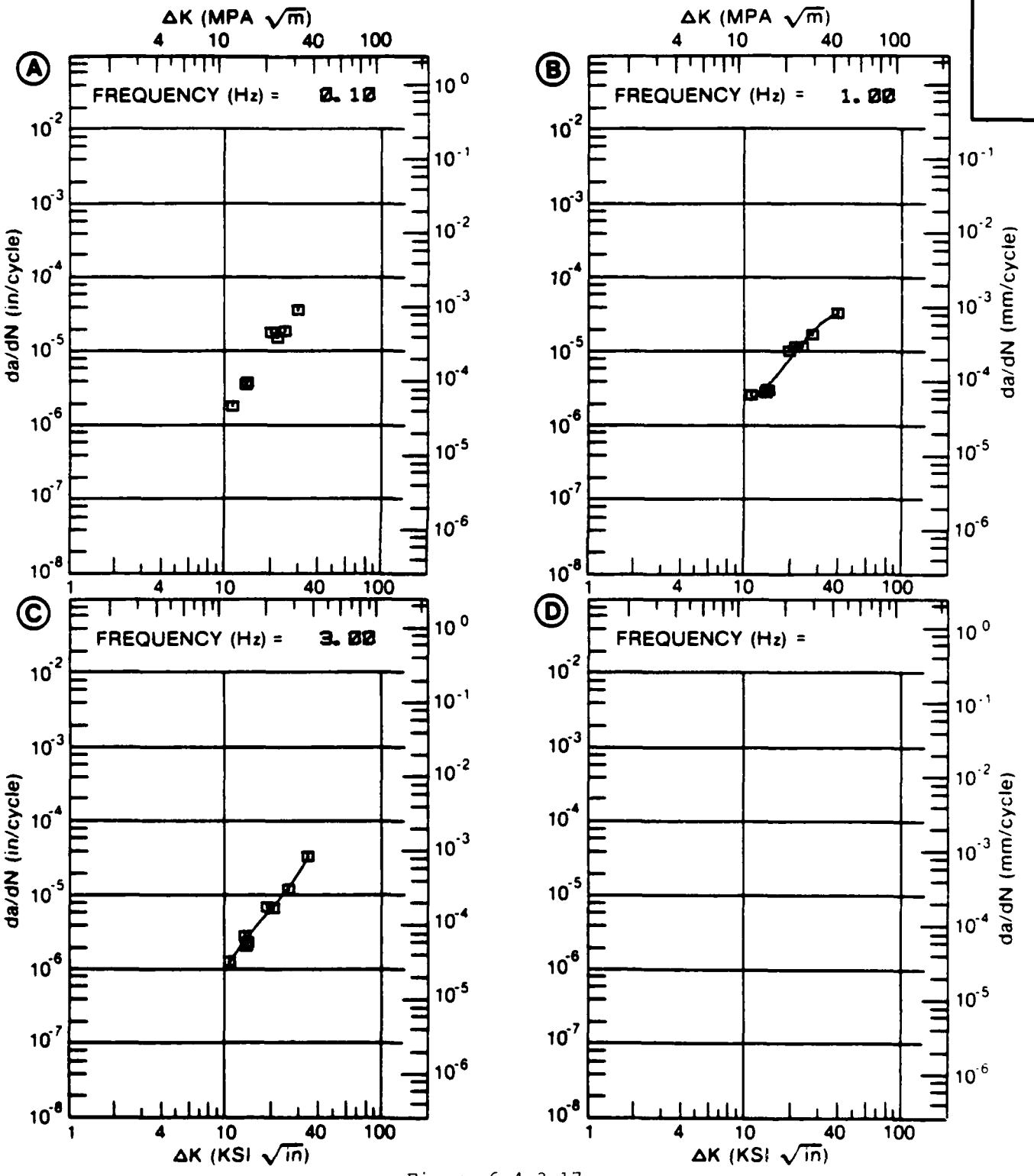


Figure 6.4.3.17

TABLE 6.4.3.18

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.4.3.18 INDICATING EFFECT

OF FREQUENCY

MATERIAL: ALLOY STEEL D6AC
CONDITION: 1700F A-BQ AT 975F, OQ AT 140F, 1000F 2+2HR
ENVIRONMENT: R.T. ,DIST H2O

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)		
			A	B	C	D
			F(HZ)= 0.10	F(HZ)= 1.00	F(HZ)= 3.00	
DELTA K MIN	A:	12.13	5.69			
	B:	12.01		2.35		
	C:	12.24			2.81	
	D:					
		13.00	8.66	3.25	3.40	
		16.00	16.8	6.39	4.97	
		20.00	23.4	10.7	5.88	
		25.00	41.1	15.6	7.59	
		30.00	71.7	20.5	12.6	
		35.00	109.	26.1		
		40.00	140.			
DELTA K MAX	A:	46.20	151.			
	B:	39.73		32.9		
	C:	30.48			13.5	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			16.63	15.16	34.97	
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1	1	
		1.25-2.0				
		>2.0				

CONDITION/HT: 1700F A-BQ AT 975F, OQ AT 140F, 1000F, 2+2HR
FORM: 0.80"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.11
ENVIRONMENT: R.T., DIST H20

YIELD STRENGTH: 220.0 KSI
ULT. STRENGTH: 238.0 KSI
SPECIMEN THK: 0.741"
SPECIMEN WIDTH: 5.000"
REFERENCES: 82543

ALLOY STEEL

D6AC

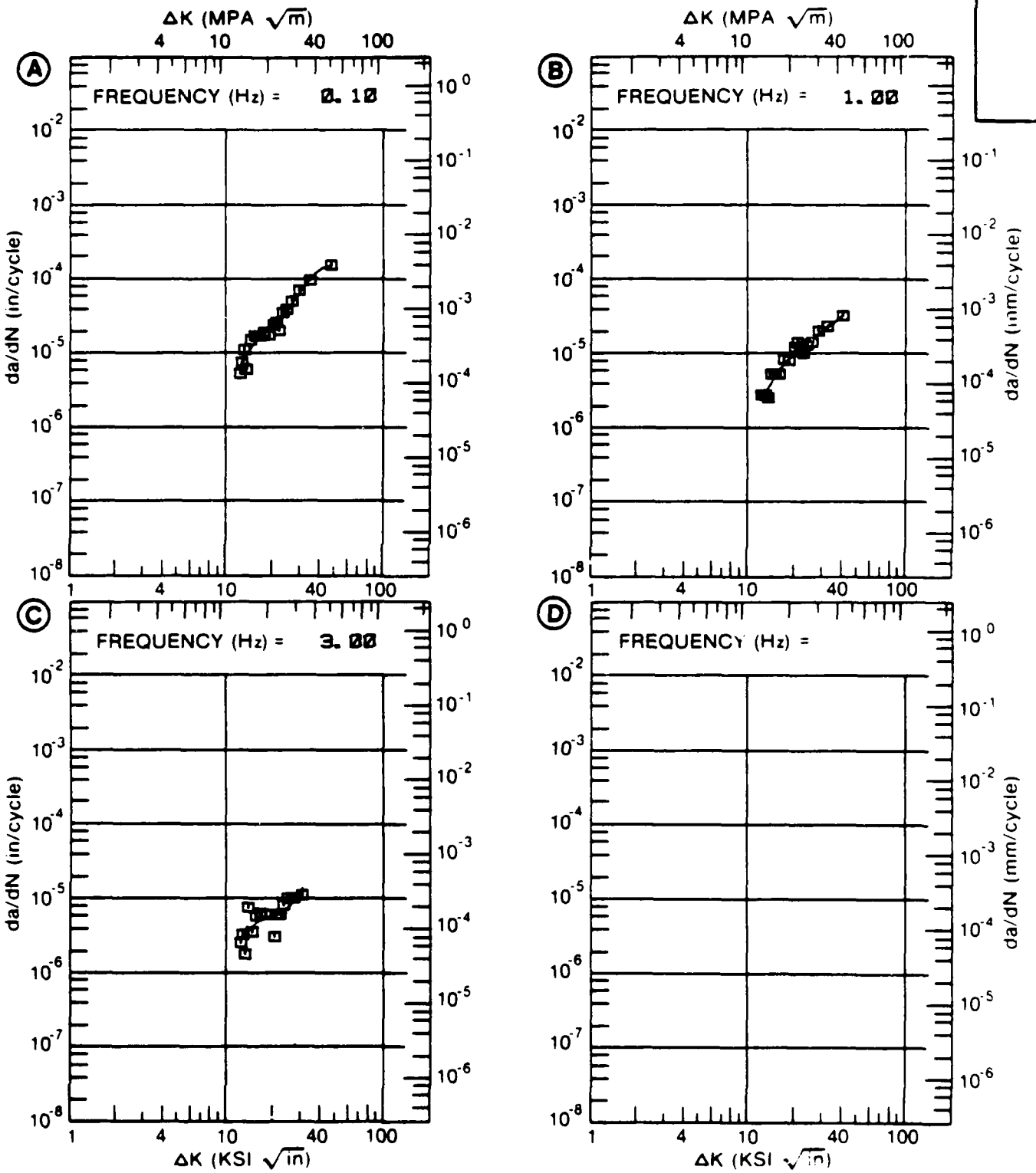


Figure 6.4.3.18

TABLE 6.4.3.19

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.4.3.19 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL D6AC
CONDITION: 1700F A-BQ AT 975F, OQ AT 140F, 1000F 2+2HR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. DIST H2O			
DELTA K MIN	A:	10.29	2.39			
	B:					
	C:					
	D:					
		13.00	4.44			
		16.00	7.10			
		20.00	11.4			
		25.00	19.0			
		30.00	30.5			
		35.00	48.8			
DELTA K MAX	A:	37.89	64.3			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 19.29

LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: 1700F A-BQ AT 975F. OQ AT 140F. 1000F 2+2HR
FORM: 0.80"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.48
FREQUENCY: 1.00 HZ

YIELD STRENGTH: 220.0 KSI
ULT. STRENGTH: 238.0 KSI
SPECIMEN THK: 0.750"
SPECIMEN WIDTH: 5.000"
REFERENCES: 82543

ALLOY STEEL

D6AC

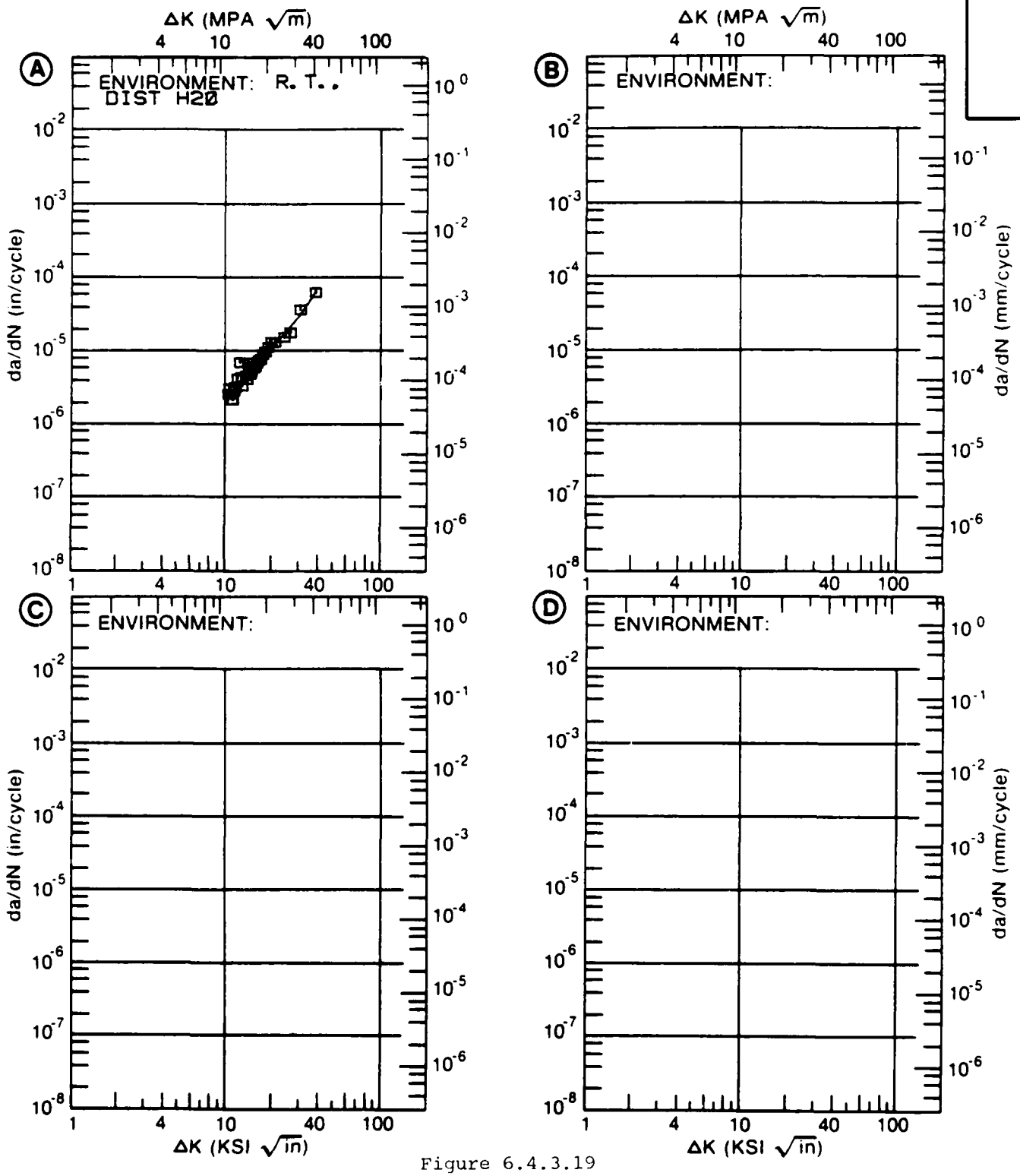


Figure 6.4.3.19

TABLE 6.4.3.20

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.4.3.20 INDICATING EFFECT

OF FREQUENCY

MATERIAL: ALLOY STEEL D6AC
CONDITION: 1700F A-BQ AT 975F, OQ AT 140F, 1000F 2+2HR
ENVIRONMENT: R.T. ,DIST H2O

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE) A	B	C	D
			F(HZ)= 0.10	F(HZ)= 1.00	F(HZ)= 3.00	
DELTA K MIN	A:	11.33	3.18			
	B:	13.93		3.08		
	C:	18.38			6.58	
	D:					
		13.00	4.80			
		16.00	8.65	5.20		
		20.00	15.7	9.51	6.47	
		25.00	27.8	14.3	10.6	
		30.00	43.7	18.7	15.0	
		35.00	63.7	23.5	16.7	
		40.00	88.2	29.7		
DELTA K MAX	A:	48.33	140.			
	B:	41.12		31.4		
	C:	38.83			20.9	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			13.57	11.95	13.92	
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	2	2	1	
		1.25-2.0				
		>2.0				

CONDITION/HT 1700F A-BQ ' ' 975F. OQ AT 140F. 1000F 2+2HR
FORM: 0.00"TH FORGING
SPECIMEN TYPE CT
ORIENTATION L-T
STRESS RATIO +0.10
ENVIRONMENT R.T., DIST H20

YIELD STRENGTH 220.0 KSI
ULT STRENGTH 238.0 KSI
SPECIMEN THK 0.750- 0.753"
SPECIMEN WIDTH: 5.000"
REFERENCES:82543

ALLOY STEEL

D6AC

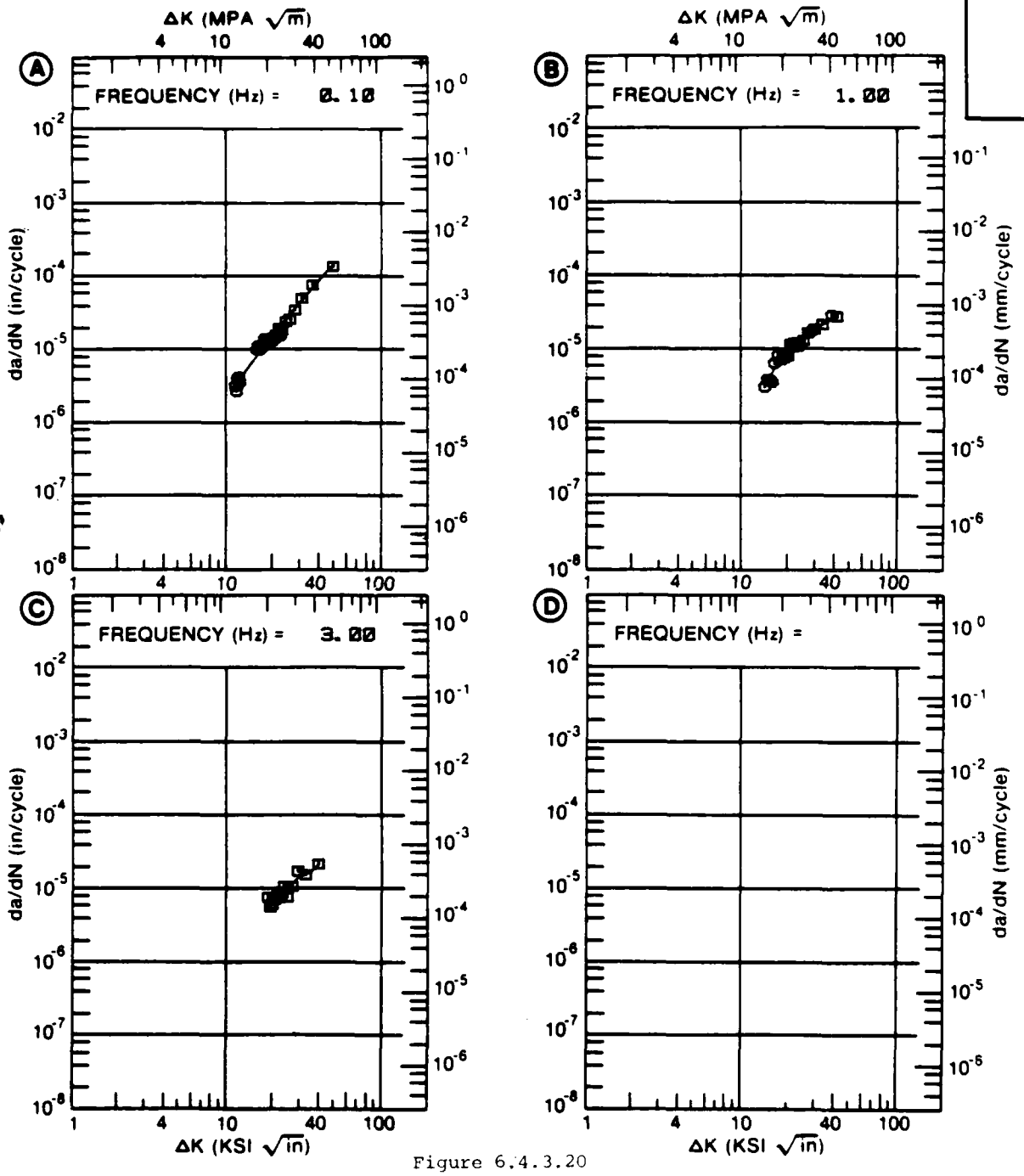


Figure 6.4.3.20

TABLE 6.4.3.21

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.4.3.21 INDICATING EFFECT

OF FREQUENCY

MATERIAL: ALLOY STEEL D6AC
CONDITION: 1700F A-BQ AT 975F, OQ AT 140F, 1000F 2+2HR
ENVIRONMENT: R.T. , JP-4 FUEL

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			F(HZ)= 0.10	F(HZ)= 1.00	F(HZ)= 3.00	
DELTA K MIN	A:	11.55	1.25			
	B:	18.43		7.19		
	C:	18.87			3.10	
	D:					
		13.00	2.52			
		16.00	6.78			
		20.00	14.8	8.37	3.73	
		25.00	26.1	12.0	7.32	
		30.00	37.2	15.7	12.1	
		35.00	48.2	19.8	17.9	
		40.00	59.7	24.5	24.5	
		50.00	87.6	37.4	38.7	
		60.00			53.0	
		70.00			66.0	
DELTA K MAX	A:	58.94	123.			
	B:	52.16		41.1		
	C:	72.93			69.5	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			17.83	6.86	17.19	
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	2	1	1	
		1.25-2.0				
		>2.0				

CONDITION/HT: 1700F A-BQ AT 975F, OQ AT 140F, 1000F 2+2HR
FORM: 0.80"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.10
ENVIRONMENT: R.T., JP-4 FUEL

YIELD STRENGTH: 220.0 KSI
ULT. STRENGTH: 238.0 KSI
SPECIMEN THK: 0.750- 0.753"
SPECIMEN WIDTH: 5.000"
REFERENCES: 82543

ALLOY STEEL

D6AC

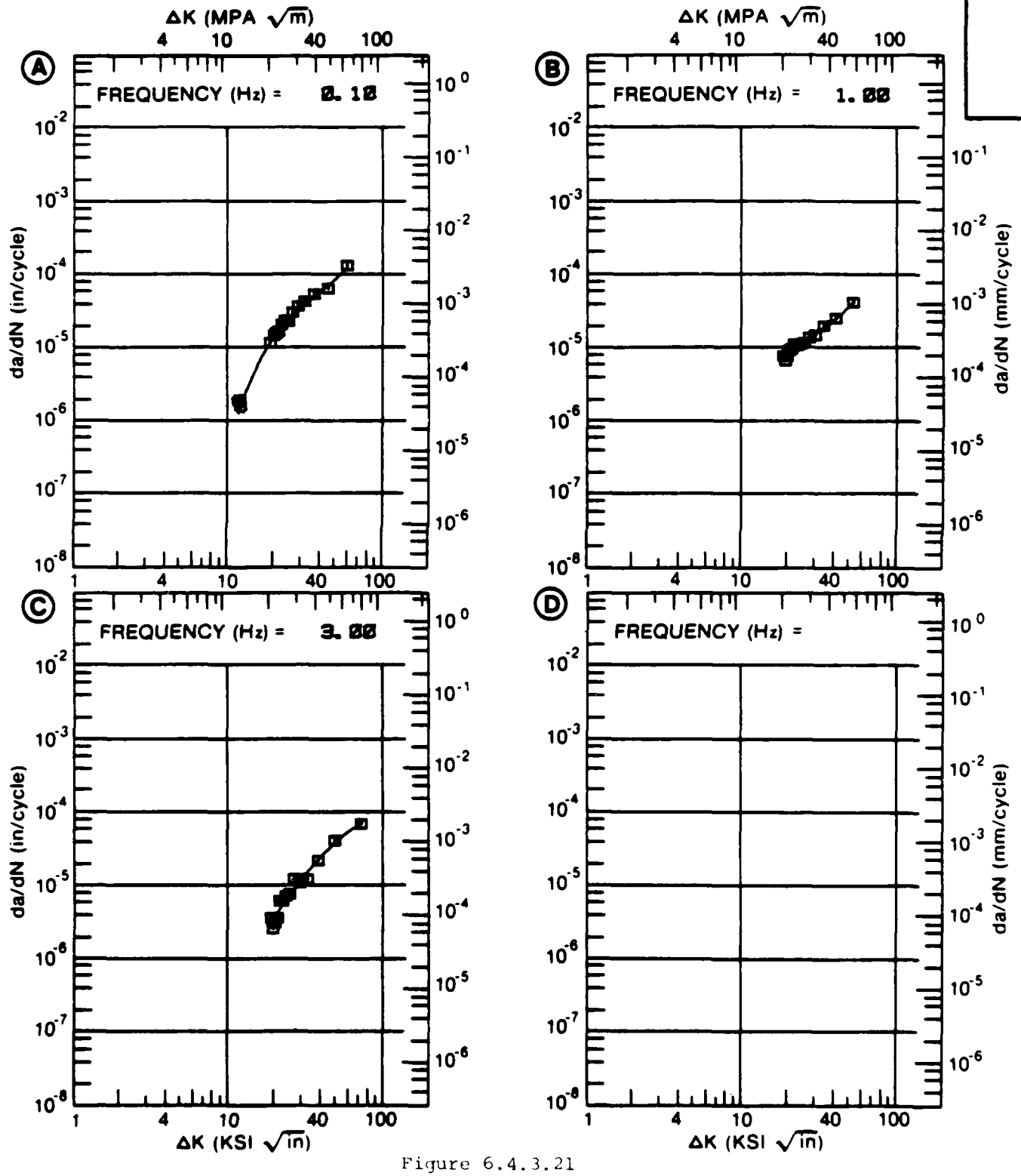


Figure 6.4.3.21

TABLE 6.4.3.22

ALLOY STEEL D6AC K(ISCC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN (*=SC)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
1550F AQ 650F 4HR	S	0.16	R.T.	L-T	241.5	DIST. WATER	0.750	0.165	CANT*	0.100	61.70	7.00			> 4000	1965	63061
1550F AQ 950F 4HR	S	0.16	R.T.	L-T	217.3	DIST. WATER	0.750	0.165	CANT*	0.100	95.70	45.20			> 10000	1965	63061
1550F 25MIN OQ 850F 1+1 HR	S	0.08	R.T.	L-T	224.7	DIST. WATER	2.000	0.050	CNT	----	------	33.00*			> 5000	1968	72283
1550F 25MIN OQ 850F 1+1 HR	S	0.08	R.T.	L-T	224.7	3N NACL	2.000	0.050	CNT	----	------	33.00*			> 5000	1968	72283

*NOTE-DATA WHICH DO NOT MEET MINIMUM SPECIMEN THICKNESS REQUIREMENTS OF 2.5(KISCC/TYS)SQUARED

TABLE 6.5.1.1

MEAN PLANE STRAIN FRACTURE TOUGHNESS DATA OF
ALLOY STEEL HP 9-4-.20 AT ROOM TEMPERATURE

CONDITION/HT	MEAN KIC ± STANDARD DEVIATION (KSI SQRT(IN))		(NUMBER OF SPECIMENS)
PLATE			
CONDITION/HT	L-T	T-L	S-L
1650F 1-2HR AC 1525F 1-2HR OQ,-100F 2HR, 1025F 4-6HR	121.5 ±29.0 (2)	-----	-----
1650F, 1-2HR, AC 1-2HR, AC, -100F 1.5HR, 1025F 4 HR, 1060F 6HR	123.5 ±12.0 (2)	-----	-----
FORGING			
CONDITION/HT	L-T	T-L	S-L
----	150.6 ± 4.5 (2)	136.3 ±16.8 (2)	-----
ANNEALED	120.6 ± 7.3 (12)	117.7 ± 1.9 (3)	-----
HEAT TREATED	140.7 ± 4.5 (10)	132.3 ± 6.6 (7)	-----
1525F OQ,-100F 1HR, 1065F 4+4HR	-----	111.7 ± 2.0 (2)	-----
1650F 1-2 HR AC, 1525F 1-2 HR OQ,-100F 2HR, 1050F 4-6HR	133.2 ± 3.9 (5)	-----	-----
1650F 1-2HR AC, 1525F 1-2 HR AC, -100F 1-2HR, 1025F 4HR	134.8 ±12.3 (5)	109.7 ± 4.7 (3)	-----
1650F 1-2HR AC 1525F 1-2HR OQ,-100F 2HR, 1025F 4-6HR	142.8 ±10.7 (6)	-----	-----

TABLE 6.5.1.1 (Con't)

MEAN PLANE STRAIN FRACTURE TOUGHNESS DATA OF
ALLOY STEEL HP 9-4-.20 AT ROOM TEMPERATURE

CONDITION/HT	MEAN KIC ± STANDARD (KSI SQRT(IN)) DEVIATION (NUMBER OF SPECIMENS)		
	FORGING		
CONDITION/HT	L-T	T-L	S-L
1650F 1-2HR AC 1525F 1-2HR OQ, -100F 2HR, 1025F 4-6HR	129.1 ± 9.7 (8)	125.3 ± 1.8 (6)	-----
1650F 2HR AC, 1525F 2HR OQ, 1000F 2+2HR AC	94.4 ± 4.4 (3)	-----	-----
1650F, 1-2HR, AC 1.5HR OQ, 1025F 12HR	125.5 ± 3.5 (2)	-----	-----
1650F, 4.5HR, AC TO 900F, HELD 0.5HR, AC, -100F 1.5HR, 1025F 8 HR, A-BQ	128.5 ± 0.7 (2)	-----	-----
1700F 4.5HR, AC 1700F 1.5HR, AC -100F 1.5HR, 1025F 4HRS	140.5 ± 0.7 (2)	-----	-----

TABLE 6.5.1.2

FATIQUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL HP9-4-.20

TEST CONDITIONS

SPECIMEN ORIENTATION: L-T

ENVIRONMENT: L. H. A. AT R. T.

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIQUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
WELDED	WELDMENT	0.08	1.00					0.42	22.2	
WELDED	WELDMENT	0.30	6.00					1.02	30.4	
WELDED	WELDMENT	0.50	6.00					5.25	54.6	
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	PLATE	0.08	----				0.85	5.61	31.0	
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	PLATE	0.08	6.00					3.99		
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	BILLET	0.05	1.00					6.90	32.1	
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	BILLET	0.08	0.10					4.58	34.3	
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	BILLET	0.08	1.00					4.96	40.9	
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	BILLET	0.08	6.00					4.23		

TABLE 6.5.1.2 (Con't)

FATIQUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL HP9-4- 20

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT L H A AT R. T.

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIQUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	BILLET	0.08	6.00				0 68	4.88	30.6	
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	BILLET	0.08	6.00				0 57	5.85	37.4	
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	BILLET	0.08	6.00					4.57	37.6	253
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	BILLET	0.08	9.00			0.13	0 77	5.77		
1525F 2HRS OQ, -100F 2HRS, 1025F 4HR5	BILLET	0.30	6.00				0 77	6.11		
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	BILLET	0.50	6.00				0 81			
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	BILLET	0.70	6.00				1 44	7.78		

TABLE 6.5.1.3

FATIQUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL HP9-4-.20

TEST CONDITIONS

SPECIMEN ORIENTATION: L-T

ENVIRONMENT: 100% HUM AT R.T.

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIQUE CRACK GROWTH RATES (MICRO IN/CYCLE)					
					2.5	5	10	20	50	100
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	PLATE	0.08	7.00				.932	6.26		
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	BILLET	0.08	0.10					6.63	38.5	
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	BILLET	0.08	1.00				0.62	7.39	40.6	
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	BILLET	0.08	1.00					8.77	46.4	
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	BILLET	0.30	1.00				0.95	7.69		
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	BILLET	0.50	1.00				1.52	8.31		

TABLE 6.5.1.4

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL HP9-4-20

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT S.T.W AT R.T.

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	PLATE	0.08	1.00					6.94		
1525F 2HRS OQ, 100F 2HRS, 1025F 4HRS	BILLET	0.08	1.00				0.74	5.26		

TABLE 6.5.1.5

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL HP9-4-.20

TEST CONDITIONS

SPECIMEN ORIENTATION T-L

ENVIRONMENT: L.H.A AT - 65 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	PLATE	0.08	1.00					2.43	29.7	
1525F 2HRS OQ, -100F 2LHRS, 1025F 4HRS	PLATE	0.08	1.00				620	4.14		
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	BILLET	0.08	1.00					3.33	27.8	

TABLE 6.5.1.6

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL HP9-4-.20

TEST CONDITIONS

SPECIMEN ORIENTATION T-L

ENVIRONMENT L H A AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1525F 2HRS AC, -100F 2HRS, 1025F 4HRS	BILLET	0.08	6.00					4.85		
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	PLATE	0.08	1.00					5.05	29.9	
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	BILLET	0.05	1.00						29.7	

TABLE 6.5.2.1

ALLOY STEEL HP 9-4-.20 K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	------SPECIMEN------ WIDTH (IN) W	THICK (IN) B	DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	STAN DEV	DATE	REFER
----------	F	1.25	R.T.	L-T	196.5	3.995	2.000	CT	2.065	1.53	153.80			1977	MA005
		1.25			196.5	4.002	2.000	CT	2.118	1.40	147.39	150.6/	4.5	1977	MA005
----------	F	1.25	R.T.	T-L	198.0	4.000	1.998	CT	2.068	1.39	148.10			1977	MA005
		1.25			198.0	3.997	2.000	CT	2.070	0.98	124.40	136.3/	16.8	1977	MA005
ANNEALED	F	3.00	R.T.	L-T	189.0	3.000	1.504	CT	1.529	0.93	115.40			1977	NC001
		3.00			189.0	4.005	2.001	CT	2.049	1.00	120.00			1977	NC001
		3.00			189.0	4.009	1.504	CT	2.038	1.15	128.39			1977	NC001
		3.00			189.0	4.005	2.001	CT	2.068	0.96	117.69			1977	NC001
		3.00			189.0	4.000	1.505	CT	2.033	0.99	119.19			1977	NC001
		3.00			189.0	2.003	0.997	CT	1.041	0.80	107.30			1977	NC001
		3.00			189.0	3.000	0.998	CT	1.522	0.94	116.10			1977	NC001
		3.00			189.0	2.000	0.998	CT	1.037	0.94	116.00			1977	NC001
		3.00			189.0	3.001	1.503	CT	1.531	0.97	118.30			1977	NC001
		3.00			192.0	3.995	2.000	CT	2.033	1.19	132.50			1976	NC001
		3.00			192.0	3.992	2.000	CT	2.059	1.09	127.30			1976	NC001
		3.00			192.0	3.996	1.999	CT	2.013	1.13	129.30	120.6/	7.3	1976	NC001
ANNEALED	F	3.00	R.T.	T-L	190.0	3.995	2.000	CT	2.080	0.98	119.30			1976	NC001
		3.00			190.0	3.998	2.000	CT	2.012	0.96	118.30			1976	NC001
		3.00			190.0	3.998	2.000	CT	2.028	0.92	119.60	117.7/	1.9	1976	NC001
HEAT TREATED	F	3.40	R.T.	L-T	185.0	4.003	1.501	CT	1.954	1.33	135.00			1973	85879
		4.00			189.0	4.000	1.503	CT	2.037	1.48	145.00			1973	85633
		4.00			190.0	3.980	1.505	CT	2.039	1.35	139.00			1973	85633
		4.00			190.0	3.971	1.506	CT	2.049	1.35	139.00			1973	85633
		4.00			190.0	3.999	1.504	CT	2.030	1.45	145.00			1973	85633
		4.00			190.0	3.995	1.504	CT	2.036	1.34	139.00			1973	85633
		4.00			191.0	4.000	1.504	CT	2.026	1.30	138.00			1973	85633
		4.00			192.0	4.002	1.504	CT	2.034	1.33	139.00			1973	85633
		4.00			192.0	4.004	1.503	CT	2.031	1.30	138.00			1973	85633
		7.00			198.0	3.990	1.511	CT	2.053	1.46	150.00	140.7/	4.5	1973	85857
HEAT TREATED	F	6.60	R.T.	T-L	186.0	3.984	1.499	CT	2.026	1.46	142.00			1973	85857

TABLE 6.5.2.1 (Con't)

ALLOY STEEL HP 9-4- 20 K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	------SPECIMEN------ WIDTH (IN) W	THICK (IN) B	DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	STAN DEV	DATE	REFER
HEAT TREATED	F	3.40	R.T.	T-L	187.0	4.000	1.501	CT	1.985	1.22	131.00			1973	85879
		3.40			187.0	4.004	1.502	CT	2.011	1.22	131.00			1973	85879
		3.40			190.0	4.005	1.499	CT	2.021	1.36	140.00			1973	85879
		3 40			196.0	4.002	1.484	CT	2.054	1.12	131.00			1973	85857
		7.00			198.0	3.989	1.464	CT	2.033	0.97	123.00			1973	85857
		7.00			198.0	3.986	1.507	CT	2.038	1.07	128.00	132.3/	6.6	1973	85857
1525F 0Q,-100F	F	4.00	R.T.	T-L	179.0	3.996	1.497	CT	2.003	0.95	110.30			1974	90012
1HR,1065F		4.00			179.0	3.995	1.498	CT	2.030	1.00	113.10			1974	90012
4+4HR												111.7/	2.0		
1650F 1-2 HR	F	3.25	R.T.	L-T	184.0	5.248	1.506	CT	2.543	1.42	139.00			1973	86428
AC,1525F 1-2		3.00			186.0	4.495	1.505	CT	2.277	1.26	132.00			1973	86428
HR 0Q,-100F		3.25			189.0	4.499	1.502	CT	2.275	1.17	129.00			1973	86428
2HR,1050F		3.25			189.0	5.245	1.511	CT	2.563	2.50	131.00			1973	86428
4-6HR		3.25			190.0	4.500	1.501	CT	2.287	1.26	135.00	133.2/	3.9	1973	86428
1650F 1-2HR	F	3.70	- 65	L-T	190.0	6.000	2.000	CT	----	1.84	163.00			1974	90011
AC,1525F 1-2 HR	AC,-100F 1-2HR,1025F 4HR														
1650F 1-2HR	F	4.00	R.T.	L-T	190.0	5.997	1.752	CT	3.044	1.02	121.00			1973	85836
AC,1525F 1-2		4.00			190.0	5.999	1.756	CT	3.054	1.04	122.00			1973	85836
HR AC,-100F		7.00			190.0	5.999	1.995	CT	2.987	1.50	147.00			1973	85836
1-2HR,1025F		7.00			190.0	6.002	1.991	CT	2.979	1.42	143.00			1973	85836
4HR		7.00			190.0	6.000	1.997	CT	2.981	1.37	141.00	134.8/	12.3	1973	85836
1650F 1-2HR	F	3.70	- 65	T-L	190.0	6.000	2.000	CT	----	1.21	132.00			1974	90011
AC,1525F 1-2 HR	AC,-100F 1-2HR,1025F 4HR														
1650F 1-2HR	F	4.00	R.T.	T-L	190.0	6.000	1.757	CT	3.077	0.80	108.00			1973	85836
AC,1525F 1-2		4.00			190.0	5.999	1.755	CT	3.071	0.78	106.00			1973	85836
HR AC,-100F		7.00			190.0	6.005	1.992	CT	3.006	0.92	115.00			1973	85836
1-2HR,1025F 4HR												109.7/	4.7		

TABLE 6.5.2.1 (Con't)

ALLOY STEEL HP 9-4-.20 K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	------SPECIMEN------ WIDTH (IN) W	THICK (IN) B	DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	STAN DEV	DATE	REFER
1650F 1-2HR AC	P	2.50	- 65	L-T	195.0	6.000	2.000	CT	----	0.75	107.00			1974	90011
1525F 1-2HR		2.50			195.0	6.000	2.000	CT	----	0.72	105.00			1974	90011
OQ,-100F 2HR,		2.50			195.0	6.000	2.000	CT	----	0.53	90.00			1974	90011
1025F 4-6HR		2.50			195.0	6.000	2.000	CT	----	0.78	109.00			1974	90011
		2.50			195.0	6.000	2.000	CT	----	0.54	91.00	100.4/	9.2	1974	90011
1650F 1-2HR AC	P	2.50	R.T.	L-T	189.0	6.000	2.000	CT	----	0.71	101.00			1974	90011
1525F 1-2HR		2.50			190.0	6.000	2.002	CT	2.905	1.53	142.00			1972	84306
OQ,-100F 2HR, 1025F 4-6HR												121.5/	29.0		
1650F 1-2HR AC	P	2.50	- 65	T-L	195.0	6.000	2.000	CT	----	0.60	96.00			1974	90011
1525F 1-2HR		2.50			195.0	6.000	2.000	CT	----	0.71	104.00			1974	90011
OQ,-100F 2HR,		2.50			195.0	6.000	2.000	CT	----	0.56	92.00			1974	90011
1025F 4-6HR												97.3/	6.1		
1650F 1-2HR AC	F	3.70	- 65	L-T	190.0	5.997	1.507	CT	2.991	1.12	127.00			1973	85836
1525F 1-2HR OQ,-100F 2HR, 1025F 4-6HR															
1650F 1-2HR AC	F	4.00	R.T.	L-T	186.0	6.000	2.005	CT	2.964	1.36	140.00			1973	85836
1525F 1-2HR		4.00			186.0	6.000	2.010	CT	2.986	1.27	136.00			1973	85836
OQ,-100F 2HR,		4.00			186.0	5.998	2.010	CT	2.975	1.42	143.00			1973	85836
1025F 4-6HR		4.00			186.0	6.002	2.010	CT	2.985	1.28	136.00			1973	85836
		4.00			186.0	6.005	2.010	CT	2.984	1.32	138.00			1973	85836
		4.00			188.0	6.000	2.000	CT	----	1.90	164.00	142.8/	10.7	1974	90011
1650F 1-2HR AC	F	3.00	R.T.	L-T	190.0	6.000	2.000	CT	----	1.34	139.00			1974	90011
1525F 1-2HR OQ,-100F 2HR, 1000F 4-6HR															
1650F 1-2HR AC	F	4.00	R.T.	L-T	194.0	4.000	1.635	CT	1.970	1.39	142.00			1972	84306
1525F 1-2HR		4.00			194.0	3.994	1.598	CT	2.366	1.26	135.00			1972	84306
OQ,-100F 2HR,		4.00			194.0	4.014	1.506	CT	1.967	1.33	141.00			1972	84306
1025F 4-6HR		4.00			198.0	5.000	2.000	CT	----	1.01	126.00			1974	90011
		4.00			198.0	5.000	2.000	CT	----	0.96	123.00			1974	90011
		4.00			198.0	5.000	2.000	CT	----	1.08	130.00			1974	90011
		4.00			198.0	5.000	2.000	CT	----	0.84	115.00			1974	90011
		4.00			198.0	5.000	2.000	CT	----	0.93	121.00	129.1/	9.7	1974	90011
1650F 1-2HR AC	F	4.00	82	L-T	190.0	6.000	1.740	CT	2.983	1.01	121.00			1973	85836
1525F 1-2HR OQ,-100F 2HR, 1025F 4-6HR															

TABLE 6.5.2.1 (Con't)

ALLOY STEEL HP 9-4-.20 K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	------SPECIMEN------ WIDTH (IN) W	THICK (IN) B	DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	STAN DEV	DATE	REFER
1650F 1-2HR AC	F	4.00	82	L-T	190.0	6.000	1.743	CT	2.971	1.19	131.00			1973	85836
1525F 1-2HR OQ,-100F 2HR, 1025F 4-6HR												126.0/	7.1		
1650F 1-2HR AC	F	4.00	R.T.	T-L	190.0	6.000	2.011	CT	2.977	1.11	126.00			1973	85836
1525F 1-2HR		4.00			190.0	6.002	2.004	CT	2.963	1.11	127.00			1973	85836
OQ,-100F 2HR,		4.00			190.0	6.002	2.010	CT	2.961	1.03	122.00			1973	85836
1025F 4-6HR		4.00			190.0	6.005	2.010	CT	2.959	1.11	126.00	125.3/	2.2	1973	85836
1650F 1-2HR AC	F	3.00	R.T.	T-L	190.0	6.000	2.000	CT	----	0.72	102.00			1974	90011
1525F 1-2HR OQ,-100F 2HR, 1000F 4-6HR															
1650F 1-2HR AC	F	4.00	R.T.	T-L	190.0	6.006	2.006	CT	2.970	1.10	126.00			1973	85836
1525F 1-2HR		4.00			194.0	4.013	1.506	CT	1.991	1.07	125.00			1972	84306
OQ,-100F 2HR, 1025F 4-6HR												125.5/	0.7		
1650F 1-2HR AC	F	4.00	82	T-L	185.0	6.001	1.752	CT	3.000	0.95	114.00			1973	85836
1525F 1-2HR OQ,-100F 2HR, 1025F 4-6HR															
1650F 1-2HR AC	F	4.00	R.T.	S-T	190.0	3.005	1.630	CT	1.484	0.93	116.00			1973	85836
1525F 1-2HR		4.00			190.0	3.003	1.632	CT	1.496	0.89	114.00			1973	85836
OQ,-100F 2HR, 1025F 4-6HR												115.0/	1.4		
1650F 1-2HR,AC	F	4.00	R.T.	L-T	186.0	6.003	2.010	CT	2.963	1.32	138.00			1973	85836
1525F 1-2HR,OQ,-100F 2HR, 1025F 4-6HR															
1650F 1-2HR,AC	F	1.70	R.T.	T-L	190.0	5.260	1.501	CT	2.628	1.43	143.00			1973	86428
1525F 1-2HR,OQ,-100F 2HR,1050F 4-6HR															
1650F 2HR AC,	F	4.00	R.T.	L-T	186.0	2.516	1.240	CT	1.171	0.63	92.80			1974	88136
1525F 2HR OQ,		4.00			186.0	2.523	1.244	CT	1.136	0.72	99.40			1974	88136
1000F 2+2HR AC		4.00			186.0	2.510	1.247	CT	1.146	0.60	91.10	94.4/	4.4	1974	88136
1650F,1-2HR,AC	P	2.50	R.T.	L-T	189.0	6.000	2.000	CT	----	1.22	132.00			1974	90011
1-2HR,AC,-100F 1.5HR,1025F 4HR,1060F 6HR															

TABLE 6.5.2.1 (Con't)

ALLOY STEEL HP 9-4-.20 K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
1650F, 1-2HR, AC	P	2.50	R.T.	L-T	189.0	6.000	2.000	CT	----	0.92	115.00			1974	90011
1-2HR, AC, -100F 1.5HR, 1025F 4HR, 1060F 6HR												123.5/	12.0		
1650F, 1-2HR, AC	P	2.50	R.T.	T-L	186.0	6.000	2.000	CT	----	0.97	116.00			1974	90011
1-2HR, AC, -130F 1.5HR, 1025-1075F 4HR															
1650F, 1-2HR, AC	P	2.50	R.T.	T-L	189.0	6.000	2.000	CT	----	1.15	128.00			1974	90011
1-2HR, AC, -100F 1.5HR, 1025F 4HR, 1060F 6HR															
1650F, 1-2HR, AC	F	4.00	R.T.	L-T	185.0	6.006	1.585	CT	2.987	1.10	123.00			1973	85836
1.5HR OQ, 1025F		4.00			185.0	6.007	1.546	CT	2.996	1.19	128.00			1973	85836
12HR												125.5/	3.5		
1650F, 4.5HR, AC	F	4.00	R.T.	L-T	185.0	6.004	1.609	CT	3.020	1.19	128.00			1973	85836
TO 900F, HELD		4.00			185.0	6.000	1.590	CT	3.031	1.22	129.00			1973	85836
0 5HR, AC, -100F 1.5HR, 1025F 8HR, A-BQ												128.5/	0.7		
1700F 4.5HR, AC	F	4.00	R.T.	L-T	185.0	6.003	1.596	CT	3.006	1.45	141.00			1973	85836
1700F 1.5HR, AC		4.00			185.0	6.005	1.605	CT	3.031	1.43	140.00			1973	85836
.-100F 1.5HR, 1025F 4HRS												140.5/	0.7		

TABLE 6.5.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.5.3.1 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.20
CONDITION:

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		E= R.T. LAB AIR 10HZ	E= R.T. 3.5% NACL 1HZ		
DELTA K MIN A:	12.17	.846			
DELTA K MIN B:	21.23		5.00		
DELTA K MIN C:					
DELTA K MIN D:					
	13.00	1.04			
	16.00	1.93			
	20.00	3.58			
	25.00	6.40	6.42		
	30.00	10.1	11.8		
	35.00	14.6	19.9		
	40.00	19.9	26.7		
	50.00	33.2	36.6		
	60.00	50.0	52.3		
	70.00		89.4		
	80.00		133.		
DELTA K MAX A:	66.04	62.1			
DELTA K MAX B:	81.85		137.		
DELTA K MAX C:					
DELTA K MAX D:					
ROOT MEAN SQUARE PERCENT ERROR		7.64	10.79		
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5				
	0.5-0.8				
	0.8-1.25	1	1		
	1.25-2.0				
	>2.0				

CONDITION/HT:
FORM: 2.50"TH BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.02
FREQUENCY:

YIELD STRENGTH: 185.5 KSI
ULT. STRENGTH: 201.0 KSI
SPECIMEN THK: 1.250"
SPECIMEN WIDTH: 5.000"
REFERENCES: 88136

ALLOY STEEL

HP9-4-.20

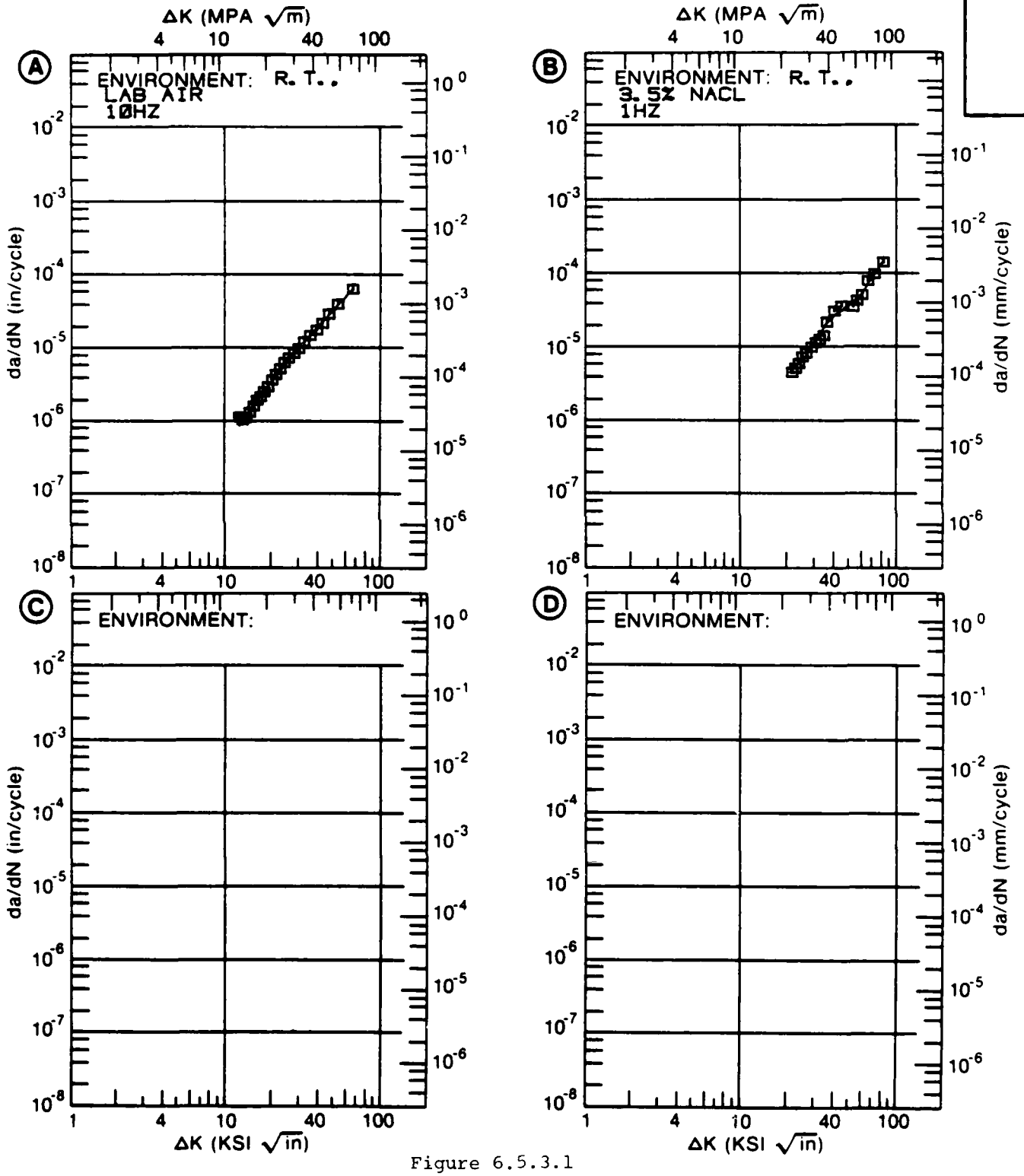


Figure 6.5.3.1

TABLE 6.5.3.2

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.5.3.2 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.20
CONDITION:

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. LAB AIR .1-20HZ	E= R.T. SIM SEA WATER .1-15HZ		
DELTA K MIN	A:	8.36	.0938			
	B:	21.08		2.87		
	C:					
	D:					
		9.00	.123			
		10.00	.180			
		13.00	.435			
		16.00	.833			
		20.00	1.61			
		25.00	3.01	4.77		
		30.00	4.93	8.01		
		35.00	7.41	12.2		
		40.00	10.5	17.4		
		50.00	18.9	31.2		
		60.00	30.6	50.0		
		70.00	46.3	74.4		
		80.00	66.8	105.		
		90.00	93.0	144.		
		100.00	126.	191.		
		130.00	278.	395.		
		160.00	542.	727.		
DELTA K MAX	A:	192.57	1026.			
	B:	192.73		1299.		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			13.48	22.71		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM: 1.25"TH FORGING
SPECIMEN TYPE: WOL
ORIENTATION: L-T
STRESS RATIO: +0.02
FREQUENCY:

YIELD STRENGTH: 196.5 KSI
ULT. STRENGTH: 209.5 KSI
SPECIMEN THK: 1.250"
SPECIMEN WIDTH: 5.000"
REFERENCES: MA005

ALLOY STEEL

HP9-4-.20

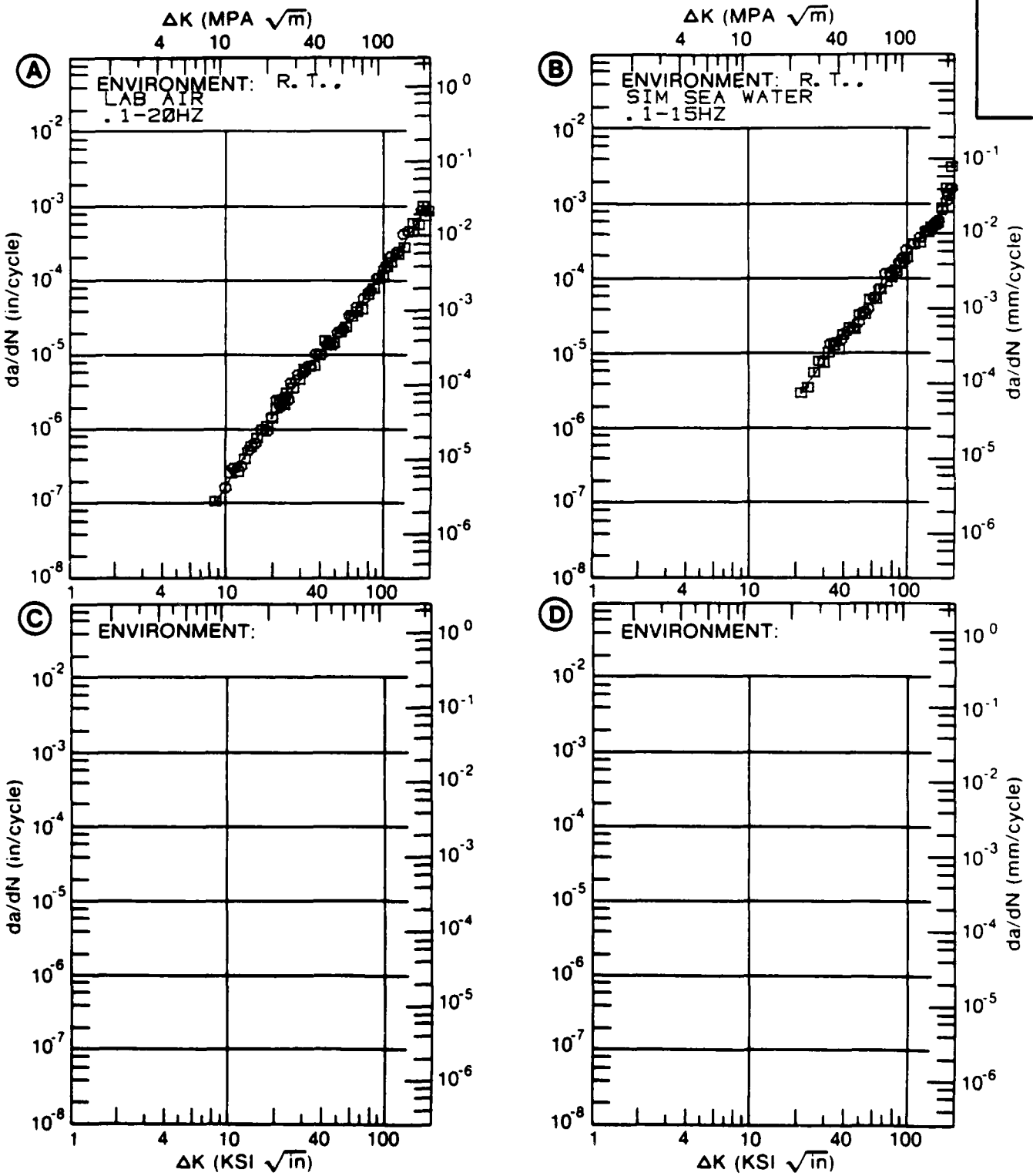


Figure 6.5.3.2

TABLE 6.5.3.3

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.5.3.3 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.20
CONDITION:

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE) A: E= R.T. LAB AIR .1-20HZ	B: E= R.T. SIM SEA WATER .1-15HZ	C	D
DELTA K MIN	A: 8.87	.131			
	B: 18.18		1.57		
	C:				
	D:				
	9.00	.141			
	10.00	.242			
	13.00	.751			
	16.00	1.55			
	20.00	2.99	2.31		
	25.00	5.31	4.97		
	30.00	8.25	8.36		
	35.00	12.0	12.4		
	40.00	16.7	17.2		
	50.00	30.7	29.9		
	60.00	54.5	49.4		
	70.00	95.3	80.3		
	80.00	165.	131.		
	90.00	285.	213.		
	100.00	490.	350.		
	130.00		1599.		
DELTA K MAX	A: 120.15	1437.			
	B: 153.57		5368.		
	C:				
	D:				
ROOT MEAN SQUARE PERCENT ERROR		14.01	20.32		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM: 1.25"TH FORGING
SPECIMEN TYPE: WOL
ORIENTATION: T-L
STRESS RATIO: +0.02
FREQUENCY:

YIELD STRENGTH: 198.0 KSI
ULT. STRENGTH: 212.5 KSI
SPECIMEN THK: 1.250"
SPECIMEN WIDTH: 5.000"
REFERENCES: MA005

ALLOY STEEL

HP9-4-.20

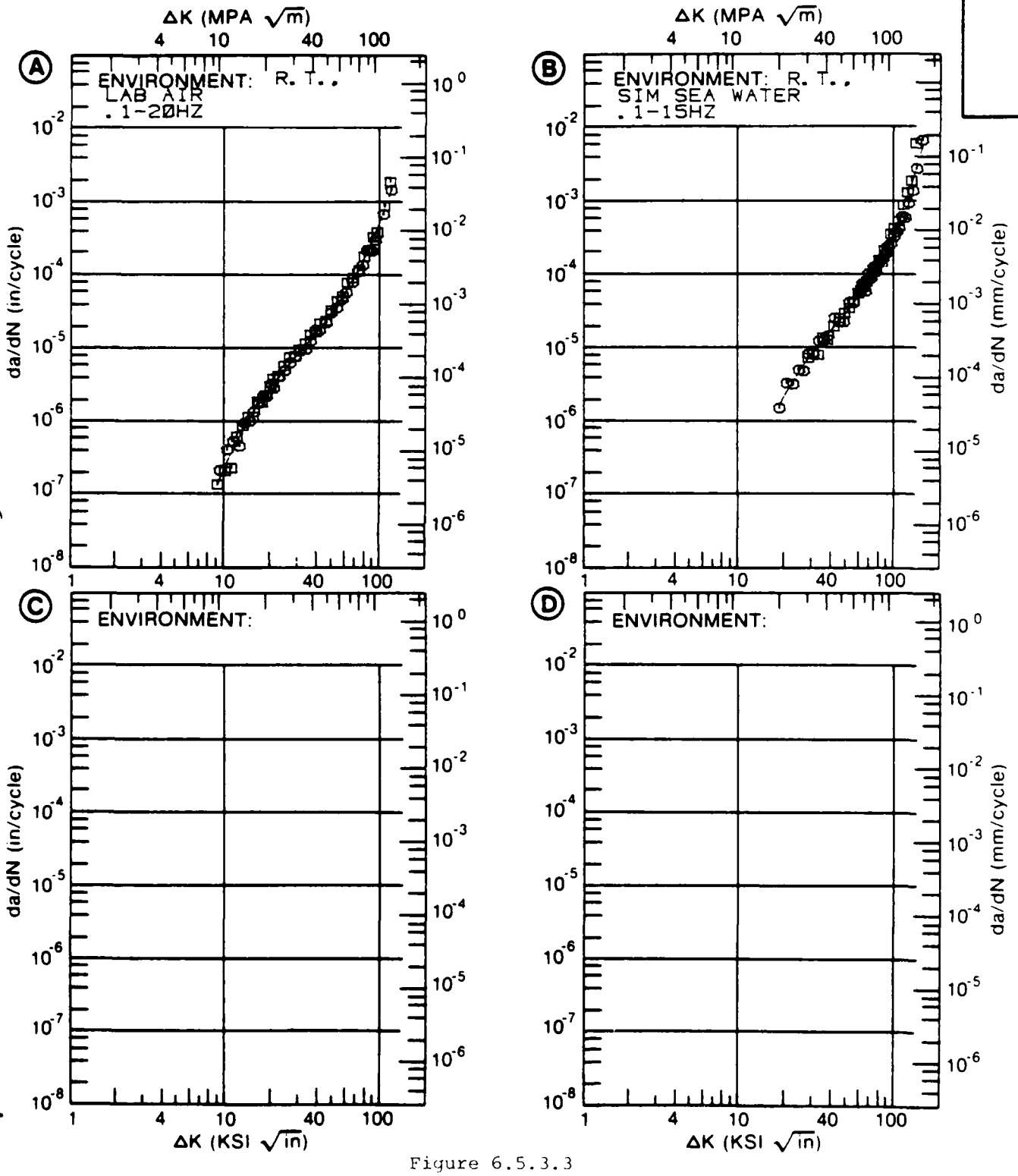


Figure 6.5.3.3

TABLE 6.5.3.4

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.5.3.4 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL HP9-4-.20
CONDITION: WELDED
ENVIRONMENT: R.T. ,L.H.A.

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.30	R=+0.50		
DELTA K MIN	A:	15.75	.287			
	B:	11.48		.502		
	C:					
	D:					
		13.00		.992		
		16.00	.314	2.48		
		20.00	1.02	5.25		
		25.00	2.82	9.46		
		30.00	5.81	14.4		
		35.00	10.1	20.6		
		40.00	15.6	28.6		
		50.00	30.4	54.6		
		60.00	50.4			
DELTA K MAX	A:	62.95	57.3			
	B:	51.28		59.4		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			6.61	6.65		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: WELDED
FORM: WELDMENT
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 6.00 HZ
ENVIRONMENT: R.T., L.H.A.

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK: 0.490- 0.500"
SPECIMEN WIDTH: 6.010"
REFERENCES:88579

ALLOY STEEL

HP9-4-.20

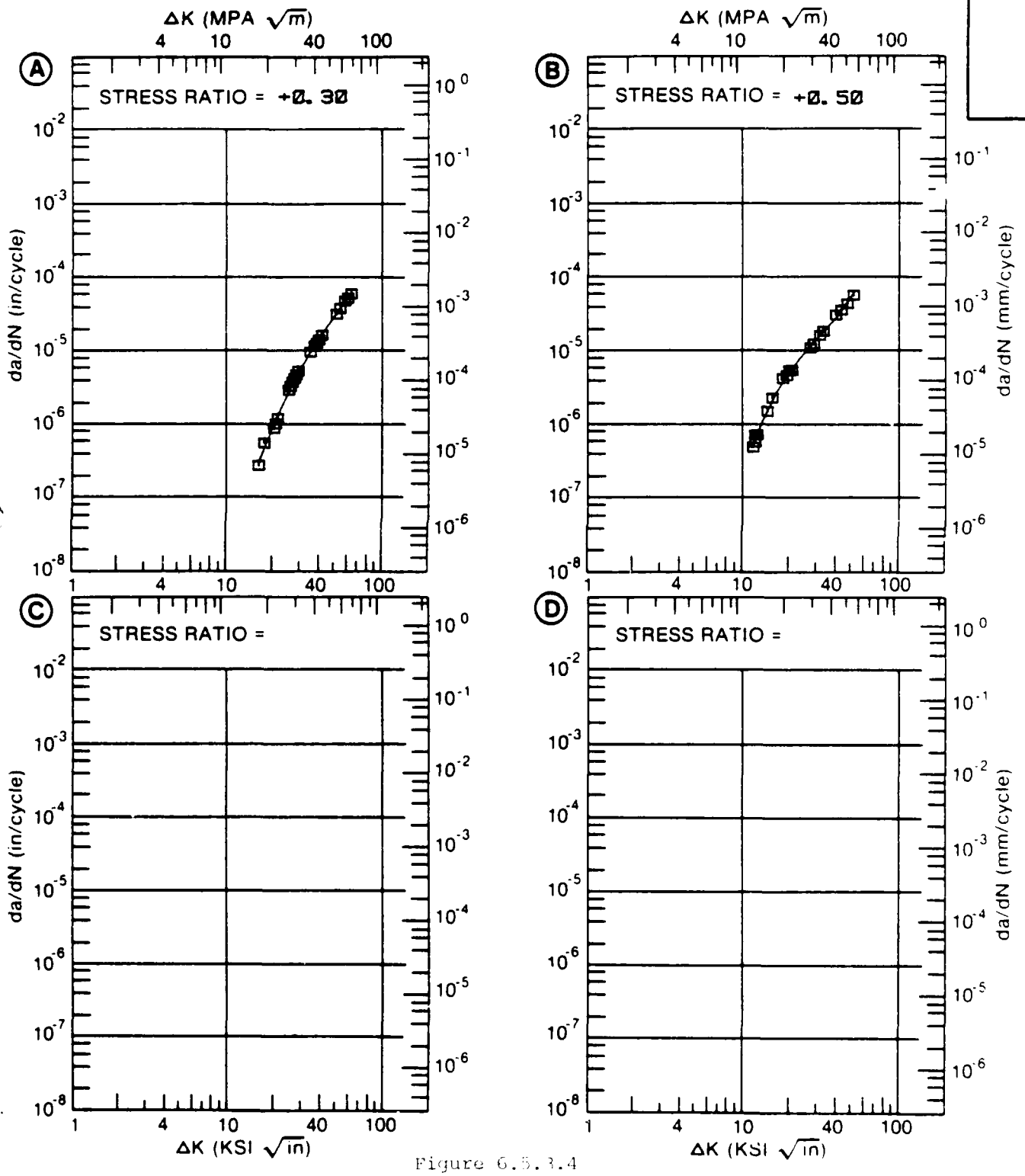


Figure 6.5.3.4

TABLE 6.5.3.5

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.5.3.5 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL HP9-4-.20
CONDITION: WELDED
ENVIRONMENT: R.T. ,L.H.A.

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		R=+0.08			
DELTA K MIN	A: 18.87	.365			
	B:				
	C:				
	D:				
	20.00	.422			
	25.00	1.77			
	30.00	4.62			
	35.00	7.55			
	40.00	10.9			
	50.00	22.2			
DELTA K MAX	A: 54.51	28.3			
	B:				
	C:				
	D:				

ROOT MEAN SQUARE PERCENT ERROR		7.92
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: WELDED
FORM: WELDMENT
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 1.00 HZ
ENVIRONMENT: R. T., L. H. A.

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK: 0.510"
SPECIMEN WIDTH: 6.000"
REFERENCES88579

ALLOY STEEL

HP9-4-.20

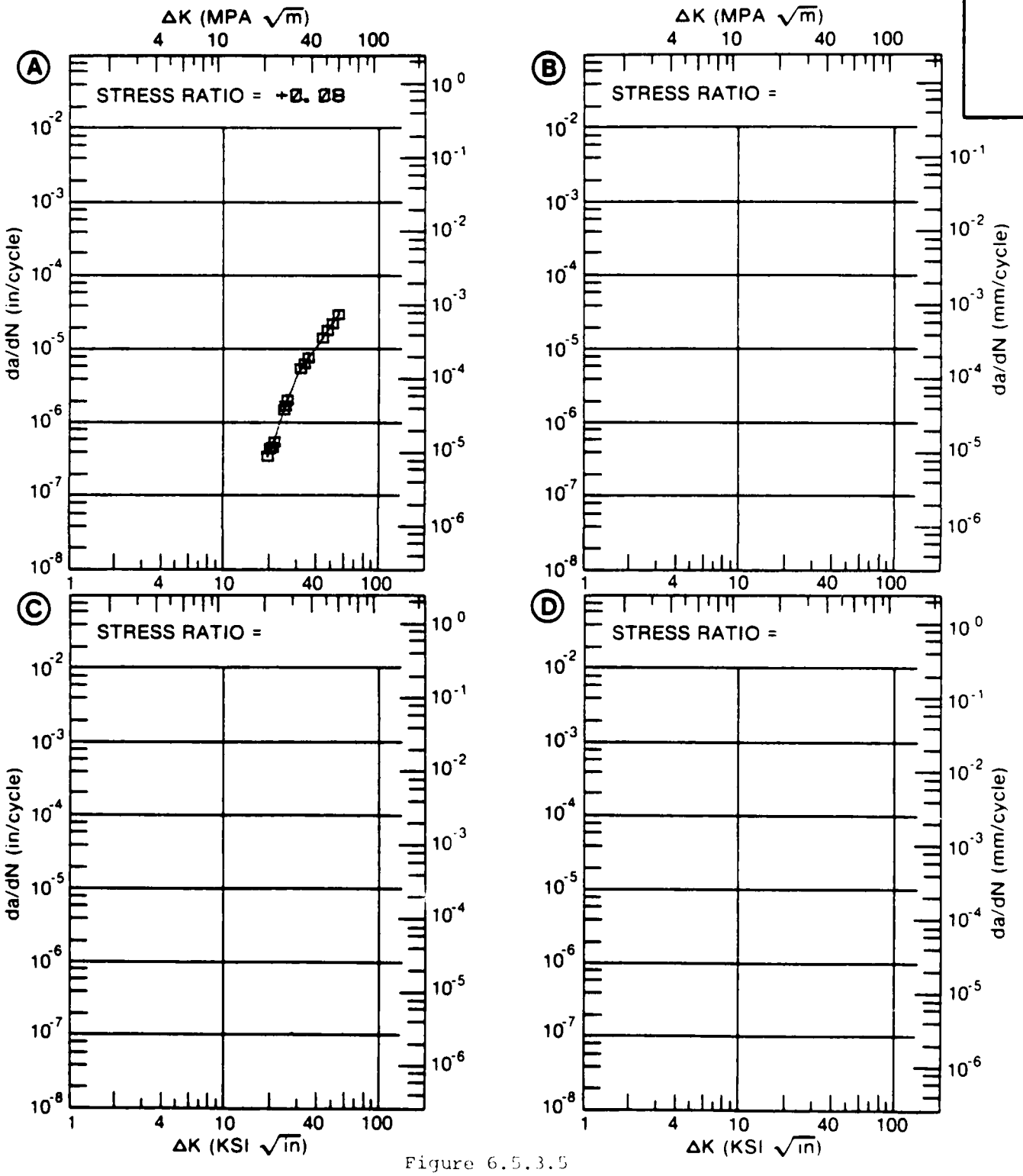


Figure 6.5.3.5

TABLE 6.5.3.6

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.5.3.6 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.20
CONDITION: 1525F 2HRS AC, -100F 2HRS, 1025F 4HRS

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. L.H.A., 6HZ	E= R.T. 100% HUM, 1HZ		
DELTA K MIN	A:	12.74	1.41			
	B:	10.61		.809		
	C:					
	D:					
		13.00	1.48	1.72		
		16.00	2.49	3.26		
		20.00	4.23	5.77		
		25.00	7.09	9.51		
		30.00	10.8	14.0		
		35.00	15.3	19.5		
		40.00	20.8	26.3		
		50.00		46.4		
DELTA K MAX	A:	48.33	32.4			
	B:	54.53		59.4		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			4.31	6.66		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: 1525F 2HRS AC. -100F 2HRS. 1025F 4HRS
FORM: 4.00"TH BILLET
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.08
FREQUENCY:

YIELD STRENGTH: 176.0 KSI
ULT. STRENGTH: 201.0 KSI
SPECIMEN THK: 0.990"
SPECIMEN WIDTH: 6.000"
REFERENCES:88579

ALLOY STEEL

HP9-4-.20

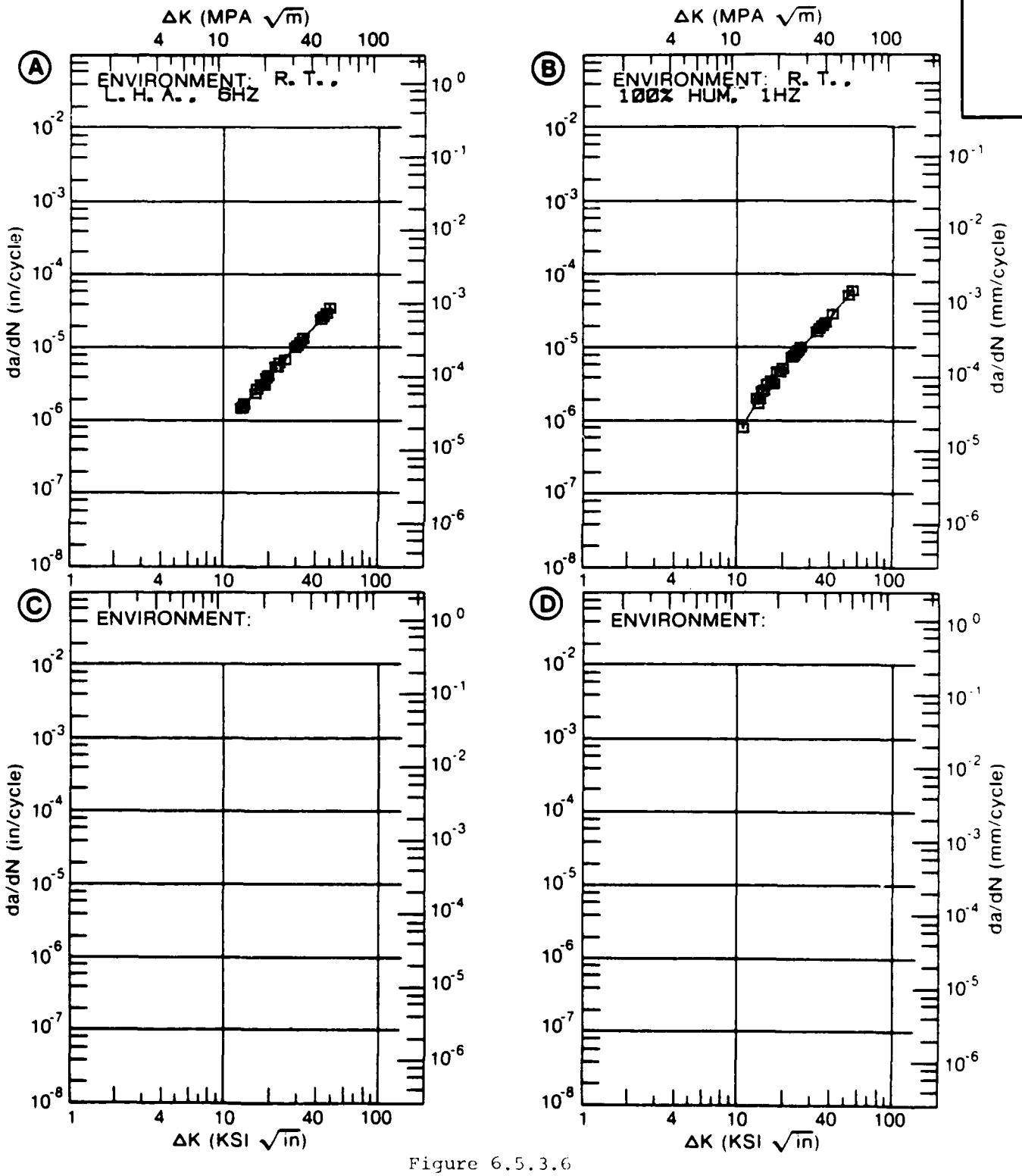


Figure 6.5.3.6

TABLE 6.5.3.7

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.5.3.7 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL HP9-4-.20
CONDITION: 1525F 2HRS AC, -100F 2HRS, 1025F 4HRS
ENVIRONMENT: R.T. ,L.H.A.

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		R=+0.08			
DELTA K MIN	A: 11.94	1.15			
	B:				
	C:				
	D:				
	13.00	1.52			
	16.00	2.77			
	20.00	4.85			
	25.00	8.01			
	30.00	11.8			
	35.00	16.4			
	40.00	21.9			
DELTA K MAX	A: 49.98	36.8			
	B:				
	C:				
	D:				

ROOT MEAN SQUARE PERCENT ERROR		3.60
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: 1525F 2HRS AC. -100F 2HRS. 1025F 4HRS
FORM: 4.00"TH BILLET
SPECIMEN TYPE: CT
ORIENTATION: T-L
FREQUENCY: 6.00 HZ
ENVIRONMENT: R. T. . L. H. A.

YIELD STRENGTH: 178.0 KSI
ULT. STRENGTH: 209.0 KSI
SPECIMEN THK: 0.990"
SPECIMEN WIDTH: 6.000"
REFERENCES: 88579

ALLOY STEEL

HP9-4-.20

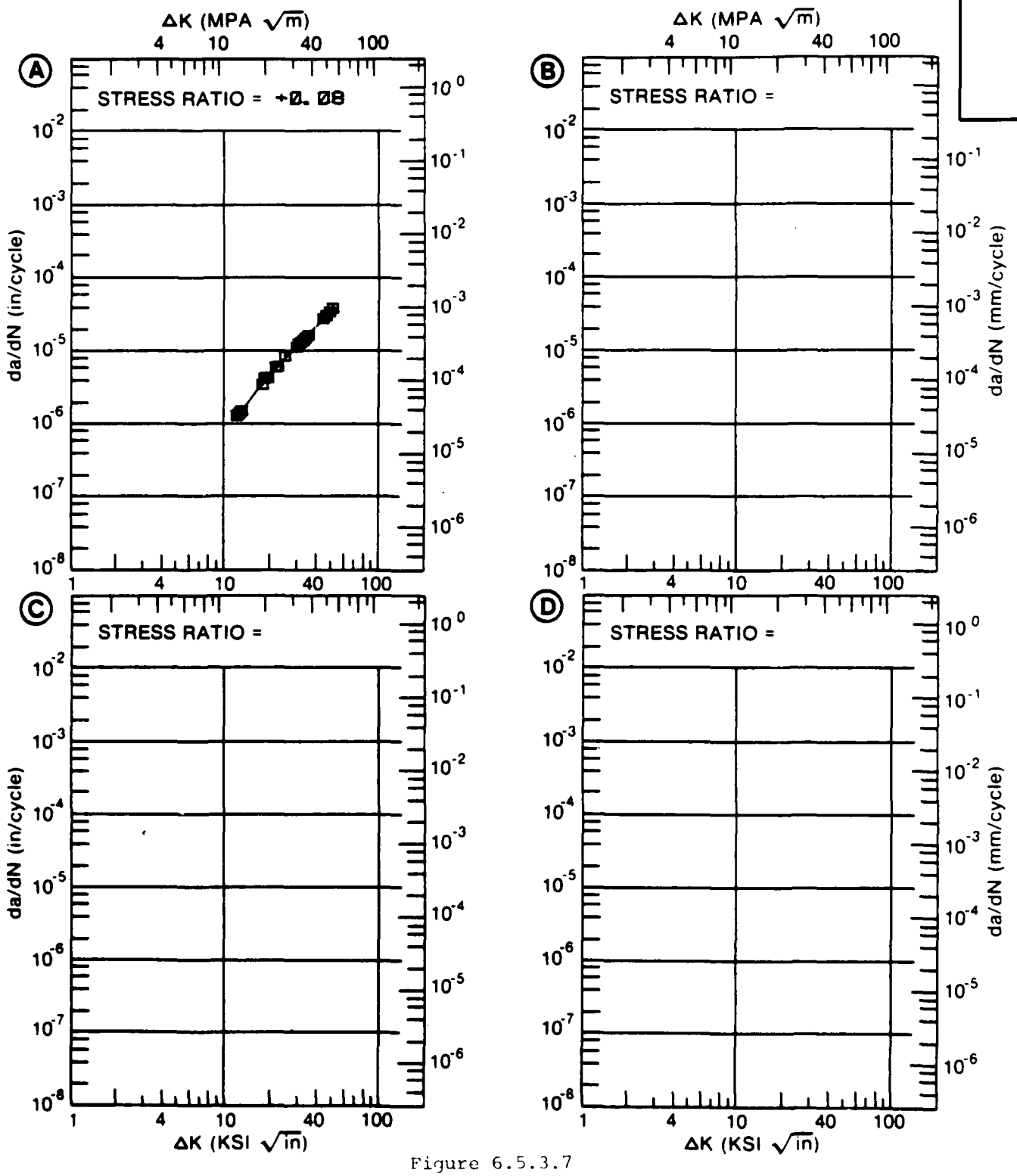


Figure 6.5.3.7

TABLE 6.5.3.8

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.5.3.8 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL HP9-4-.20
CONDITION: 1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS
ENVIRONMENT: R.T. , L.H.A.

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.08			
DELTA K MIN	A:	14.91	1.68			
	B:					
	C:					
	D:					
		16.00	2.18			
		20.00	3.99			
		25.00	6.04			
		30.00	8.45			
		35.00	12.2			
		40.00	18.9			
DELTA K MAX	A:	46.67	37.7			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 8.01

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: 1525F 2HRS OQ. -100F 2HRS. 1025F 4HRS
FORM: 2.50"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 6.00 HZ
ENVIRONMENT: R. T., L. H. A.
YIELD STRENGTH: 189.0 KSI
ULT. STRENGTH: 201.0 KSI
SPECIMEN THK: 0.830"
SPECIMEN WIDTH: 5.990"
REFERENCES88579

ALLOY STEEL

HP9-4-.20

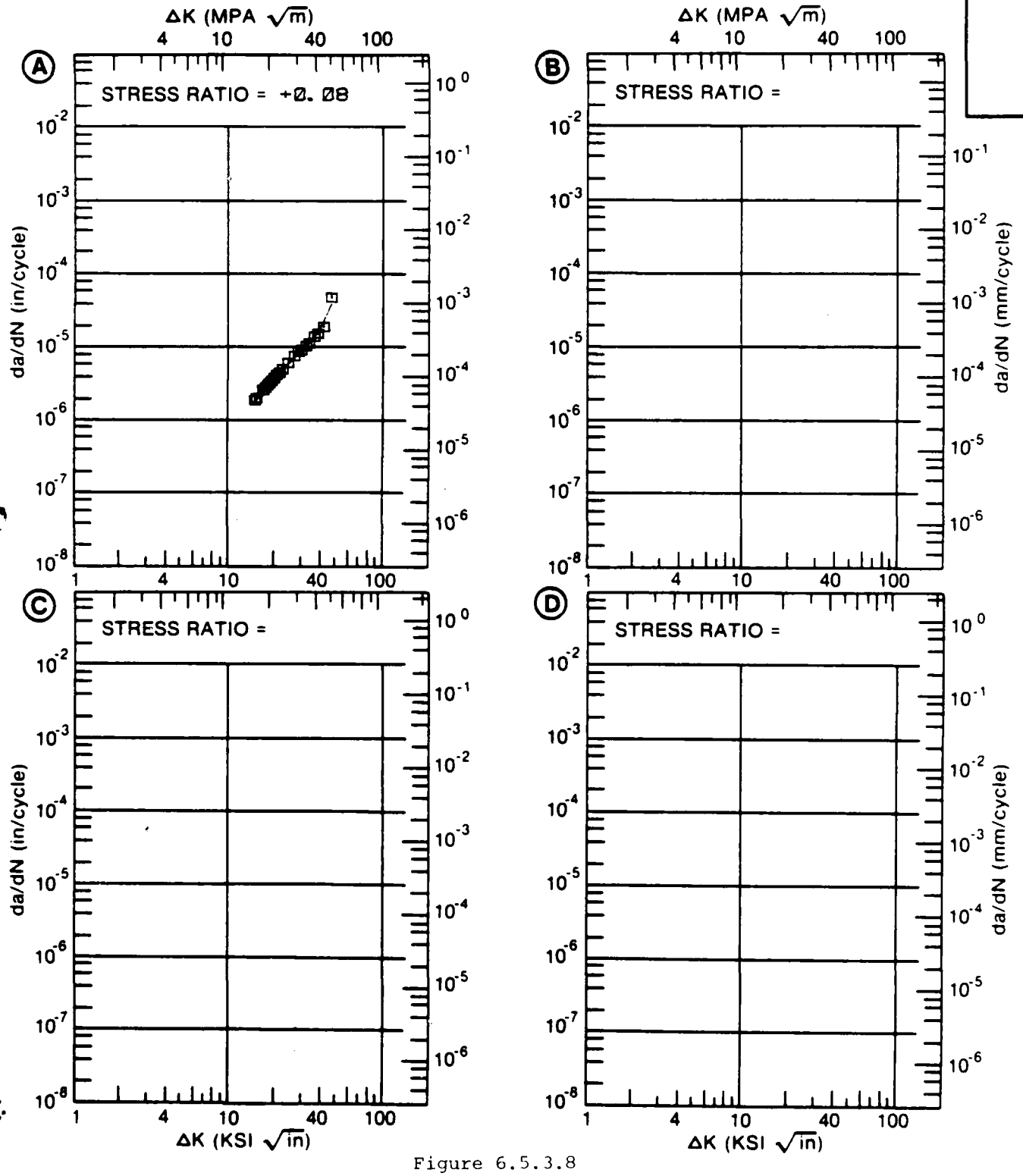


Figure 6.5.3.8

TABLE 6.5.3.9

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.5.3.9 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.20
CONDITION: 1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. L.H.A. 6HZ	E= R.T. DIST. H2O 0.1HZ		
DELTA K MIN	A:	8.50	.445			
	B:	12.13		1.92		
	C:					
	D:					
		9.00	.565			
		10.00	.859			
		13.00	2.14	2.43		
		16.00	3.72	4.68		
		20.00	5.61	8.73		
		25.00	7.75	15.2		
		30.00	10.2	22.9		
		35.00	13.7	31.7		
		40.00	18.3	41.4		
		50.00	31.0	64.0		
		60.00	48.0	90.8		
		70.00		122.		
		80.00		159.		
		90.00		203.		
		100.00		254.		
DELTA K MAX	A:	65.72	59.3			
	B:	106.00		288.		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			14.55	3.67		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	2	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: 1525F 2HRS OQ. -100F 2HRS. 1025F 4HRS
FORM: 2.50"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.08
FREQUENCY:

YIELD STRENGTH: 188.0- 189.0 KSI
ULT. STRENGTH: 200.0- 201.0 KSI
SPECIMEN THK: 0.990- 1.000"
SPECIMEN WIDTH: 7.400- 7.410"
REFERENCES:88579

ALLOY STEEL

HP9-4-.20

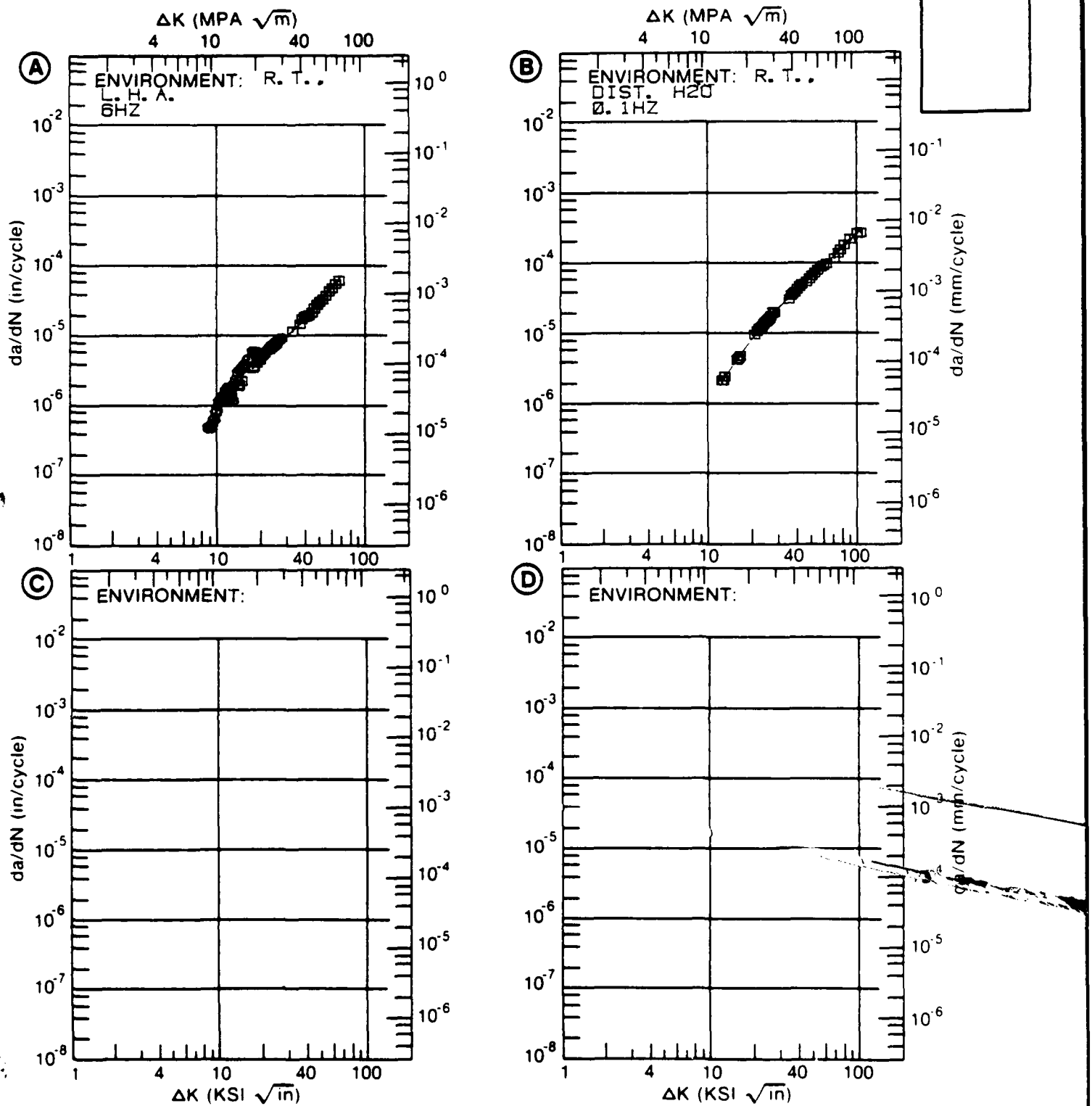


Figure 6.5.3.9

TABLE 6.5.3.10

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.5.3.10 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.20
CONDITION: 1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=- 65F L.H.A.	E= R.T. 100% HUM	E= R.T. S.T.W.	
DELTA K MIN	A:	8.84	.483			
	B:	8.69		.711		
	C:	11.00			1.43	
	D:					
		9.00	.513	.754		
		10.00	.719	.932		
		13.00	1.50	1.84	2.34	
		16.00	2.47	3.37	4.08	
		20.00	4.03	6.26	6.94	
		25.00	6.45	10.2	11.1	
		30.00	9.55		15.4	
		35.00	13.6			
		40.00	18.8			
		50.00	34.0			
		60.00	54.2			
DELTA K MAX	A:	66.62	68.4			
	B:	26.15		11.0		
	C:	34.39			19.3	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			10.79	16.06	16.33	
LIFE PREDICTION RATIO (NP/NA)		0.5-0.8	2	1	1	
		0.8-1.25				
		1.25-2.0				

CONDITION/HT: 1525F 2HRS OQ. -100F 2HRS. 1025F 4HRS
FORM: 2.50"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.08
FREQUENCY: 1.00 HZ

YIELD STRENGTH: 188.0- 191.0 KSI
ULT. STRENGTH: 200.0- 201.0 KSI
SPECIMEN THK: 0.993- 1.000"
SPECIMEN WIDTH: 7.400"
REFERENCES:88579, 85837

ALLOY STEEL

HP9-4-.20

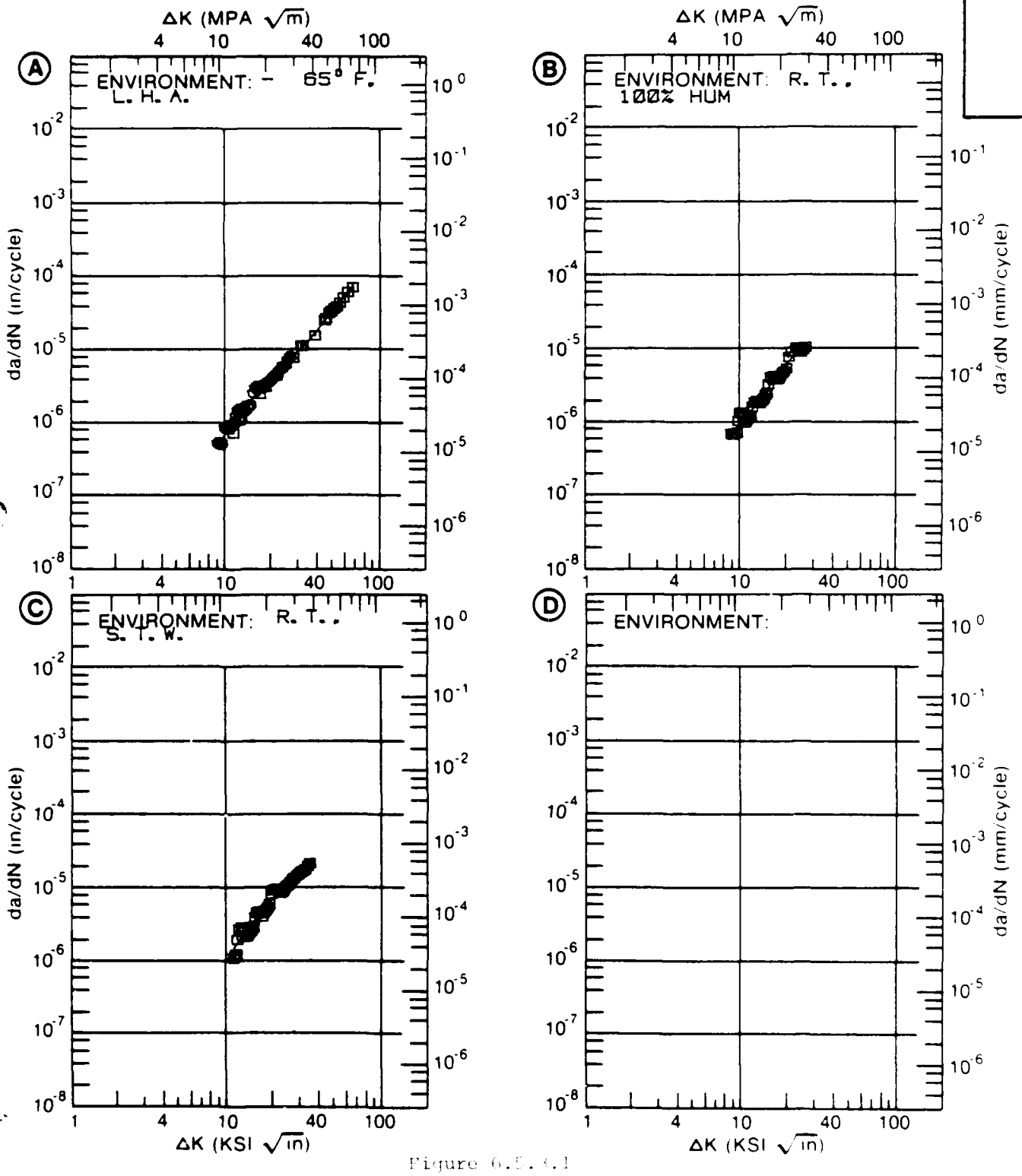


Figure 6.5.4.1

TABLE 6.5.3.11

FATIQUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.5.3.11 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL HP9-4-.20
CONDITION: 1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS
ENVIRONMENT: - 65F, L. H. A.

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE) A	B	C	D
		R=+0.08			
DELTA K MIN	A: 9.54	.473			
	B:				
	C:				
	D:				
	10.00	.620			
	13.00	1.29			
	16.00	2.31			
	20.00	4.14			
	25.00	6.65			
	30.00	8.61			
DELTA K MAX	A: 32.43	9.20			
	B:				
	C:				
	D:				

ROOT MEAN SQUARE PERCENT ERROR 10.93

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: 1525F 2HRS OQ.-100F 2HRS. 1025F 4HRS
FORM: 2.50"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: T-L
FREQUENCY: 1.00 HZ
ENVIRONMENT: - 65° F. L. H. A.
YIELD STRENGTH: 188.0 KSI
ULT. STRENGTH: 200.0 KSI
SPECIMEN THK: 0.993"
SPECIMEN WIDTH: 6.000"
REFERENCES:85837

ALLOY STEEL

HP9-4-.20

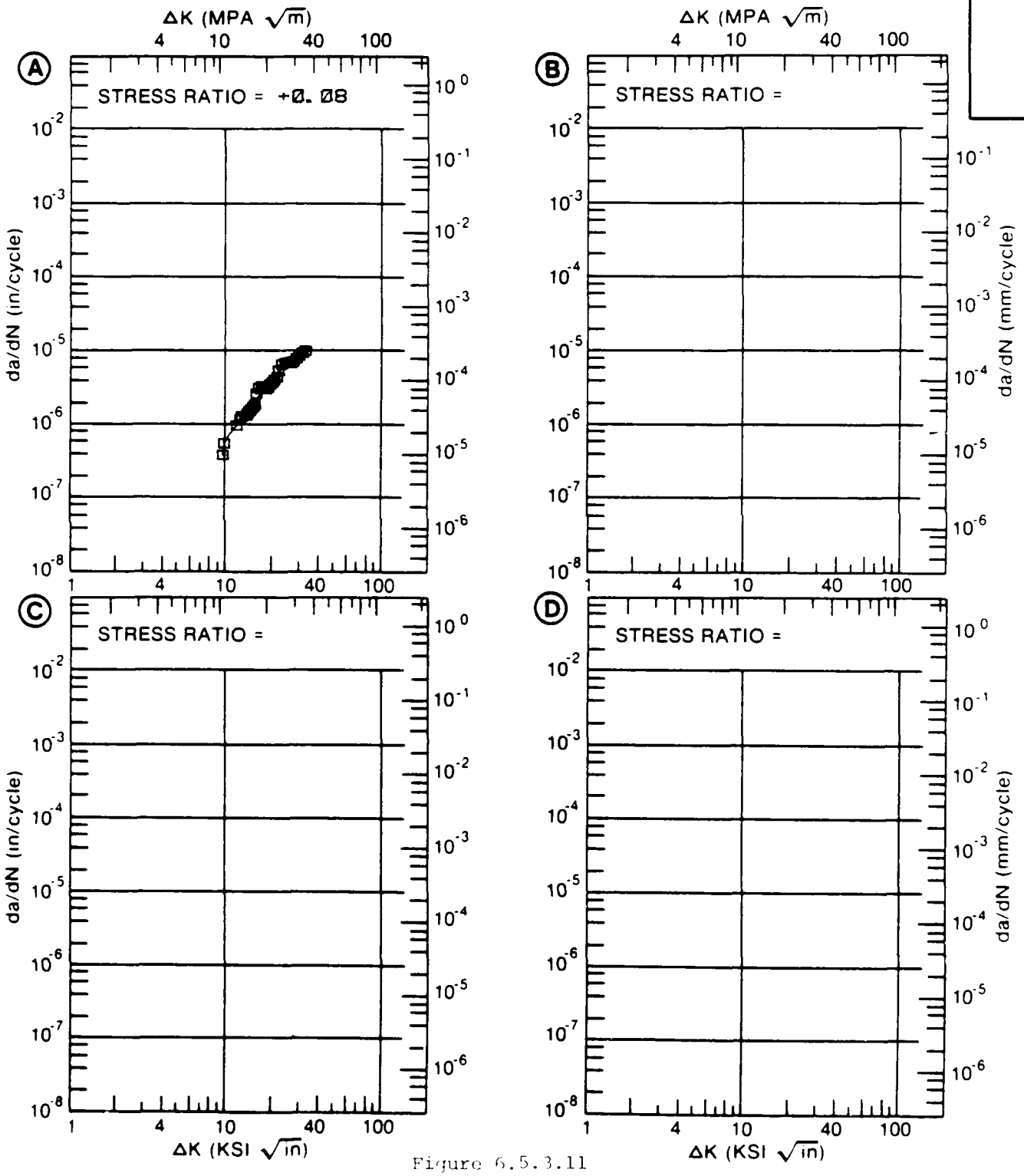


Figure 6.5.3.11

TABLE 6.5.3.12

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.5.3.12 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.20
CONDITION: 1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=- 65F L.H.A.	E= R.T. L.H.A.		
DELTA K MIN	A:	13.08	.738			
	B:	11.34		.968		
	C:					
	D:					
		13.00		1.62		
		16.00	1.30	3.12		
		20.00	2.43	5.05		
		25.00	4.55	7.19		
		30.00	7.54	9.43		
		35.00	11.5	12.3		
		40.00	16.5	16.4		
		50.00	29.7	29.9		
		60.00	47.2	51.3		
		70.00		80.0		
DELTA K MAX	A:	63.48	54.3			
	B:	72.79		89.0		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			3.87	11.94		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: 1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS
FORM: 2.50"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: T-L
STRESS RATIO: +0.08
FREQUENCY: 1.00 HZ
YIELD STRENGTH: 188.0 KSI
ULT. STRENGTH: 199.0 KSI
SPECIMEN THK: 0.990"
SPECIMEN WIDTH: 7.400"
REFERENCES:88579

ALLOY STEEL

HP9-4-.20

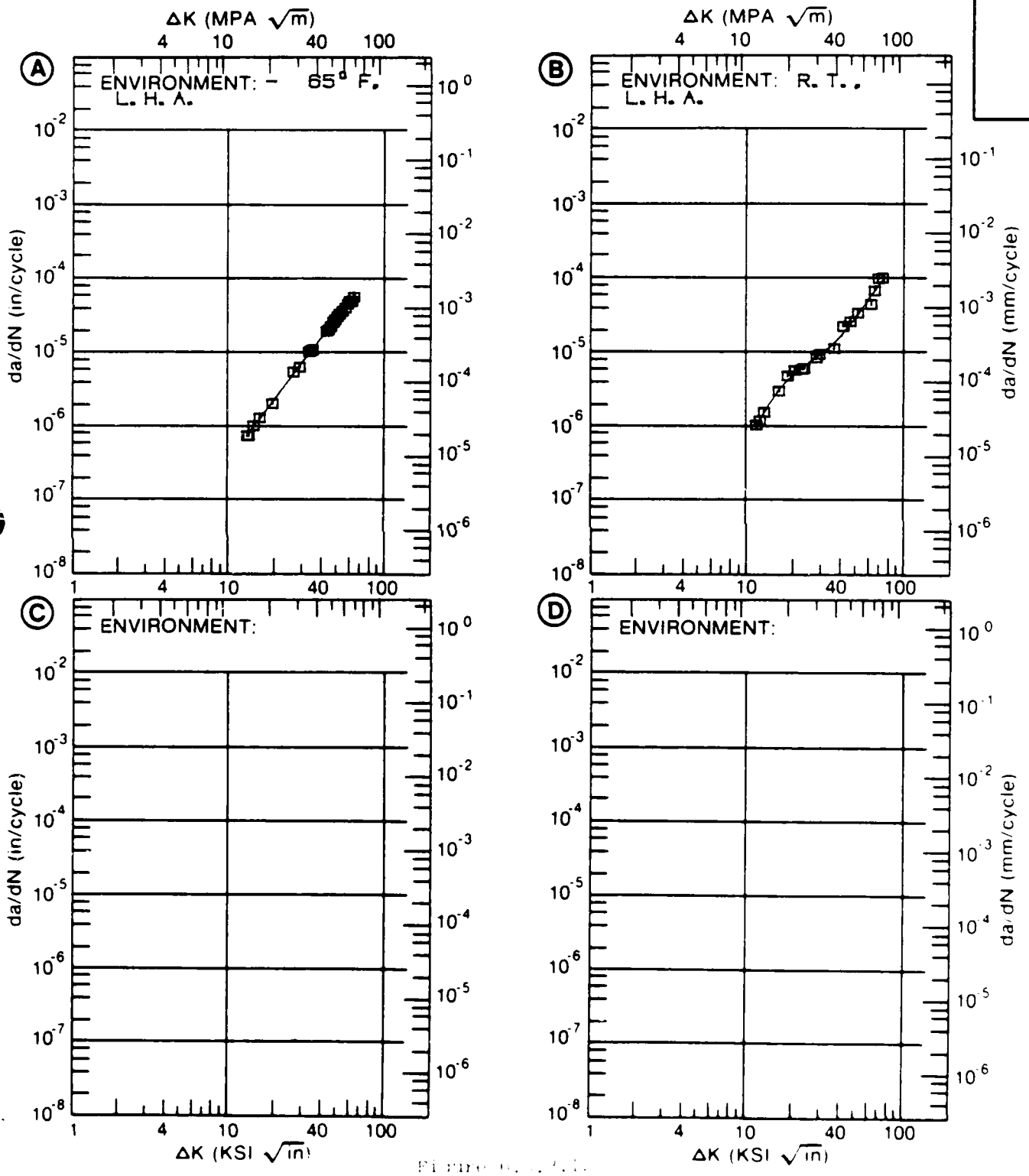


TABLE 6.5.3.13

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.5.3.13 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL HP9-4-.20
CONDITION: 1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS
ENVIRONMENT: R.T. , L.H.A.

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE) A	B	C	D
			R=+0.05			
DELTA K MIN	A:	19.41	6.79			
	B:					
	C:					
	D:					
		20.00	6.90			
		25.00	8.40			
		30.00	10.8			
		35.00	14.1			
		40.00	18.6			
		50.00	32.1			
		60.00	53.9			
		70.00	87.6			
		80.00	138.			
		90.00	212.			
DELTA K MAX	A:	95.59	266.			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR		16.27
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: 1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS
FORM: 4.00"TH BILLET
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 1.00 HZ
ENVIRONMENT: R. T., L. H. A.

YIELD STRENGTH: 188.0 KSI
ULT. STRENGTH: 204.0 KSI
SPECIMEN THK: 1.990"
SPECIMEN WIDTH: 5.990"
REFERENCES: 88579

ALLOY STEEL

HP9-4-.20

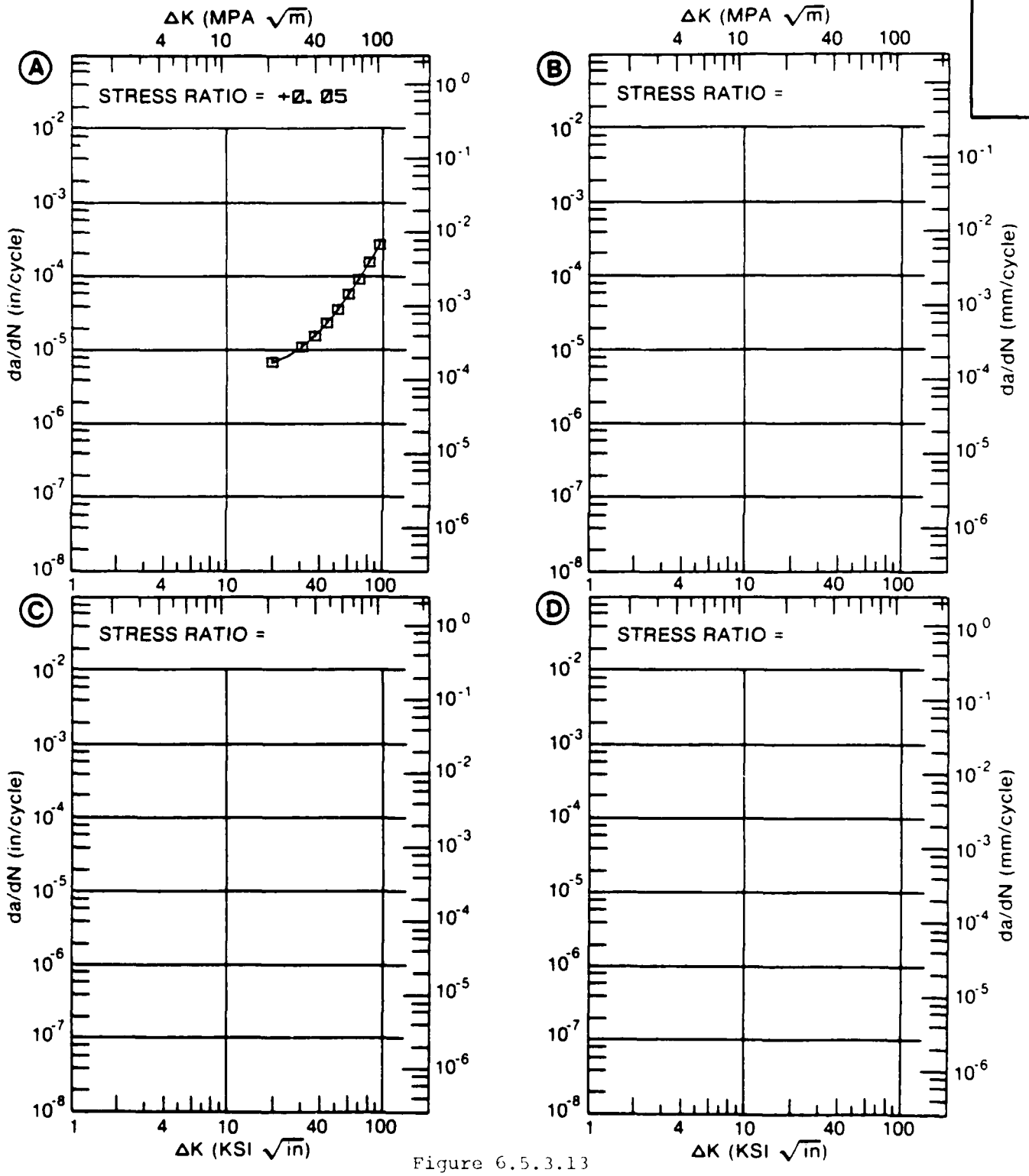


Figure 6.5.3.13

TABLE 6.5.3.14

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.5.3.14 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL HP9-4-.20
CONDITION: 1525F 2HRS OQ,-100F 2HRS, 1025F 4HRS
ENVIRONMENT: R.T. ,L.H.A.

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		R=+0.08	R=+0.30	R=+0.50	R=+0.70
DELTA K MIN	A: 12.52	1.28			
	B: 8.62		.505		
	C: 9.59			.674	
	D: 5.66				.183
	6.00				.197
	7.00				.310
	8.00				.551
	9.00		.568		.943
	10.00		.771	.819	1.44
	13.00	1.43	1.76	2.07	2.87
	16.00	2.58	3.35	3.43	4.54
	20.00	4.57	6.11		7.78
	25.00	7.77	9.32		13.6
	30.00	11.8			21.2
	35.00	16.6			
	40.00	22.4			
	50.00	37.6			
	60.00	58.7			
	70.00	87.8			
	80.00	128.			
	90.00	181.			
	100.00	253.			
DELTA K MAX	A: 102.55	275.			
	B: 27.08		10.2		
	C: 19.92			5.62	
	D: 33.41				27.3
ROOT MEAN SQUARE PERCENT ERROR		4.66	16.89	2.93	17.74
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5				
	0.5-0.8				
	0.8-1.25	1	1	1	1
	1.25-2.0				
	>2.0				

CONDITION/HT: 1525F 2HRS OQ. -100F 2HRS. 1025F 4HRS
FORM: 4.00"TH BILLET
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 6.00 HZ
ENVIRONMENT: R. T. , L. H. A.

YIELD STRENGTH: 186.0- 189.0 KSI
ULT. STRENGTH: 203.0- 211.0 KSI
SPECIMEN THK: 0.991- 1.000"
SPECIMEN WIDTH: 6.000- 6.010"
REFERENCES: 88579, 85837

ALLOY STEEL

HP9-4-.20

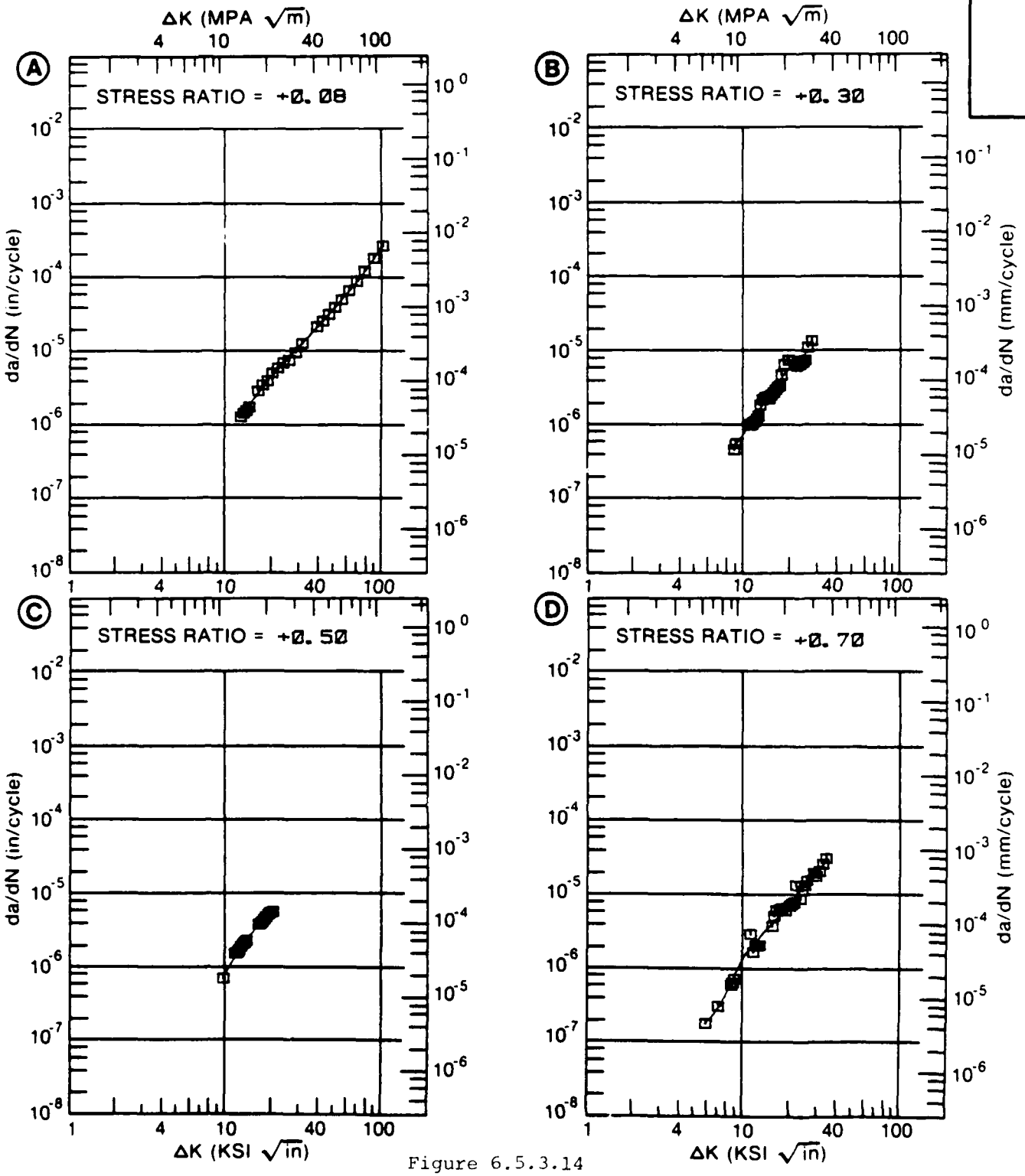


Figure 6.5.3.14

TABLE 6.5.3.15

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.5.3.15 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL HP9-4-.20
CONDITION: 1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS
ENVIRONMENT: R.T. ,100% HUM

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		R=+0.30	R=+0.50		
DELTA K MIN A:	7.60	.371			
DELTA K MIN B:	6.77		.615		
DELTA K MIN C:					
DELTA K MIN D:					
	7.00		.670		
	8.00	.371	.923		
	9.00	.532	1.20		
	10.00	.958	1.52		
	13.00	2.77	2.80		
	16.00	4.68	4.90		
	20.00	7.69	8.31		
	25.00	15.0			
DELTA K MAX A:	25.00	15.0			
DELTA K MAX B:	23.21		9.80		
DELTA K MAX C:					
DELTA K MAX D:					
ROOT MEAN SQUARE PERCENT ERROR		19.42	17.66		
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5				
	0.5-0.8				
	0.8-1.25	1	1		
	1.25-2.0				
	>2.0				

CONDITION/HT: 1525F 2HRS OQ. -100F 2HRS. 1025F 4HRS
FORM: 4.00"TH BILLET
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 1.00 HZ
ENVIRONMENT: R.T., 100% HUM

YIELD STRENGTH: 189.0 KSI
ULT. STRENGTH: 203.0 KSI
SPECIMEN THK: 0.986- 0.987"
SPECIMEN WIDTH: 7.400"
REFERENCES:85837

ALLOY STEEL

HP9-4-.20

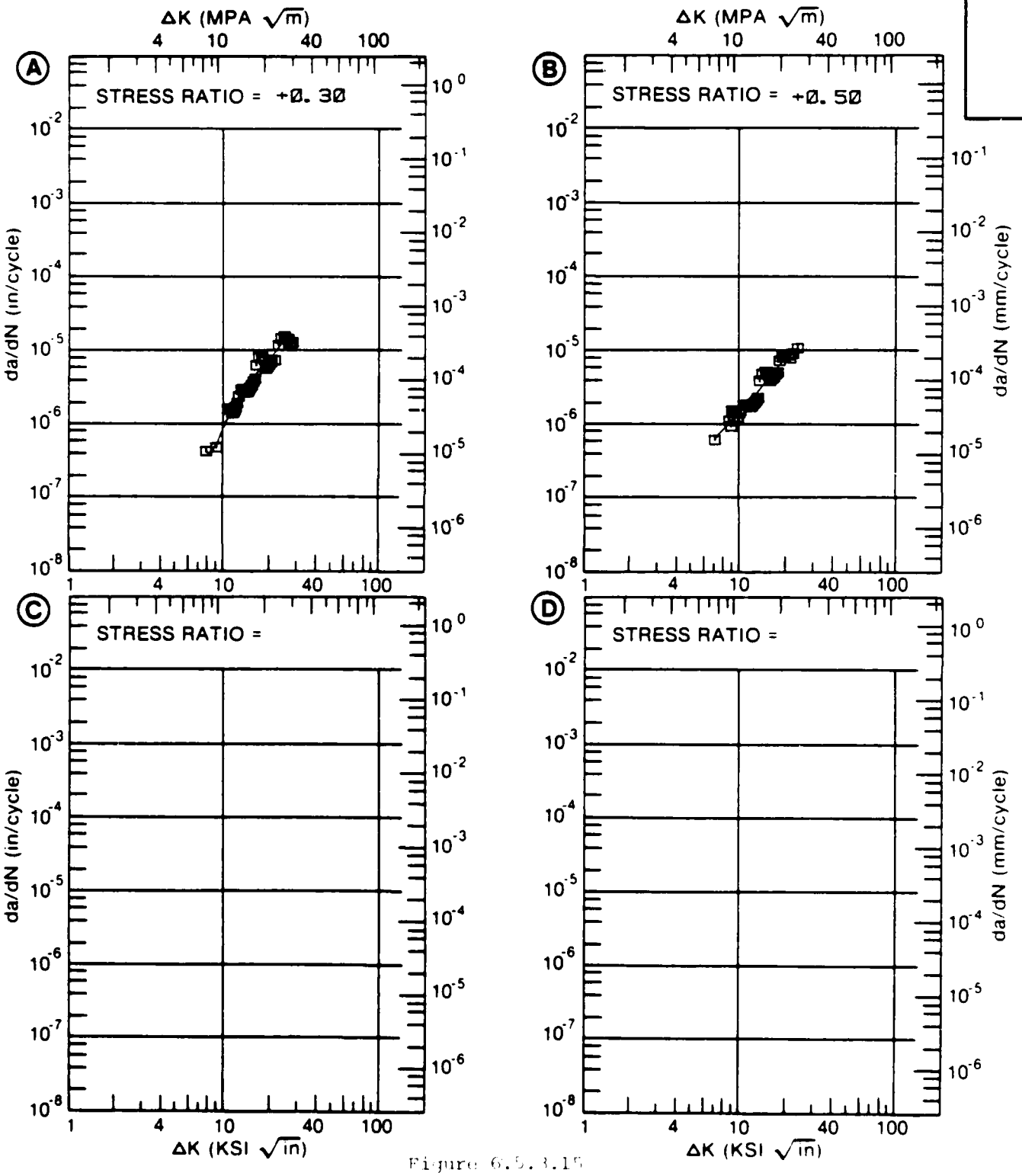


Figure 6.5.3.15

TABLE 6.5.3.16

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.5.3.16 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.20
CONDITION: 1525F 2HRS OQ,-100F 2HRS, 1025F 4HRS

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. L.H.A. SP. THK. =.260"	E= R.T. L.H.A. SP. THK. =.504"		
DELTA K MIN	A:	8.16	.393			
	B:	9.68		.531		
	C:					
	D:					
		9.00	.477			
		10.00	.688	.574		
		13.00	1.60	1.64		
		16.00	2.84	3.24		
		20.00	4.88	5.85		
		25.00	7.76	9.61		
		30.00	10.9	13.9		
		35.00	14.6	19.1		
		40.00	19.1	25.4		
		50.00	30.6	37.4		
		60.00	44.8			
DELTA K MAX	A:	68.23	57.6			
	B:	53.22		39.4		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			2.81	14.12		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: 1525F 2HRS OQ. -100F 2HRS. 1025F 4HRS
FORM: 4.00"TH BILLET
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.08
FREQUENCY: 6.00 HZ

YIELD STRENGTH: 186.0 KSI
ULT. STRENGTH: 211.0 KSI
SPECIMEN THK:
SPECIMEN WIDTH: 6.000"
REFERENCES: 88579, 85837

ALLOY STEEL

HP9-4-.20

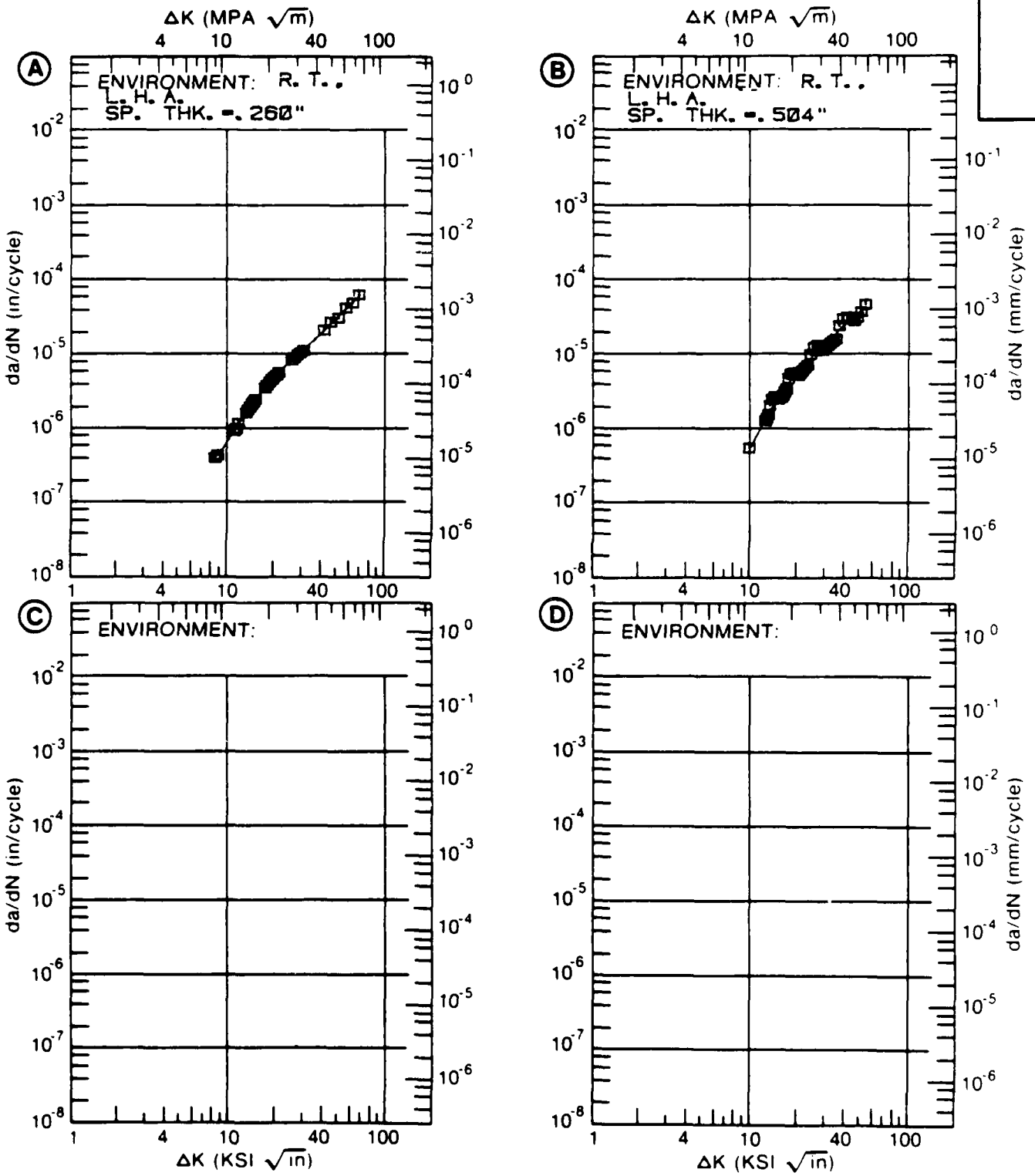


Figure 6.5.3.16

TABLE 6.5.3.17

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.5.3.17 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.20
CONDITION: 1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=- 65F L.H.A.	E= R.T. L.H.A.	E= R.T. S.C.S.	E= R.T. S.T.W.
DELTA K MIN	A:	14.63	1.45			
	B:	12.61		1.35		
	C:	5.66			.101	
	D:	5.62				.144
		6.00			.123	.172
		7.00			.195	.265
		8.00			.288	.388
		9.00			.416	.546
		10.00			.596	.742
		13.00		1.49	1.53	1.59
		16.00	2.05	2.77	2.97	2.87
		20.00		4.96	5.44	5.26
		25.00		8.32	8.98	9.23
		30.00		12.6	12.6	14.0
		35.00		18.4	16.0	19.2
		40.00		26.5	19.0	24.4
		50.00		40.9		
DELTA K MAX	A:	18.90	2.64			
	B:	55.93		41.2		
	C:	41.08			19.6	
	D:	43.29				27.8
ROOT MEAN SQUARE PERCENT ERROR			12.87	13.81	13.85	6.38
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5					
	0.5-0.8					
	0.8-1.25		1	1	1	1
	1.25-2.0					
	>2.0					

CONDITION/HT: 1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS
FORM: 4.00"TH BILLET
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.08
FREQUENCY: 1.00 HZ

YIELD STRENGTH: 186.0- 189.0 KSI
ULT. STRENGTH: 203.0- 211.0 KSI
SPECIMEN THK: 0.989- 1.000"
SPECIMEN WIDTH: 6.000"
REFERENCES: 85837, 88579

ALLOY STEEL

HP9-4-.20

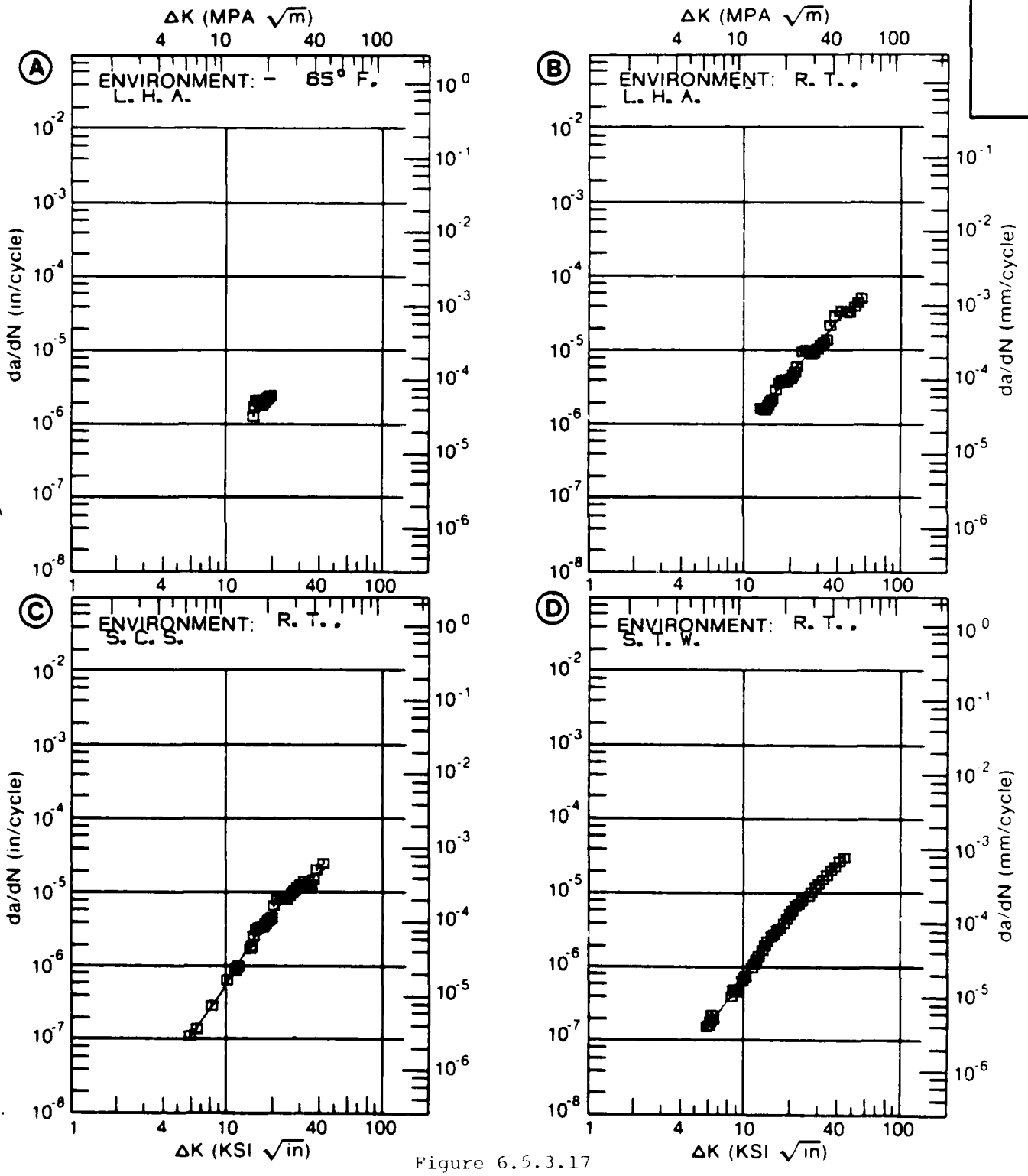


Figure 6.5.3.17

TABLE 6.5.3.18

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.5.3.18 INDICATING EFFECT

OF FREQUENCY

MATERIAL: ALLOY STEEL HP9-4-.20
CONDITION: 1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS
ENVIRONMENT: R.T. ,L.H.A.

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			F(HZ)= 0.10	F(HZ)= 9.00		
DELTA K MIN	A:	10.61	.828			
	B:	3.86		.0801		
	C:					
	D:					
		4.00		.0851		
		5.00		.131		
		6.00		.199		
		7.00		.293		
		8.00		.418		
		9.00		.578		
		10.00		.779		
		13.00	1.54	1.67		
		16.00	2.74	3.06		
		20.00	4.58	5.77		
		25.00	7.19	10.5		
		30.00	10.3	16.5		
		35.00	14.3	23.4		
		40.00	19.4	30.6		
		50.00	34.3			
DELTA K MAX	A:	58.49	49.8			
	B:	43.08		35.1		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			2.77	5.07		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: 1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS
FORM: 4.00"TH BILLET
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.08
ENVIRONMENT: R. T., L. H. A.

YIELD STRENGTH: 186.0 KSI
ULT. STRENGTH: 211.0 KSI
SPECIMEN THK: 1.000"
SPECIMEN WIDTH: 6.000"
REFERENCES: 88579

ALLOY STEEL

HP9-4-.20

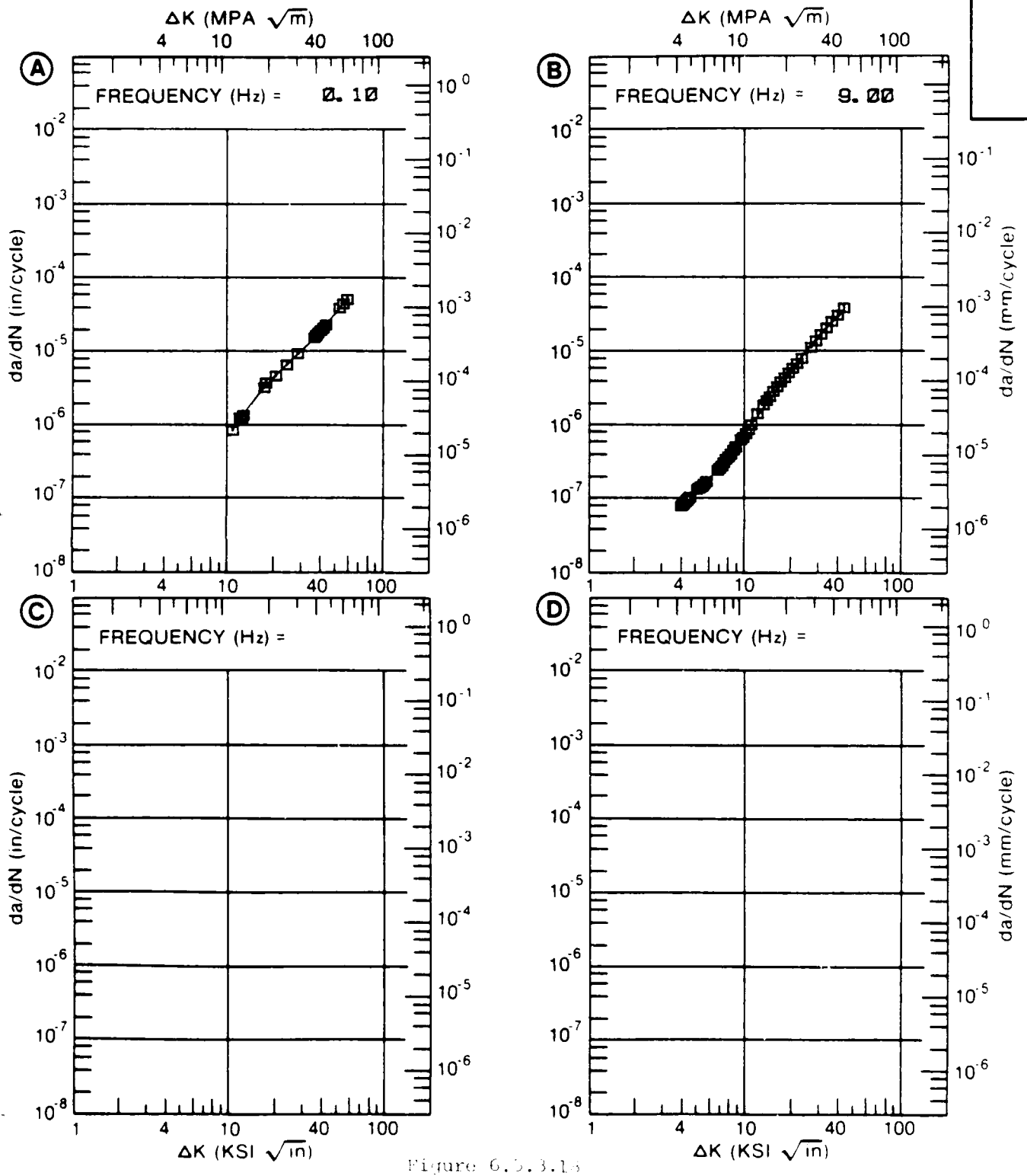


Figure 6.5.3.1-6

TABLE 6.5.3.19

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.5.3.19 INDICATING EFFECT

OF FREQUENCY

MATERIAL: ALLOY STEEL HP9-4-.20
CONDITION: 1525F 2HRS OQ,-100F 2HRS, 1025F 4HRS
ENVIRONMENT: R.T. ,100% HUM

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		F(HZ)= 0.10	F(HZ)= 1.00		
DELTA K MIN	A: 10.13	.423			
	B: 9.79		.555		
	C:				
	D:				
	10.00		.623		
	13.00	1.54	2.09		
	16.00	3.44	4.22		
	20.00	6.63	7.39		
	25.00	11.0	11.2		
	30.00	15.4	14.9		
	35.00	20.1	18.9		
	40.00	25.2	24.1		
	50.00	38.5	40.6		
DELTA K MAX	A: 55.79	49.0			
	B: 59.72		72.6		
	C:				
	D:				
ROOT MEAN SQUARE PERCENT ERROR		6.79	10.69		
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5				
	0.5-0.8				
	0.8-1.25	1	1		
	1.25-2.0				
	>2.0				

CONDITION/HT: 1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS
FORM: 4.00"TH BILLET
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.08
ENVIRONMENT: R.T., 100% HUM

YIELD STRENGTH 186.0- 189.0 KSI
ULT STRENGTH 203.0- 211.0 KSI
SPECIMEN THK 0.989- 1.000"
SPECIMEN WIDTH 6.000"
REFERENCES 88579, 85837

ALLOY STEEL

HP9-4-.20

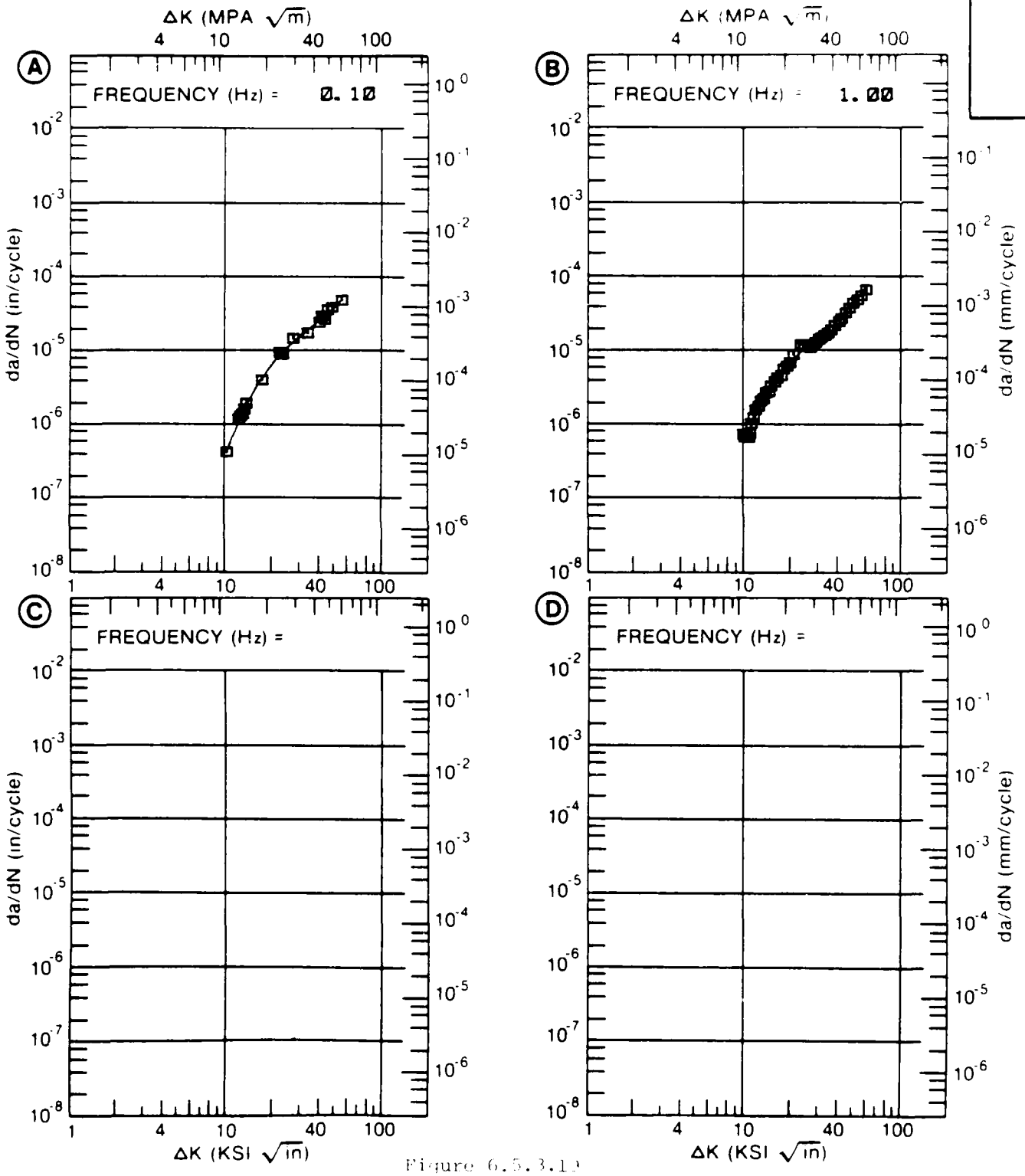


Figure 6.5.3.1.3

TABLE 6.5.3.20

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.5.3.20 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL HP9-4-.20
CONDITION: 1525F 2HRS OQ,-100F 2HRS, 1025F 4HRS
ENVIRONMENT: - 65F, L.H.A.

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE) A	B	C	D
			R=+0.08			
DELTA K MIN	A:	17.18	2.64			
	B:					
	C:					
	D:					
		20.00	3.33			
		25.00	4.96			
		30.00	7.27			
		35.00	10.5			
		40.00	14.9			
		50.00	27.8			
		60.00	47.3			
		70.00	74.3			
		80.00	109.			
DELTA K MAX	A:	86.98	138.			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 4.77

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: 1525F 2HRS OQ. -100F 2HRS. 1025F 4HRS
FORM: 4.00"TH BILLET
SPECIMEN TYPE: CT
ORIENTATION: T-L
FREQUENCY: 1.00 HZ
ENVIRONMENT: - 65° F. L. H. A.

YIELD STRENGTH: 188.0 KSI
ULT. STRENGTH: 204.0 KSI
SPECIMEN THK: 1.000"
SPECIMEN WIDTH: 6.000"
REFERENCES: 88579

ALLOY STEEL

HP9-4-.20

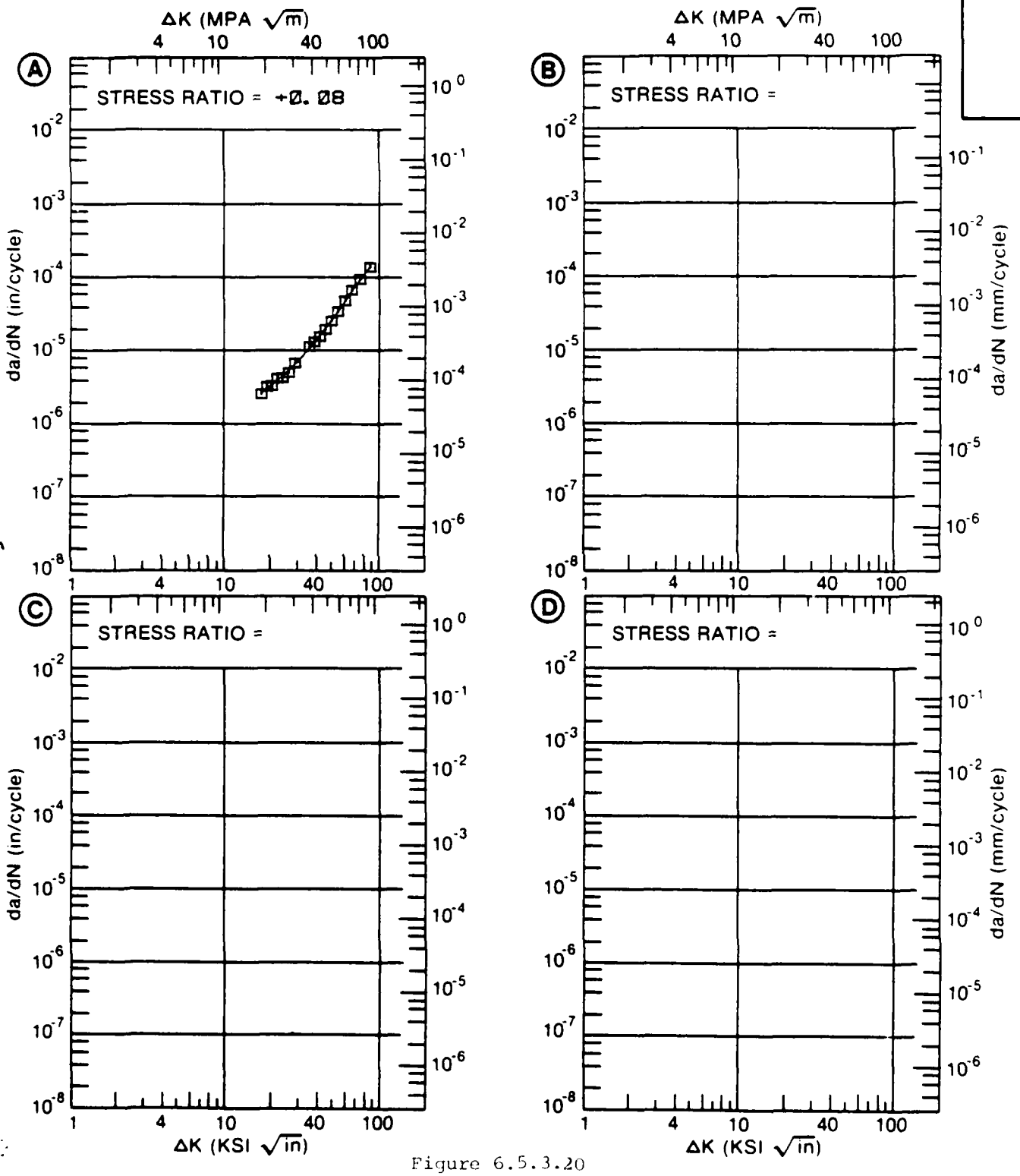


Figure 6.5.3.20

TABLE 6.5.3.21

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.5.3.21 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL HP9-4-.20
CONDITION: 1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS
ENVIRONMENT: R.T. , L.H.A.

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE) A	B	C	D
			R=+0.05			
DELTA K MIN	A:	24.44	2.98			
	B:					
	C:					
	D:					
		25.00	3.70			
		30.00	9.15			
		35.00	13.3			
		40.00	17.9			
		50.00	29.7			
		60.00	47.1			
		70.00	74.0			
		80.00	116.			
		90.00	175.			
DELTA K MAX	A:	97.82	236.			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 16.46

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	
	1.25-2.0	1
	>2.0	

CONDITION/HT: 1525F 2HRS OQ. -100F 2HRS. 1025F 4HRS
FORM: 4.00"TH BILLET
SPECIMEN TYPE: CT
ORIENTATION: T-L
FREQUENCY: 1.00 HZ
ENVIRONMENT: R. T. . L. H. A.

YIELD STRENGTH: 188.0 KSI
ULT. STRENGTH: 204.0 KSI
SPECIMEN THK: 2.000"
SPECIMEN WIDTH: 5.810"
REFERENCES: 88579

ALLOY STEEL

HP9-4-.20

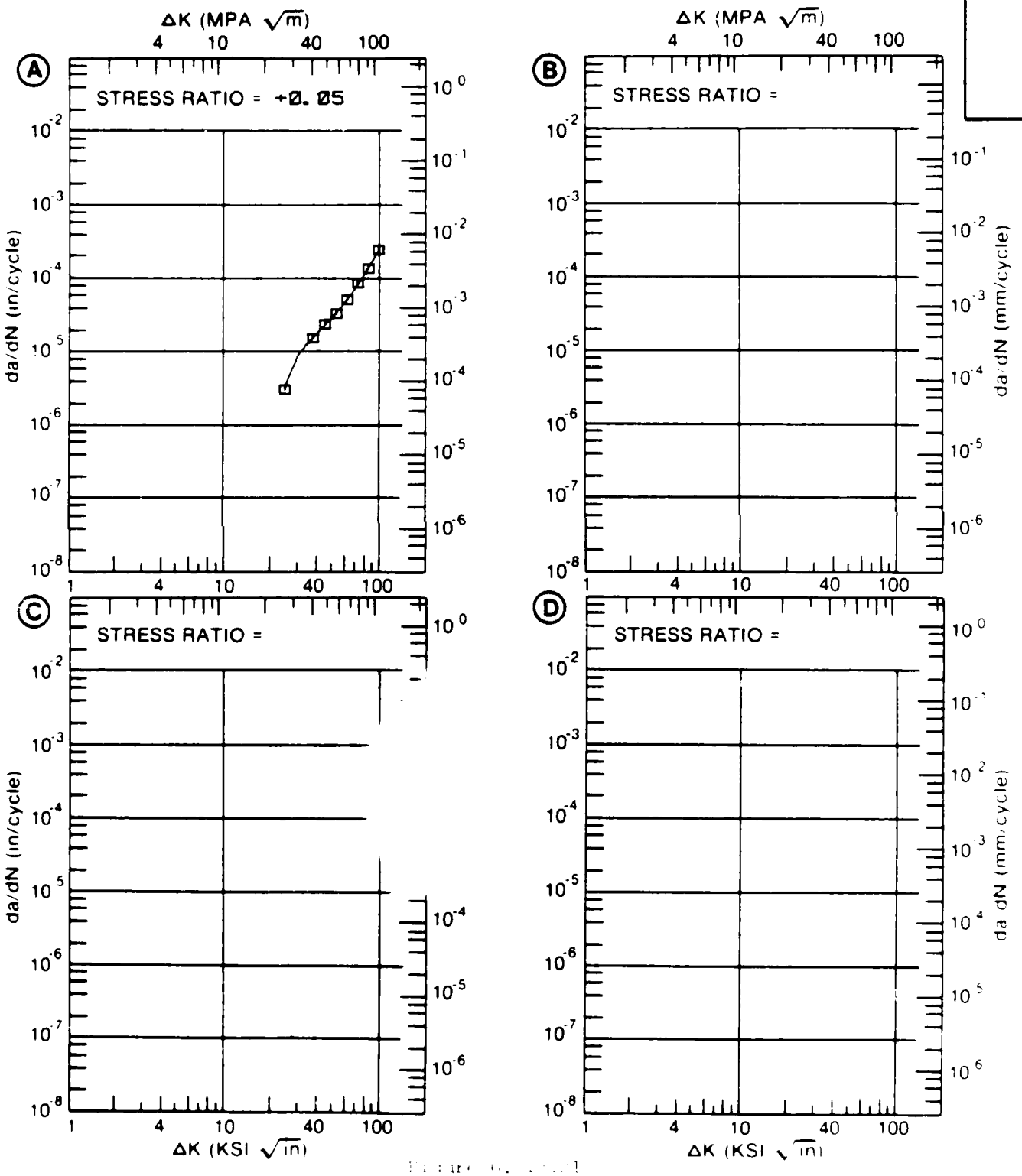


TABLE 6.5.3.22

ALLOY STEEL HP9-4- 20 K(ISCC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN (*=SG)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
----------	P	0.50	R.T.	---	----	NP04-0.2% H2O	5.500	0.500	TDCB	----	150.00	140.00*			----	1971	80667
----------	P	0.50	R.T.	---	----	SYNTH SEAWATER	----	----	TDCB	----	------	110.00*			----	1969	74232
----------	P	1.25	R.T.	T-L	198.0	SIM. SEA WATER	3.083	1.247	BWOL	1.367	------	92.80			195840	1977	MA005
		1.25			198.0		3.088	1.250	BWOL	1.366	------	94.50			195840	1977	MA005
													93.7/	1.2			
GTA WELD WELDMENT	P	0.50	R.T.	---	----	SYNTH SEAWATER	----	----	TDCB	----	------	65.00			----	1969	74232
QUENCHED AND TEMPERED	P	1.00	R.T	---	180.0	3.5 PCT NACL	----	1.000	CANT*	----	210.00	110.00			----	1972	83613
		1.00		---	195.0		----	1.000	CANT*	----	200.00	110.00			----	1972	83613
													110.0/	0.0			
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	P	2.50	R.T.	L-T	189.0	S.T.W.	2.000	1.000	DCB	----	119.00	105.00			86280	1976	RI006
		2.50			189.0		2.000	1.000	DCB	----	119.00	103.00			86280	1976	RI006
		2.50			189.0		2.000	1.000	DCB	----	119.00	107.00			86280	1976	RI006
													105.0/	2.0			
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	P	2.50	R.T.	T-L	190.0	S.T.W.	2.000	1.000	DCB	----	119.00	97.00			86280	1976	RI006
		2.50			190.0		2.000	1.000	DCB	----	119.00	97.00			86280	1976	RI006
		2.50			190.0		2.000	1.000	DCB	----	119.00	93.00			86280	1976	RI006
		2.50			190.0		2.000	1.000	DCB	----	119.00	104.00			86280	1976	RI006
		2.50			190.0		2.000	1.000	DCB	----	119.00	96.00			86280	1976	RI006
													97.4/	4.0			
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	FB	4.00	R.T.	L-T	186.0	S.C.S.	2.000	1.000	DCB	----	118.00	>122.00			60660	1976	RI006
		4.00			186.0		2.000	1.000	DCB	----	118.00	>129.00			60180	1976	RI006
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	FB	4.00	R.T.	L-T	186.0	S.T.W.	2.000	1.000	DCB	----	118.00	>126.00			86280	1976	RI006
		4.00			186.0		2.000	1.000	DCB	----	118.00	>129.00			86280	1976	RI006
		4.00			186.0		2.000	1.000	DCB	----	118.00	110.00			86280	1976	RI006
1525F 2HRS OQ, -100F 2HRS, 1025F 4HRS	FB	4.00	R.T.	T-L	187.0	S.T.W.	2.000	1.000	DCB	----	118.00	109.00			86280	1976	RI006

*NOTE-DATA WHICH DO NOT MEET MINIMUM SPECIMEN THICKNESS REQUIREMENTS OF 2.5(KISCC/TYS)SQUARED

TABLE 6.4.3.22 (Con't)

ALLOY STEEL HP9-4-.20 K(ISCC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN (*=SG)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
1525F 2HRS OQ, FB		4.00	R.T.	T-L	187.0	S.T.W.	2.000	1.000	DCB	----	118.00	105.00			76860	1976	RI006
-100F 2HRS,		4.00			187.0		2.000	1.000	DCB	----	118.00	117.00			86280	1976	RI006
1025F 4HRS													107.0/	2.8			
1525F 2HRS OQ, FB		4.00	R.T.	S-T	----	S.T.W.	2.000	1.000	DCB	----	118.00	97.00			86280	1976	RI006
-100F 2HRS,		4.00			----		2.000	1.000	DCB	----	118.00	79.00			86280	1976	RI006
1025F 4HRS		4.00			----		2.000	1.000	DCB	----	118.00	81.00			86280	1976	RI006
		4.00			----		2.000	1.000	DCB	----	118.00	75.00			116820	1976	RI006
													78.3/	3.1			

TABLE 6.6.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.6.3.1 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.20(CEVM)
CONDITION: ANNEALED

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. LAB AIR 5-10HZ	E= R.T. SIM. SEA WATER 1-20HZ		
DELTA K MIN	A:	10.59	1.04			
	B:	11.52		1.04		
	C:					
	D:					
		13.00	2.03	1.59		
		16.00	3.62	3.03		
		20.00	6.19	5.56		
		25.00	9.93	9.51		
		30.00	14.2	14.2		
		35.00	18.9	19.6		
		40.00	24.2	25.8		
		50.00	37.0	40.7		
		60.00	53.7	59.8		
		70.00	75.6			
		80.00	104.			
DELTA K MAX	A:	89.69	141.			
	B:	63.26		67.1		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			7.22	9.60		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	2	2		
		1.25-2.0				
		>2.0				

CONDITION/HT: ANNEALED
FORM: 3.00"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.10
FREQUENCY:

YIELD STRENGTH: 191.8 KSI
ULT. STRENGTH: 204.2 KSI
SPECIMEN THK: 0.997- 1.003"
SPECIMEN WIDTH: 7.400"
REFERENCES:NC002

ALLOY STEEL

HP9-4-20 (CEVM)

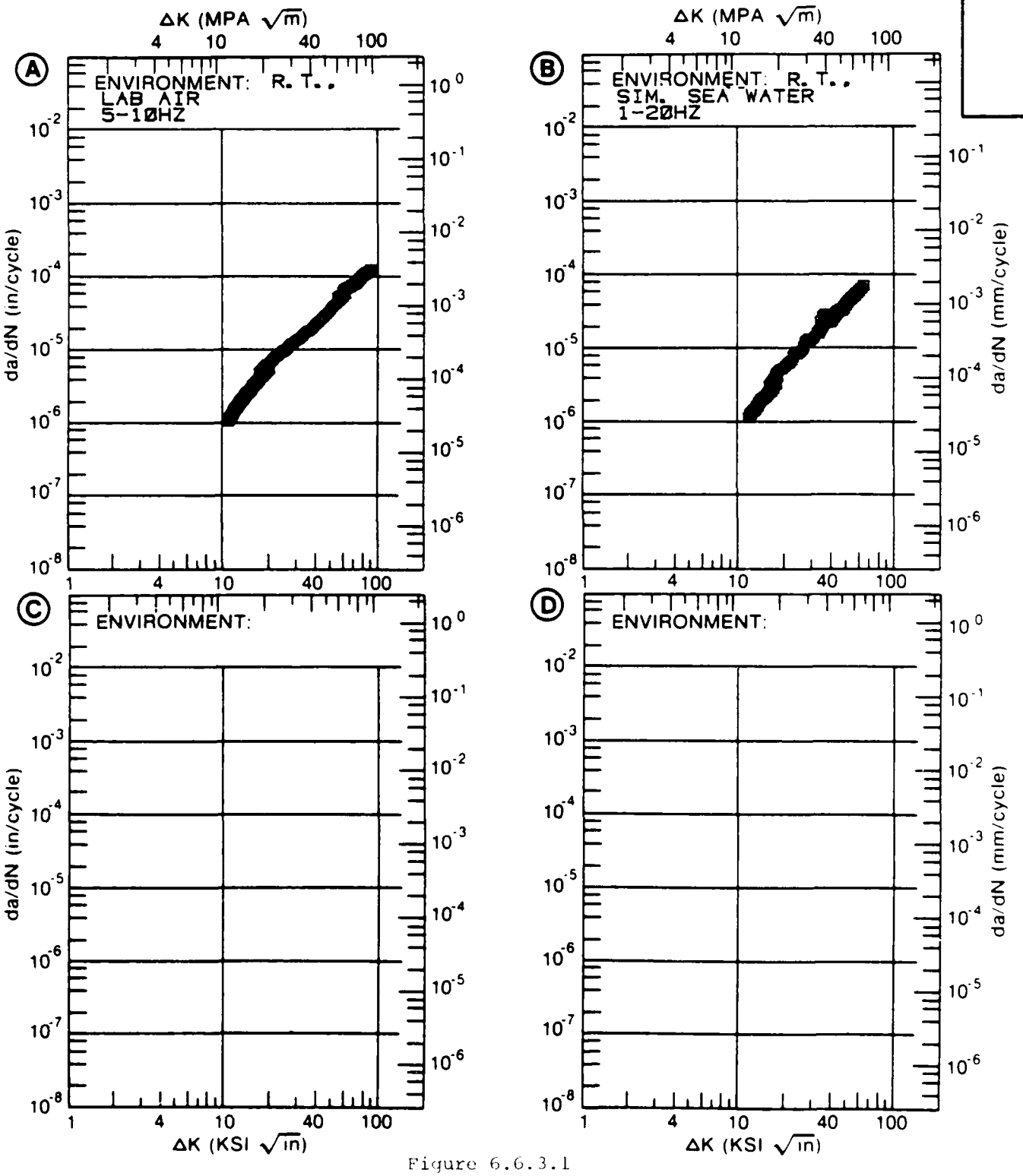


Figure 6.6.3.1

TABLE 6.6.3.2

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.6.3.2 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.20(CEVM)
CONDITION: ANNEALED

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. LAB AIR 10-15HZ	E= R.T. SIM. SEA WATER 1-10HZ		
DELTA K MIN	A:	10.03	.928			
	B:	11.55		1.16		
	C:					
	D:					
		13.00	2.17	1.73		
		16.00	3.84	3.22		
		20.00	6.53	5.78		
		25.00	10.5	9.77		
		30.00	15.1	14.6		
		35.00	20.5	20.2		
		40.00	26.7	26.8		
		50.00	42.9	43.6		
		60.00	65.7	66.6		
		70.00	98.1			
		80.00	144.			
DELTA K MAX	A:	87.05	188.			
	B:	65.98		84.3		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			8.76	8.20		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	2	2		
		1.25-2.0				
		>2.0				

CONDITION/HT: ANNEALED
FORM: 3.00"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: T-L
STRESS RATIO: +0.10
FREQUENCY:

YIELD STRENGTH: 192.2 KSI
ULT. STRENGTH: 204.8 KSI
SPECIMEN THK: 1.003- 1.004"
SPECIMEN WIDTH: 7.400"
REFERENCES: NC002

ALLOY STEEL

HP9-4-20 (CEVM)

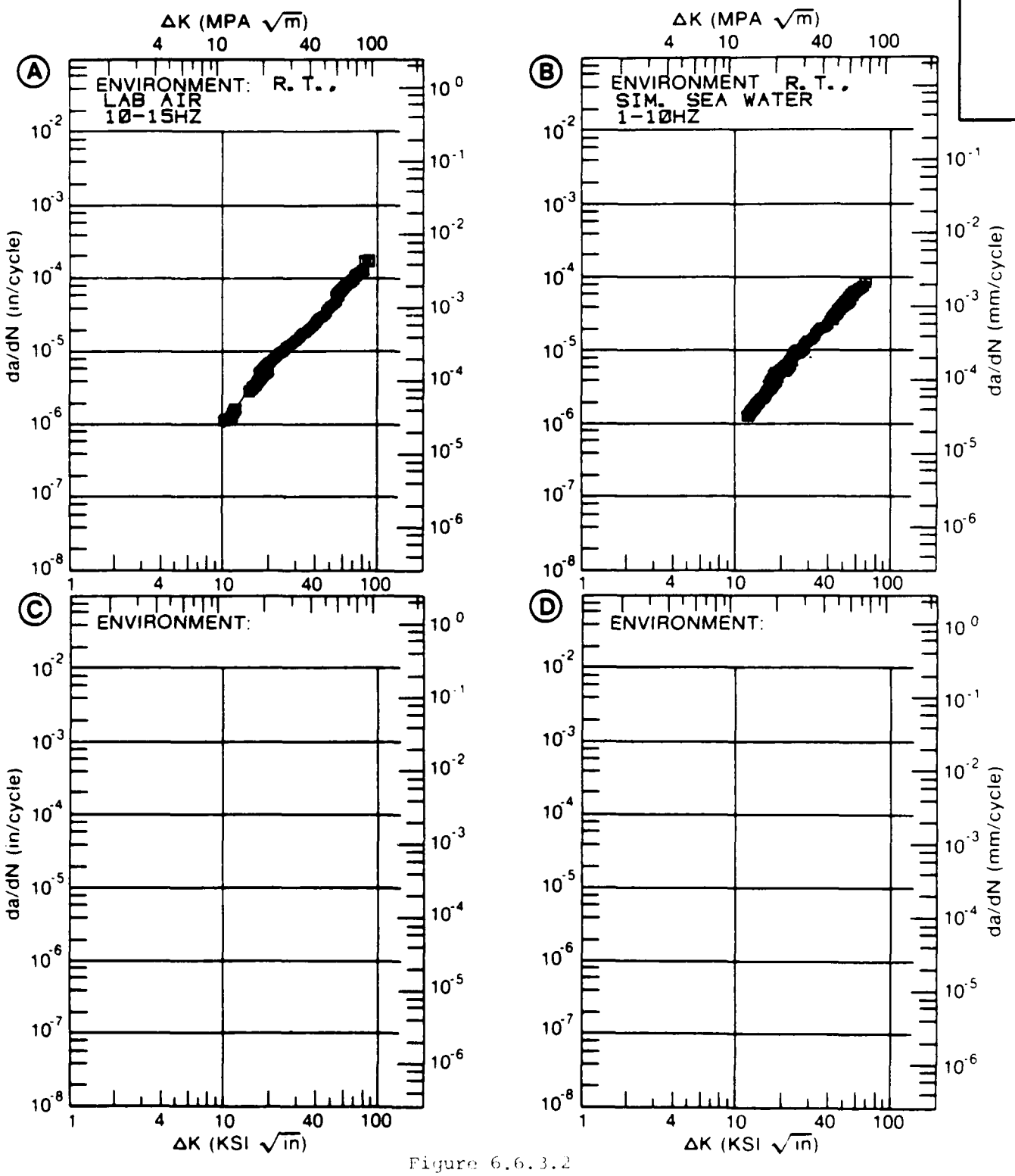


Figure 6.6.3.2

TABLE 6.7.1.1

MEAN PLANE STRAIN FRACTURE TOUGHNESS DATA OF
ALLOY STEEL HP 9-4-.25(VAR) AT ROOM TEMPERATURE

CONDITION/HT	MEAN KIC ± STANDARD DEVIATION (KSI SQRT(IN))	(NUMBER OF SPECIMENS)

FORGING

CONDITION/HT	L-T	T-L	S-L
1550F 1 HR,OQ 1000F 2+2HR,AC	-----	98.9 ± 4.5 (2)	-----

TABLE 6.7.2.1

ALLOY STEEL HP 9-4- 25(VAR) K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	------SPECIMEN------ WIDTH (IN) W	THICK (IN) B	DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	STAN DEV	DATE	REFER
1550F 1 HR,OQ	F	3.00	- 75	T-L	187.0	5.110	2.000	WOL	1.834	1.08	123.00			196	76411 (1)
1000F 2+2HR,AC		3.00			187.0	5.110	2.000	WOL	1.864	0.82	107.00			1966	76411 (1)
												115.0/	11.3		
1550F 1 HR,OQ	F	3.00	- 40	T-L	188.0	5.110	2.000	WOL	1.886	0.86	110.00			1966	76411 (1)
1000F 2+2HR,AC		3.00			188.0	5.110	2.000	WOL	1.863	0.89	112.00			1966	76411 (1)
												111.0/	1.4		
1550F 1 HR,OQ	F	3.00	0	T-L	187.0	5.110	2.000	WOL	1.837	0.82	107.00			1966	76411 (1)
1000F 2+2HR,AC		3.00			187.0	5.110	2.000	WOL	1.879	0.79	105.00			1966	76411 (1)
												106.0/	1.4		
1550F 1 HR,OQ	F	3.00	32	T-L	187.0	5.110	2.000	WOL	1.868	0.79	104.00			1966	76411 (1)
1000F 2+2HR,AC		3.00			187.0	5.110	2.000	WOL	1.954	0.71	99.40			1966	76411 (1)
												101.7/	3.3		
1550F 1 HR,OQ	F	3.00	R T.	T-L	175.0	5.110	2.000	WOL	1.822	0.75	95.70			1966	76411 (1)
1000F 2+2HR,AC		3.00			175.0	5.110	2.000	WOL	1.808	0.85	102.00			1966	76411 (1)
												98.9/	4.5		
1550F 1 HR,OQ	F	3.00	100	T-L	180.0	5.110	2.000	WOL	1.853	0.84	104.00			1966	76411 (1)
1000F 2+2HR,AC		3.00			180.0	5.110	2.000	WOL	1.855	0.78	101.00			1966	76411 (1)
												102.5/	2.1		
1550F 1 HR,OQ	F	3.00	150	T-L	175.0	5.110	2.000	WOL	1.834	1.00	111.00			1966	76411 (1)
1000F 2+2HR,AC		3.00			175.0	5.110	2.000	WOL	1.824	0.92	106.00			1966	76411 (1)
												108.5/	3.5		

NOTES:
(1) (VAR)=(VACUUM ARC REMELTED)

TABLE 6.8.1.1

MEAN PLANE STRAIN FRACTURE TOUGHNESS DATA OF
ALLOY STEEL HP 9-4-.30 AT ROOM TEMPERATURE

CONDITION/HT	MEAN KIC ± STANDARD DEVIATION (KSI SQRT(IN))	(NUMBER OF SPECIMENS)

PLATE

CONDITION/HT	L-T	T-L	S-L
HEAT TREATED TO 49 RC HARDNESS	-----	82.5 ± 5.0 ( )	-----

FORGING

CONDITION/HT	L-T	T-L	S-L
1650F 1-2HR AC 1525F 1-2HR OQ -100F 1-3HR, 1000F 4HR	106.0 ± 1.4 (2)	89.0 ± 3.0 (3)	-----
1650F 1-2HR AC 1525F 1-2HR OQ -100F 1-3HR, 1050F 4HR	-----	87.5 ± 0.8 (2)	-----
1650F 1-2HR AC 1525F 1-2HR OQ -100F 1-3HR 1025F 4HR	-----	93.5 ± 0.7 (2)	-----
1650F, 2HR AC 1550F 2HR OQ 1000F 2+2HR AC	82.0 ± 0.0 (2)	-----	-----

TABLE 6.8.1.2

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL HP9-4- 30

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT L H A AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
UTS=220-240KSI	BILLET	-1.00	10.00					3.62	30.0	
UTS 220-240KSI	BILLET	0.00	10.00					3.34	25.9	132
UTS=220-240KSI	BILLET	0.50	10.00				0.94	6.26	49.3	
1525F 2HRS OQ, 100F 2HRS, 1025F 2+2HR	FORGED BAR	0.30	6.00					4.51	98.9	
1550F 2HRS OQ, 100F 1HR, 1025F 2+2HR	FORGED BAR	0.08	1.00				0.89	5.04		
1550F 2HRS OQ, 100F 1HR, 1025F 2+2HR	FORGED BAR	0.30	6.00				1.12	7.35		
1550F 2HRS OQ, 100F 1HR, 1025F 2+2HR	FORGED BAR	0.50	6.00				1.17	6.60		

TABLE 6.8.1.3

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL HP9-4-30

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT LAB AIR AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
- - -	FORGING	0.02	5.0-20.0				0.39	2.99	38.9	
	BAR	0.02	1.0						46.4	
	BAR	0.02	10.0					3.59	46.6	

TABLE 6.8.1.4

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL HP9-4- 30

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT 3 5% NACl AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2 5	5	1	20	50	100
- - - -	BAR	0 02	1 0						42 8	
TUS= 220-240KSI	BILLET	0 00	0 10					6 21	36 3	260
TUS= 220-240KSI	BILLET	0 00	1 00					4 25	41 1	
TUS= 220-240KSI	BILLET	0 00	10 00					2 74	27 7	266
UTS=220-240KSI	BILLET	-1 00	0 10					2 88	33 9	

TABLE 6.8.1.5

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL HP9-4- 30

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT S.T.W AT R.T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
1525F 2HRS OQ, -100F 1HR, 1025F 2+2HR	FORGED BAR	0.08	1.00					5.68	62.3	
1550F 2HRS OQ, -100F 1HR, 1025F 2+2HR	FORGED BAR	0.08	0.10				3.00	13.2		
1550F 2HRS OQ, -100F 1HR, 1025F 2+2HR	FORGED BAR	0.30	1.00				1.06	7.45		
1550F 2HRS OQ, -100F 1HR, 1025F 2+2HR	FORGED BAR	0.50	1.00				2.38	9.51		
1550F 2HRS OQ, -100F 1HR, 1025F 2+2HR	FORGED BAR	0.50	1.00				1.35	7.70		

TABLE 6.8.1.6

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL HP9-4- 30

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT ALT IMMERSION IN SEA WATER AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2 5	5	10	20	50	100
TUS=220-240KSI	BILLET	0 00	1 00	IMMERSED				4 16	34 3	
TUS=220-240KSI	BILLET	0 00	10 00	IMMERSED				3 51	30 7	
TUS=220-240KSI	BILLET	0 00	1 00	1ST HALF DRY CYCLE				1 62	29 7	
TUS=220-240KSI	BILLET	0 00	10 00	1ST HALF DRY CYCLE				3 28		
TUS=220-240KSI	BILLET	0 00	1 00	2ND HALF DRY CYCLE				2 70	25 8	
TUS 220-240KSI	BILLET	0 00	10 00	2ND HALF DRY CYCLE				3 27		

TABLE 6.8.1.7

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL HP9-4- 30

TEST CONDITIONS

SPECIMEN ORIENTATION T-L

ENVIRONMENT: DRY AIR AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
------	PLATE	0.50	0.10					7.16		
	PLATE	0.80	1.00				14.7			

TABLE 6.8.1.8

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL HP9-4-.30

TEST CONDITIONS

SPECIMEN ORIENTATION T-L

ENVIRONMENT L H A AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2 5	5	10	20	50	100
1550F 2HRS OQ, -100F 1HR 1025F 2+2HR	FORGED BAR	0.08	6.00					5.13		
1550F 2HRS OQ, -100F 3HRS, 1000F 2+2HRS	FORGED BAR	0.08	6.00					3.58	46.7	

TABLE 6.8.1.9

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL HP9-4- 30

TEST CONDITIONS

SPECIMEN ORIENTATION T-L

ENVIRONMENT H20 SATURATED JP4 FUEL AT R.T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ. (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
-----	PLATE	0.00	15.00					2.49		
	PLATE	0.10	0.10						67.7	
	PLATE	0.10	1.00						49.2	
	PLATE	0.50	0.10					8.46		
	PLATE	0.50	1.00					7.88		

TABLE 6.8.1.10

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL HP9-4- 30

TEST CONDITIONS

SPECIMEN ORIENTATION T-L

ENVIRONMENT DIST WATER AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2 5	5	10	20	50	100
-----	PLATE	0 00	15 00					2 86		
	PLATE	0 10	0 10						336	
	PLATE	0 10	1 00						51 7	
	PLATE	0 50	1 00					24 0		

TABLE 6.8.1.11

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL HP9-4- 30

TEST CONDITIONS

SPECIMEN ORIENTATION T-L

ENVIRONMENT 3 5% NACL AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIQUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2 5	5	10	20	50	100
-----	PLATE	0 00	15 00					3.02		
	PLATE	0 10	0 10						114	
	PLATE	0 10	1 00						53.6	
	PLATE	0 50	0 10					18.7		
	PLATE	0 50	1 00					11.3		
	PLATE	0 80	0 10				71 3	293		

TABLE 6.8.1.12

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL HP9-4- 30

TEST CONDITIONS

SPECIMEN ORIENTATION: T-L

ENVIRONMENT: S T W AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2 5	5	10	20	50	100
-----	PLATE	0 10	0 10						208	
	PLATE	0 10	1 00						67 0	
	PLATE	0 50	1 00					9 57		
1550F 2HRS OQ, -100F 1HR, 1025F 2+2HR	FORGED BAR	0 08	1 00				0 68	4 84		

TABLE 6.8.2.1

ALLOY STEEL HP 9-4-.30 K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	------SPECIMEN------ WIDTH (IN) W	THICK (IN) B	DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	STAN DEV	DATE	REFER
----------	F	1.25	81	L-T	207.5	2.529	1.245	CT	1.273	0.65	106.10			1977	MA005
		1.25			207.5	2.519	1.245	CT	1.263	0.67	108.19	107.1/	1.5	1977	MA005
----------	F	1.25	81	T-L	208.3	2.523	1.246	CT	1.258	0.58	101.10			1977	MA005
		1.25			208.3	2.534	1.246	CT	1.293	0.58	101.10	101.1/	0.0	1977	MA005
HEAT TREATED TO 49 RC HARDNESS	P	3.25	R.T.	T-L	189.0	2.004	1.005	NB	0.990	0.52	86.00			1971	84029
		3.25			189.0	[illegible]	1.005	NB	1.010	0.44	78.90			1971	84029
												82.5/	5.0		
1525F,OQ,-100F 3HR,1050F 4HR	F	3.00	- 65	T-L	175.0	5.000	1.900	CT	----	1.64	142.00			1974	90011
1650F 1-2HR AC	F	3.00	- 65	L-T	220.0	3.000	1.000	CT	----	0.23	67.00			1974	90011
1525F 1-2HR OQ ,-100F 1-3HR, 1000F 4HR		3.00			220.0	3.000	1.000	CT	----	0.22	66.00	66.5/	0.7	1974	90011
1650F 1-2HR AC	F	3.00	R.T.	L-T	205.0	3.000	1.000	CT	----	0.80	116.00			1974	90011
1525F 1-2HR OQ,-100F 1-3HR 1025F 4HR															
1650F 1-2HR AC	F	3.00	R.T.	L-T	206.0	3.000	1.000	CT	----	0.65	105.00			1974	90011
1525F 1-2HR OQ ,-100F 1-3HR, 1000F 4HR		3.00			206.0	3.000	1.000	CT	----	0.67	107.00	106.0/	1.4	1974	90011
1650F 1-2HR AC	F	3.00	R.T.	T-L	200.0	3.000	1.000	CT	----	0.47	87.00			1972	84306
1525F 1-2HR OQ ,-100F 1-3HR, 1050F 4HR		3.00			200.0	3.000	1.000	CT	----	0.48	88.10	87.6/	0.8	1974	90011
1650F 1-2HR AC	F	3.00	R.T.	T-L	205.0	3.000	1.000	CT	----	0.51	93.00			1974	90011
1525F 1-2HR OQ ,-100F 1-3HR 1025F 4HR		3.00			205.0	3.000	1.000	CT	----	0.52	94.00	93.5/	0.7	1974	90011
1650F 1-2HR AC	F	3.00	R.T.	T-L	206.0	3.000	1.000	CT	----	0.43	86.00			1974	90011
1525F 1-2HR OQ,-100F 1-3HR, 1000F 4HR															

TABLE 6.8.2.1 (Con't)

ALLOY STEEL HP 9-4- 30 K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIEN	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
1650F 1-2HR AC	F	3.00	R.T.	T-L	215.0	3.000	1.000	CT	----	0.46	92.00			1974	90011
1525F 1-2HR OQ		3.00			215.0	3.000	1.000	CT	----	0.43	89.00			1974	90011
-100F 1-3HR, 1000F 4HR												89.0/	3.0		
1650F 2HRS AC,	F	----	R.T.	---	201.8	2.008	0.997	CT	1.024	0.80	114.20			1977	AM002
1550F 2HR OQ, -100F 2HR AC, 1000F 4HR, AC, 1000F 4HR, AC															
1650F, 2HR AC	F	3.25	R.T.	L-T	192.0	4.014	2.016	CT	1.997	0.48	82.00			1974	88136
1550F 2HR OQ		3.25			192.0	4.003	2.015	CT	1.933	0.48	82.00			1974	88136
1000F 2*2HR AC												82.0/	0.0		
1650F, AC, 1525F	F	3.00	R.T.	T-L	197.0	3.000	1.000	CT	----	0.67	102.00			1974	90011
1-2HR, OQ, -100F 1-3HR, 1050F 4HR															

TABLE 6.8.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.1 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION:

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. H2O SATURATED JP-4 FUEL	E= R.T. DIST. WATER	E= R.T. 3.5% NACL	
DELTA K MIN	A:	16.82	1.76			
	B:	14.06		.486		
	C:	12.13			.768	
	D:					
		13.00			.880	
		16.00		1.09	1.50	
		20.00	2.49	2.86	3.02	
		25.00	4.93	5.39	6.14	
		30.00	9.01	8.58	10.2	
DELTA K MAX	A:	32.11	11.1			
	B:	32.59		10.9		
	C:	31.67			11.6	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			7.46	16.31	10.25	

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM: 0.63"TH PLATE
SPECIMEN TYPE: DCB
ORIENTATION: T-L
STRESS RATIO: +0.00
FREQUENCY: 15.00 HZ

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK:
SPECIMEN WIDTH:
REFERENCES:88140

ALLOY STEEL

HP9-4-.30

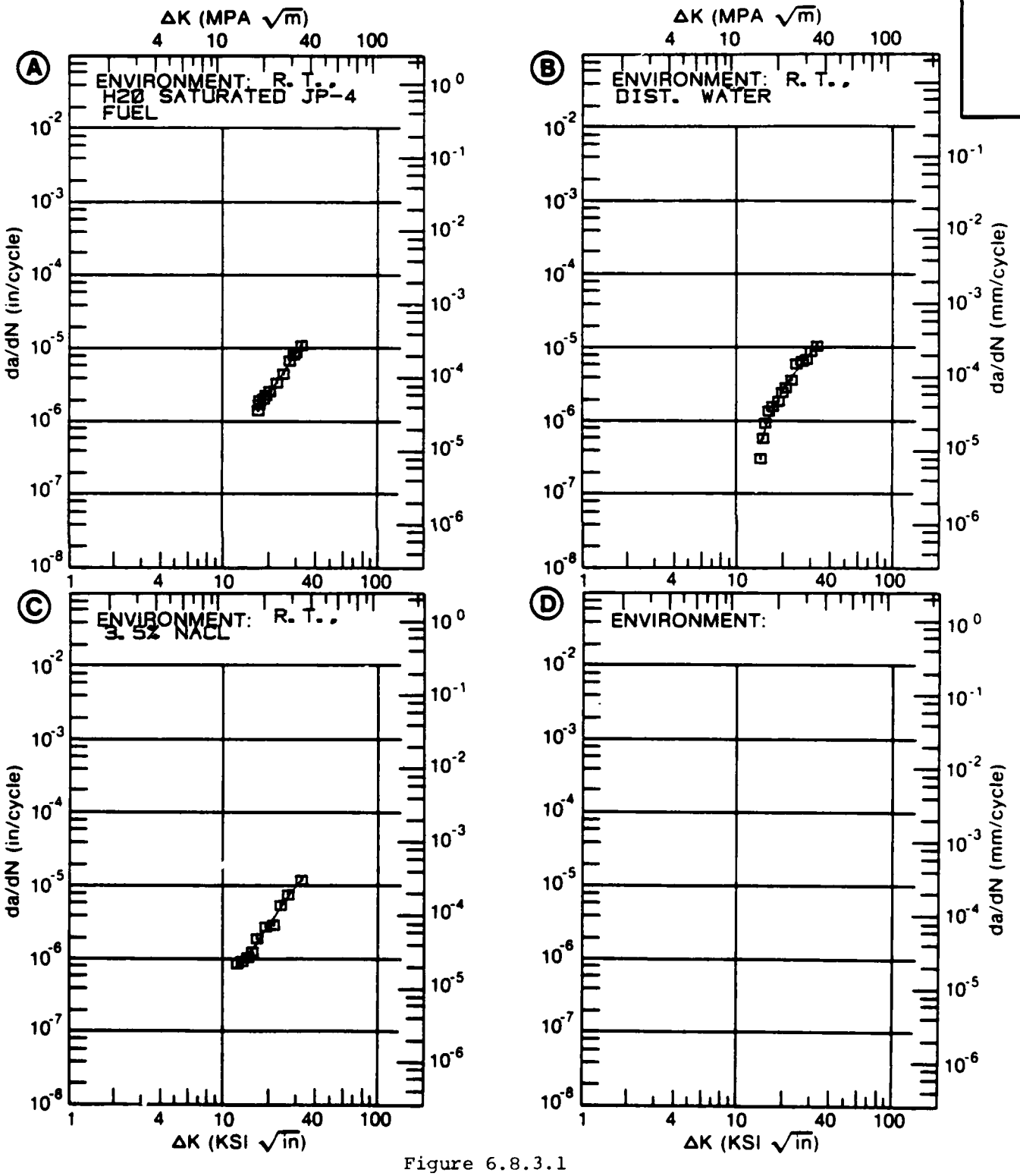


Figure 6.8.3.1

TABLE 6.8.3.2

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.2 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION:

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. H20 SATURATED JP-4 FUEL	E= R.T. ALT. JP-4 FUEL & DIST. WATER	E= R.T. DIST. WATER	
DELTA K MIN	A:	32.39	17.4			
	B:	31.49		16.3		
	C:	33.22			25.6	
	D:					
		35.00	19.8	23.3	25.7	
		40.00	25.5	32.8	28.7	
		50.00	49.2	60.1	51.7	
		60.00	131.	141.	136.	
		70.00	480.	474.	472.	
		80.00		2264.	1984.	
DELTA K MAX	A:	79.89	2259.			
	B:	82.06		3250.		
	C:	81.07			2335.	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			15.69	20.13	13.20	

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM: 0.63"TH PLATE
SPECIMEN TYPE: DCB
ORIENTATION: T-L
STRESS RATIO: +0.10
FREQUENCY: 1.00 HZ

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK:
SPECIMEN WIDTH:
REFERENCES:88140

ALLOY STEEL

HP9-4-.30

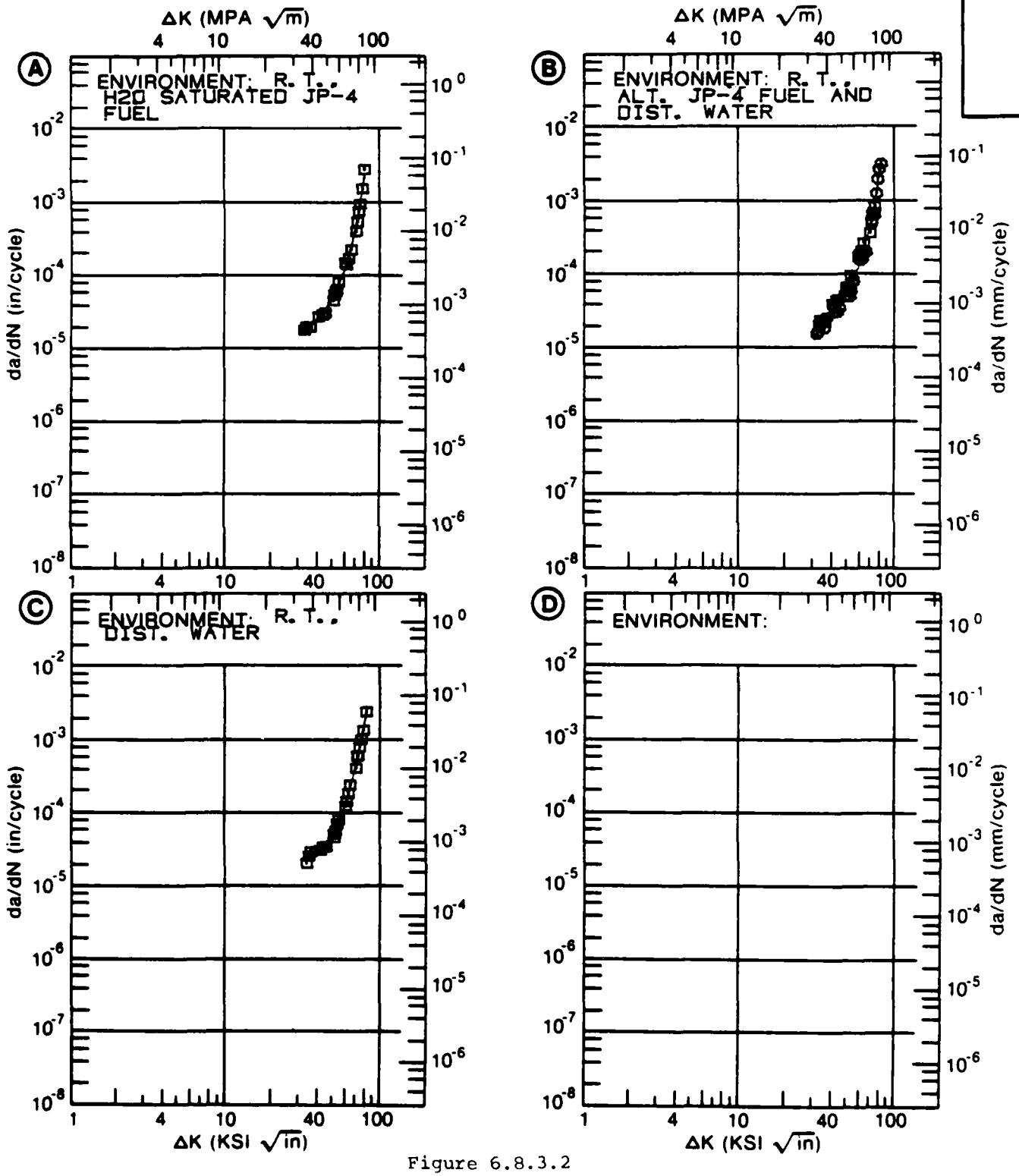


Figure 6.8.3.2

TABLE 6.8.3.3

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.3 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION:

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. 3.5% NACL	E= R.T. S.T.W.		
DELTA K MIN	A:	33.69	16.1			
	B:	33.79		17.7		
	C:					
	D:					
		35.00	18.3	20.1		
		40.00	26.9	31.2		
		50.00	53.6	67.0		
		60.00	135.	171.		
		70.00	478.	574.		
		80.00	2374.			
DELTA K MAX	A:	81.70	3215.			
	B:	74.63		1106.		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			19.65	8.94		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM: 0.63"TH PLATE
SPECIMEN TYPE: DCB
ORIENTATION: T-L
STRESS RATIO: +0.10
FREQUENCY: 1.00 HZ

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK:
SPECIMEN WIDTH:
REFERENCES:88140

ALLOY STEEL

HP9-4-.30

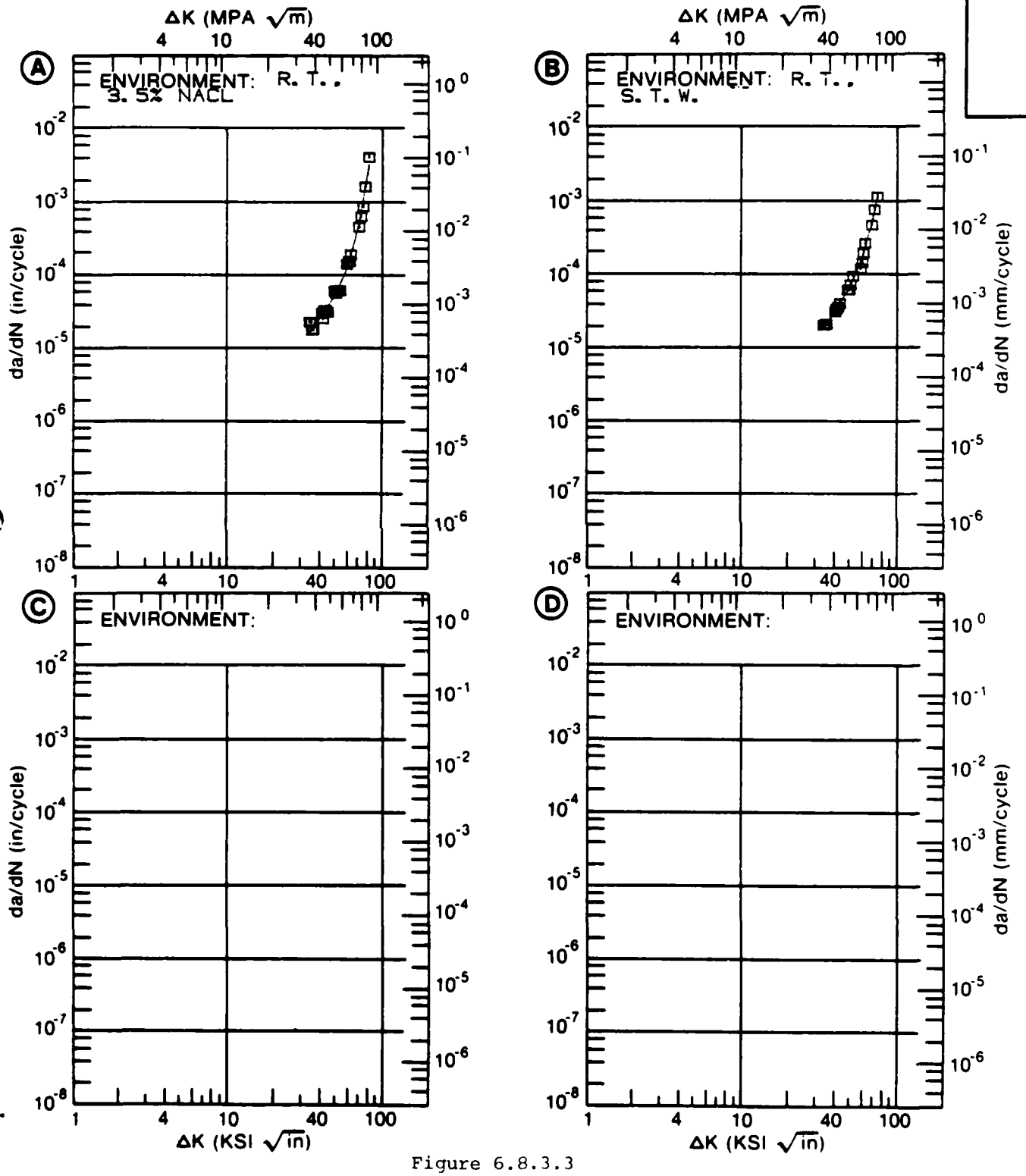


Figure 6.8.3.3

TABLE 6.8.3.4

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.4 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION:

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. H20 SATURATED JP-4 FUEL	E= R.T. DIST. WATER	E= R.T. 3.5% NACL	E= R.T. S.T.W.
DELTA K MIN	A:	42.02	37.3			
	B:	32.63		172.		
	C:	33.47			81.3	
	D:	32.86				74.2
		35.00		206.	84.1	104.
		40.00		264.	93.6	165.
		50.00	67.7	336.	114.	208.
		60.00	141.	380.	135.	203.
		70.00	510.	430.	156.	214.
		80.00	3795.			268.
DELTA K MAX	A:	81.35	5261.			
	B:	74.25		459.		
	C:	74.38			165.	
	D:	80.85				275.
ROOT MEAN SQUARE PERCENT ERROR			27.30	14.62	6.96	22.52

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM: Ø.63"TH PLATE
SPECIMEN TYPE: DCB
ORIENTATION: T-L
STRESS RATIO: +Ø.1Ø
FREQUENCY: Ø.1Ø HZ

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK:
SPECIMEN WIDTH:
REFERENCES:88140

ALLOY STEEL

HP9-4-.30

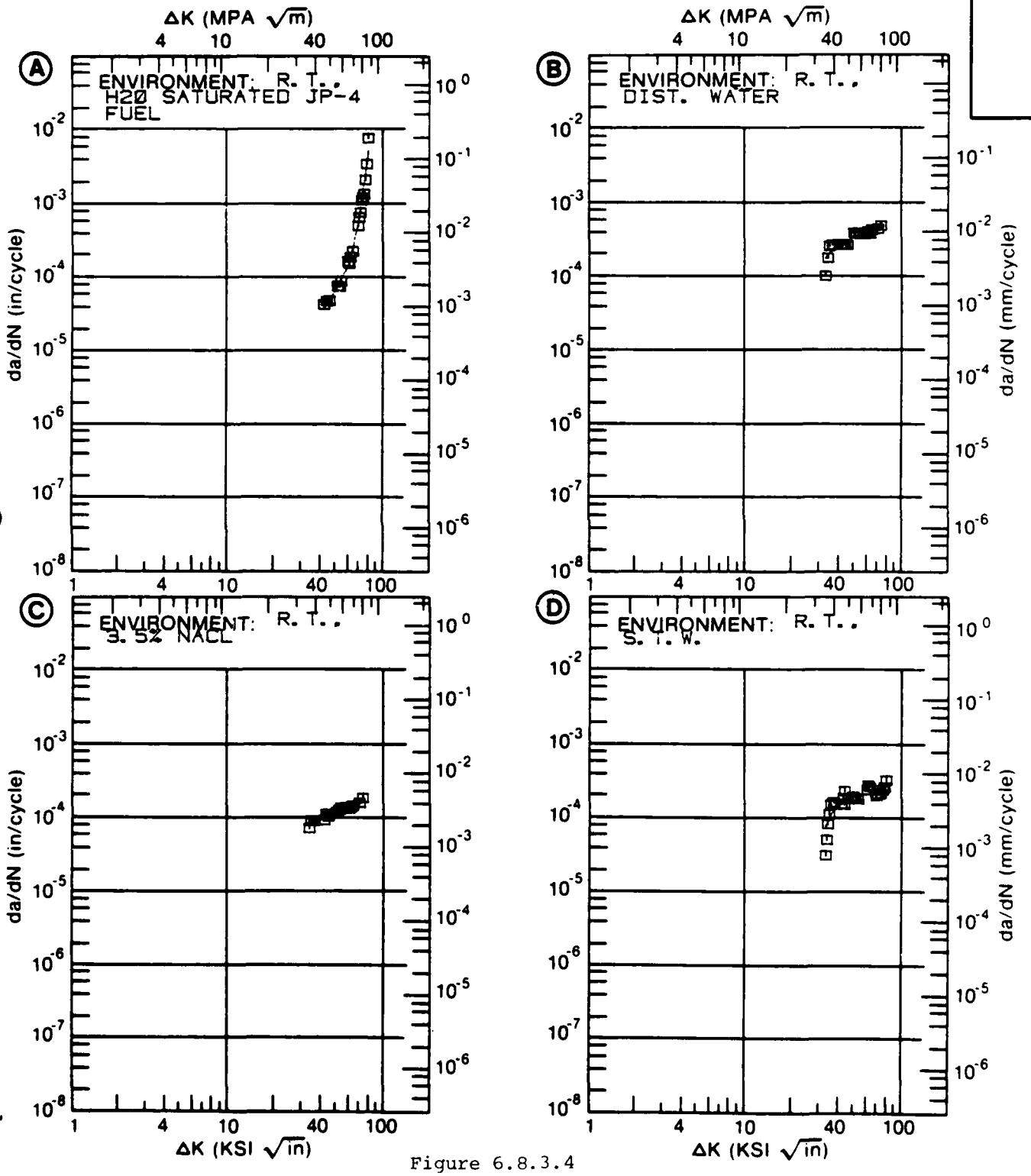


Figure 6.8.3.4

TABLE 6.8.3.5

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.5 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION:

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. 3.5% NACL	E= R.T. S.T.W.		
DELTA K MIN	A:	17.66	7.08			
	B:	17.33		5.32		
	C:					
	D:					
		20.00	11.3	9.57		
		25.00	14.4	15.8		
		30.00	20.4	24.4		
		35.00	51.2	48.1		
		40.00	251.	130.		
DELTA K MAX	A:	43.14	946.			
	B:	43.96		360.		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			15.04	9.73		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM: Ø.63"TH PLATE
SPECIMEN TYPE: DCB
ORIENTATION: T-L
STRESS RATIO: +Ø.5Ø
FREQUENCY: 1.ØØ HZ

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK:
SPECIMEN WIDTH:
REFERENCES:88140

ALLOY STEEL

HP9-4-.3Ø

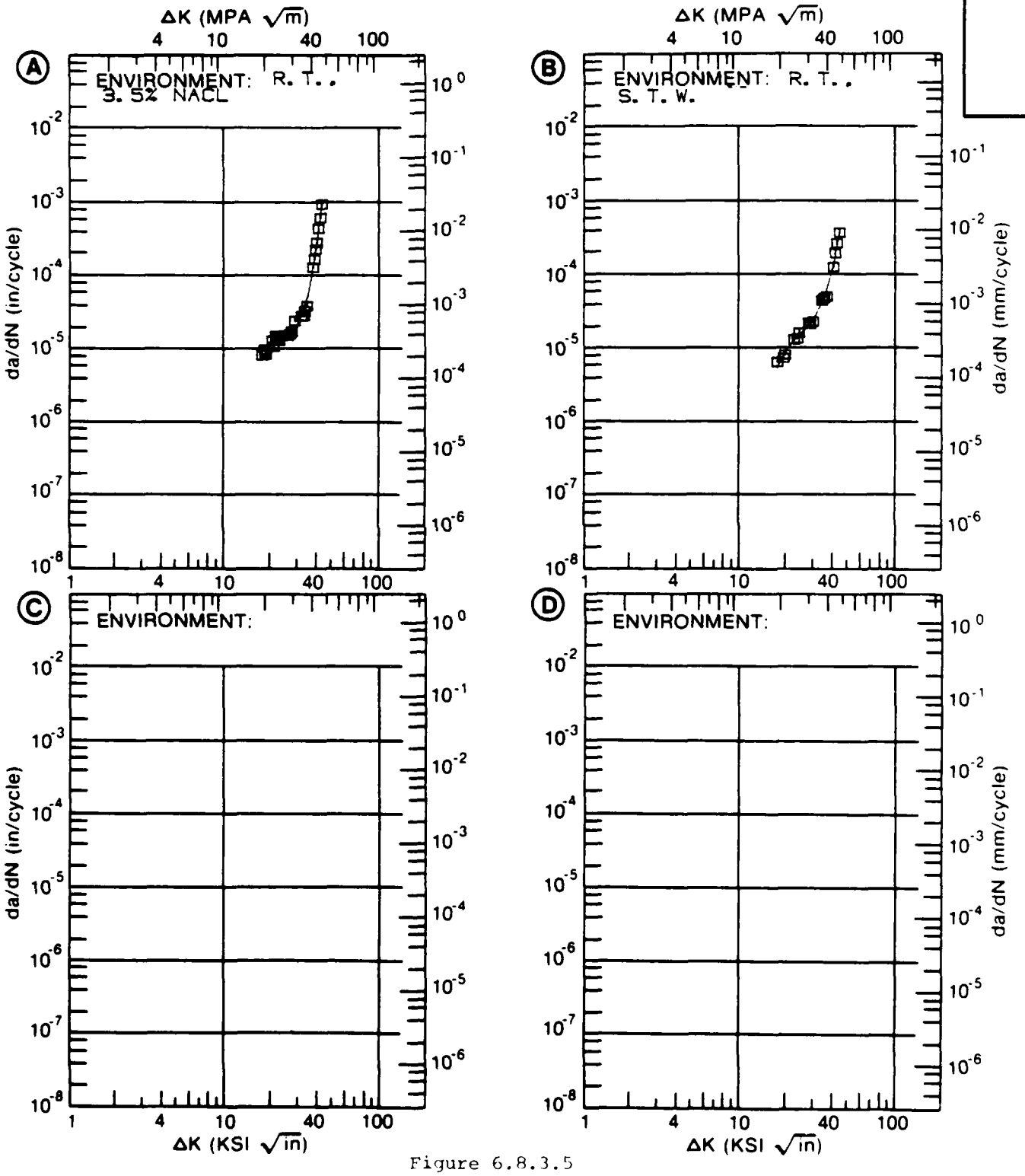


Figure 6.8.3.5

TABLE 6.8.3.6

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.6 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION:

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CLE) A E= R.T. H2O SATURATED JP-4 FUEL	B E= R.T. DIST. WATER	D
DELTA K MIN	A: 17.61	5.31		
	B: 17.35		17.0	
	C:			
	D:			
	20.00	7.88	24.0	
	25.00	13.0	31.8	
	30.00	24.3	37.3	
	35.00	63.4	45.6	
	40.00	240.	61.2	
DELTA K MAX	A: 44.83	1210.		
	B: 42.67		74.9	
	C:			
	D:			
ROOT MEAN SQUARE PERCENT ERROR		23.03	12.53	

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM: 0.63"TH PLATE
SPECIMEN TYPE: DCB
ORIENTATION: T-L
STRESS RATIO: +0.50
FREQUENCY: 1.00 HZ

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK:
SPECIMEN WIDTH:
REFERENCES:88140

ALLOY STEEL

HP9-4-.30

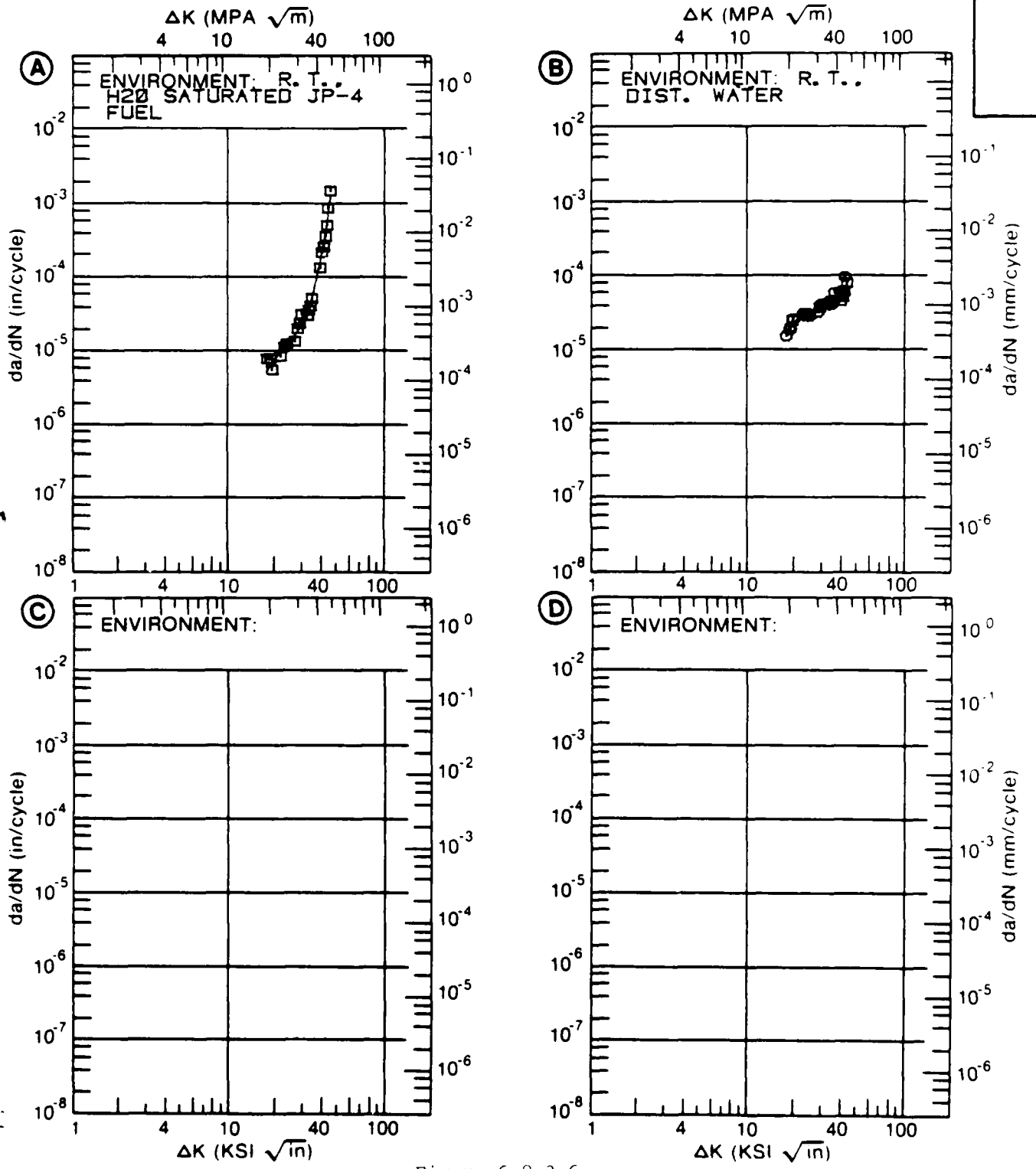


Figure 6.8.3.6

TABLE 6.8.3.7

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.7 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION:

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. DRY AIR	E= R.T. H2O SATURATED JP-4 FUEL	E= R.T. 3.5% NACL	
DELTA K MIN	A:	18.49	4.31			
	B:	19.18		7.07		
	C:	19.21			15.1	
	D:					
		20.00	7.16	8.46	18.7	
		25.00	13.2	15.5	37.6	
		30.00	19.2	25.4	48.0	
		35.00	45.4	57.1	59.1	
		40.00	213.	195.	82.0	
DELTA K MAX	A:	46.29	3988.			
	B:	48.48		4021.		
	C:	45.63			145.	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			33.08	35.71	17.05	

LIFE PREDICTION RATIO SUMMARY (NP/NA)
0.0-0.5
0.5-0.8
0.8-1.25
1.25-2.0
>2.0

CONDITION/HT:
FORM: Ø.63"TH PLATE
SPECIMEN TYPE: DCB
ORIENTATION: T-L
STRESS RATIO: +Ø.5Ø
FREQUENCY: Ø.1Ø HZ

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK:
SPECIMEN WIDTH:
REFERENCES:88140

ALLOY STEEL

HP9-4-.3Ø

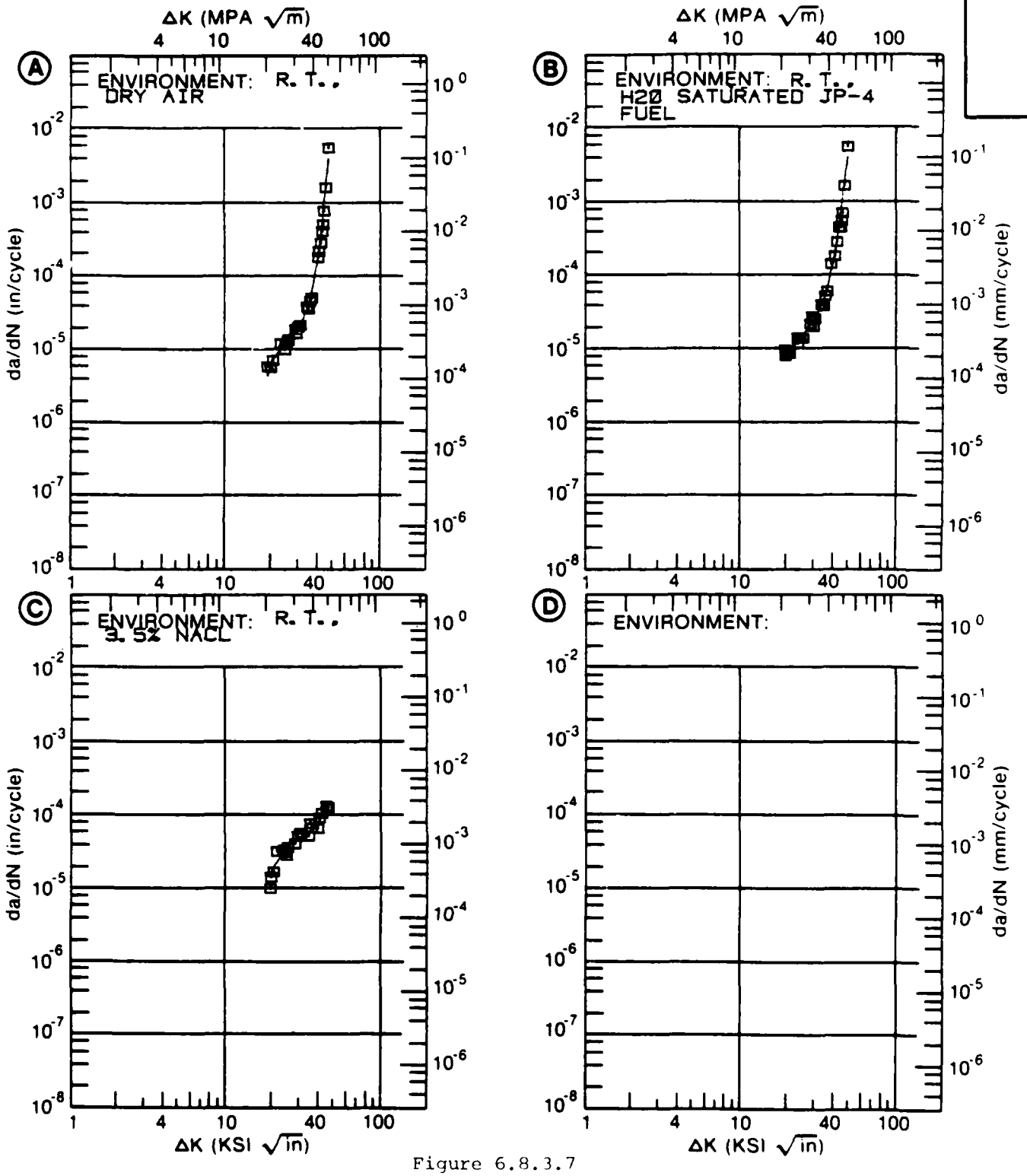


Figure 6.8.3.7

TABLE 6.8.3.8

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.8 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION:

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. DRY AIR			
DELTA K MIN	A:	7.57	5.23			
	B:					
	C:					
	D:					
		8.00	8.99			
		9.00	12.5			
		10.00	14.7			
		13.00	35.7			
		16.00	320.			
DELTA K MAX	A:	16.27	397.			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 31.55

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM: 0.63"TH PLATE
SPECIMEN TYPE: DCB
ORIENTATION: T-L
STRESS RATIO: +0.80
FREQUENCY: 1.00 HZ

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK:
SPECIMEN WIDTH:
REFERENCES:88140

ALLOY STEEL

HP9-4-.30

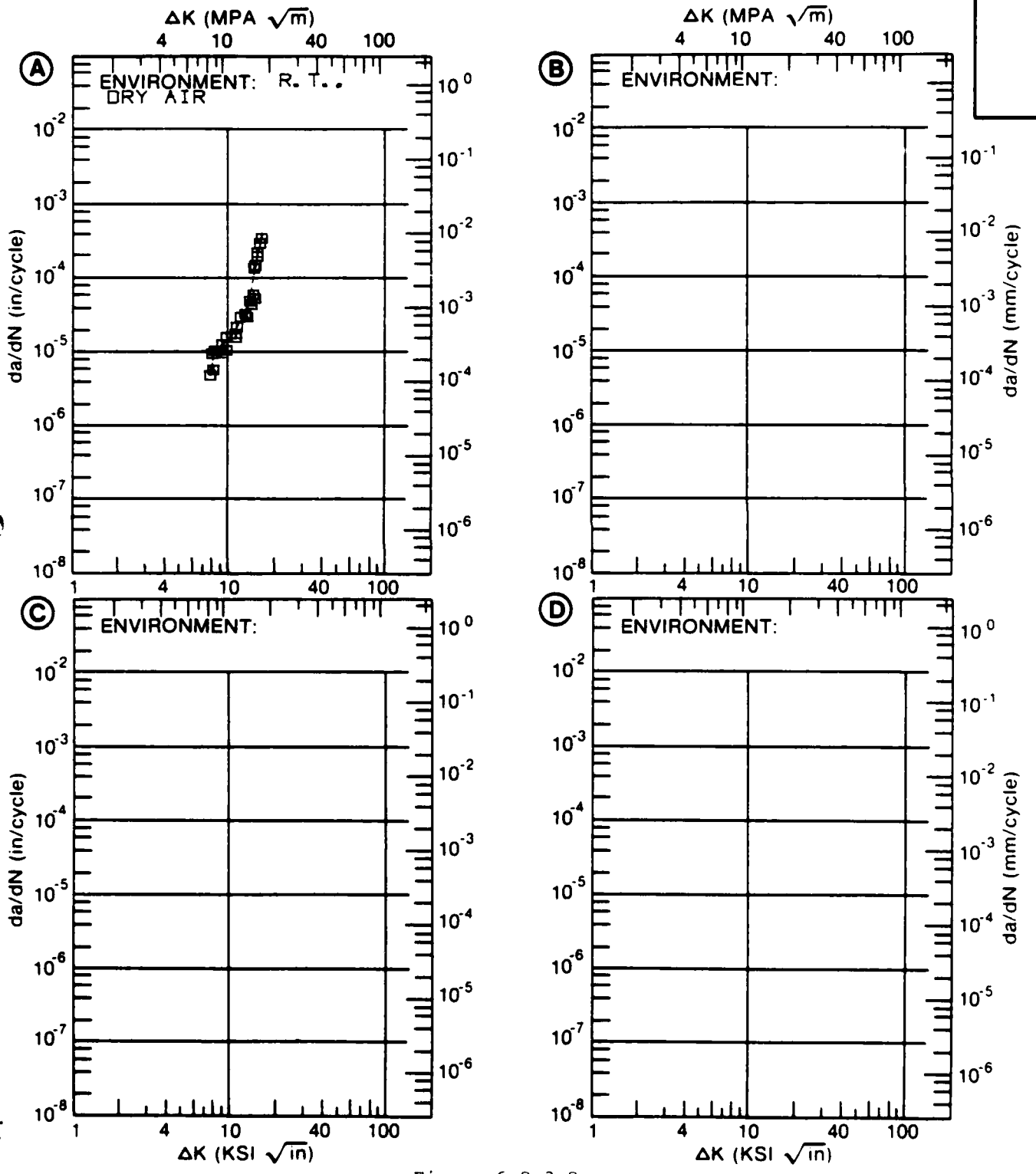


Figure 6.8.3.8

TABLE 6.8.3.9

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.9 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION:

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE) A	B	C	D
		E= R. T. 3. 5% NACL			
DELTA K MIN	A: 7. 53	9. 22			
	B:				
	C:				
	D:				
	8. 00	15. 6			
	9. 00	37. 7			
	10. 00	71. 3			
	13. 00	201.			
	16. 00	287.			
	20. 00	293.			
DELTA K MAX	A: 20. 05	293.			
	B:				
	C:				
	D:				

ROOT MEAN SQUARE PERCENT ERROR 23. 29

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0. 0-0. 5
	0. 5-0. 8
	0. 8-1. 25
	1. 25-2. 0
	>2. 0

CONDITION/HT:
FORM: 0.63"TH PLATE
SPECIMEN TYPE: DCB
ORIENTATION: T-L
STRESS RATIO: +0.80
FREQUENCY: 0.10 HZ

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK:
SPECIMEN WIDTH:
REFERENCES:88140

ALLOY STEEL

HP9-4-.30

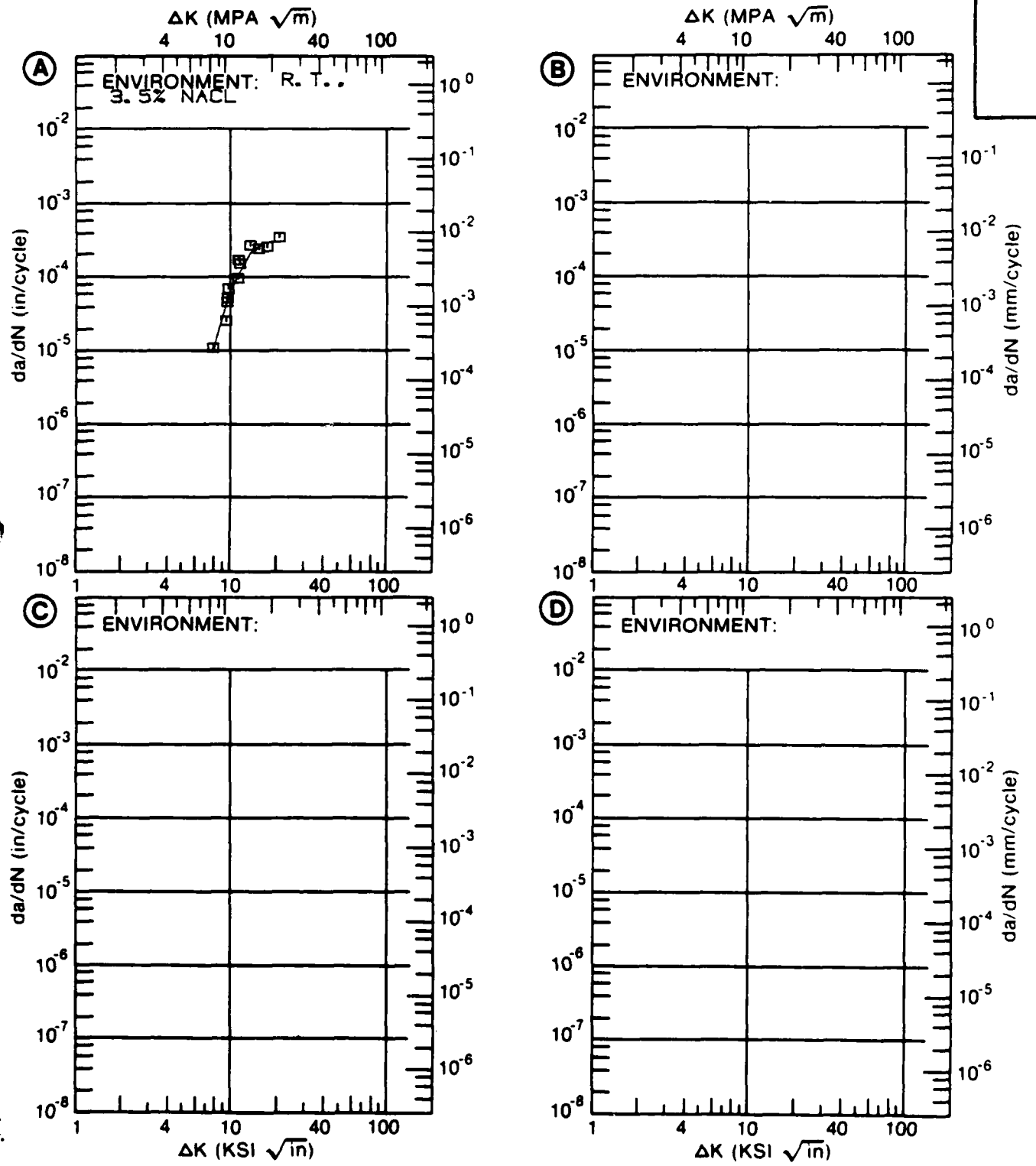


Figure 6.8.3.9

TABLE 6.8.3.10

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.10 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION:

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. LAB AIR 1HZ	E= R.T. LAB AIR 10HZ	E= R.T. 3.5% NACL 1HZ	
DELTA K MIN	A:	21.66	6.29			
	B:	12.31		.880		
	C:	21.78			5.82	
	D:					
		13.00		1.05		
		16.00		1.96		
		20.00		3.59		
		25.00	7.96	6.34	7.60	
		30.00	11.6	10.1	11.3	
		35.00	17.0	15.4	16.3	
		40.00	24.4	22.6	22.9	
		50.00	46.4	46.6	42.8	
		60.00	79.8			
		70.00	126.			
DELTA K MAX	A:	75.97	159.			
	B:	56.90		75.0		
	C:	55.81			59.4	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			2.86	3.82	2.80	
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1	1	
		1.25-2.0				
		>2.0				

CONDITION/HT:
FORM: 2.50"TH BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.02
FREQUENCY:

YIELD STRENGTH: 192.5 KSI
ULT. STRENGTH: 228.0 KSI
SPECIMEN THK: 1.250"
SPECIMEN WIDTH: 5.000"
REFERENCES: 88136

ALLOY STEEL

HP9-4-.30

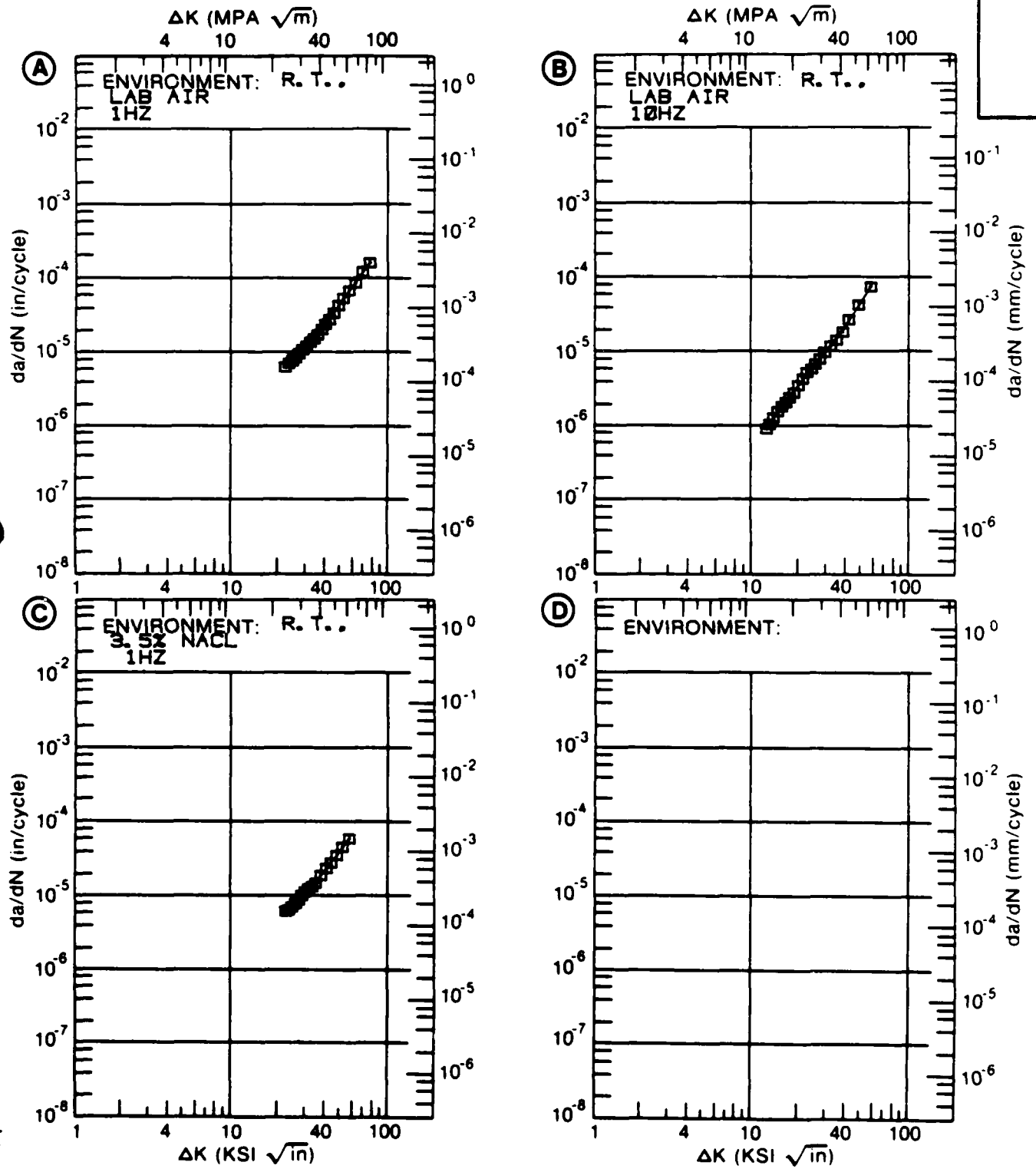


Figure 6.8.3.10

TABLE 6.8.3.11

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.11 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION:

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE) A	B	C	D
		E= R.T. LAB AIR 5-20HZ	E= R.T. SIM SEA WATER .1-15HZ		
DELTA K MIN	A: 6.38	.110			
	B: 20.13		1.96		
	C:				
	D:				
	7.00	.138			
	8.00	.200			
	9.00	.286			
	10.00	.399			
	13.00	.901			
	16.00	1.63			
	20.00	2.99			
	25.00	5.40	5.37		
	30.00	8.83	9.86		
	35.00	13.6	15.3		
	40.00	20.0	21.6		
	50.00	38.9	37.3		
	60.00	63.8	58.7		
	70.00	89.2	89.4		
	80.00		135.		
	90.00		203.		
	100.00		306.		
	130.00		961.		
DELTA K MAX	A: 71.24	92.1			
	B: 139.67		1271.		
	C:				
	D:				
ROOT MEAN SQUARE PERCENT ERROR		18.91	16.17		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM: 1.25"TH FORGING
SPECIMEN TYPE: WOL
ORIENTATION: L-T
STRESS RATIO: +0.02
FREQUENCY:

YIELD STRENGTH: 204.5 KSI
ULT. STRENGTH: 230.5 KSI
SPECIMEN THK: 1.250"
SPECIMEN WIDTH: 5.000"
REFERENCES: MA005

ALLOY STEEL

HP9-4-.30

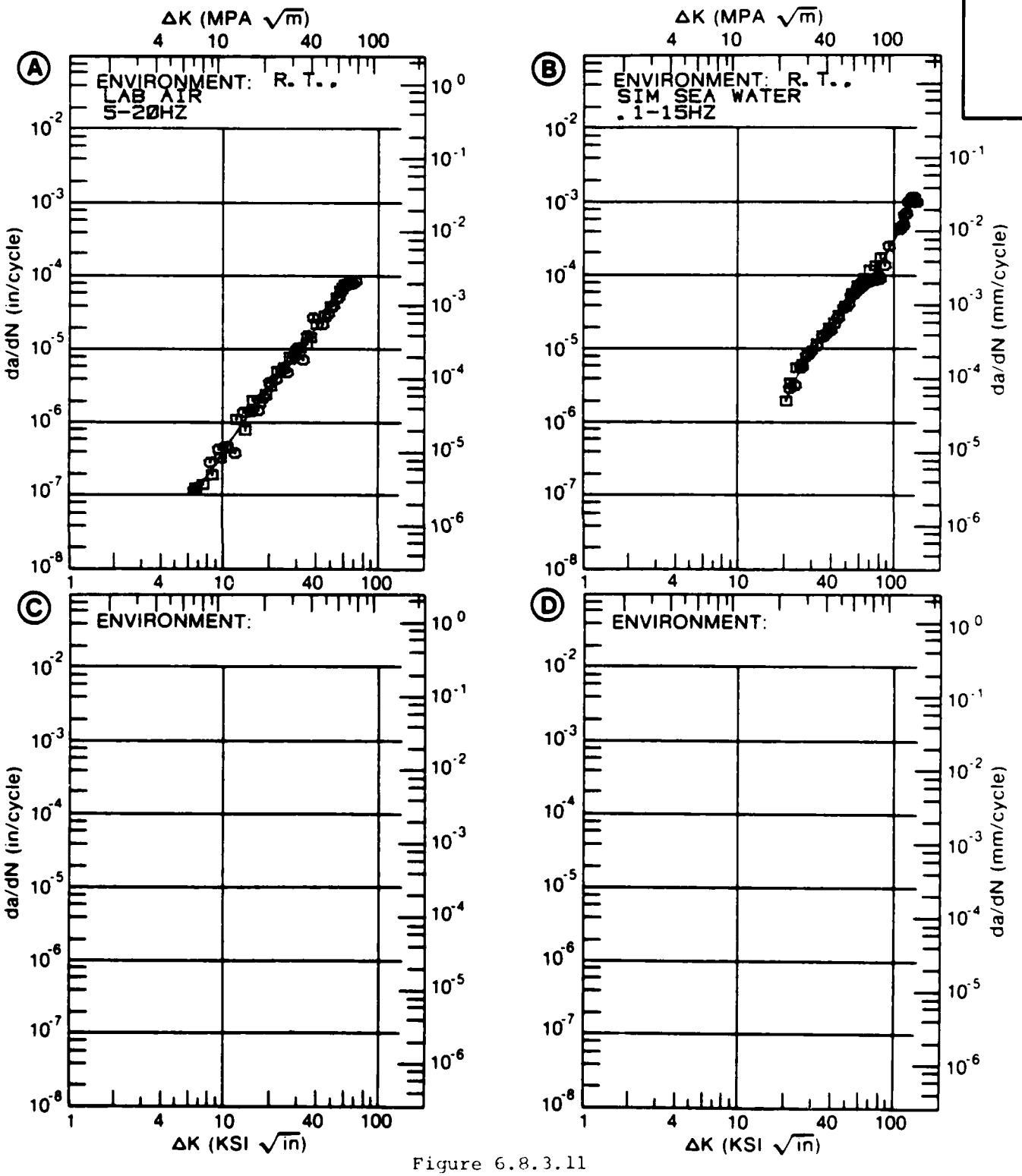


Figure 6.8.3.11

TABLE 6.8.3.12

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.12 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION:

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. LAB AIR .1-20HZ	E= R.T. SIM SEA WATER .1-15HZ		
DELTA K MIN	A:	7.13	.181			
	B:	15.09		.791		
	C:					
	D:					
		8.00	.208			
		9.00	.282			
		10.00	.399			
		13.00	.979			
		16.00	1.82	.994		
		20.00	3.34	2.45		
		25.00	5.97	5.44		
		30.00	9.65	9.38		
		35.00	14.8	14.4		
		40.00	21.9	20.9		
		50.00	45.8	41.6		
		60.00	95.5	82.3		
		70.00	205.	166.		
		80.00	458.	345.		
		90.00	996.	732.		
		100.00	1883.	1867.		
DELTA K MAX	A:	111.38	3048.			
	B:	110.08		9836.		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			20.12	19.19		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM: 1.25"TH FORGING
SPECIMEN TYPE: WOL
ORIENTATION: T-L
STRESS RATIO: +0.02
FREQUENCY:

YIELD STRENGTH: 206.0 KSI
ULT. STRENGTH: 233.0 KSI
SPECIMEN THK: 1.250"
SPECIMEN WIDTH: 5.000"
REFERENCES: MA005

ALLOY STEEL

HP9-4-.30

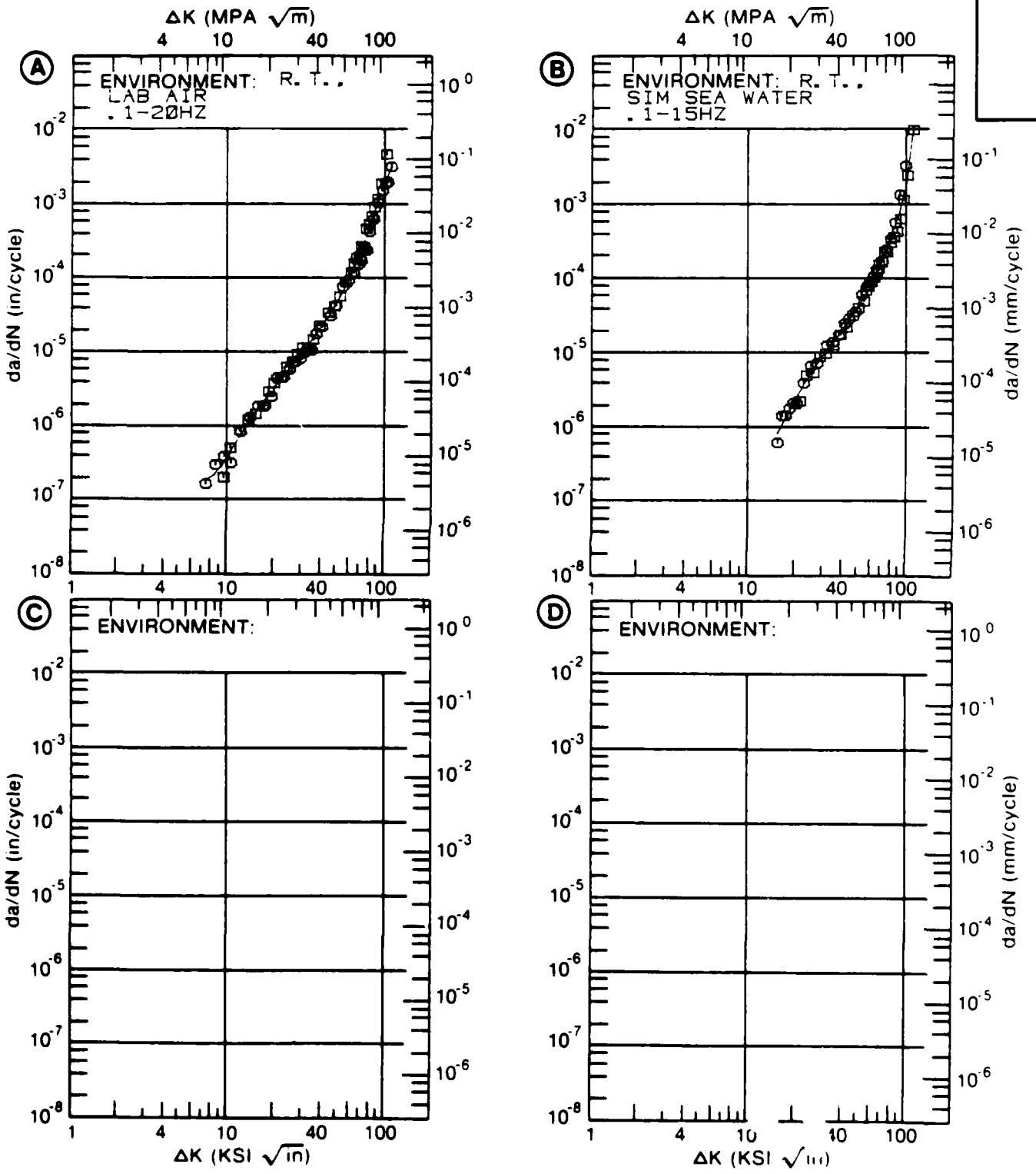


Figure 6.8.3.12

TABLE 6.8.3.13

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.13 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION: UTS=220-240KSI
ENVIRONMENT: R.T. ,L.H.A.

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		R=-1.00	R=+0.00	R=+0.50	
DELTA K MIN	A: 11.76	.708			
	B: 11.75		.562		
	C: 5.78			.191	
	D:				
	6.00			.213	
	7.00			.336	
	8.00			.497	
	9.00			.700	
	10.00			.948	
	13.00	1.01	.835	1.98	
	16.00	1.94	1.72	3.49	
	20.00	3.62	3.34	6.26	
	25.00	6.31	5.92	10.9	
	30.00	9.64	8.99	16.8	
	35.00	13.6	12.5	23.8	
	40.00	18.4	16.5	31.6	
	50.00	30.0	25.9	49.3	
	60.00	43.0	37.9		
	70.00	61.4	53.4		
	80.00	99.2	73.2		
	90.00		98.8		
	100.00		132.		
DELTA K MAX	A: 85.73	141.			
	B: 118.22		283.		
	C: 58.56			65.7	
	D:				
ROOT MEAN SQUARE PERCENT ERROR		11.42	13.18	10.66	

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: UTS=220-240KSI
FORM: 3.20"TH BILLET
SPECIMEN TYPE: CCP
ORIENTATION: L-T
FREQUENCY: 10.00 HZ
ENVIRONMENT: R.T., L.H.A.

YIELD STRENGTH: 210.5- 212.0 KSI
ULT. STRENGTH: 228.5- 229.0 KSI
SPECIMEN THK: 0.250"
SPECIMEN WIDTH: 3.900- 4.000"
REFERENCES: MA007, MA010

ALLOY STEEL

HP9-4-.30

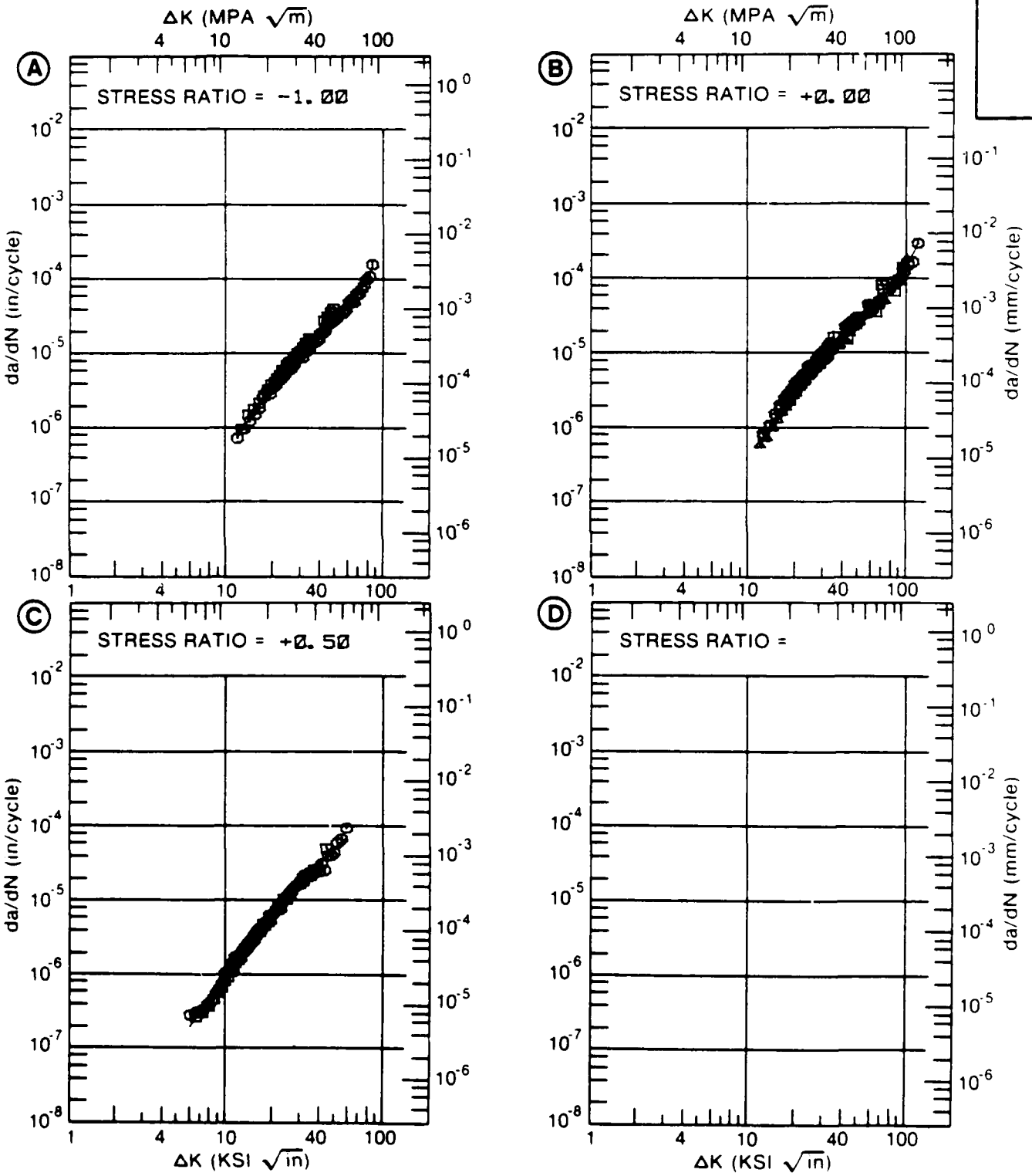


Figure 6.8.3.13

TABLE 6.8.3.14

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.14 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION: UTS=220-240KSI
ENVIRONMENT: R.T. ,3.5% NACL

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=-1.00			
DELTA K MIN	A:	12.51	.87			
	B:					
	C:					
	D:					
		13.00	1.02			
		16.00	1.65			
		20.00	2.88			
		25.00	5.84			
		30.00	10.6			
		35.00	16.7			
		40.00	23.0			
		50.00	33.9			
		60.00	45.6			
		70.00	63.7			
		80.00	96.1			
		90.00	158.			
DELTA K MAX	A:	93.29	189.			
	B:					
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			27.30			

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: UTS-220-240KSI
FORM: 3.20"TH BILLET
SPECIMEN TYPE: CCP
ORIENTATION: L-T
FREQUENCY: 0.10 HZ
ENVIRONMENT: R.T., 3.5% NACL

YIELD STRENGTH: 212.0 KSI
ULT. STRENGTH: 229.0 KSI
SPECIMEN THK: 0.250"
SPECIMEN WIDTH: 4.000"
REFERENCES: MA007

ALLOY STEEL

HP9-4-.30

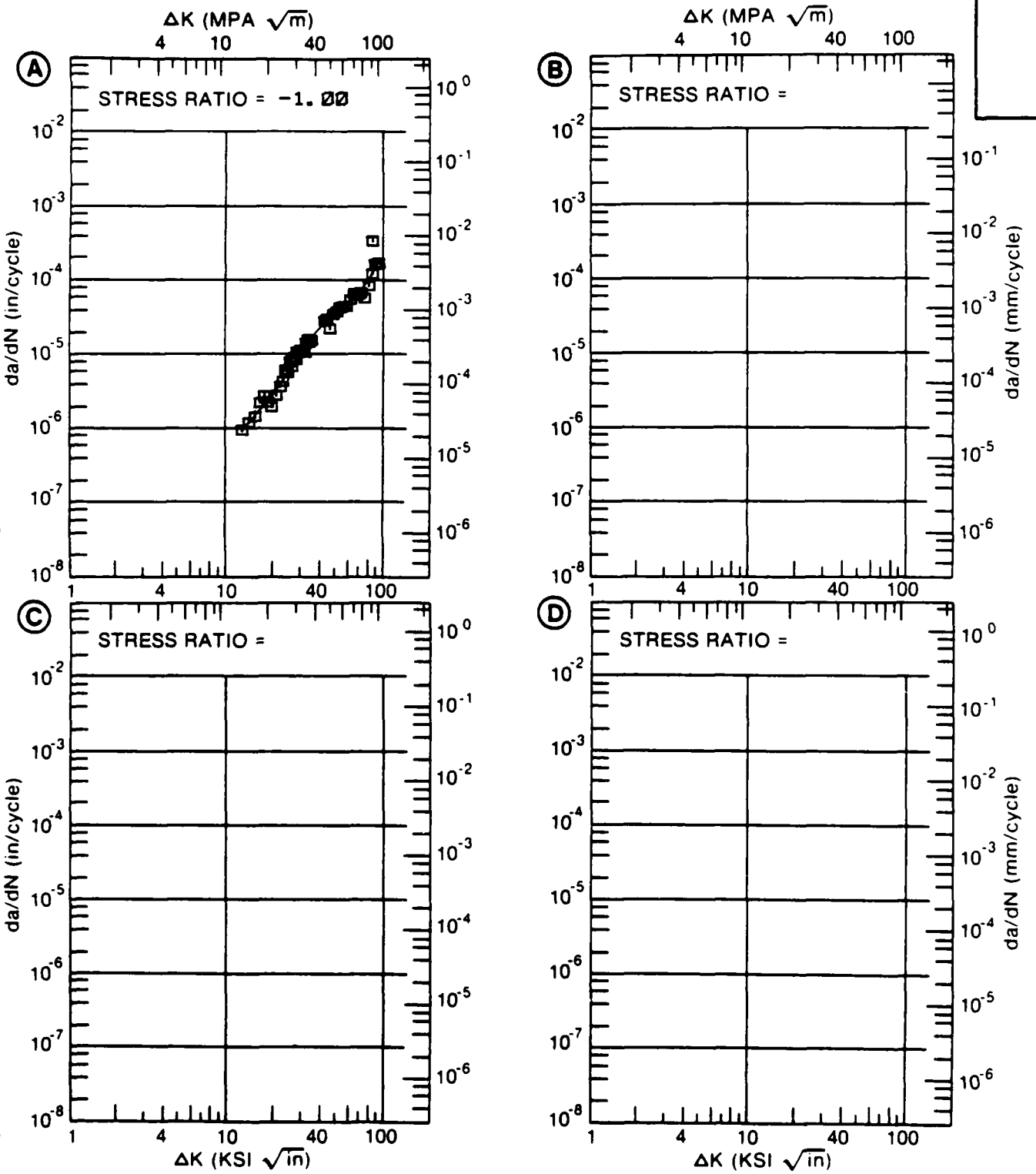


Figure 6.8.3.14

TABLE 6.8.3.15

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.15 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION: TUS=220-240KSI

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. ALT IMMERSION IN SEA WATER-1ST HALF DRY CYC	E= R.T. ALT IMMERSION IN SEA WATER-2ND HALF DRY CYC	E= R.T. ALT IMMERSION IN SEA WATER-IMMERSED	
DELTA K MIN	A:	11.34	.535			
	B:	11.28		.357		
	C:	11.21			.416	
	D:					
		13.00	.771	.665	.782	
		16.00	1.62	1.54	1.72	
		20.00	3.28	3.27	3.51	
		25.00	5.63	5.83	6.22	
		30.00	9.59	8.63	8.97	
		35.00	12.5	13.2	12.2	
		40.00		18.9	16.9	
		50.00			30.7	
DELTA K MAX	A:	35.32	12.1			
	B:	43.89		20.0		
	C:	55.99			36.1	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			21.34	19.96	15.01	

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: TUS-220-240KSI
FORM: 3.20"TH BILLET
SPECIMEN TYPE: CCP
ORIENTATION: L-T
STRESS RATIO: +0.00
FREQUENCY: 10.00 HZ

YIELD STRENGTH: 210.5 KSI
ULT. STRENGTH: 228.5 KSI
SPECIMEN THK: 0.250"
SPECIMEN WIDTH: 3.900"
REFERENCES: MA010

ALLOY STEEL

HP9-4-.30

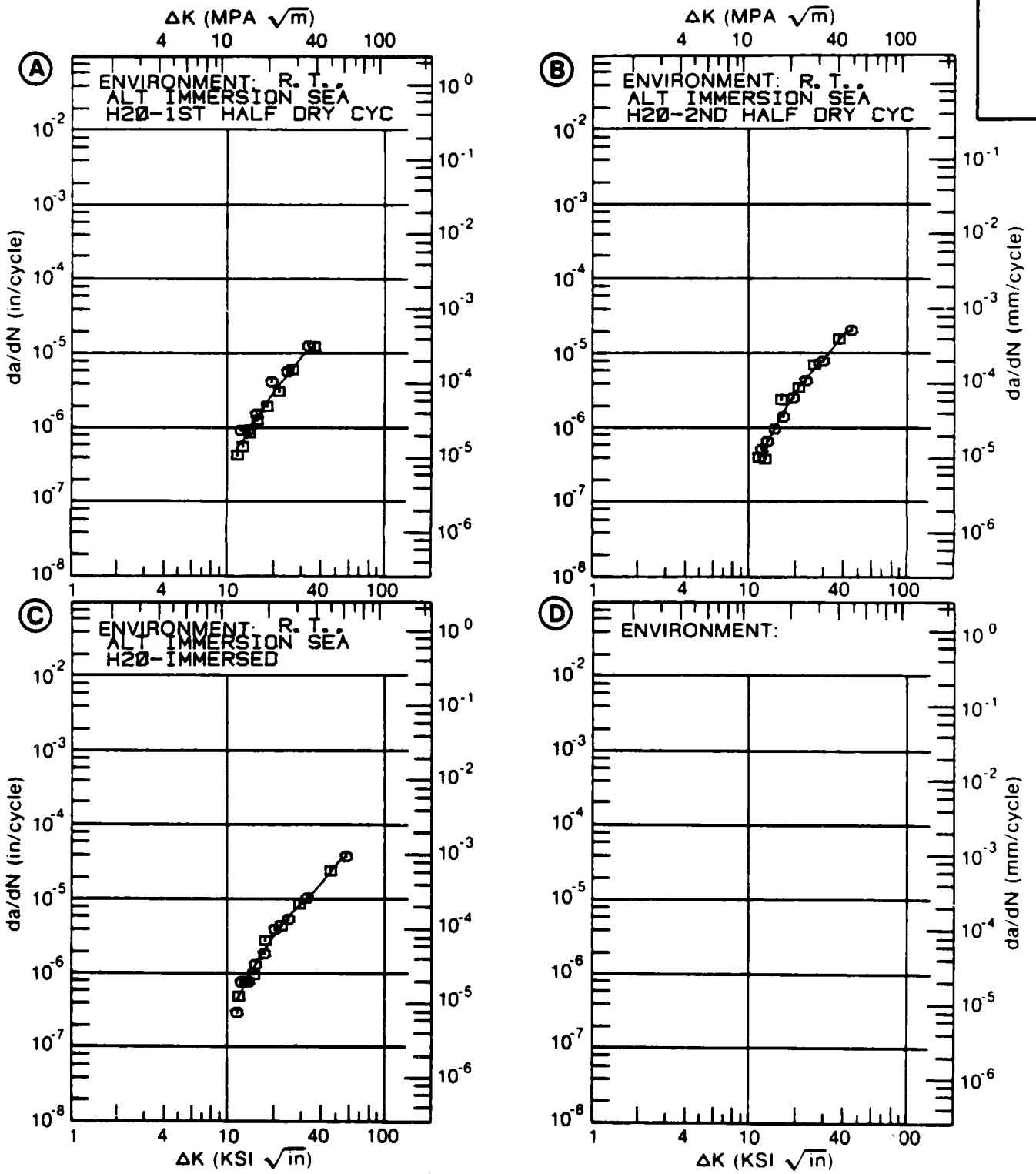


Figure 6.8.3.15

TABLE 6.8.3.16

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.16 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION: TUS=220-240KSI

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. ALT IMMERSION IN SEA WATER-1ST HALF DRY CYC	E= R.T. ALT IMMERSION IN SEA WATER-2ND HALF DRY CYC	E= R.T. ALT IMMERSION IN SEA WATER-IMMERSED	
DELTA K MIN	A:	15.92	.79			
	B:	16.15		1.09		
	C:	15.84			2.32	
	D:					
		16.00	.768		2.40	
		20.00	1.54	2.70	4.71	
		25.00	4.11	5.59	7.74	
		30.00	7.80	8.98	11.4	
		35.00	12.3	12.6	16.3	
		40.00	17.3	16.6	22.1	
		50.00	29.0	25.8	34.4	
		60.00	43.4	38.2	43.0	
		70.00		55.8		
DELTA K MAX	A:	68.44	58.9			
	B:	78.64		77.6		
	C:	63.89			44.6	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			46.54	44.55	39.09	

LIFE PREDICTION RATIO SUMMARY (NP/NA)
0.0-0.5
0.5-0.8
0.8-1.25
1.25-2.0
>2.0

CONDITION/HT: TUS-220-240KSI
FORM: 3.20"TH BILLET
SPECIMEN TYPE: CCP
ORIENTATION: L-T
STRESS RATIO: +0.00
FREQUENCY: 1.00 HZ

YIELD STRENGTH: 210.5 KSI
ULT. STRENGTH: 228.5 KSI
SPECIMEN THK: 0.250"
SPECIMEN WIDTH: 3.900"
REFERENCES: MA010

ALLOY STEEL

HP9-4-.30

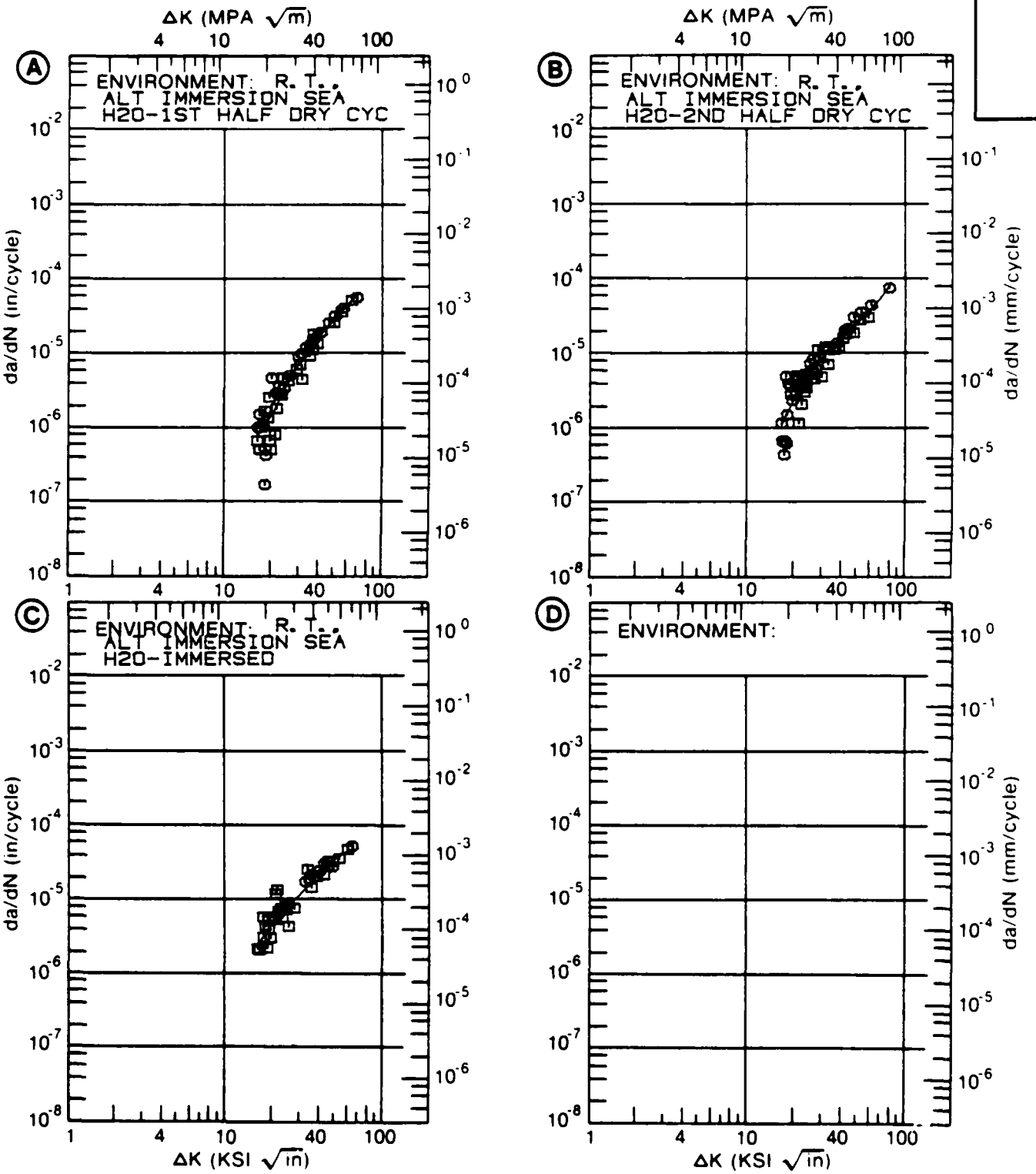


Figure 6.8.3.16

TABLE 6.8.3.17

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.17 INDICATING EFFECT

OF FREQUENCY

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION: UTS=220-240KSI
ENVIRONMENT: R.T. ,3.5% NACL

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			F(HZ)= 0.10	F(HZ)= 1.00	F(HZ)= 10.00	
DELTA K MIN	A:	12.78	2.26			
	B:	12.97		1.34		
	C:	12.70			.813	
	D:					
		13.00	2.33	1.35	.859	
		16.00	3.66	2.45	1.46	
		20.00	6.21	4.25	2.74	
		25.00	9.50	7.00	5.25	
		30.00	12.8	10.5	8.77	
		35.00	16.7	15.1	13.1	
		40.00	21.6	21.3	17.8	
		50.00	36.3	41.1	27.7	
		60.00	59.5	78.4	40.6	
		70.00	94.7	149.	60.4	
		80.00	145.	284.	93.9	
		90.00	206.	540.	154.	
		100.00	260.		266.	
DELTA K MAX	A:	120.03	286.			
	B:	95.98		791.		
	C:	107.82			426.	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			43.87	7.22	12.29	

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: UTS=220-240KSI
FORM: 3.20"TH BILLET
SPECIMEN TYPE: CCP
ORIENTATION: L-T
STRESS RATIO: +0.00
ENVIRONMENT: R.T., 3.5% NACL

YIELD STRENGTH: 212.0 KSI
ULT. STRENGTH: 229.0 KSI
SPECIMEN THK: 0.250"
SPECIMEN WIDTH: 4.000"
REFERENCES:MA007

ALLOY STEEL

HP9-4-.30

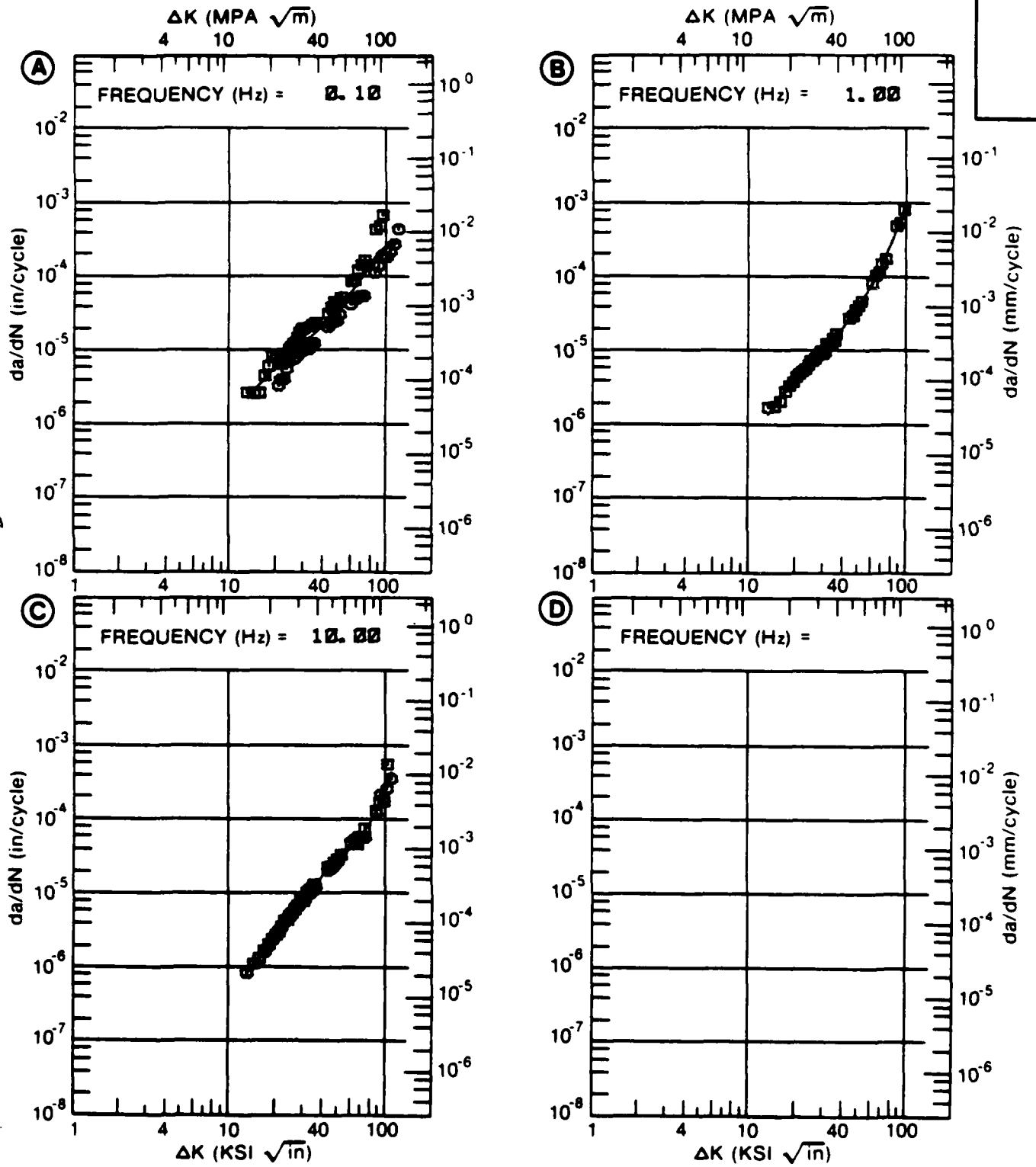


Figure 6.8.3.17

TABLE 6.8.3.18

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.18 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION: 1525F 2HRS OQ, -100F 1HR, 1025F 2+2HR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. L.H.A.	E= R.T. S.T.W.		
DELTA K MIN	A:	10.79	1.00			
	B:	11.35		1.25		
	C:					
	D:					
		13.00	1.69	1.98		
		16.00	3.91	3.50		
		20.00		5.68		
		25.00		8.78		
		30.00		12.8		
		35.00		18.6		
		40.00		27.4		
		50.00		62.3		
		60.00		152.		
		70.00		388.		
DELTA K MAX	A:	19.15	4.55			
	B:	73.59		550.		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			12.92	8.85		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: 1525F 2HRS OQ, -100F 1HR, 1025F 2+2HR
FORM: 3.00"TH FORGED BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.08
FREQUENCY: 1.00 HZ
YIELD STRENGTH: 216.0 KSI
ULT. STRENGTH: 239.0 KSI
SPECIMEN THK: 0.970- 1.000"
SPECIMEN WIDTH: 4.970- 5.010"
REFERENCES: 88579

ALLOY STEEL

HP9-4-.30

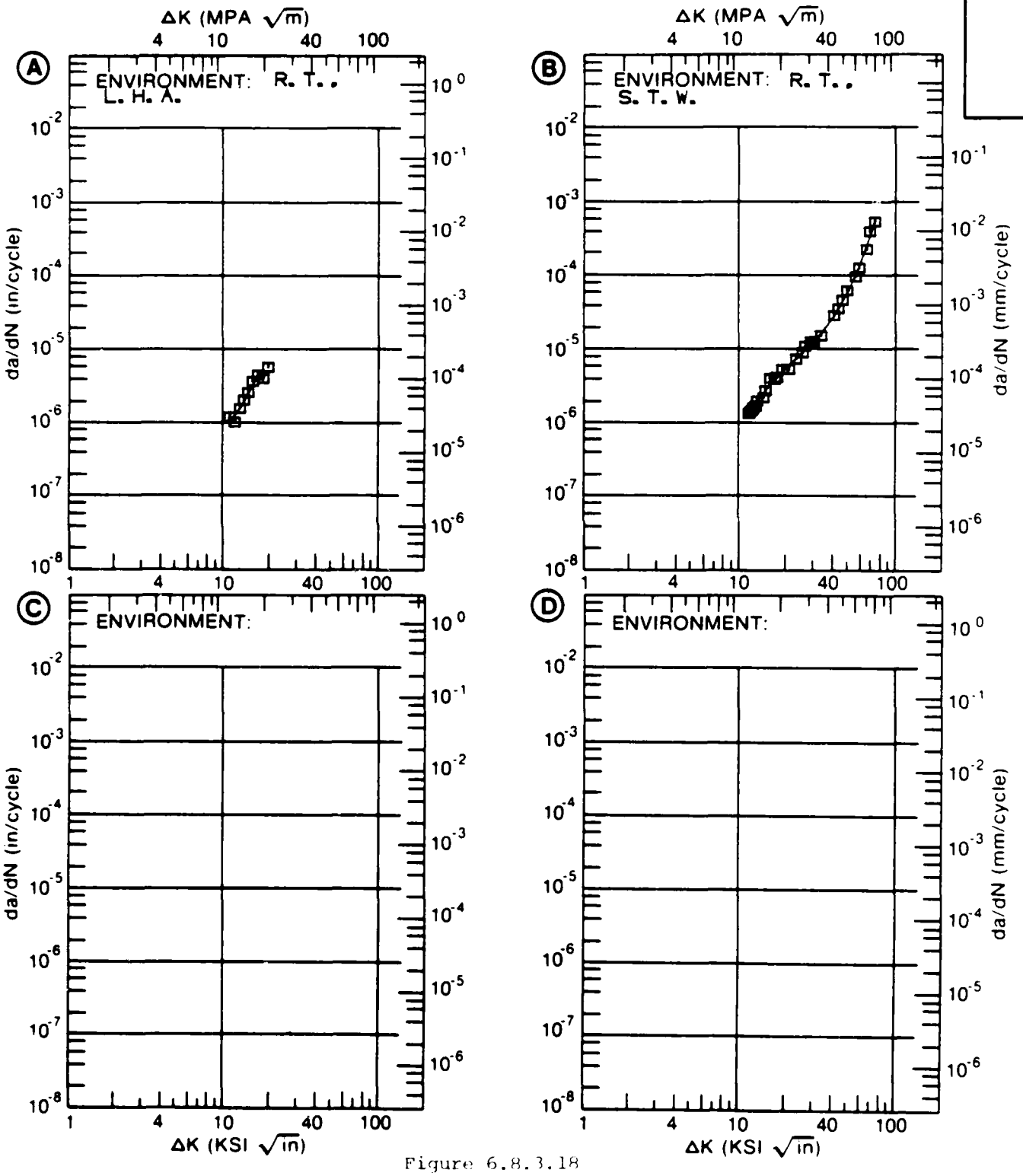


Figure 6.8.3.18

TABLE 6.8.3.19

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.19 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION: 1525F 2HRS OQ, -100F 2HRS, 1025F 2+2HR
ENVIRONMENT: R.T. , L.H.A.

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE) A	B	C	D
			R=+0.30			
DELTA K MIN	A:	11.36	.756			
	B:					
	C:					
	D:					
		13.00	1.34			
		16.00	2.62			
		20.00	4.51			
		25.00	7.34			
		30.00	11.5			
		35.00	18.6			
		40.00	31.2			
		50.00	98.9			
		60.00	261.			
DELTA K MAX	A:	63.58	327.			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 9.89

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: 1525F 2HRS OQ, -100F 2HRS, 1025F 2+2HR
FORM: 3.00"TH FORGED BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 6.00 HZ
ENVIRONMENT: R. T., L. H. A.

YIELD STRENGTH: 216.0 KSI
ULT. STRENGTH: 239.6 KSI
SPECIMEN THK: 0.970"
SPECIMEN WIDTH: 4.970"
REFERENCES: 88579

ALLOY STEEL

HP9-4-.30

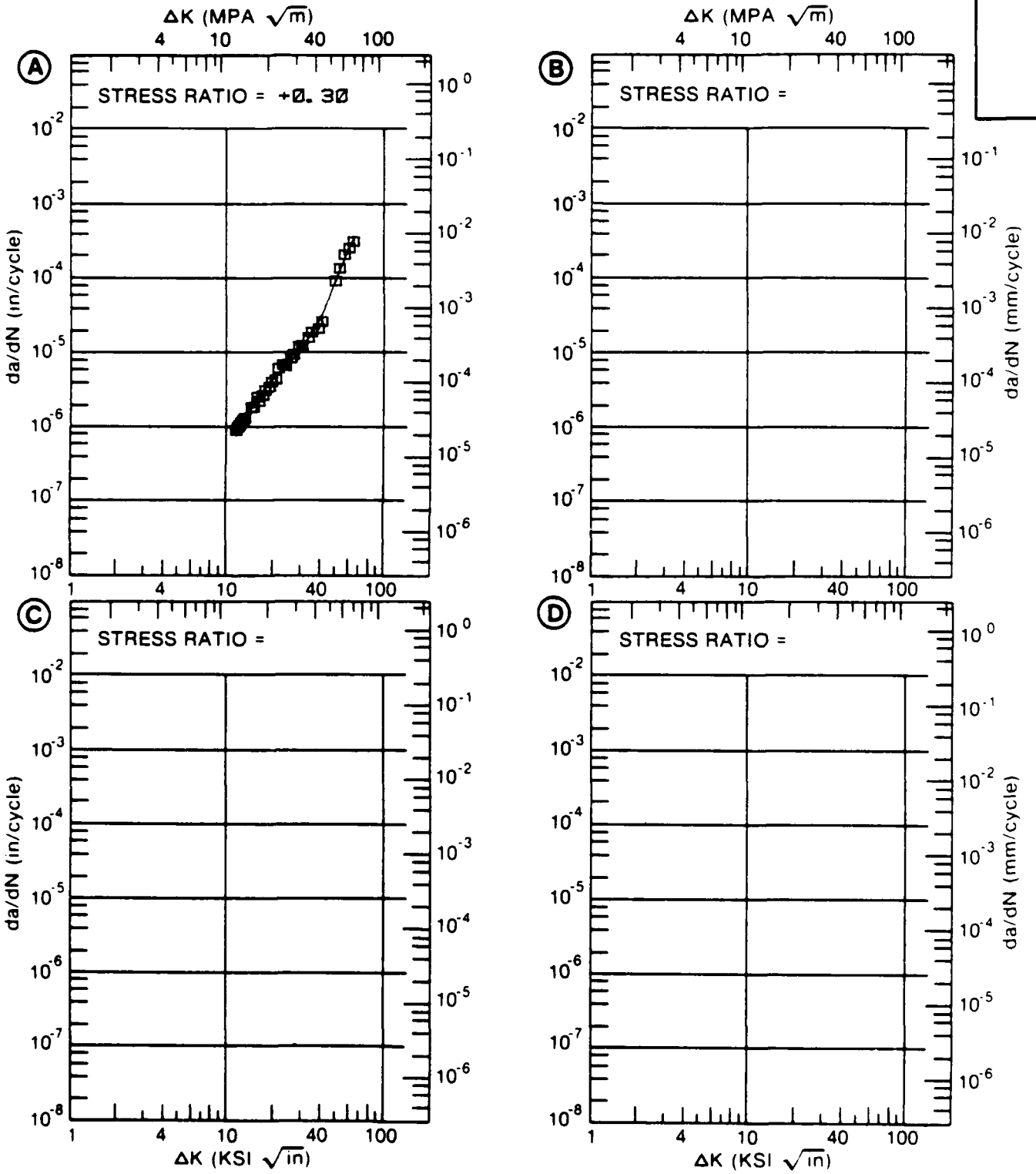


Figure 6.8.3.19

TABLE 6.8.3.20

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.20 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION: 1550F 2HRS OQ, -100F 1HR, 1025F 2+2HR
ENVIRONMENT: R.T. , L.H.A.

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.30	R=+0.50		
DELTA K MIN	A:	7.73	.529			
	B:	7.94		.632		
	C:					
	D:					
		8.00	.581	.645		
		9.00	.816	.880		
		10.00	1.12	1.17		
		13.00	2.52	2.36		
		16.00	4.51	3.99		
		20.00	7.35	6.60		
		25.00	9.57	9.91		
DELTA K MAX	A:	27.36	9.82			
	B:	25.94		10.5		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			12.81	11.39		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: 1550F 2HRS OQ. -100F 1HR. 1025F 2+2HR
FORM: 3.00"TH FORGED BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 6.00 HZ
ENVIRONMENT: R. T., L. H. A.

YIELD STRENGTH: 198.0 KSI
ULT. STRENGTH: 220.0 KSI
SPECIMEN THK: 0.988- 0.993"
SPECIMEN WIDTH: 7.400"
REFERENCES: 85837

ALLOY STEEL

HP9-4-.30

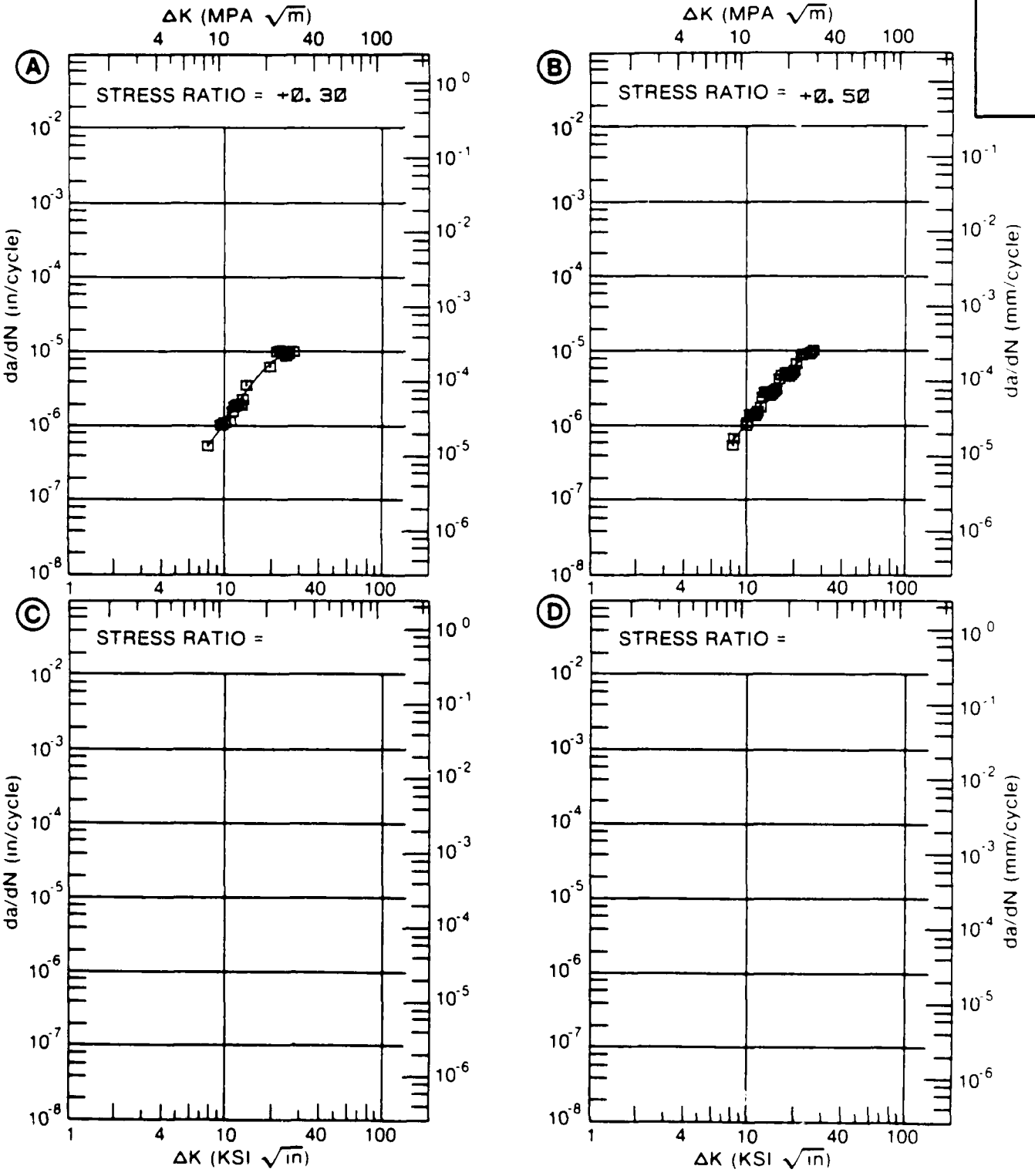


Figure 6.8.3.20

TABLE 6.8.3.21

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.21 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION: 1550F 2HRS OQ, -100F 1HR, 1025F 2+2HR
ENVIRONMENT: R.T. , L.H.A.

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		R=+0.08			
DELTA K MIN	A: 6.05	.226			
	B:				
	C:				
	D:				
	7.00	.336			
	8.00	.485			
	9.00	.669			
	10.00	.890			
	13.00	1.78			
	16.00	3.00			
	20.00	5.04			
	25.00	8.05			
DELTA K MAX	A: 29.80	11.1			
	B:				
	C:				
	D:				

ROOT MEAN SQUARE PERCENT ERROR 17.24

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: 1550F 2HRS OQ, -100F 1HR, 1025F 2+2HR
FORM: 3.00"TH FORGED BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 1.00 HZ
ENVIRONMENT: R. T., L. H. A.

YIELD STRENGTH: 198.0 KSI
ULT. STRENGTH: 220.0 KSI
SPECIMEN THK: 0.992"
SPECIMEN WIDTH: 7.400"
REFERENCES: 85837

ALLOY STEEL

HP9-4-.30

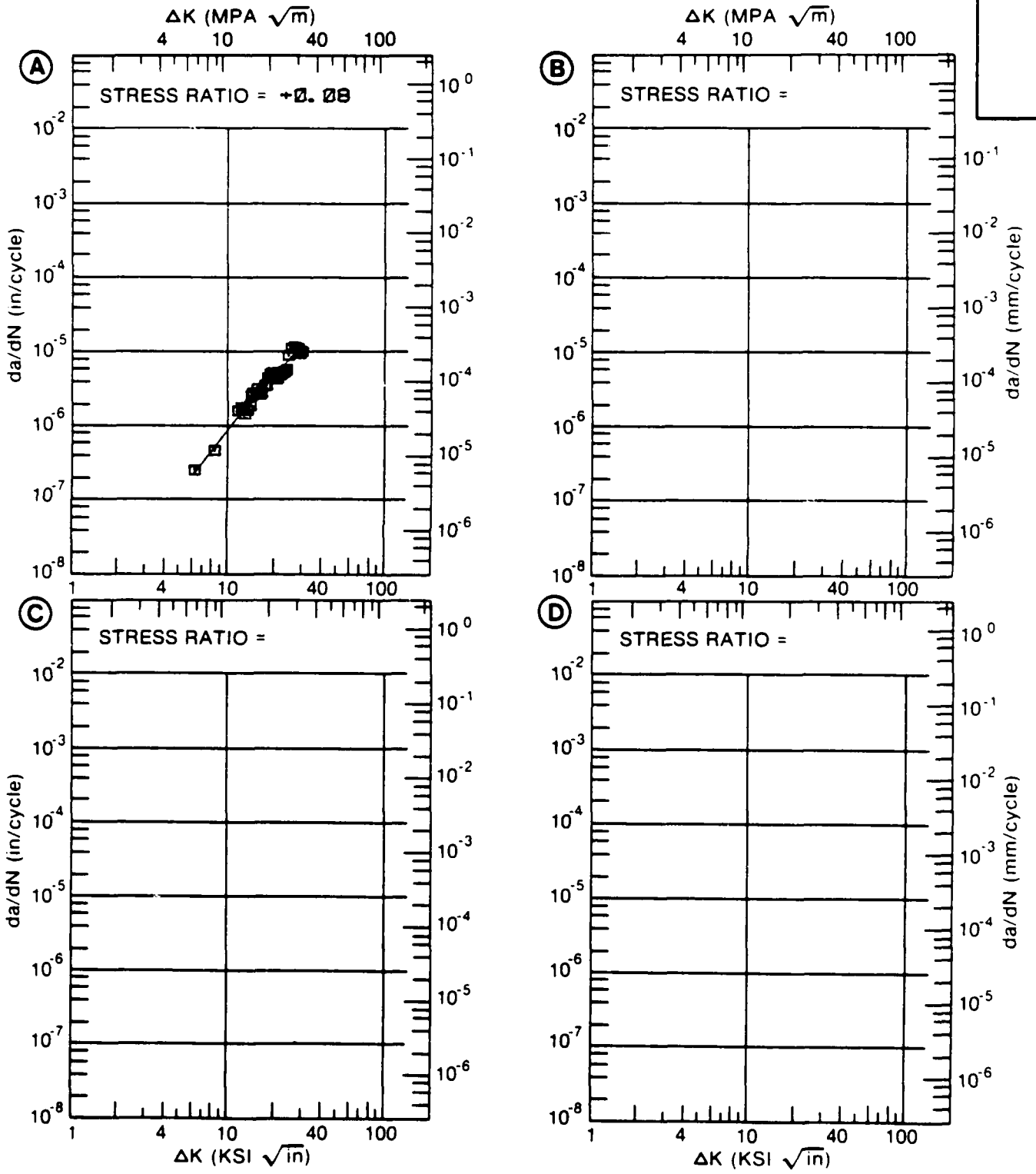


Figure 6.8.3.21

TABLE 6.8.3.22

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.22 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION: 1550F 2HRS OQ,-100F 1HR,1025F 2+2HR
ENVIRONMENT: R.T. ,S.T.W.

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.30	R=+0.50		
DELTA K MIN	A:	9.12	.449			
	B:	7.06		.454		
	C:					
	D:					
		8.00		.920		
		9.00		1.59		
		10.00	1.06	2.38		
		13.00	2.43	4.89		
		16.00	4.39	6.96		
		20.00	7.45	9.51		
		25.00	11.7	15.5		
		30.00		25.0		
		35.00		36.3		
DELTA K MAX	A:	27.24	15.3			
	B:	38.97		62.3		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			10.46	17.18		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: 1550F 2HRS OQ. -100F 1HR. 1025F 2+2HR
FORM: 3.00"TH FORGED BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 1.00 HZ
ENVIRONMENT: R.T., S.T.W.

YIELD STRENGTH: 198.0 KSI
ULT. STRENGTH: 220.0 KSI
SPECIMEN THK: 0.990- 0.991"
SPECIMEN WIDTH: 7.400"
REFERENCES: 85837, 88579

ALLOY STEEL

HP9-4-.30

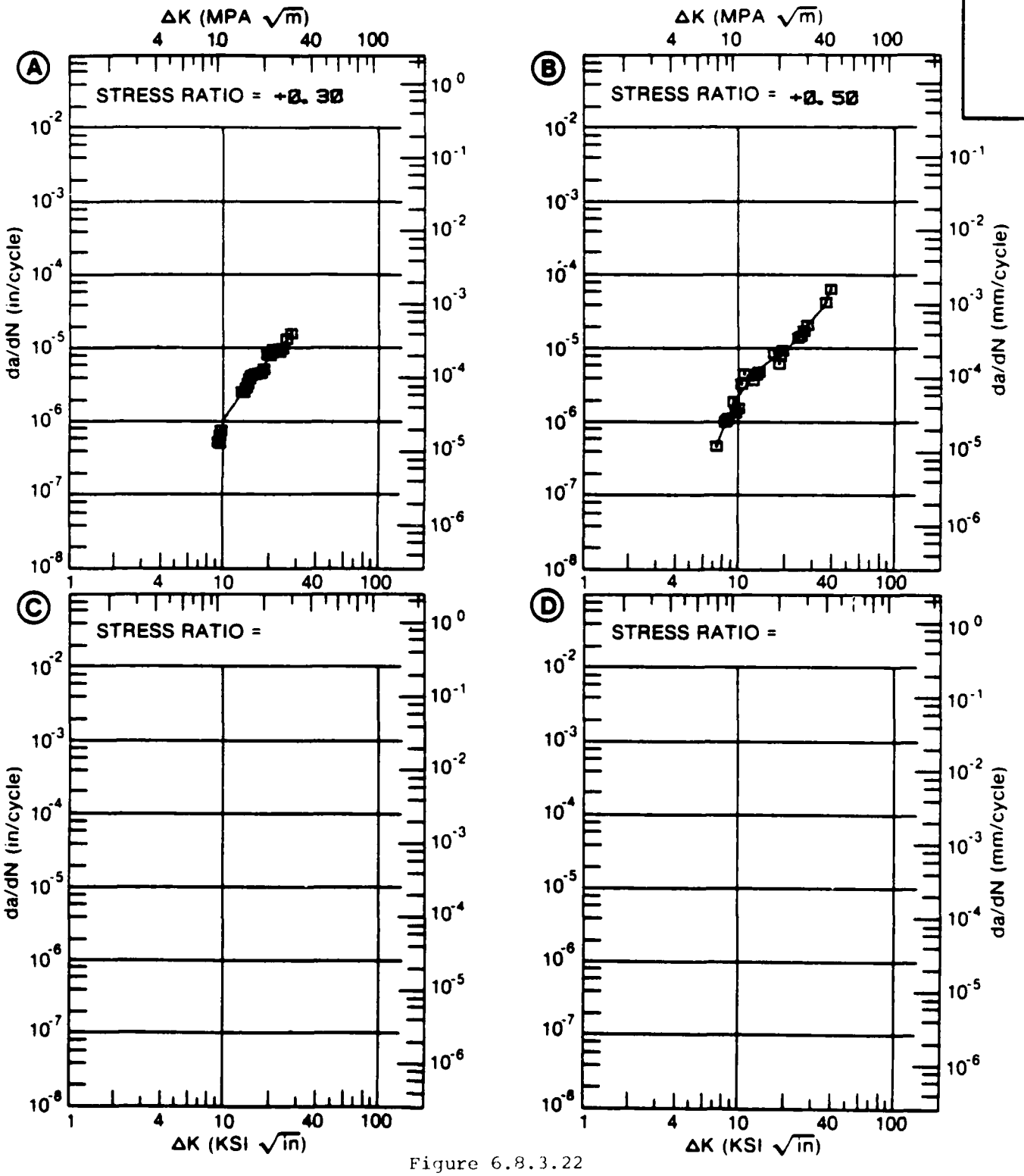


Figure 6.8.3.22

TABLE 6.8.3.23

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.22 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION: 1550F 2HRS OQ, -100F 1HR, 1025F 2+2HR
ENVIRONMENT: R.T. , S.T.W.

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.50			
DELTA K MIN	A:	9.77	1.26			
	B:					
	C:					
	D:					
		10.00	1.35			
		13.00	2.65			
		16.00	4.45			
		20.00	7.70			
		25.00	13.3			
		30.00	21.0			
		35.00	31.2			
		40.00	44.4			
DELTA K MAX	A:	47.24	69.8			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 18.04

LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: 1550F 2HRS OQ. -100F 1HR. 1025F 2+2HR
FORM: 3.00"TH FORGED BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 1.00 HZ
ENVIRONMENT: R. T., S. T. W.
YIELD STRENGTH: 198.0 KSI
ULT. STRENGTH: 220.0 KSI
SPECIMEN THK: 0.740"
SPECIMEN WIDTH: 7.390"
REFERENCES: 88579

ALLOY STEEL

HP9-4-.30

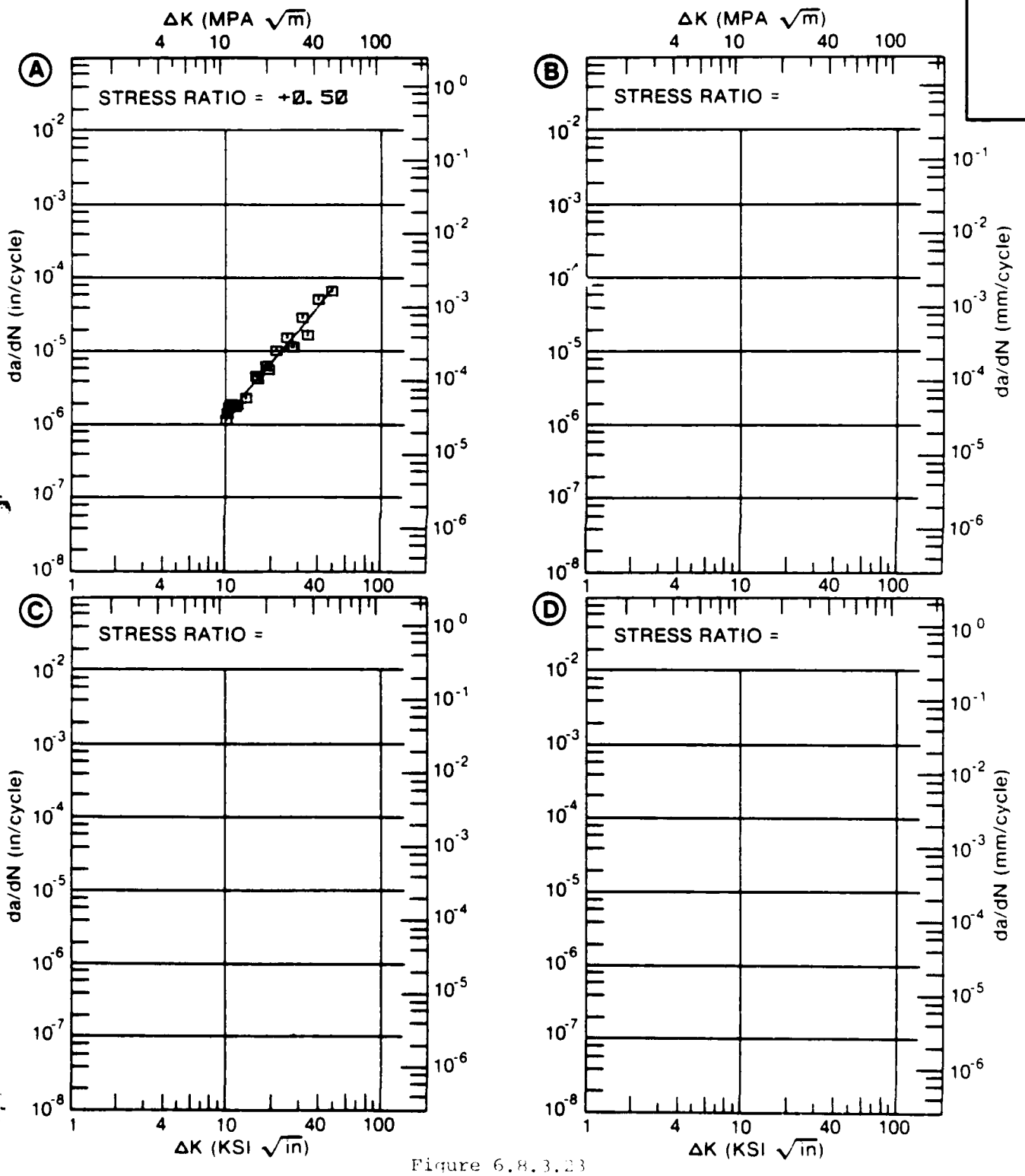


Figure 6.8.3.23

TABLE 6.8.3.24

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.24 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION: 1550F 2HRS OQ,-100F 1HR,1025F 2+2HR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE) A	B	C	D
			E=- 65F L.H.A			
DELTA K MIN	A:	9.19	.482			
	B:					
	C:					
	D:					
		10.00	.508			
		13.00	1.23			
		16.00	2.15			
		20.00	3.59			
		25.00	5.91			
		30.00	9.32			
DELTA K MAX	A:	31.92	11.1			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 11.36

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: 1550F 2HRS OQ. -100F 1HR. 1025F 2+2HR
FORM: 3.00"TH FORGED BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.08
FREQUENCY: 6.00 HZ

YIELD STRENGTH: 198.0 KSI
ULT. STRENGTH: 220.0 KSI
SPECIMEN THK: 0.992"
SPECIMEN WIDTH: 7.400"
REFERENCES: 85837

ALLOY STEEL

HP9-4-.30

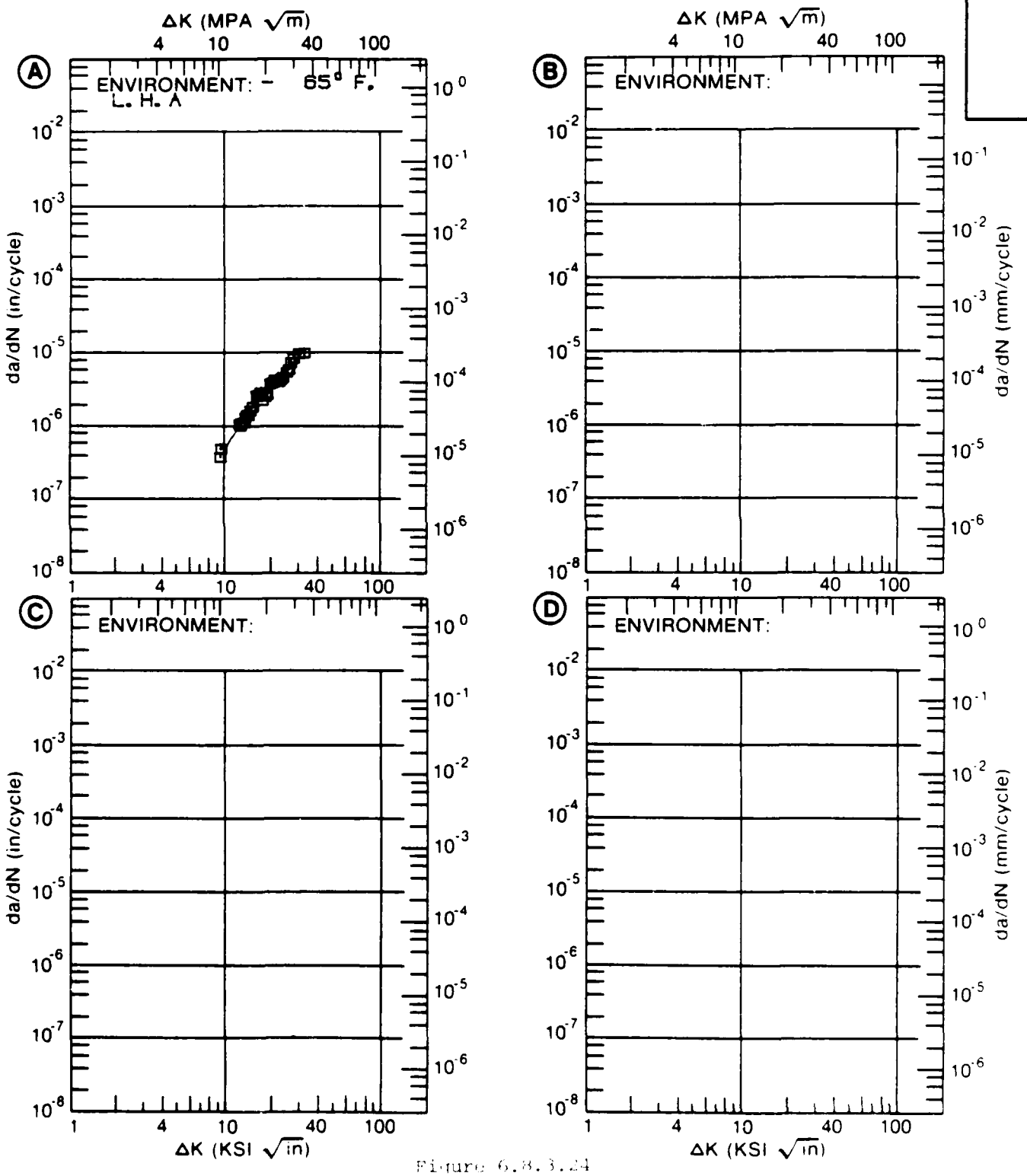


Figure 6.8.3.24

TABLE 6.8.3.25

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.25 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION: 1550F 2HRS OQ,-100F 1HR,1025F 2+2HR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE) A	B	C	D
			E= R.T. L.H.A.	E= R.T. S.T.W.		
DELTA K MIN	A:					
	B:	9.52		1.36		
	C:					
	D:					
		10.00		3.00		
		13.00		5.35		
		16.00		9.17		
		20.00		13.2		
		25.00		19.1		
		30.00		32.3		
DELTA K MAX	A:					
	B:	30.92		41.3		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			0.00	11.98		

LIFE PREDICTION RATIO SUMMARY (NP/NA)				
	0.0-0.5			
	0.5-0.8			
	0.8-1.25		1	
	1.25-2.0			
	>2.0			

CONDITION/HT: 1550F 2HRS OQ. -100F 1HR. 1025F 2+2HR
FORM: 3.00"TH FORGED BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.08
FREQUENCY: 0.10 HZ

YIELD STRENGTH: 198.0 KSI
ULT. STRENGTH: 220.0 KSI
SPECIMEN THK: 0.740- 1.000"
SPECIMEN WIDTH: 7.390- 7.400"
REFERENCES: 98579

ALLOY STEEL

HP9-4-.30

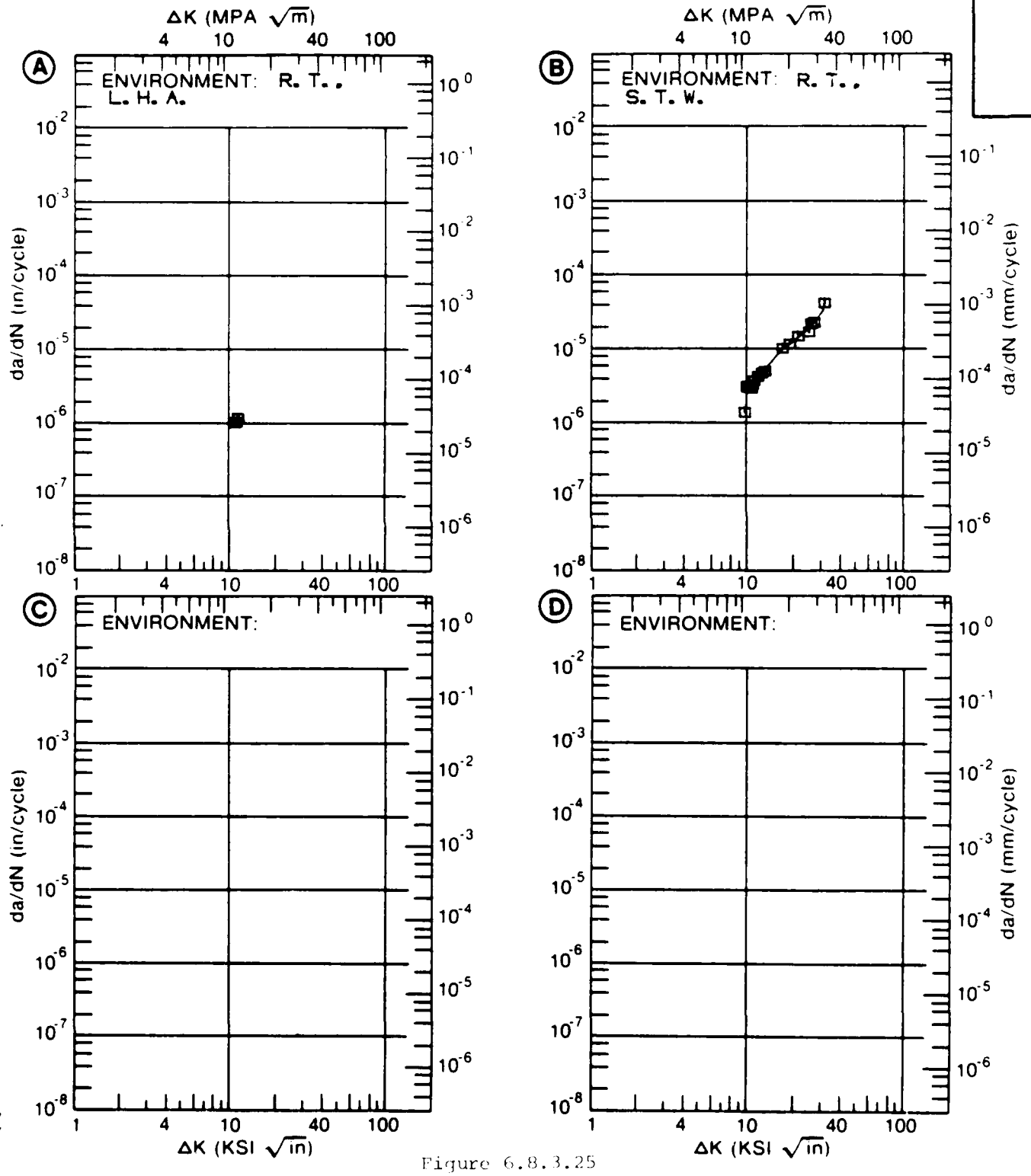


Figure 6.8.3.25

TABLE 6.8.3.26

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.26 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION: 1550F 2HRS OQ, -100F 1HR, 1025F 2+2HR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. L.H.A. 6HZ	E= R.T. S.T.W. 1HZ		
DELTA K MIN	A:	11.36	1.18			
	B:	7.33		.196		
	C:					
	D:					
		8.00		.289		
		9.00		.466		
		10.00		.688		
		13.00	1.67	1.60		
		16.00	2.89	2.81		
		20.00	5.13	4.84		
		25.00	8.51	8.07		
		30.00	11.9	12.2		
		35.00		17.7		
		40.00		24.9		
DELTA K MAX	A:	31.16	12.6			
	B:	48.54		42.8		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			12.23	12.09		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: 1550F 2HRS OQ. -100F 1HR. 1025F 2+2HR
FORM: 3.00"TH FORGED BAR
SPECIMEN TYPE: CT
ORIENTATION: T-L
STRESS RATIO: +0.08
FREQUENCY:

YIELD STRENGTH: 198.0- 199.0 KSI
ULT. STRENGTH: 220.0- 223.0 KSI
SPECIMEN THK: 0.740- 0.986"
SPECIMEN WIDTH: 6.000- 7.400"
REFERENCES: 85837, 88579

ALLOY STEEL

HP9-4-.30

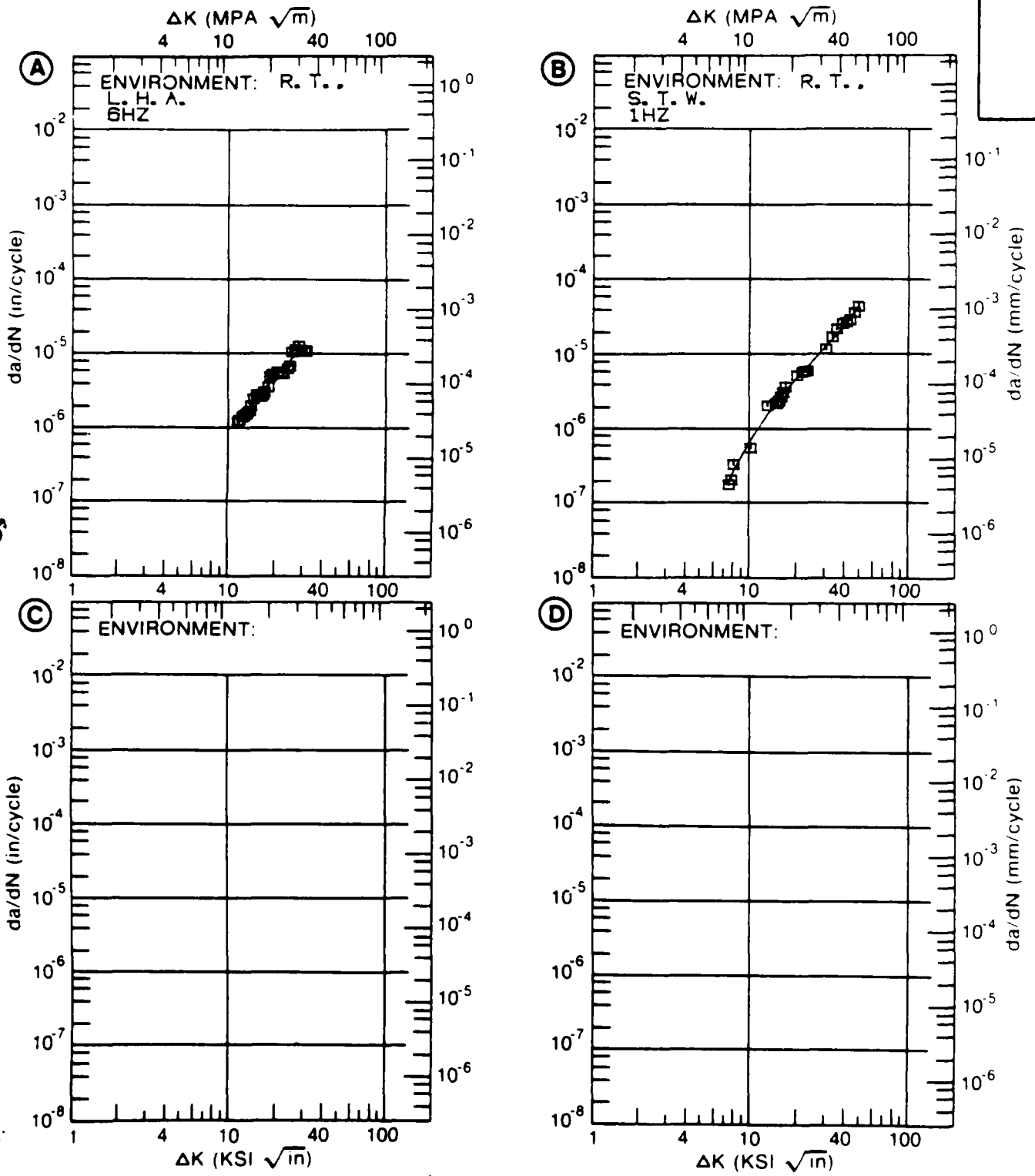


Figure 6.8.3.26

TABLE 6.8.3.27

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.8.3.27 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL HP9-4-.30
CONDITION: 1550F 2HRS OQ, -100F 3HRS, 1000F 2+2HRS
ENVIRONMENT: R.T. ,L.H.A.

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		R=+0.08			
DELTA K MIN	A: 10.28	.922			
	B:				
	C:				
	D:				
	13.00	1.46			
	16.00	2.22			
	20.00	3.58			
	25.00	6.04			
	30.00	9.64			
	35.00	14.8			
	40.00	22.2			
	50.00	46.7			
	60.00	92.3			
	70.00	174.			
	80.00	315.			
DELTA K MAX	A: 88.40	507.			
	B:				
	C:				
	D:				
ROOT MEAN SQUARE PERCENT ERROR		20.51			

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: 1550F 2HRS OQ, -100F 3HRS, 1000F 2+2HRS
FORM: 3.00"TH FORGED BAR
SPECIMEN TYPE: CT
ORIENTATION: T-L
FREQUENCY: 6.00 HZ
ENVIRONMENT: R. T., L. H. A.

YIELD STRENGTH: 215.0 KSI
ULT. STRENGTH: 244.0 KSI
SPECIMEN THK: 0.970"
SPECIMEN WIDTH: 4.980"
REFERENCES: 88579

ALLOY STEEL

HP9-4-.30

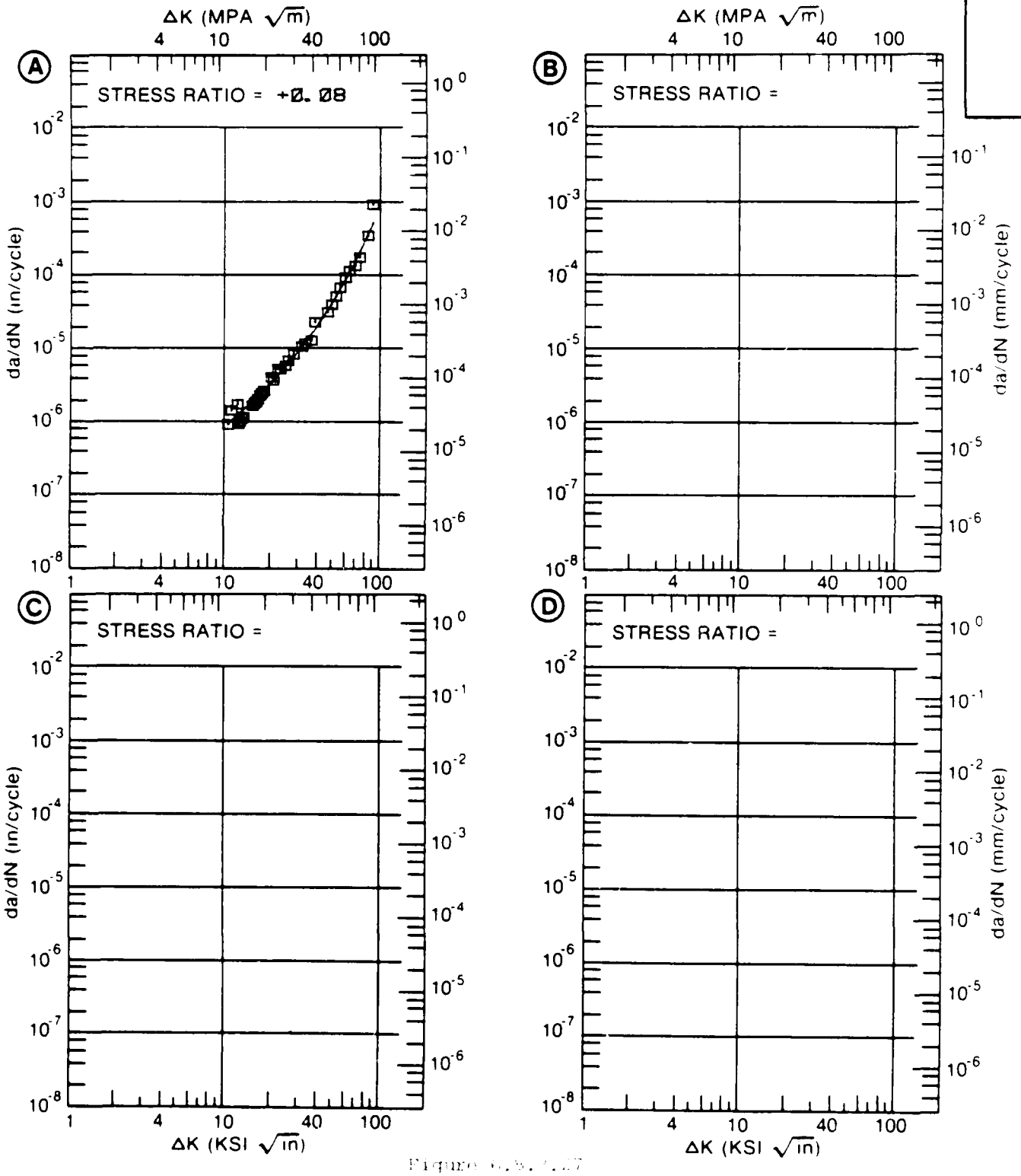


Figure 6.5.7.27

TABLE 6.8.3.28

ALLOY STEEL HP9-4-.30 K(ISCC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN (*=SG)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
[illegible]	F	1.25	R.T.	T-L	206.0	SIM. SEA WATER	3.087	1.250	BWOL	1.379	------	< 41.60			----	1977	MA005
		1.25			206.0		3.085	1.251	BWOL	1.364	------	< 41.30			----	1977	MA005
[illegible]	F	1.25	R.T.	S-T	204.5	SIM. SEA WATER	3.079	1.250	BWOL	1.355	------	< 38.50			----	1977	MA005
		1.25			204.5		3.079	1.251	BWOL	1.365	------	< 38.60			----	1977	MA005
QUENCHED + TEMPERED AT 950F	P	0.48	R.T.	---	----	3.5 PCT NACL	1.500	0.500	NB	0.300	116.00	35.00*			----	1967	74302
		0.48		---	231.0		1.500	0.480	NB	----	116.00	45.00*			----	1967	74302

*NOTE-DATA WHICH DO NOT MEET MINIMUM SPECIMEN THICKNESS REQUIREMENTS OF 2.5(KISCC/TYS)SQUARED

TABLE 6.9.3.1

ALLOY STEEL HP9-4- 45 K(ISCC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN (*=SG)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
1650F 0 5HR AC S 1500F 0 33HR AC		0.08	R.T	---	212.5	DIST. WATER	2.000	0.050	CNT	----	------	88.00*			20000	1968	72283
1600F 0 5HR AC S 1500F 0 33HR AC		0.08	R.T	---	212.5	3N NACL	2.000	0.050	CNT	----	------	35.00*			> 30000	1968	72283
425F	P	0.48	R.T	---	220.0	3.5 PCT NACL.	1.500	0.480	NB	0.300	89.00	20.00			----	1971	84351

*NOTE DATA WHICH DO NOT MEET MINIMUM SPECIMEN THICKNESS REQUIREMENTS OF 2.5(KISCC/TYS)SQUARED

TABLE 6.10.1.J

MEAN PLANE STRAIN FRACTURE TOUGHNESS DATA OF
ALLOY STEEL HY-TUF AT ROOM TEMPERATURE

CONDITION/HT	MEAN KIC ± STANDARD (KSI SQRT(IN)) DEVIATION	(NUMBER OF SPECIMENS)

FORGING

CONDITION/HT	L-T	T-L	S-L
1700F 1HR,AC, 1600F 1HR,OQ, 550F 2HR	-----	111.5 ± 2.1 (2)	-----

TABLE 6.10.2.1

ALLOY STEEL HY-TUF K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	------SPECIMEN------ WIDTH (IN) W	THICK (IN) B	DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	STAN DEV	DATE	REFER
1700F 1HR AC, 1600F 1HR+1000F 20 MIN, OQ, 550F 2HR	F	6.50	R.T.	L-T	198.0	1.999	1.003	CT	0.988	0.92	120.00			1974	91284
1700F 1HR AC, 1600F 1HR+1000F 20 MIN, OQ, 550F 2HR	F	6.50	R.T.	T-L	200.0	1.999	1.003	CT	0.977	0.80	113.00			1974	91284
1700F 1HR, AC, 1600F 1HR, OQ, 550F 2HR	F	6.50	R.T.	L-T	198.0	1.999	1.000	CT	0.983	0.86	116.00			1974	91284
1700F 1HR, AC, 1600F 1HR, OQ, 550F 2HR	F	6.50	R.T.	T-L	198.0	1.999	1.003	CT	0.977	0.76	110.00			1974	91284
		6.50			198.0	1.999	1.003	CT	0.973	0.81	113.00	111.5/	2.1	1974	91284

TABLE 6.11.3.1

ALLOY STEEL HY-150 K(ISCC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN (*=SG)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
1500F 1HR WQ	P	1.00	R.T.	---	150.0	3.0 PCT NACL	2.000	1.000	CANT*	0.200	------	115.00*			> 30000	1968	73824

*NOTE: DATA WHICH DO NOT MEET MINIMUM SPECIMEN THICKNESS REQUIREMENTS OF 2.5(KISCC/TYS)SQUARED

TABLE 6.12.1.1

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL HY-180

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT LAB AIR AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE)					
					2.5	5	10	20	50	100
STA (UTS = 180 KSI)	FORGED BAR	0.10	10.00					4.29	30.8	
STA (UTS = 180 KSI)	FORGED BAR	0.10	30.00			0.09	0.55	3.33		
STA (UTS = 180 KSI)	FORGED BAR	0.50	10.00					5.61		
STA (UTS = 180 KSI)	FORGED BAR	0.50	30.00			0.09	0.62	4.00		

TABLE 6.12.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.12.3.1 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL HY-180
CONDITION: STA (UTS = 180KSI)
ENVIRONMENT: R.T. ,LAB AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.10	R=+0.50		
DELTA K MIN	A:	2.72	.0170			
	B:	2.62		.0105		
	C:					
	D:					
		3.00	.0232	.0179		
		3.50	.0368	.0313		
		4.00	.0539	.0491		
		5.00	.0986	.0979		
		6.00	.158	.164		
		7.00	.232	.248		
		8.00	.322	.351		
		9.00	.430	.474		
		10.00	.556	.620		
		13.00	1.07	1.21		
		16.00	1.82	2.11		
		20.00	3.33	4.00		
		25.00	6.36	8.07		
		30.00	11.2			
DELTA K MAX	A:	31.28	12.9			
	B:	26.38		9.67		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			14.34	21.78		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: STA (UTS = 180KSI)
FORM: 1.75"TH FORGED BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 30.00 HZ
ENVIRONMENT: R.T., LAB AIR

YIELD STRENGTH: 197.1 KSI
ULT. STRENGTH: 199.6 KSI
SPECIMEN THK: 0.253"
SPECIMEN WIDTH: 1.500"
REFERENCES: DA001

ALLOY STEEL

HY-180

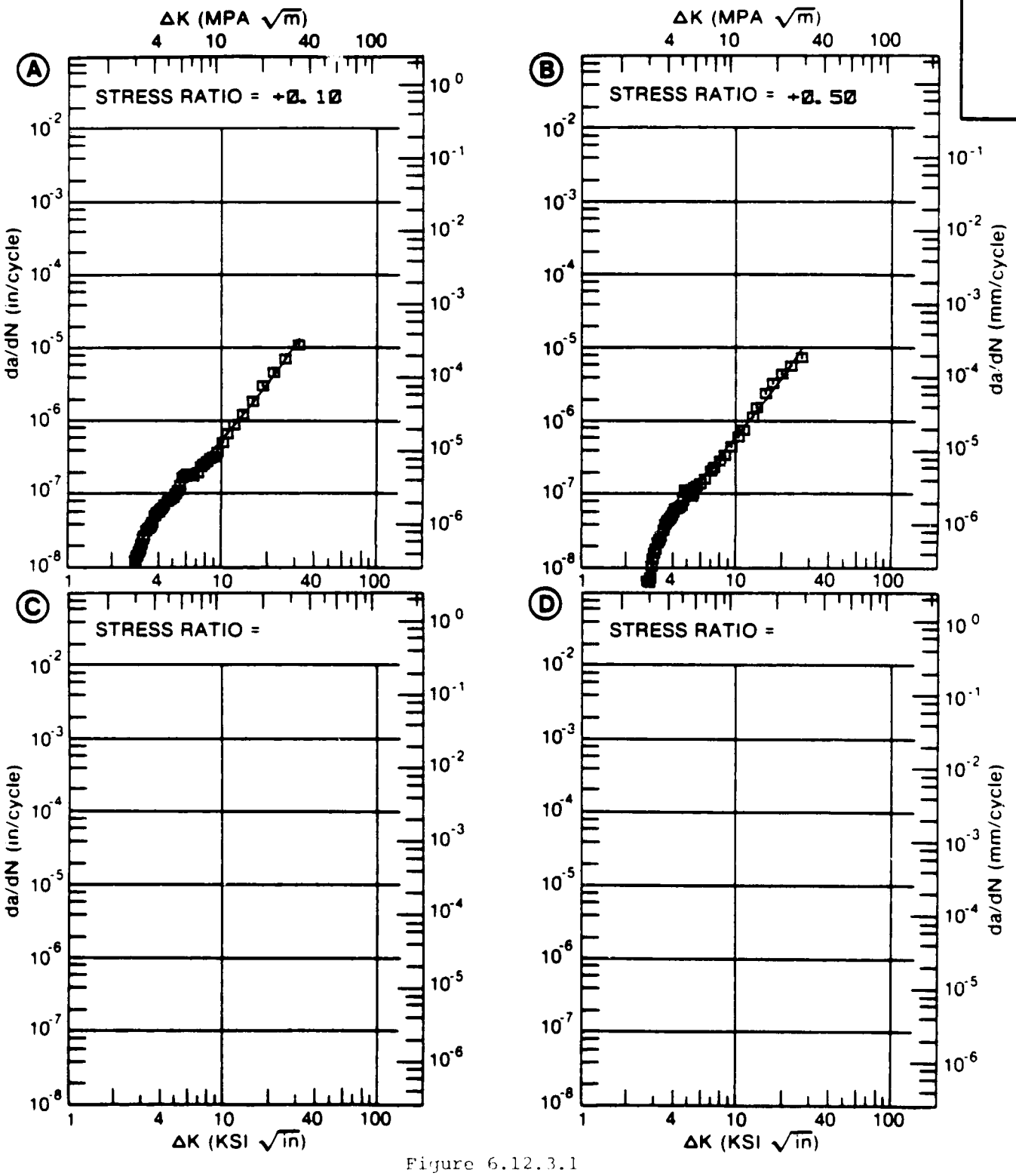


Figure 6.12.3.1

TABLE 6.12.3.2

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.12.3.2 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL HY-180
CONDITION: STA (UTS = 180KSI)
ENVIRONMENT: R.T. ,LAB AIR

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		R=+0.10	R=+0.50		
DELTA K MIN	A: 11.51	.645			
	B: 10.71		.899		
	C:				
	D:				
	13.00	1.10	1.84		
	16.00	2.31	3.37		
	20.00	4.29	5.61		
	25.00	7.04	8.57		
	30.00	10.1	11.9		
	35.00	13.6	15.8		
	40.00	18.0	20.6		
	50.00	30.8			
DELTA K MAX	A: 59.28	51.3			
	B: 43.61		25.0		
	C:				
	D:				
ROOT MEAN SQUARE PERCENT ERROR		3.94	5.39		
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5				
	0.5-0.8				
	0.8-1.25	1	1		
	1.25-2.0				
	>2.0				

CONDITION/HT: STA (UTS = 180KSI)
FORM: 1.75"TH FORGED BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 10.00
ENVIRONMENT: R.T., LAB AIR

YIELD STRENGTH: 197.1 KSI
ULT. STRENGTH: 199.6 KSI
SPECIMEN THK: 0.377"
SPECIMEN WIDTH: 1.500- 1.501"
REFERENCES: A001

ALLOY STEEL

HY-180

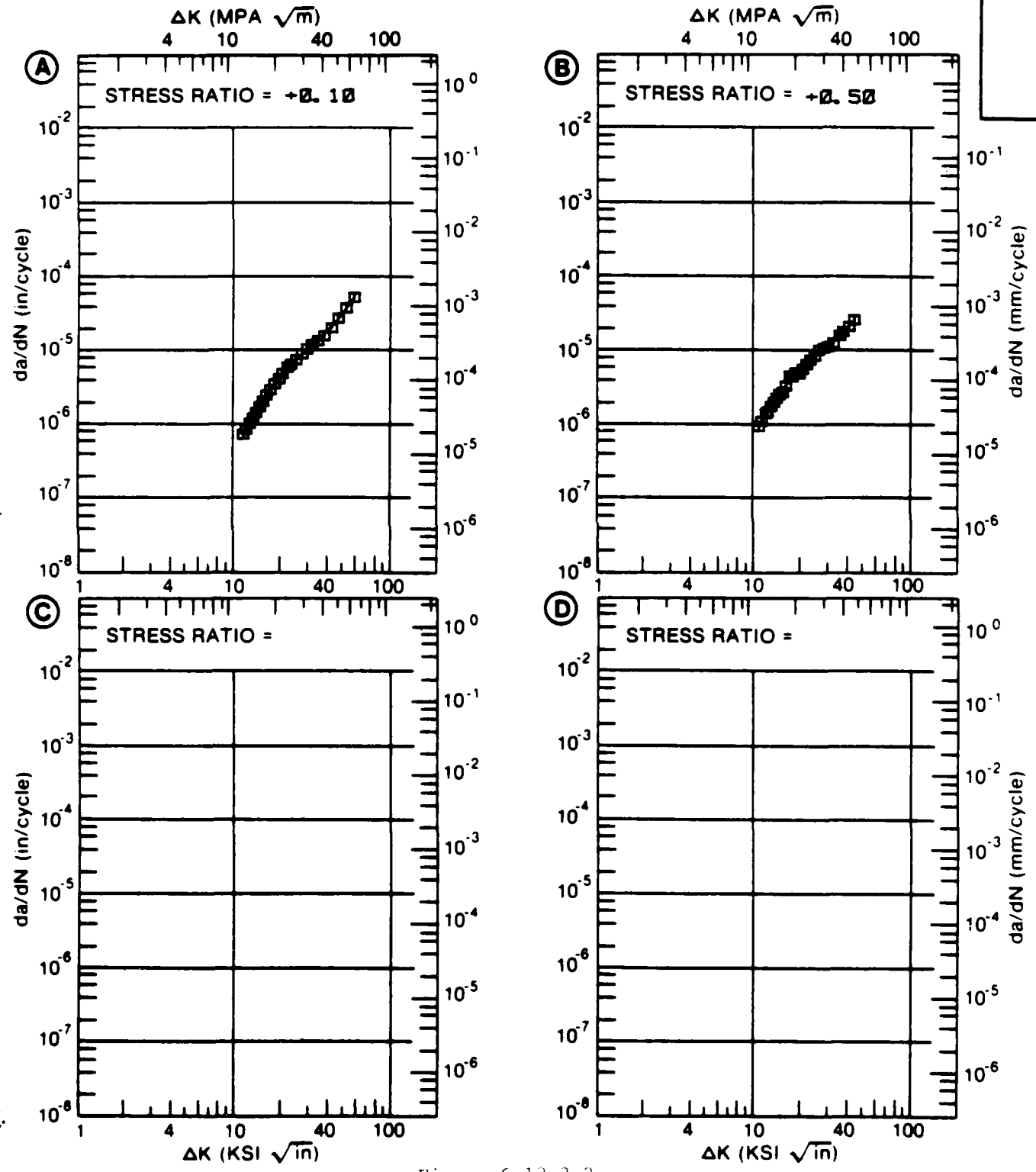


Figure 6.12.3.2

TABLE 6.12.3.3

FATIQUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.12.3.3 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL HY-80
CONDITION:
ENVIRONMENT: R.T. ,3.5% NACL

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		R=+0.10			
DELTA K MIN	A: 24.02	5.47			
	B:				
	C:				
	D:				
	25.00	5.88			
	30.00	8.35			
	35.00	11.6			
	40.00	15.8			
	50.00	28.1			
	60.00	48.0			
	70.00	79.2			
DELTA K MAX	A: 77.74	114.			
	B:				
	C:				
	D:				

ROOT MEAN SQUARE PERCENT ERROR 9.48

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM:
SPECIMEN TYPE: WOL
ORIENTATION:
FREQUENCY: Ø.5Ø HZ
ENVIRONMENT: R.T.,3.5% NACL

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK: Ø.4ØØ"
SPECIMEN WIDTH: 2.55Ø"
REFERENCES:UDØØ7

ALLOY STEEL

HY-8Ø

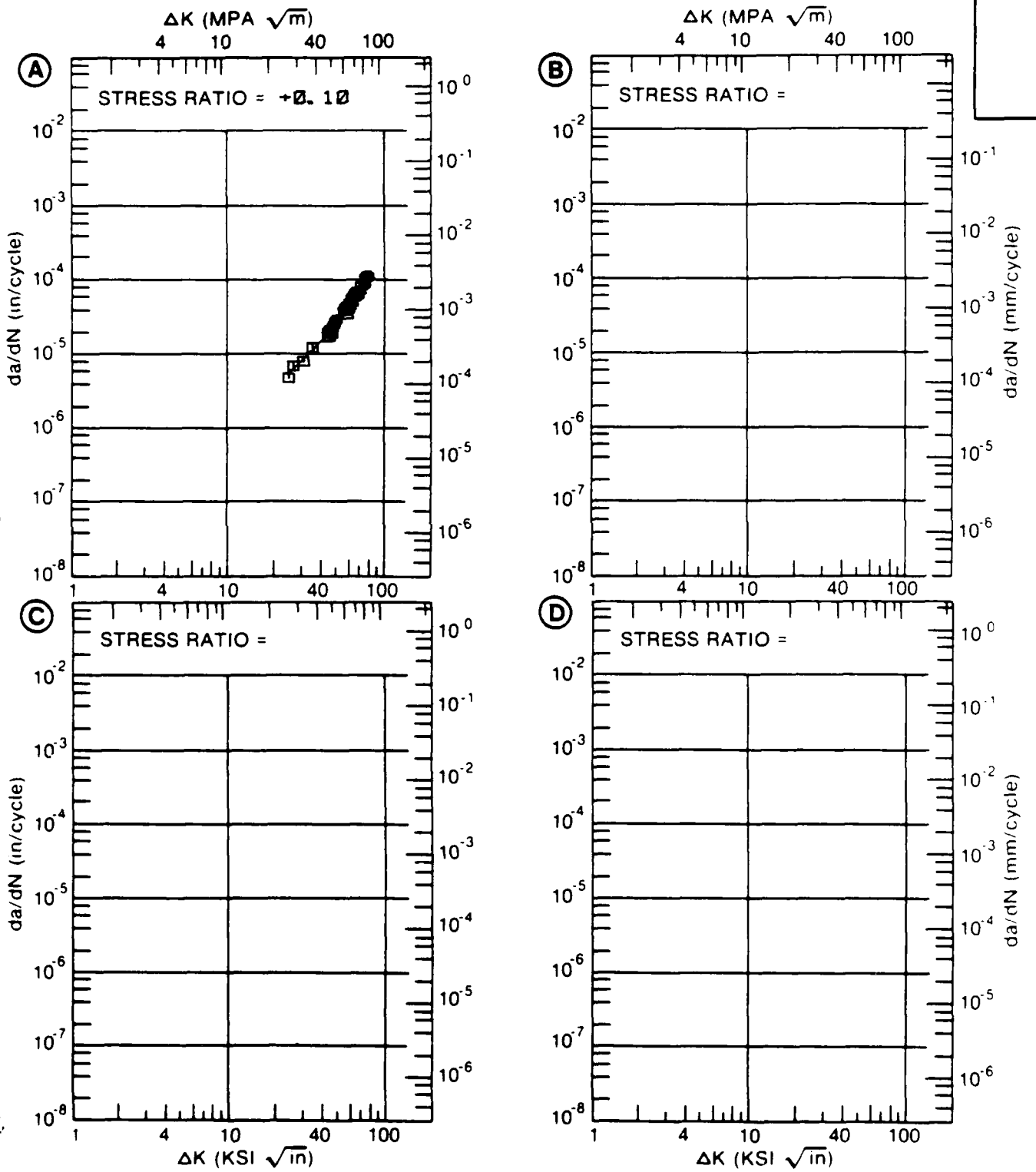


Figure 6.12.3.3

TABLE 6.13.1.1

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL H11

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT LAB AIR AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2 5	5	10	20	50	100
AUSTENIZED & TEMPERED (TYS = 220KSI)	ROUND BAR	0 10	10 00					3 53		
AUSTENIZED & TEMPERED (TYS = 220KSI)	ROUND BAR	0 10	30 00				0 33	2 95		
AUSTENIZED & TEMPERED (TYS = 220KSI)	ROUND BAR	0 50	10 00					4 94		
AUSTENIZED & TEMPERED (TYS = 220KSI)	ROUND BAR	0 50	30 00			0 09	0 73	4 56		

TABLE 6.13.1.2

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL H11

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT AIR AT 650 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
AUSTENIZED & TEMPERED (TYS = 220KSI)	ROUND BAR	0.10	7.00						34.6	
AUSTENIZED & TEMPERED (TYS = 220KSI)	ROUND BAR	0.50	7.00				1.61			

TABLE 6.13.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.13.3.1 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL H11
CONDITION: AUSTENIZED & TEMPERED (TYS = 220KSI)
ENVIRONMENT: R.T. ,LAB AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.10	R=+0.50		
DELTA K MIN	A:	6.34	.0757			
	B:	3.07		.0168		
	C:					
	D:					
		3.50		.0269		
		4.00		.0428		
		5.00		.0905		
		6.00		.163		
		7.00	.105	.262		
		8.00	.163	.390		
		9.00	.240	.549		
		10.00	.339	.738		
		13.00	.791	1.49		
		16.00	1.51	2.52		
		20.00	2.95	4.56		
		25.00	5.52			
		30.00	8.88			
		35.00	12.9			
		40.00	17.4			
DELTA K MAX	A:	44.01	21.3			
	B:	23.97		10.5		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			4.06	13.76		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: AUSTENIZED & TEMPERED (TYS = 220KSI)
FORM: 3.18"TH ROUND BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 30.00 HZ
ENVIRONMENT: R.T..LAB AIR

YIELD STRENGTH: 215.4 KSI
ULT. STRENGTH: 258.1 KSI
SPECIMEN THK: 0.256- 0.257"
SPECIMEN WIDTH: 2.002"
REFERENCES: DA001

ALLOY STEEL

H11

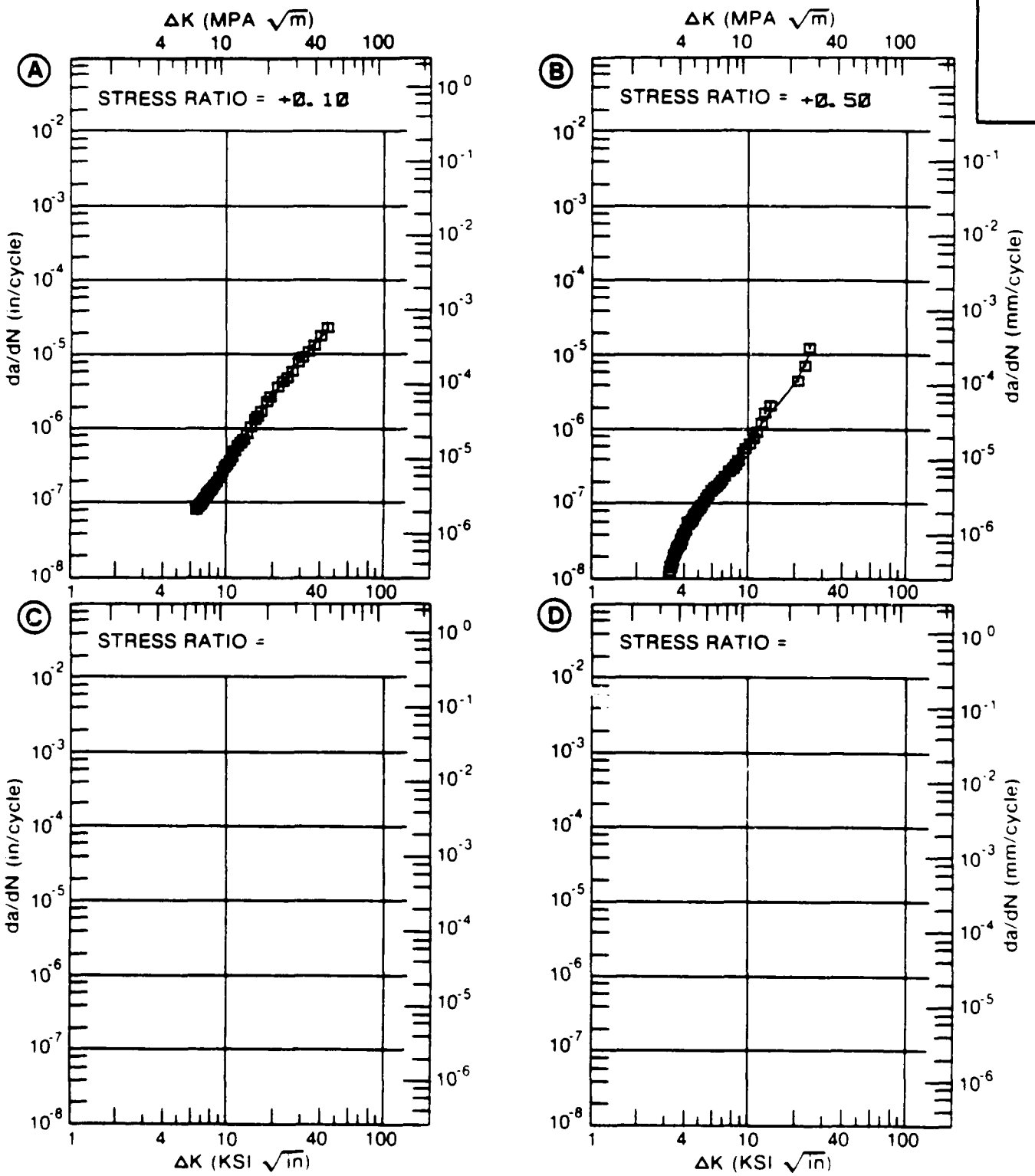


Figure 6.1-3.1

TABLE 6.13.3.2

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.13.3.2 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL H11
CONDITION: AUSTENIZED & TEMPERED (TYS = 220KSI)
ENVIRONMENT: R.T. ,LAB AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.10	R=+0.50		
DELTA K MIN	A:	12.92	.949			
	B:	10.54		.691		
	C:					
	D:					
		13.00	.970	1.41		
		16.00	1.90	2.66		
		20.00	3.53	4.94		
		25.00	6.19			
		30.00	9.73			
		35.00	14.5			
		40.00	20.9			
DELTA K MAX	A:	42.50	24.9			
	B:	22.18		6.46		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			1.90	2.05		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: AUSTENIZED & TEMPERED (TYS = 220KSI)
FORM: 3.18"TH ROUND BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 10.00 HZ
ENVIRONMENT: R.T., LAB AIR

YIELD STRENGTH: 215.4 KSI
ULT. STRENGTH: 258.1 KSI
SPECIMEN THK: 0.488"
SPECIMEN WIDTH: 2.005- 2.010"
REFERENCES: DA001

ALLOY STEEL

H11

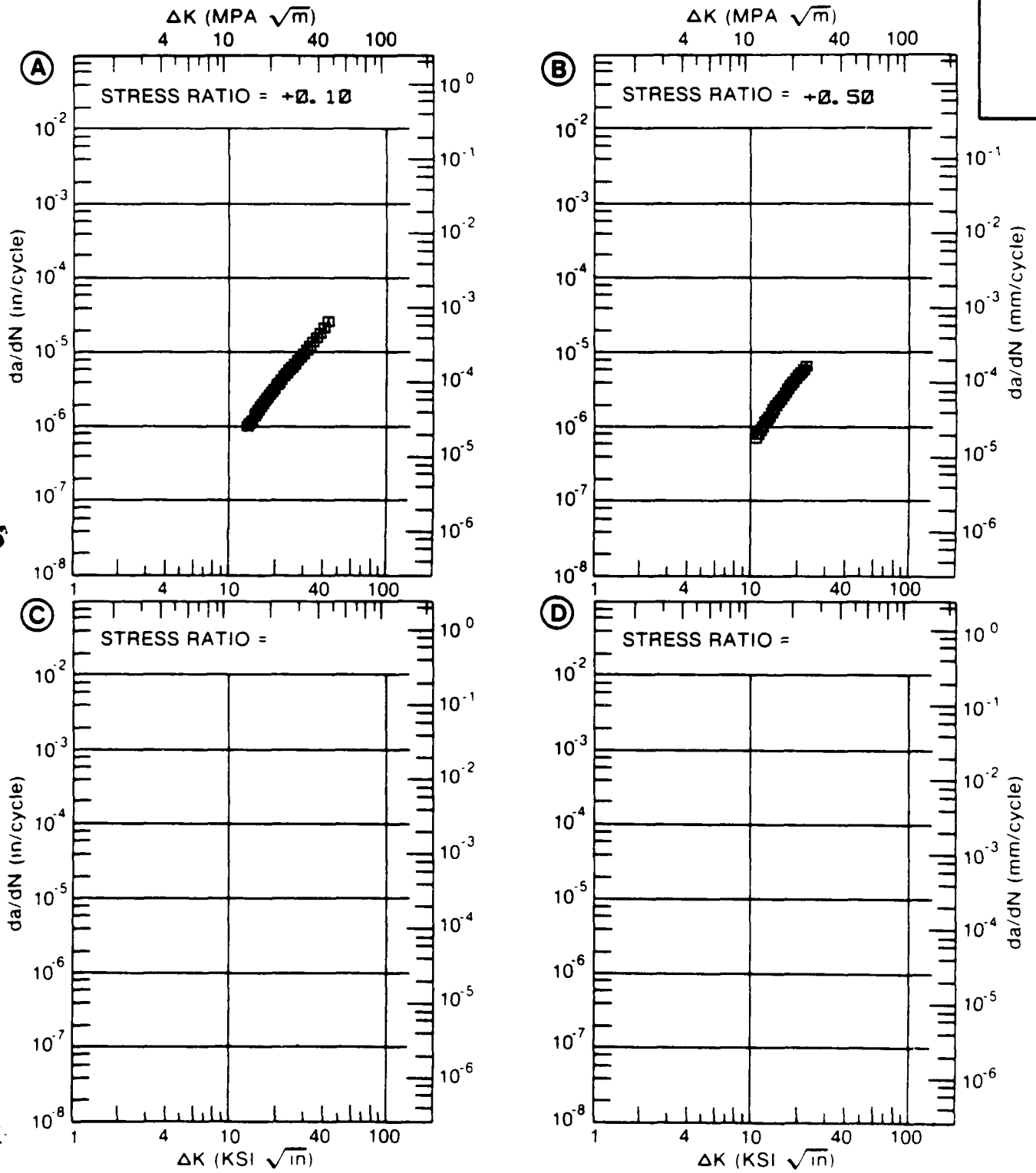


Figure 6.13.3.2

TABLE 6.13.3.3

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.13.3.3 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL H11
CONDITION: AUSTENIZED & TEMPERED (TYS = 220KSI)
ENVIRONMENT: + 650F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.10	R=+0.50		
DELTA K MIN	A:	27.33	7.00			
	B:	7.01		1.03		
	C:					
	D:					
		8.00		1.17		
		9.00		1.36		
		10.00		1.61		
		13.00		2.97		
		16.00				
		20.00				
		25.00				
		30.00	8.83			
		35.00	13.1			
		40.00	18.6			
		50.00	34.6			
		60.00	59.8			
		70.00	97.9			
		80.00	154.			
DELTA K MAX	A:	87.90	216.			
	B:	14.69		4.42		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			6.82	11.15		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: AUSTENIZED & TEMPERED (TYS = 220KSI)
FORM: 3.18"TH ROUND BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 7.00 HZ
ENVIRONMENT: + 650° F, AIR

YIELD STRENGTH: 215.4 KSI
ULT. STRENGTH: 258.1 KSI
SPECIMEN THK: 0.257- 0.488"
SPECIMEN WIDTH: 2.000"
REFERENCES: DA001

ALLOY STEEL

H11

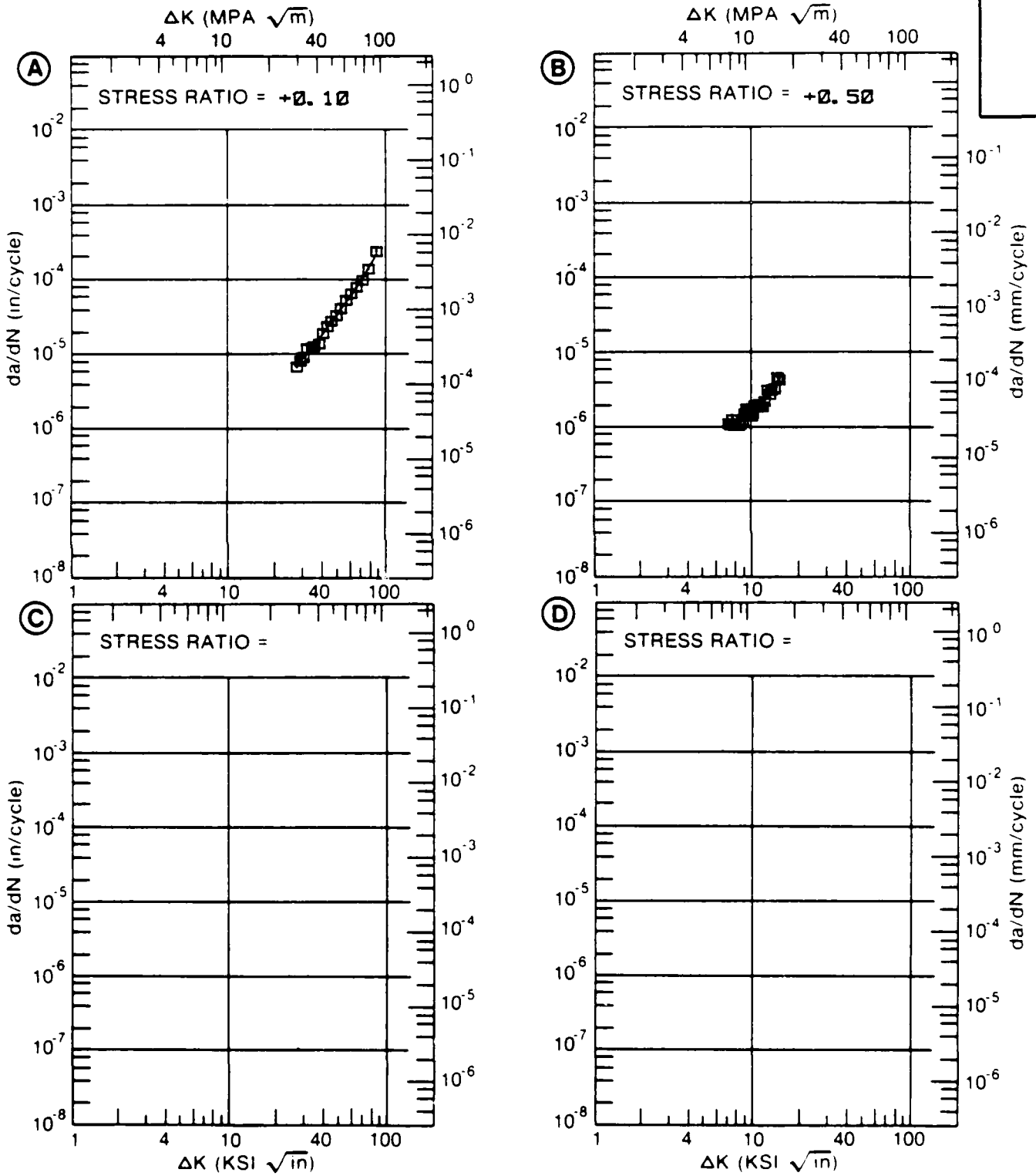


Figure 6.13.3.3

TABLE 6.13.3.4

SUSTAINED CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.13.3.4 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL H11
CONDITION:

K MAX (KSI*IN**1/2)			DA/DT (10**-3 IN/HOUR)			
			A	B	C	D
			E= DIST. WATER	E= ARGON, 100% REL HUM		
K MAX MIN	A:	17.50	15.4			
	B:	22.50		876.		
	C:					
	D:					
		20.00	81.2			
		25.00	573.	1089.		
		30.00	1648.	2424.		
		35.00	3253.	3552.		
K MAX MAX	A:	38.50	4763.			
	B:	37.00		5024.		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			69.12	18.74		

CONDITION/HT:
FORM:
SPECIMEN TYPE: CNT
ORIENTATION:
YIELD STRENGTH: 230.0 KSI
ULT STRENGTH:

SPECIMEN THK: 0.080 - 0.125"
SPECIMEN WIDTH:
CRACK LENGTH (A_O):
K_{ISCC}:
REFERENCES: 75111, 84309

ALLOY STEEL

H11

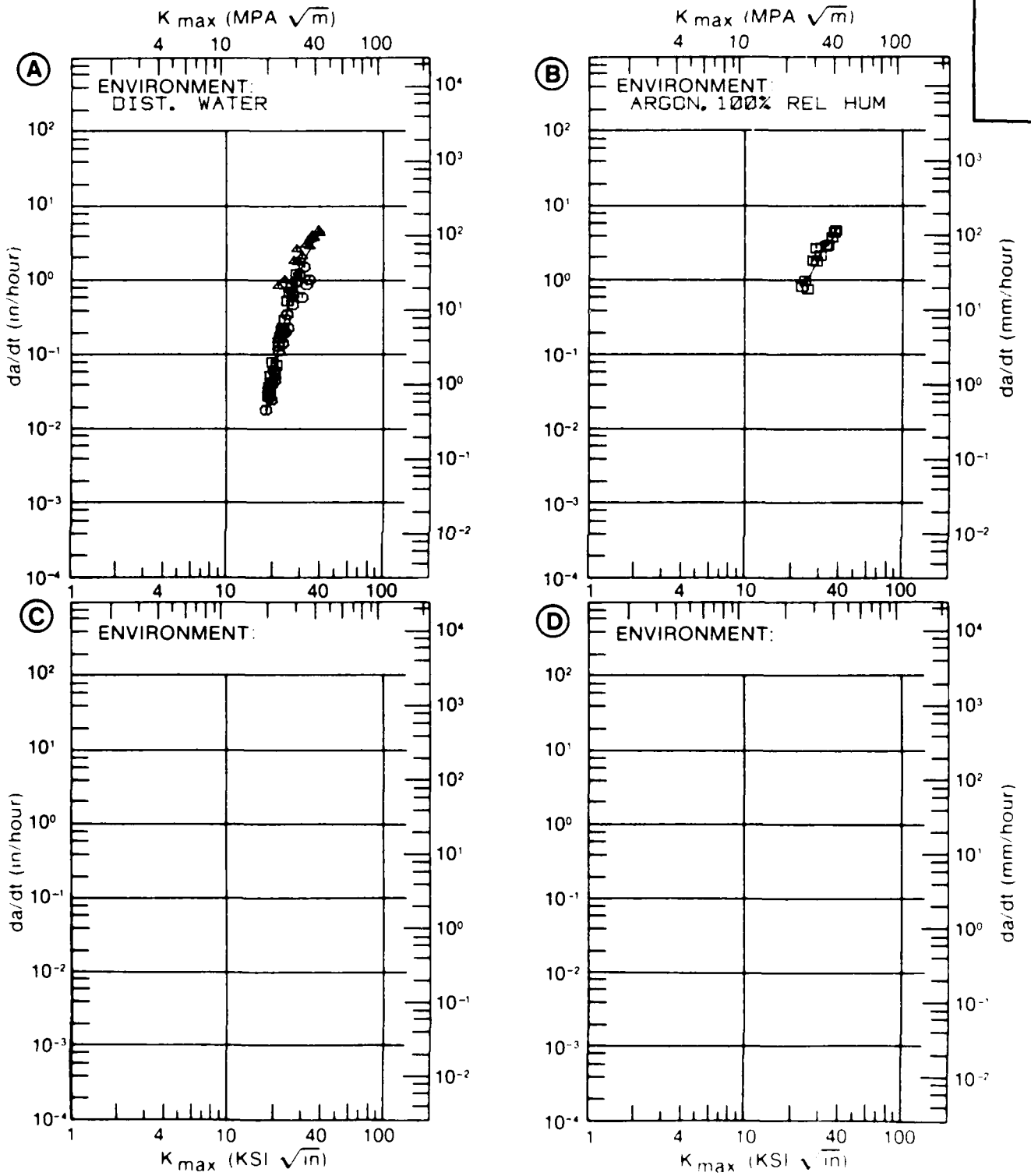


Figure 6.13.3.4

TABLE 6.13.3.5

ALLOY STEEL H11 K(ISCC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN (*=SG)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
QUENCHED + TEMPERED AT 1100F	P	0.48	R.T.	---	188.0	3.5 PCT NACL	1.500	0.480	--	----	54.00	30.00			----	1971	84351
1325F, 1850F 0.5HR AC, 1060F 2+2HR	S	0.08	R.T.	---	205.6	DIST. WATER	2.000	0.050	CNT	----	------	35.00*			4000	1968	72283
1325F, 1850F 0.5HR AC, 1060F 2+2HR	S	0.08	R.T.	---	205.6	3N NACL	2.000	0.050	CNT	----	------	28.00*			> 20000	1968	72283

*NOTE DATA WHICH DO NOT MEET MINIMUM SPECIMEN THICKNESS REQUIREMENTS OF 2.5(KISCC/TYS)SQUARED

TABLE 6.14.1.1

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL 10NI STEEL

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT DRY AIR AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2 5	5	10	20	50	100
------	PLATE	0 10	6 00					5 20	22 9	
	PLATE	0 10	6 00				0 44	3 90	25 2	
	PLATE	0 30	6 00				0 80	4 64		
	PLATE	0 50	6 00			0 09	1 00	4 70		
	PLATE	0 70	6 00			0 12	0 93	5 76		

TABLE 6.14.1.2

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL 10NI STEEL

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT S T W AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2 5	5	10	20	50	100
- - - -	PLATE	0 10	0 10						43 5	
	PLATE	0 10	1 00				0 11	2 92	40 4	
	PLATE	0 50	0 10				1 60	13 1	85 2	
	PLATE	0 50	1 00				0 52	6 48	48 3	

TABLE 6.14.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.14.3.1 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL 10NI STEEL
CONDITION:
ENVIRONMENT: R.T. ,DRY AIR

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		R=+0.10	R=+0.50		
DELTA K MIN	A: 7.88	.165			
	B: 4.05		.069		
	C: 2				
	D:				
	5.00		.0971		
	6.00		.168		
	7.00		.294		
	8.00	.177	.484		
	9.00	.294	.730		
	10.00	.449	1.00		
	13.00	1.14	1.89		
	16.00	2.15	2.89		
	20.00	3.90	4.70		
	25.00	6.57	7.57		
	30.00	9.64	10.4		
	35.00	13.1			
	40.00	16.8			
	50.00	25.2			
	60.00	35.0			
	70.00	46.6			
DELTA K MAX	A: 71.09	48.0			
	B: 34.16		12.1		
	C:				
	D:				
ROOT MEAN SQUARE PERCENT ERROR		33.80	24.26		
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5				
	0.5-0.8				
	0.8-1.25				
	1.25-2.0	1	1		
	>2.0				

CONDITION/HT:
FORM: 0.50"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 6.00 HZ
ENVIRONMENT: R.T., DRY AIR

YIELD STRENGTH: 183.3 KSI
ULT. STRENGTH: 197.4 KSI
SPECIMEN THK: 0.494"
SPECIMEN WIDTH: 2.494- 2.496"
REFERENCES: 88575

ALLOY STEEL

10NI STEEL

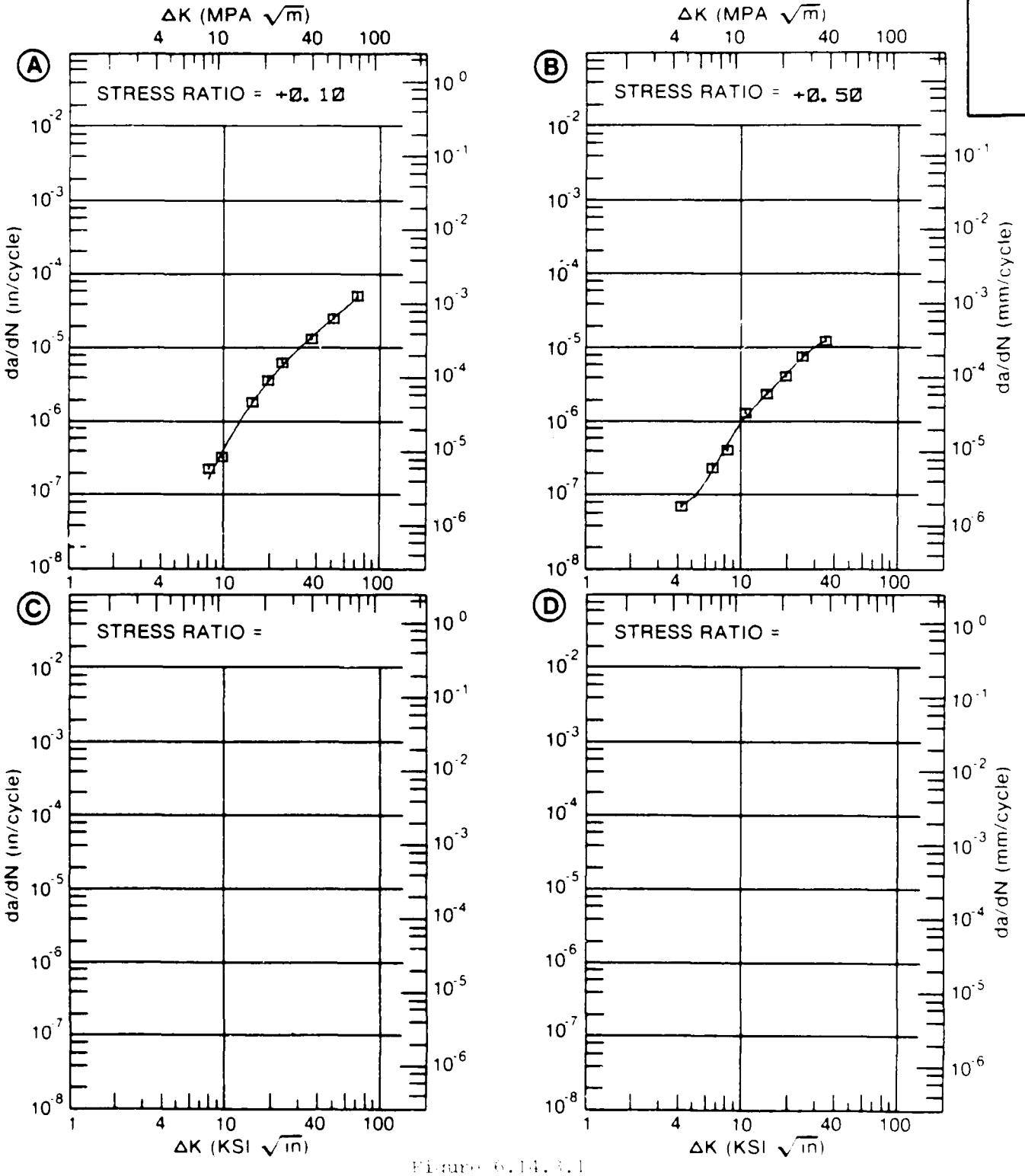


Figure 6.14.3.1

TABLE 6.14.3.2

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.14.3.2 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL 10NI STEEL
CONDITION:
ENVIRONMENT: R.T. , S.T.W.

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		R=+0.10	R=+0.50		
DELTA K MIN A:	23.16	9.91			
DELTA K MIN B:	5.79		.0829		
DELTA K MIN C:					
DELTA K MIN D:					
	6.00		.106		
	7.00		.278		
	8.00		.576		
	9.00		1.02		
	10.00		1.60		
	13.00		4.12		
	16.00		7.55		
	20.00		13.1		
	25.00	12.8	21.2		
	30.00	19.9	30.7		
	35.00	25.5	42.1		
	40.00	30.5	55.3		
	50.00	43.5	85.2		
	60.00		114.		
DELTA K MAX A:	59.08	66.0			
DELTA K MAX B:	69.37		136.		
DELTA K MAX C:					
DELTA K MAX D:					
ROOT MEAN SQUARE PERCENT ERROR		6.88	78.50		
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5				
	0.5-0.8				
	0.8-1.25	1			
	1.25-2.0		1		
	>2.0				

CONDITION/HT:
FORM: Ø.5Ø"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: Ø.1Ø HZ
ENVIRONMENT: R.T., S.T.W.

YIELD STRENGTH: 183.3 KSI
ULT. STRENGTH: 197.4 KSI
SPECIMEN THK: Ø.497- Ø.516"
SPECIMEN WIDTH: 2.497- 2.498"
REFERENCES:88575

ALLOY STEEL

10NI STEEL

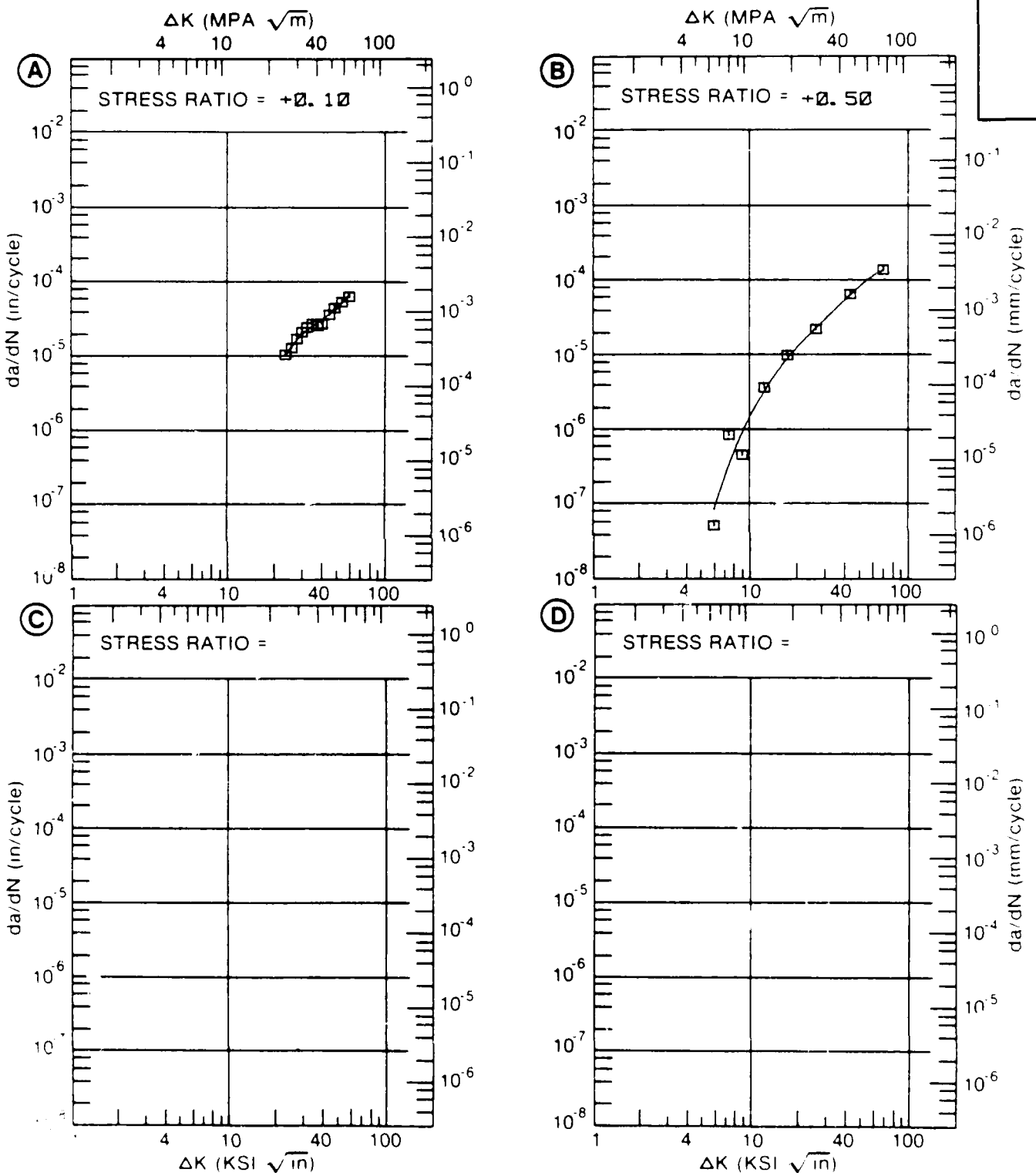


TABLE 6.14.3.3

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.14.3.3 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL 10NI STEEL
CONDITION:
ENVIRONMENT: R.T. ,DRY AIR

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		R=+0.10	R=+0.30	R=+0.70	
DELTA K MIN A:	11.50	.739			
DELTA K MIN B:	5.39		.0561		
DELTA K MIN C:	3.91			.0937	
DELTA K MIN D:					
	4.00			.0943	
	5.00			.122	
	6.00		.0993	.185	
	7.00		.207	.290	
	8.00		.362	.446	
	9.00		.563	.660	
	10.00		.807	.931	
	13.00	1.31	1.73	2.03	
	16.00	2.82	2.88	3.44	
	20.00	5.20	4.64	5.76	
	25.00	8.14	7.25	9.31	
	30.00	10.9	10.4	13.7	
	35.00	13.5	14.4	19.3	
	40.00	16.2		27.3	
	50.00	22.9			
	60.00	32.6			
	70.00	47.4			
DELTA K MAX A:	79.57	69.3			
DELTA K MAX B:	37.57		16.8		
DELTA K MAX C:	48.99			55.8	
DELTA K MAX D:					
ROOT MEAN SQUARE PERCENT ERROR		21.23	12.49	53.40	
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5				
	0.5-0.8				
	0.8-1.25				
	1.25-2.0	1	1	1	
	>2.0				

CONDITION/HT:
FORM: 1.00"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 6.00 HZ
ENVIRONMENT: R.T., DRY AIR

YIELD STRENGTH: 183.3 KSI
ULT. STRENGTH: 197.4 KSI
SPECIMEN THK: 0.754"
SPECIMEN WIDTH: 4.951- 4.998"
REFERENCES: 88575

ALLOY STEEL

10NI STEEL

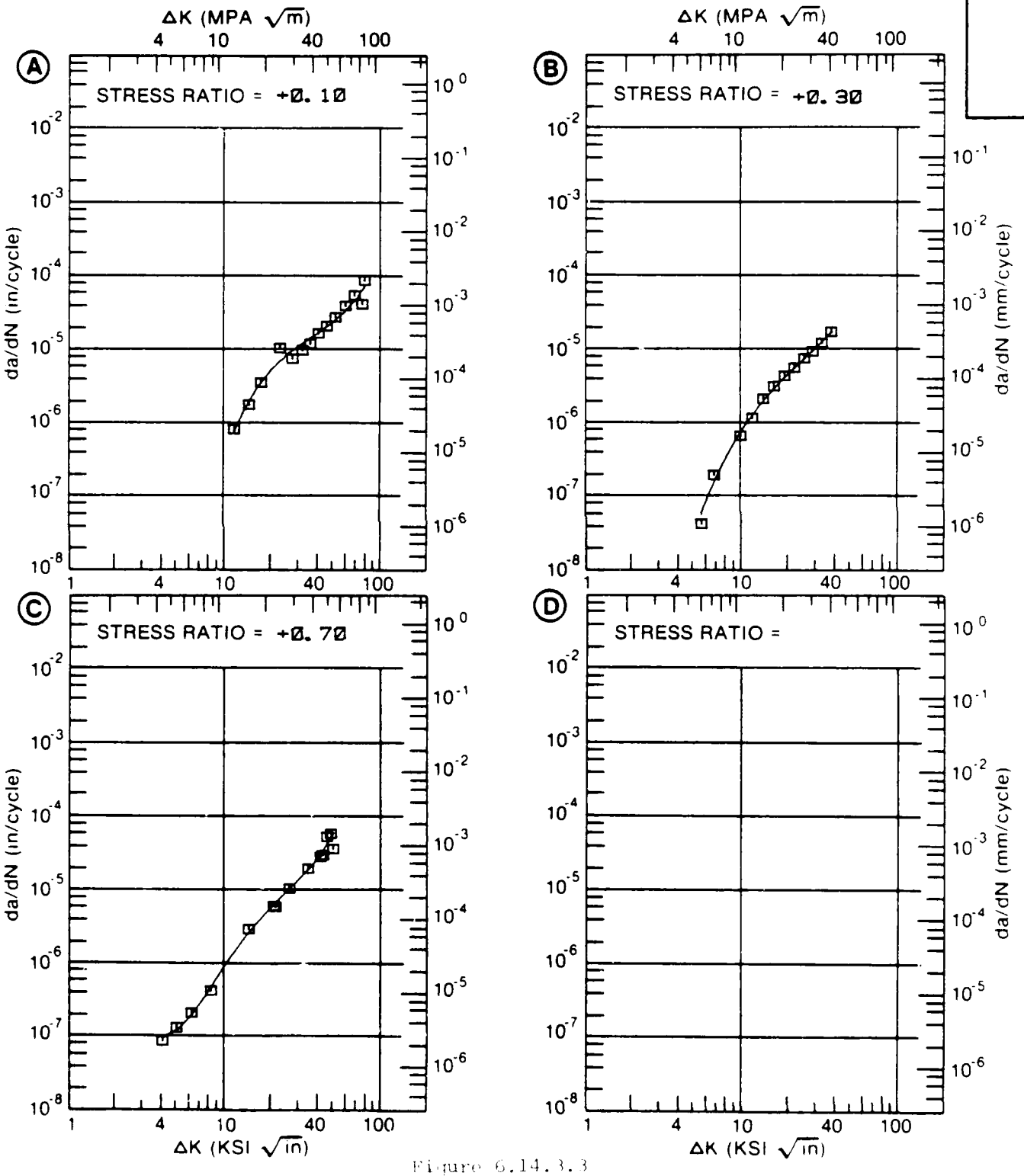


Figure 6.14.3.3

TABLE 6.14.3.4

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.14.3.4 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL 10NI STEEL
CONDITION:
ENVIRONMENT: R.T. ,S.T.W.

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		R=+0.10	R=+0.50		
DELTA K MIN	A: 7.72	.0224			
	B: 5.73		.0357		
	C:				
	D:				
	6.00		.0456		
	7.00		.100		
	8.00	.0283	.191		
	9.00	.0594	.328		
	10.00	.111	.521		
	13.00	.449	1.50		
	16.00	1.18	3.17		
	20.00	2.92	6.48		
	25.00	6.43	12.1		
	30.00	11.3	18.9		
	35.00	17.4	26.3		
	40.00	24.4	33.9		
	50.00	40.4	48.3		
	60.00	58.1	60.6		
	70.00	76.8			
	80.00	96.1			
	90.00	116.			
DELTA K MAX	A: 95.02	126.			
	B: 68.00		68.6		
	C:				
	D:				
ROOT MEAN SQUARE PERCENT ERROR		33.58	34.04		
LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5				
	0.5-0.8				
	0.8-1.25	1	1		
	1.25-2.0	1			
	>2.0	2			

CONDITION/HT:
FORM: 1.00"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 1.00 HZ
ENVIRONMENT: R. T., S. T. W.

YIELD STRENGTH: 183.3 KSI
ULT. STRENGTH: 197.4 KSI
SPECIMEN THK: 0.750- 0.757"
SPECIMEN WIDTH: 4.993- 5.014"
REFERENCES:88575

ALLOY STEEL

10NI STEEL

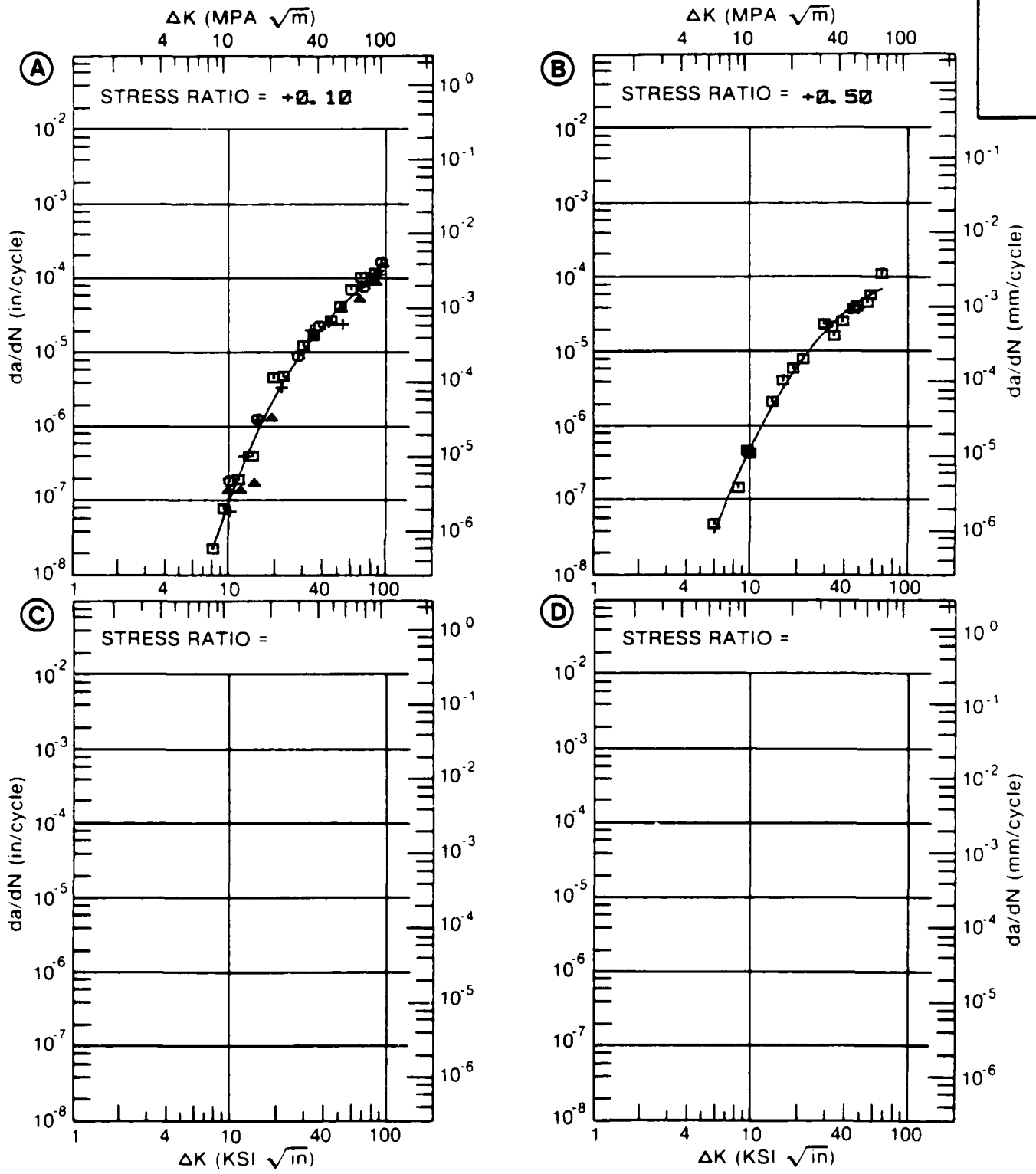


Figure 6.14.3.4

TABLE 6.14.3.5

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.14.3.5 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 10NI STEEL
CONDITION:

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE) A E= R.T. S.T.W.	B	C	D
DELTA K MIN	A: 10.71	.0314			
	B:				
	C:				
	D:				
	13.00	.160			
	16.00	.661			
	20.00	2.21			
	25.00	5.63			
	30.00	10.3			
	35.00	15.5			
	40.00	21.2			
	50.00	33.0			
	60.00	46.0			
	70.00	60.9			
	80.00	79.1			
	90.00	102.			
	100.00	131.			
	130.00	285.			
DELTA K MAX	A: 138.84	360.			
	B:				
	C:				
	D:				

ROOT MEAN SQUARE PERCENT ERROR	28.84

LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT:
FORM: 1.00"TH PLATE
SPECIMEN TYPE: CT
ORIENTATION: T-L
STRESS RATIO: +0.10
FREQUENCY: 1.00 HZ

YIELD STRENGTH: 183.3 KSI
ULT. STRENGTH: 197.4 KSI
SPECIMEN THK: 0.755"
SPECIMEN WIDTH: 5.001"
REFERENCES: 88575

ALLOY STEEL

10NI STEEL

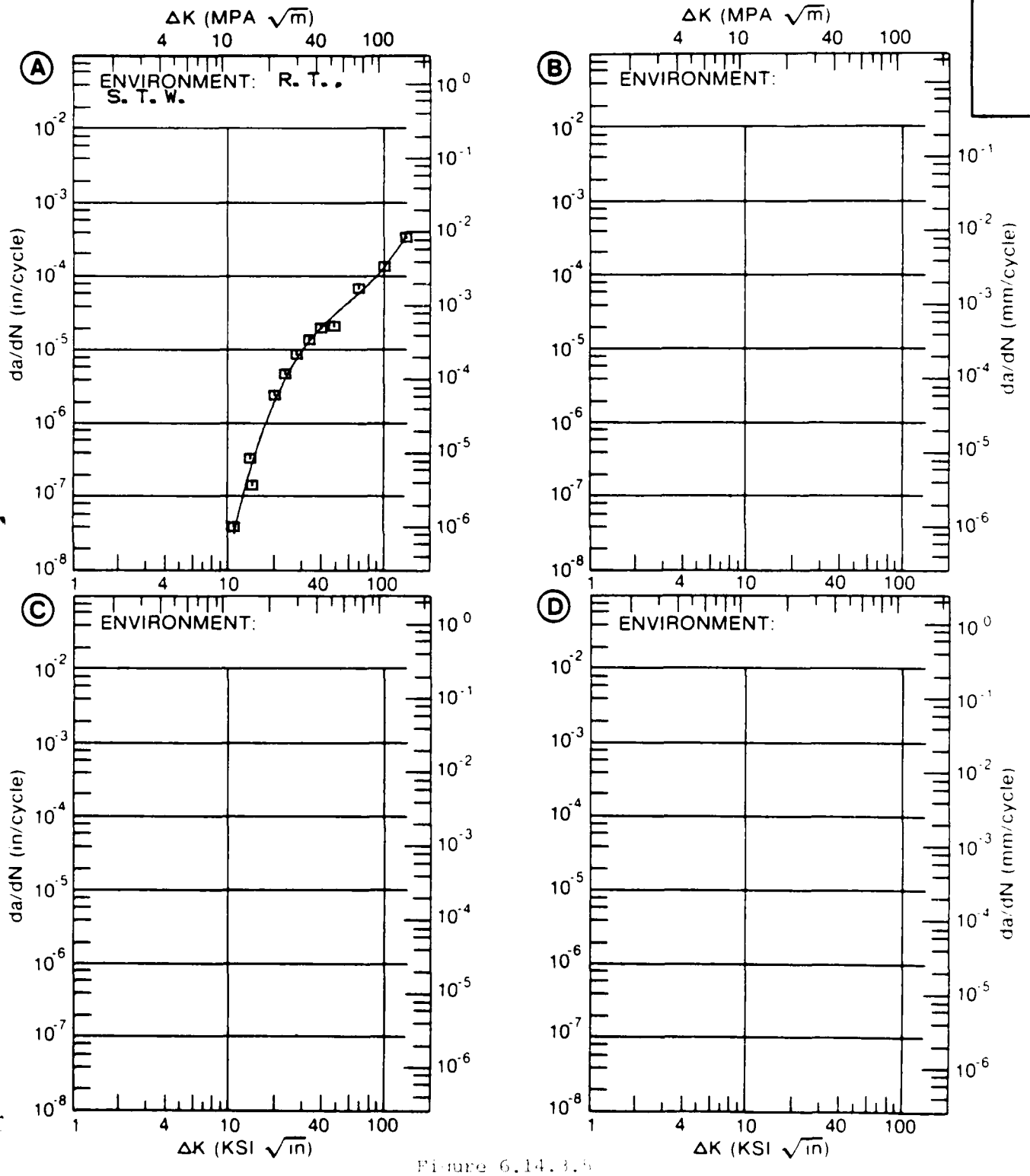


Figure 6.14.3.5

TABLE 6.15.1.1

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL 12-9-2 MAR

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT LAB AIR AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2 5	5	10	20	50	100
STA 900	ROUND BAR	0 10	10 00					8 17		
STA 900	ROUND BAR	0 10	30 00				0 14	8 92		

TABLE 6.15.2.1

ALLOY STEEL 12-9-2(MAR) K(IC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5*(K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
STA 900	BR	3.00	R.T.	L-T	251.3	2.005	0.958	CT	0.942	0.03	29.60			1979	DA001

TABLE 6.15.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.15.3.1 INDICATING EFFECT

OF FREQUENCY

MATERIAL: ALLOY STEEL 12-9-2 MAR
CONDITION: STA 900
ENVIRONMENT: R.T. ,LAB AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			F(HZ)= 10.00 SP. THK. =.503"	F(HZ)= 30.00 SP. THK. =.253"		
DELTA K MIN	A:	12.68	.730			
	B:	6.95		.014		
	C:	6				
	D:					
		7.00		.0154		
		8.00		.0401		
		9.00		.0829		
		10.00		.149		
		13.00	.863	.581		
		16.00	2.68	1.86		
		20.00	8.17	8.92		
DELTA K MAX	A:	23.91	27.8			
	B:	21.41		15.9		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			11.25	14.09		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT STA 900
FORM: 3.00"TH ROUND BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.10
ENVIRONMENT: R.T., LAB AIR

YIELD STRENGTH: 251.3 KSI
ULT. STRENGTH: 257.3 KSI
SPECIMEN THK:
SPECIMEN WIDTH: 1.990- 1.991"
REFERENCES: DA001

ALLOY STEEL

12-9-2 MAR

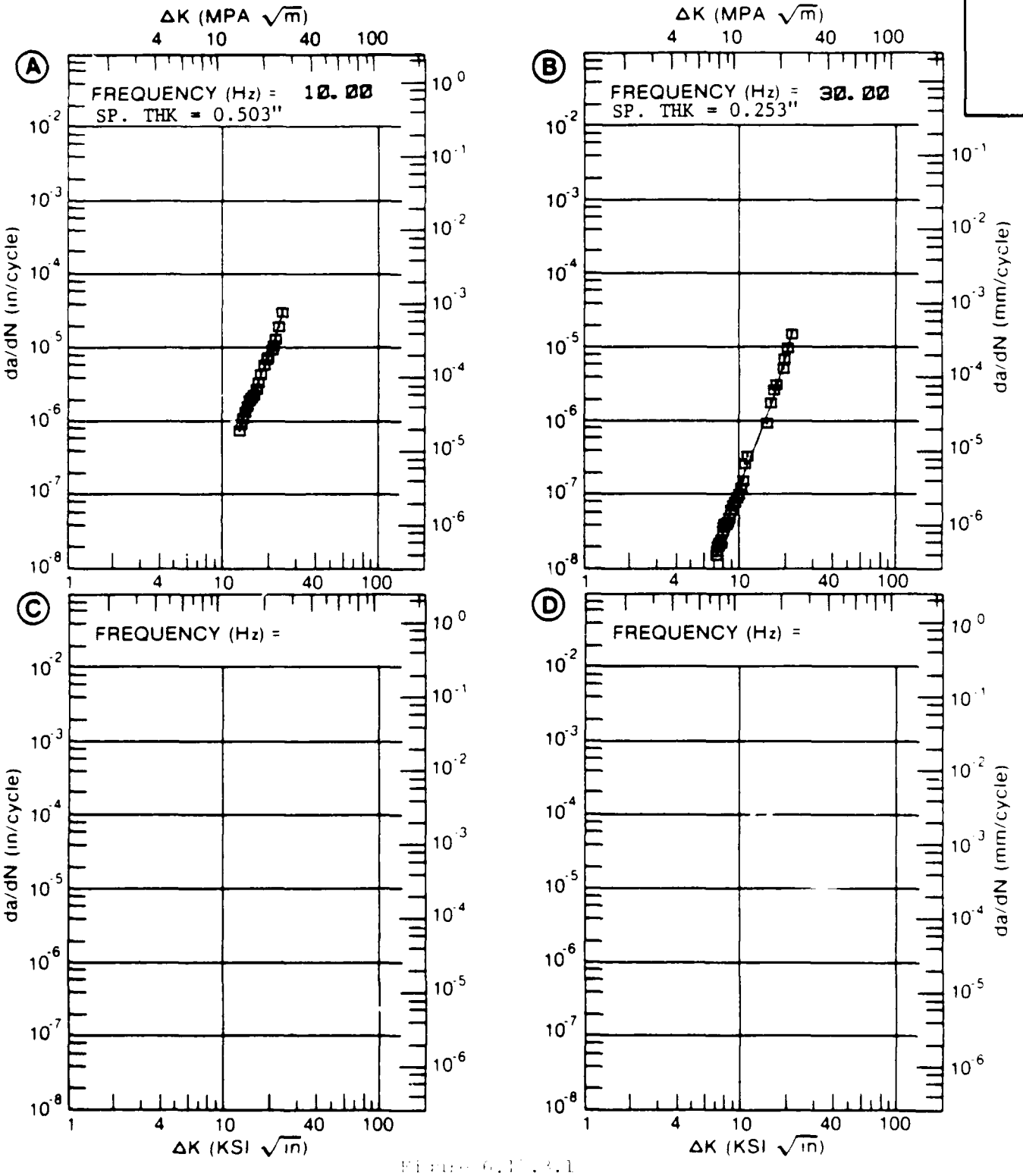


Figure 6.1-2.1

TABLE 6.16.3.1

ALLOY STEEL 12NI-5CR-3MO K(ISCC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN (*=SG)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
	--	-	R T	--	---	SYNTH SEAWATER	----	----	CANT	----	------	38 00			----	1969	74232
	--	-		---	184 0		----	----	--	----	------	50 00			----	1969	74232
													44 0/	8 5			
		---	R T	T-S	185 0	3 5 PCT NACL	----	----	CANT	----	135 00	83 00			4800	1967	70887
	- P	1 00	R T	---	185 0	3 5 PCT NACL	3 200	1 000	WOL *	1 520	95 80	43 60			----	1969	84317
		1 00		- -	185 0		----	----	CANT*	----	138 00	44 00			----	1969	84317
		1 00		- -	170 0		3 200	1 000	WOL *	1 520	85 00	52 00			----	1969	84317
		1 00		---	170 0		----	----	CANT*	----	123 00	50 00			----	1969	84317
													47 4/	4 2			
ELECTRIC [illegible]	P	1 00	R T	---	176 0	SYNTH SEAWATER	1 000	1 000	CANT*	----	130 00	40 00			> 60000	1966	65166
STA WELDED	W	-- -	R T	--	178 0	SYNTH SEAWATER	----	----	--	----	------	33 00			----	1969	74232
LOW-RESIDUAL	P	1 00	R T	---	183 0	SYNTH SEAWATER	1 000	1 000	CANT*	---	169 00	108 00			> 60000	1966	65166
[illegible] 150 KSI	P	1 00	R T	---	150 0	3 5 PCT NACL	----	1 000	CANT*	---	150 00	130 00*			----	1972	83613
[illegible] 160 KSI	P	1 00	R T	---	160 0	3 5 PCT NACL	----	1 000	CANT*	----	205 00	130 00*			----	1972	83613
[illegible] 170 KSI	P	1 00	R T	---	170 0	3 5 PCT NACL	---	1 000	CANT*	----	155 00	110 00*			----	1972	83613
[illegible] 175 KSI	P	1 00	R T	---	175 0	3 5 PCT NACL	----	1 000	CANT*	----	140 00	105 00*			----	1972	83613

*NOTE DATA WHICH DO NOT MEET MINIMUM SPECIMEN THICKNESS REQUIREMENTS OF 2 5(KISCC/TYS)SQUARED

TABLE 6.16.3.1 (Cont't)

ALLOY STEEL 12NI-5CR-3MO K(ISCC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN (*=SC)	CRACK LENGTH (IN) A	K(0) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
1500F,900F 20HR AC	P	1.00	R T	L-S	176.0	3.5 PCT NACL	2.500	0.500	CANT*	----	249.00	80.00			----	1970	84342
1500F,900F 20HR AC	P	1.00	R T	T-S	176.0	3.5 PCT NACL	2.50	0.500	CANT*	----	246.00	70.00			----	1970	84342

TABLE 6.17.3.1

ALLOY STEEL 18NI(180)(MAR) K(ISCC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN (*=SG)	CRACK LENGTH (IN) A	K(0) (KSI*SQRT IN)	K(ISCC) MEAN (KSI*SQRT IN)	STAN DEV	TEST TIME (MIN)	DATE	REFER
[illegible]	P	1.00	R T	- -	170.0	3.5 PCT NACL	----	1.000	CANT*	----	160.00	140.00*		----	1972	83613
[illegible]	P	1.00	R T	- -	175.0	3.5 PCT NACL	----	1.000	CANT*	----	160.00	125.00*		----	1972	83613
[illegible]	P	1.00	R T	---	178.0	SYNTH SEAWATER	1.000	1.000	CANT*	----	118.00	108.00		> 60000	1966	65166
[illegible]	P	1.00	R T	- -	185.0	3.5 PCT NACL	----	1.000	CANT*	----	180.00	130.00*		----	1972	83613
[illegible]	P	1.00	R T	-	190.0	3.5 PCT NACL	----	1.000	CANT*	----	170.00	120.00*		----	1972	83613
[illegible]	P	1.00	R T	---	175.0	3.5 PCT NACL	----	1.000	CANT*	----	165.00	60.00		----	1972	83613
[illegible]	P	1.00	R T	- -	200.0	3.5 PCT NACL	----	1.000	CANT*	----	190.00	105.00		----	1972	83613
[illegible]	P	- -	R T	1-S	177.0	SEAWATER	----	----	CANT	----	------	143.00*		----	1971	81004
[illegible]	P	1.00	R T	T S	177.0	3.5 PCT NACL	----	----	CANT	----	------	130.00*		> 30000	1971	81004

*NOTE DATA WHICH DO NOT MEET MINIMUM SPECIMEN THICKNESS REQUIREMENTS OF 2.5(KISCC/TYS)SQUARED

TABLE 6.18.1.1

MEAN PLANE STRAIN FRACTURE TOUGHNESS DATA OF
ALLOY STEEL 18NI(200)(MAR) AT ROOM TEMPERATURE

CONDITION/HT	MEAN KIC ± STANDARD (KSI SQRT(IN)) DEVIATION	(NUMBER OF SPECIMENS)	
PLATE			
CONDITION/HT	L-T	T-L	S-L
1650F 4.5 HR, AC, AGED 1000F 6 HR	102.3 ± 1.2 (3)	-----	-----
1650F 4.5 HR, AC, AGED 950F 24 HR	99.3 ± 1.2 (3)	-----	-----
1650F 4.5 HR, AC, AGED 900F 24 HR	96.5 ± 0.7 (2)	-----	-----
FORGING			
CONDITION/HT	L-T	T-L	S-L
1650F 4.5 HR, AC, AGED 900F 6 HR	100.3 ± 0.6 (3)	-----	-----

TABLE 6.18.2.1

ALLOY STEEL 18NI(200)(MAR) K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	------SPECIMEN------ WIDTH (IN) W	THICK (IN) B	DESIGN	CRACK LENGTH (IN) A	2.5*(K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	STAN DEV	DATE	REFER
1650F 4 5 HR, AC, AGED 1000F 4 HR	P	4.25	R.T.	L-T	211.0	4.700	2.400	CT	2.400	0.60	103.00			1972	83834 (1)
		4.25			211.0	6.310	3.900	CT	3.220	0.60	103.00			1972	83834 (1)
		4.25			211.0	7.900	3.900	NB	3.930	0.57	101.00			1972	83834 (1)
												102.3/	1.2		
1650F 4 5 HR, AC, AGED 950F 24 HR	P	4.25	R.T.	L-T	216.0	7.870	3.900	NB	3.930	0.54	100.00			1972	83834 (1)
		4.25			216.0	4.720	2.400	CT	2.390	0.54	100.00			1972	83834 (1)
		4.25			216.0	6.300	3.940	CT	3.940	0.54	98.00			1972	83834 (1)
												99.3/	1.2		
1650F 4 5 HR, AC, AGED 900F 24 HR	P	4.25	R.T.	L-T	219.0	4.730	2.400	CT	2.390	0.48	96.00			1972	83834 (1)
		4.25			219.0	7.890	3.900	NB	3.940	0.49	97.00			1972	83834 (1)
												96.5/	0.7		
1650F 4 5 HR, AC, AGED 900F 6 HR	F	3.00	R.T.	L-T	210.0	6.300	3.900	CT	3.180	0.57	100.00			1972	83834 (1)
		3.00			210.0	4.700	2.400	CT	2.360	0.58	101.00			1972	83834 (1)
		3.00			224.0	7.900	3.900	CT	3.880	0.57	100.00			1972	83834 (1)
												100.3/	0.6		
1650F, 4 5 HR, AC, AGED 850F 24 HR	F	3.00	R.T.	L-T	224.0	6.300	3.900	CT	3.160	0.33	81.00			1966	76411 (1)

NOTES
(1) VACUUM ARC REMELTED

TABLE 6.18.3.1

ALLOY STEEL 18NI(200)(MAR) K(ISCC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN (*=SQ)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC) MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
----------	P	0.50	R.T.	L-T	207.0	UNSYMMETRICAL DIMETYL HYDROZINE	5.500	0.500	TDCB	----	110.00	110.00*		> 47500	----	80667
TYS=215KSI	P	1.00	R.T.	---	215.0	3.5 PCT NACL	----	1.000	CANT*	----	125.00	70.00		----	1972	83613
WELD CENTER LINE	P	----	R.T.	L-S	215.0	3.5 PCT NACL	----	----	CANT	----	115.00	70.00		19000	1967	70887
1500F 1HR AC	P	1.00	R.T.	T-S	219.0	3.5 PCT NACL	----	----	CANT	----	-------	39.00		> 20000	1971	80824
700F 3HR		1.00			219.0		----	----	CANT	----	-------	94.00*		> 60000	1971	81004
1650F 700F 3HR AC	P	1.00	R.T.	---	197.0	3.5 PCT NACL	2.500	0.500	CANT*	----	231.00	104.00*		----	1970	84342
1675F 2HR AC 500F,15MIN 850F 4HR COOL 250F/MIN	P	----	R.T.	T-S	197.5	3.5 PCT NACL	0.938	0.750	CANT*	0.250	144.00	78.00		> 30000	1967	69162
1675F 2HR AC 500F,0.25HR 850F 4HR,COOL 250F/MIN	P	0.94	R.T.	T-S	192.6	3.5 PCT NACL	0.938	0.750	CANT*	0.250	146.00	48.00		> 39000	1967	69162

*NOTE DATA WHICH DO NOT MEET MINIMUM SPECIMEN THICKNESS REQUIREMENTS OF 2.5(KISCC/TYS)SQUARED

TABLE 6.19.1.1

MEAN PLANE STRAIN FRACTURE TOUGHNESS DATA OF
ALLOY STEEL 18NI(250)(MAR) AT ROOM TEMPERATURE

CONDITION/HT	MEAN KIC ± STANDARD (KSI SQRT(IN)) DEVIATION	(NUMBER OF SPECIMENS)

PLATE

CONDITION/HT	L-T	T-L	S-L
1500F AC, 850F 6 HR	76.0 ± 1.9 (5)	-----	-----
1500F AC, 900F 24 HR	80.7 ± 1.2 (6)	-----	-----
1500F AC, 950F 6 HR	84.0 ± 2.6 (6)	-----	-----
1500F, AC, 900F 6 HR	82.3 ± 3.2 (6)	-----	-----

BILLET

CONDITION/HT	L-T	T-L	S-L
1500F 1HR, AC, AGED 900F 3HR, AC	74.3 ± 4.2 (7)	64.1 ± 4.4 (6)	-----

TABLE 6.19.2.1

ALLOY STEEL 18NI(250)(MAR) K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	-------SPECIMEN------- WIDTH (IN) W	THICK (IN) B	DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
1500F AC,850F 4 HR	P	4.25	R.T.	L-T	253.0	3.750	1.800	NB	1.800	0.22	73.00			1972	83834
		4.25			253.0	3.000	1.800	CT	1.800	0.22	76.00			1972	83834
		4.25			253.0	3.000	1.800	CT	1.800	0.24	78.00			1972	83834
		4.25			253.0	3.000	1.800	CT	1.800	0.23	77.00			1972	83834
		4.25			253.0	3.750	1.800	NB	1.800	0.22	76.00	76.0/	1.9	1972	83834
1500F AC,900F 24 HR	P	2.00	R.T.	L-T	259.0	3.000	1.800	CT	1.800	0.24	81.00			1968	73612
		2.00			259.0	3.000	1.800	CT	1.800	0.25	82.00			1968	73612
		2.00			259.0	3.750	1.800	NB	1.800	0.24	80.00			1968	73612
		2.00			259.0	3.750	1.800	NB	1.800	0.25	82.00			1968	73612
		2.00			259.0	3.750	1.800	NB	1.800	0.23	79.00			1968	73612
		2.00			259.0	3.000	1.800	CT	1.800	0.24	80.00	80.7/	1.2	1968	73612
1500F AC,950F 4 HR	P	2.00	R.T.	L-T	252.0	3.750	1.800	NB	1.800	0.32	89.00			1968	73612
		2.00			252.0	3.000	1.800	CT	1.800	0.28	84.00			1968	73612
		2.00			252.0	3.000	1.800	CT	1.800	0.27	83.00			1968	73612
		2.00			252.0	3.000	1.800	CT	1.800	0.26	82.00			1968	73612
		2.00			252.0	3.750	1.800	NB	1.800	0.26	82.00			1968	73612
		2.00			252.0	3.750	1.800	NB	1.600	0.28	84.00	84.0/	2.6	1968	73612
1500F 1HR,AC, AGED 900F 3HR, AC	BT	12.00	R.T.	L-T	231.0	2.000	1.020	NB	----	0.26	74.90			1974	90981 (1)
		12.00			231.0	2.000	1.020	NB	----	0.24	70.90			1974	90981 (1)
		12.00			233.0	1.000	0.500	CT	----	0.25	73.40			1974	90981 (1)
		1.00			233.0	2.000	1.020	NB	----	0.24	72.20			1974	90981 (1)
		12.00			233.0	2.000	1.020	NB	----	0.22	69.60			1974	90981 (1)
		12.00			233.0	1.000	0.500	CT	----	0.27	77.20			1974	90981 (1)
		12.00			233.0	1.000	0.500	CT	----	0.31	81.80			1974	90981 (1)
												74.3/	4.2		
1500F 1HR,AC, AGED 900F 3HR, AC	BT	12.00	R.T.	T-L	232.0	2.000	1.020	NB	----	0.22	69.10			1974	90981 (1)
		12.00			232.0	1.000	0.500	CT	----	0.20	65.00			1974	90981 (1)
		12.00			232.0	1.000	0.500	CT	----	0.22	69.20			1974	90981 (1)
		12.00			232.0	2.000	1.020	NB	----	0.16	57.00			1974	90981 (1)
		12.00			232.0	2.000	1.020	NB	----	0.17	61.00			1974	90981 (1)

NOTES
(1) COMPOSITION(WT PERCENT) 0.014C,0.08ZMN,0.006P,0.07SI,18.6NI,0.10CR,4.75MO0.6 41TI,0.11AL

TABLE 6.19.2.1 (Con't)

ALLOY STEEL 18NI(250)(MAR) K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	-------SPECIMEN------ WIDTH (IN) W	THICK (IN) B	DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	STAN DEV	DATE	REFER
1500F 1HR, AC, AGED 900F 3HR, AC	BT	12.00	R.T.	T-L	232.0	1.000	0.500	CT	----	0.17	61.20	64.1/	4.4	1974	90981 (1)
1500F, AC, 900F 6 HR	P	2.00	R.T.	L-T	259.0	3.000	1.800	CT	1.800	0.23	79.00			1968	73612
		2.00			259.0	3.750	1.800	NB	1.800	0.24	81.00			1968	73612
		2.00			259.0	3.750	1.800	NB	1.800	0.26	84.00			1968	73612
		2.00			259.0	3.000	1.800	CT	1.800	0.24	81.00			1968	73612
		2.00			259.0	3.000	1.800	CT	1.800	0.24	81.00			1968	73612
		2.00			259.0	3.750	1.800	NB	1.800	0.29	88.00	82.3/	3.2	1968	73612

NOTES
(1) COMPOSITION(WT PERCENT) 0.014C, 0.087MN, 0.006P, 0.07SI, 18.6NI, 0.10CR, 4.75MOO, 0.41TI, 0.11AL

TABLE 6.19.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.19.3.1 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 18NI(250)MAR
CONDITION: TUS=243KSI

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE) A	B	C	D
			E= R. T. 3. 5%NACL			
DELTA K MIN	A:	11. 39	2. 23			
	B:					
	C:					
	D:					
		13. 00	5. 05			
		16. 00	11. 1			
		20. 00	18. 0			
		25. 00	27. 5			
		30. 00	42. 7			
		35. 00	66. 9			
		40. 00	94. 2			
DELTA K MAX	A:	45. 03	113.			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 12. 81

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0. 0-0. 5	
	0. 5-0. 8	
	0. 8-1. 25	
	1. 25-2. 0	1
	>2. 0	

CONDITION/HT: TUS=243KSI
FORM: 12.00"TH BILLET
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.10
FREQUENCY: 1.00 HZ

YIELD STRENGTH: 232.7 KSI
ULT. STRENGTH: 243.5 KSI
SPECIMEN THK: 1.001"
SPECIMEN WIDTH: 2.554"
REFERENCES: 90981

ALLOY STEEL

18NI (250) MAR

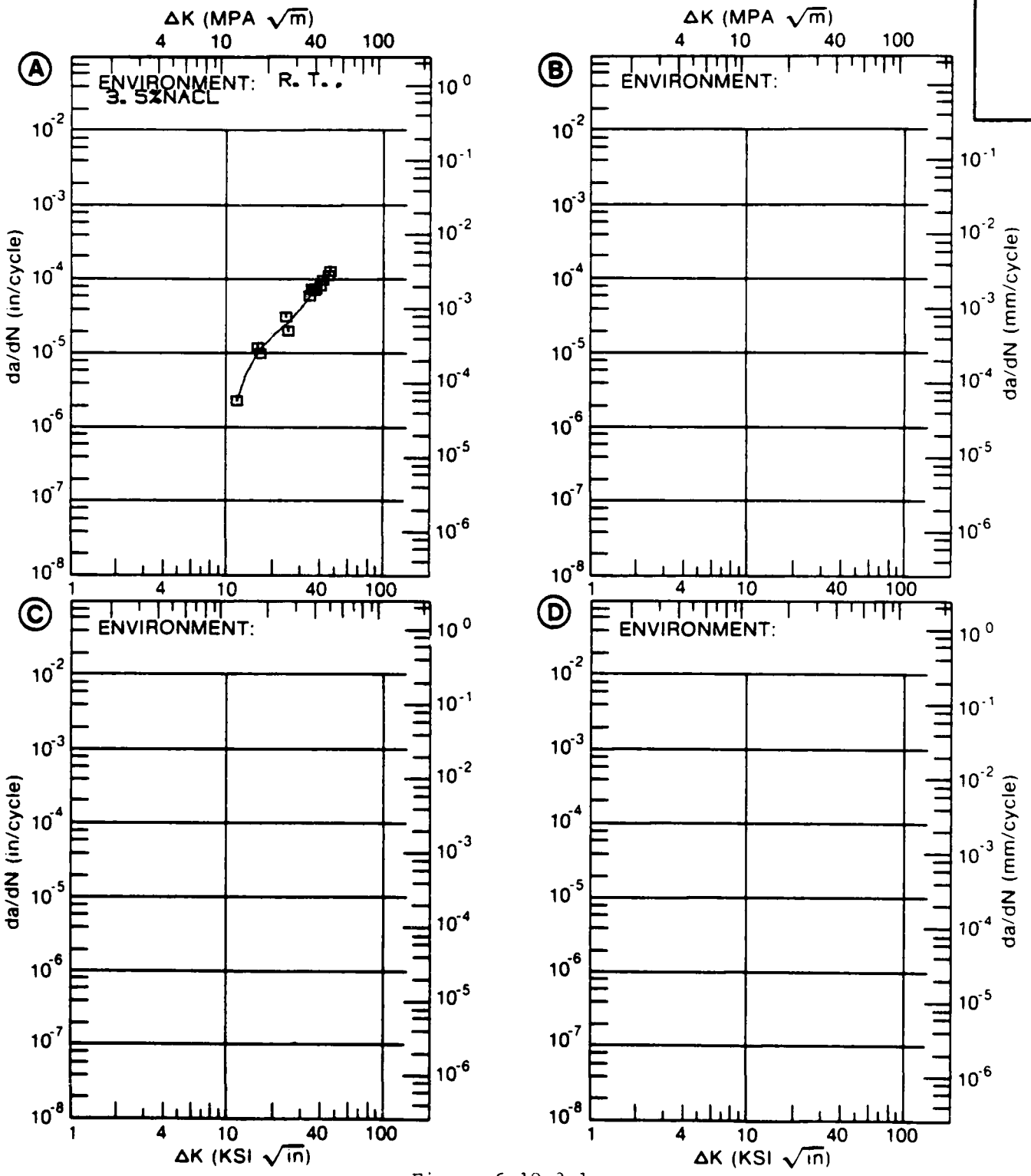


Figure 6.19.3.1

TABLE 6.19.3.2

FATIQUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.19.3.2 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 18NI(250)MAR
CONDITION: TUS=243KSI

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE) A E= R.T. LAB AIR	B E= R.T. 3.5%NACL	C	D
DELTA K MIN	A: 7.69	.290			
	B:				
	C:				
	D:				
	8.00	.373			
	9.00	.716			
	10.00	1.16			
	13.00	2.73			
	16.00	4.21			
	20.00	5.91			
	25.00	8.16			
	30.00	11.4			
	35.00	16.7			
	40.00	25.7			
	50.00	71.0			
DELTA K MAX	A: 52.78	97.0			
	B:				
	C:				
	D:				
ROOT MEAN SQUARE PERCENT ERROR		121.19	0.00		

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	
	1.25-2.0	
	>2.0	1

CONDITION/HT: TUS=243KSI
FORM: 12.00"TH BILLET
SPECIMEN TYPE: CT
ORIENTATION: T-L
STRESS RATIO: +0.10
FREQUENCY: 10.00 HZ

YIELD STRENGTH: 231.8 KSI
ULT. STRENGTH: 243.0 KSI
SPECIMEN THK: 1.000- 1.001"
SPECIMEN WIDTH: 2.553"
REFERENCES: 90981

ALLOY STEEL

18NI (250) MAR

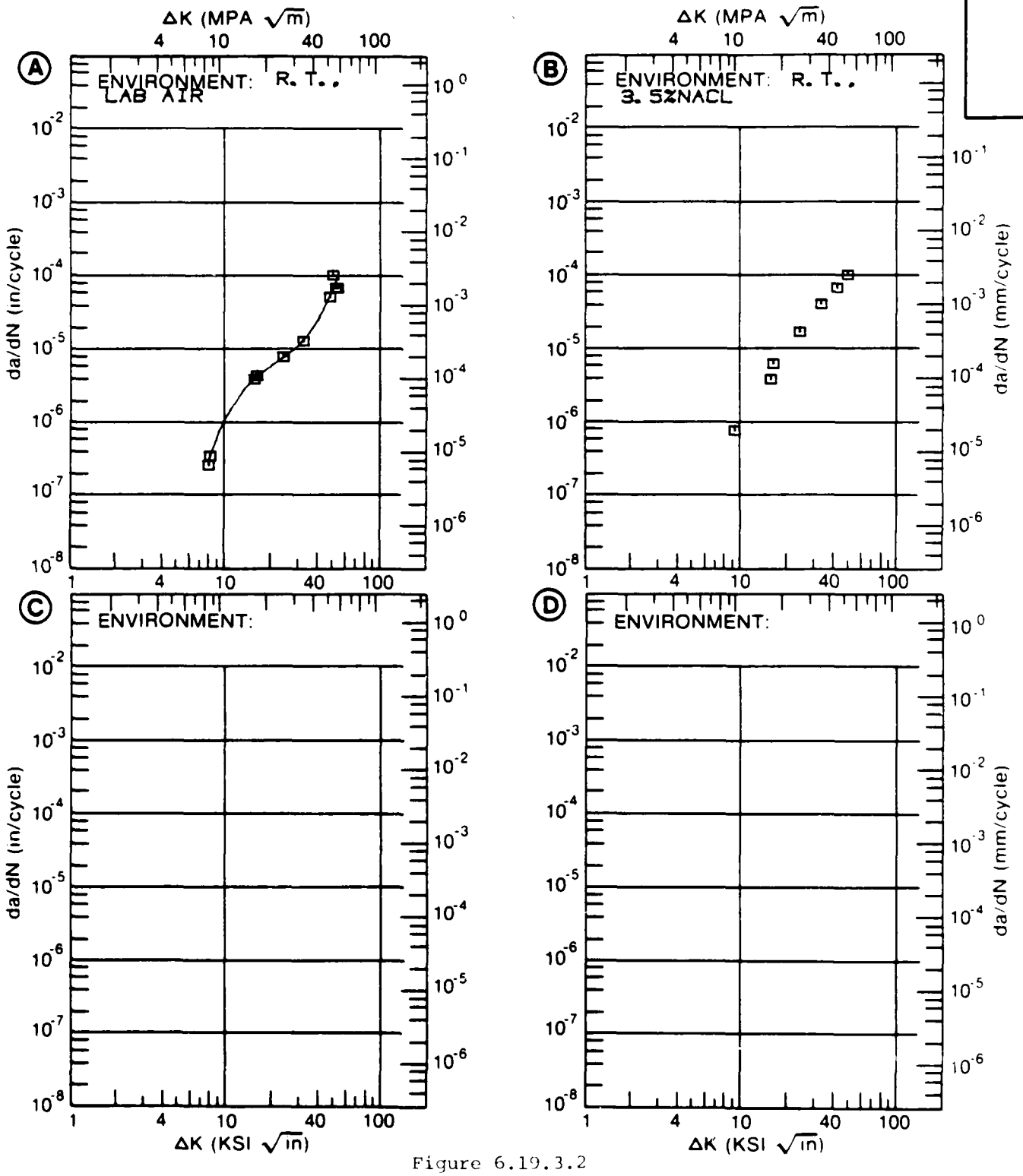


Figure 6.19.3.2

TABLE 6.19.3.3

SUSTAINED CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.19.3.3 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 18NI(250)
CONDITION:

K MAX (KSI*IN**1/2)		DA/DT (10**-3 IN/HOUR)			
		A	B	C	D
		E= 3.5% NACL			
K MAX MIN	A:				
	B:				
	C:				
	D:				
200.00					
K MAX MAX	A:				
	B:				
	C:				
	D:				

ROOT MEAN SQUARE PERCENT ERROR 0.00

CONDITION/HT:
FORM:
SPECIMEN TYPE: TDCB
ORIENTATION:
YIELD STRENGTH:
ULT STRENGTH:

SPECIMEN THK:
SPECIMEN WIDTH:
CRACK LENGTH (A_O):
K_{ISCC}:
REFERENCES:78313

ALLOY STEEL

18NI (250)

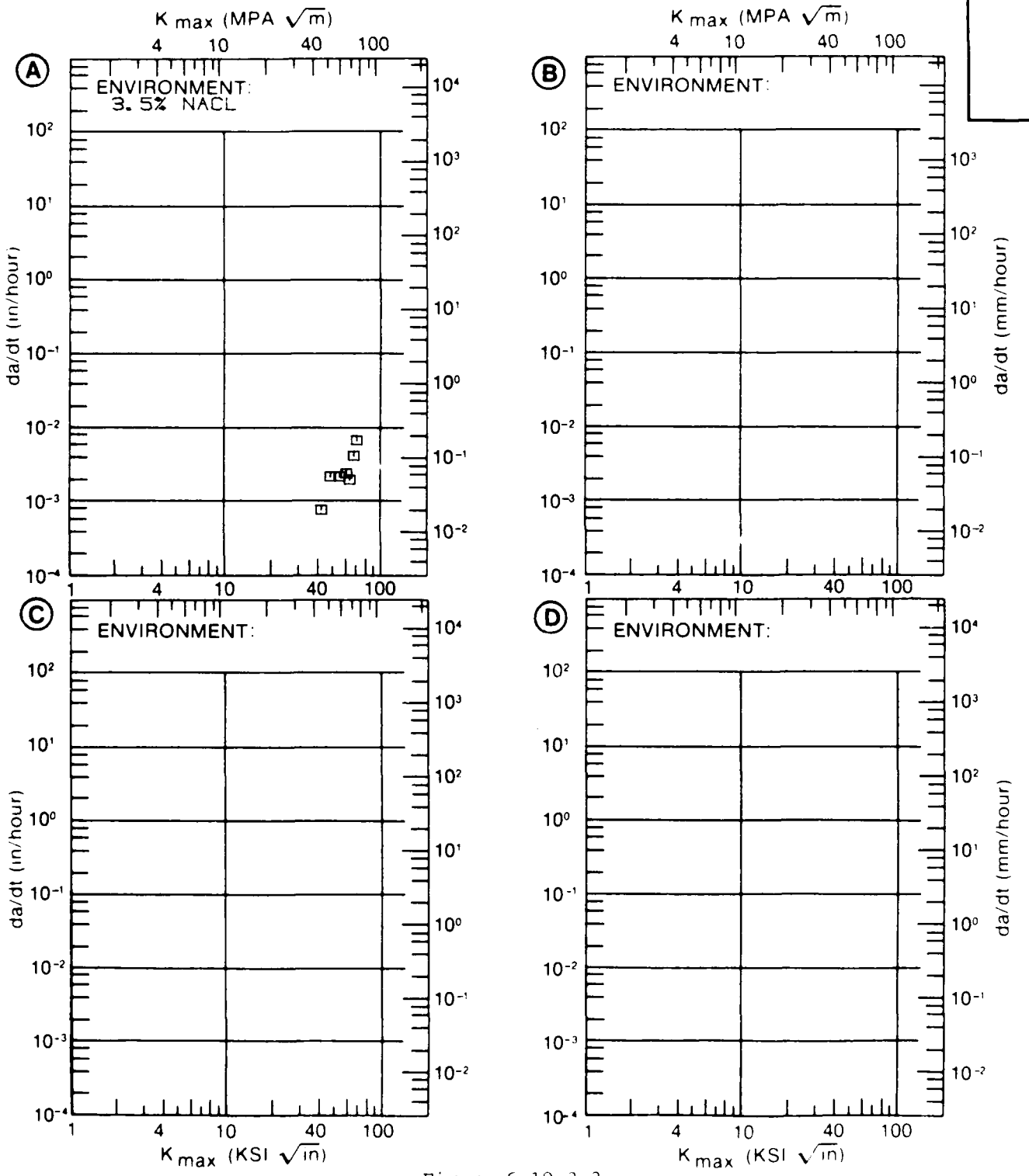


Figure 6.19.3.3

TABLE 6.19.3.4

SUSTAINED CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.19.3.4 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 18NI(250)
CONDITION:

K MAX (KSI*IN**1/2)			DA/DT (10**-3 IN/HOUR) A E= DEHUMIDIFIED HYDROGEN	DA/DT (10**-3 IN/HOUR) B E= HYDROGEN	DA/DT (10**-3 IN/HOUR) C	DA/DT (10**-3 IN/HOUR) D
K MAX MIN	A:	18.00	1494.			
	B:	23.10		1403.		
	C:					
	D:					
		20.00	4145.			
		25.00	8724.	2376.		
		30.00		5529.		
		35.00		8306.		
		40.00		10206.		
		50.00		12754.		
K MAX MAX	A:	29.20	11124.			
	B:	52.70		13502.		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			9.07	2.81		

CONDITION/HT:
FORM: Ø.3"TH PLATE
SPECIMEN TYPE: CNT
ORIENTATION:
YIELD STRENGTH: 246.Ø KSI
ULT STRENGTH:

SPECIMEN THK: Ø.25Ø"
SPECIMEN WIDTH 2.75Ø"
CRACK LENGTH (A_O):
K_{ISCC}:
REFERENCES 7Ø887, 84310

ALLOY STEEL

18NI (25Ø)

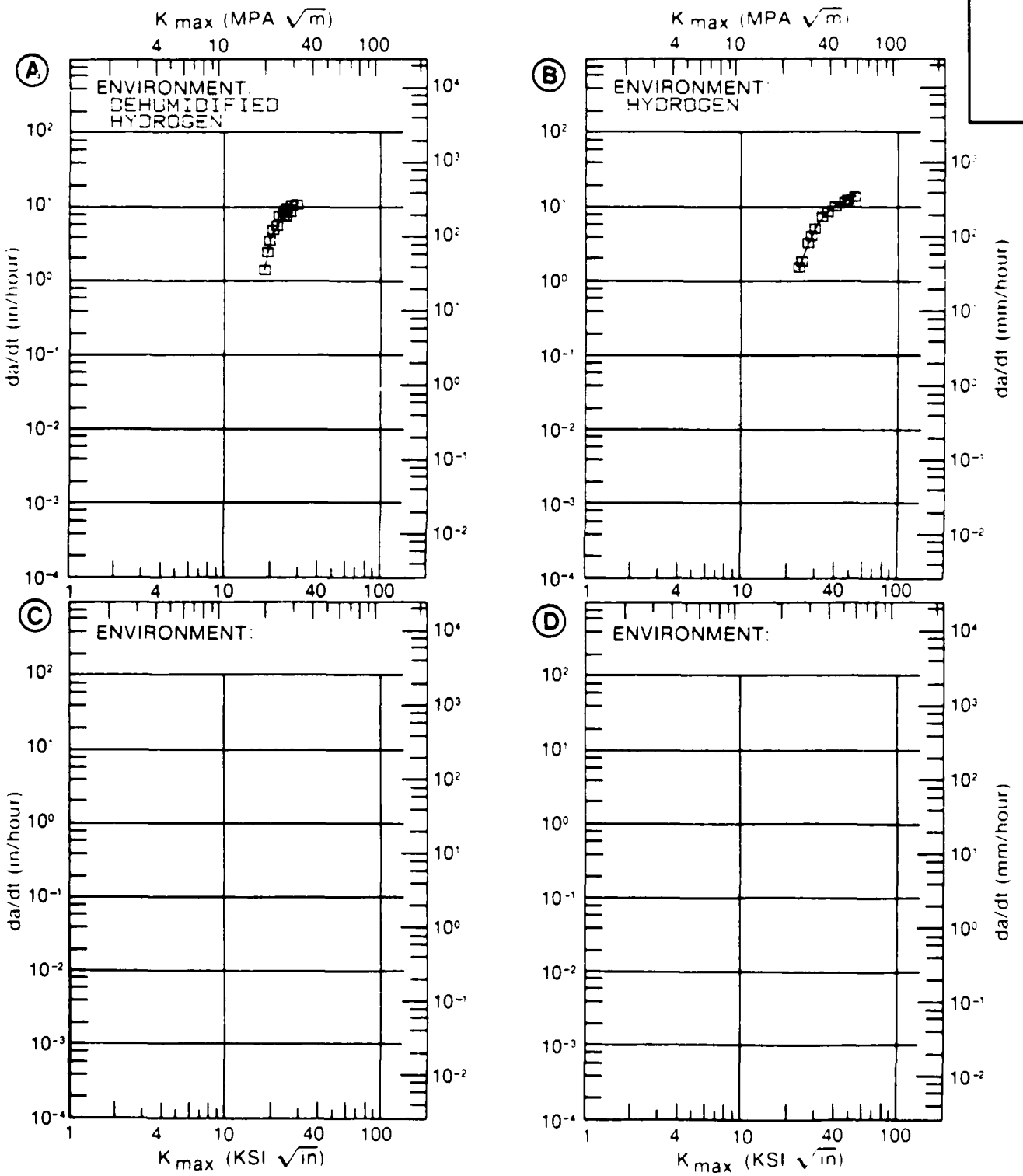


Figure 6.19.3.4

TABLE 6.19.3.5

ALLOY STEEL 18NI(250)(MAR) K(ISCC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN (*=SC)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
----------	P	----	R.T.	---	259.0	SYNTH SEAWATER	----	----	--	----	------	36.50			----	1969	74232
		1.00		---	252.0		1.000	1.000	CANT*	----	72.60	49.00			> 30000	1966	65166
		1.25		---	259.0		0.500	1.000	CANT*	0.170	68.00	21.00			> 60000	1968	73829
		1.25		---	259.0		1.000	1.000	CANT*	0.350	78.00	37.00			> 60000	1968	73829
		1.25		---	259.0		3.000	1.000	CANT*	1.050	93.00	35.00			> 60000	1968	73829
		1.25		---	259.0		5.000	1.000	CANT*	1.750	95.00	38.00			> 60000	1968	73829
													36.1/	8.9			
AGE 900F 3HR	P	0.48	R.T.	L-T	249.0	3.5 PCT NACL	1.500	0.480	NB	----	92.00	45.00			----	1971	84351
AGED 900F 3HR	P	0.50	R.T.	L-S	----	3.5 PCT NACL	0.482	0.375	CANT	----	------	31.00			> 5000	1971	80824
AC		0.50			----		0.500	0.375	CANT*	----	------	50.00			7000	1971	80824
													40.5/	13.4			
TYS=250KSI	P	1.00	R.T.	---	250.0	3.5 PCT NACL	----	1.000	CANT*	----	70.00	50.00			----	1972	83613
TYS=260KSI	P	1.00	R.T.	---	260.0	3.5 PCT NACL	----	1.000	CANT*	----	95.00	70.00			----	1972	83613
1650F 1.25HR	P	1.25	R.T.	---	259.0	SYNTH SEAWATER	1.000	1.000	CANT*	----	78.00	37.00			----	1970	78065
WQ,1525F		1.25		---	259.0		3.000	1.000	CANT*	----	93.00	35.00			----	1970	78065
1.25HR WQ,900F 3HR AC													36.0/	1.4			
1650F 1.25HR WQ,1525F 1.25HR WQ 900F 3HR AC	P	1.25	R.T.	---	259.0	SYNTH SEAWATER	5.000	1.000	CANT*	----	95.00	38.00			----	1970	78065
900F 2HR AC	S	0.08	R.T.	---	228.0	DIST. WATER	2.000	0.050	CNT	----	------	110.00*			> 30000	1968	72283

*NOTE-DATA WHICH DO NOT MEET MINIMUM SPECIMEN THICKNESS REQUIREMENTS OF 2.5(KISCC/TYS)SQUARED

TABLE 6.19.3.5 (Con't)

ALLOY STEEL 18NI(250)(HAR) K(ISCC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	------SPECIMEN-------- WIDTH (IN) W	THICK (IN) B	DESIGN (*=SC)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
900F 2HR AC	S	0.08	R.T.	---	228.0	3.5 PCT NACL	2.000	0.030	CNT	----	------	110.00*			20000	1968	72283

*NOTE-DATA WHICH DO NOT MEET MINIMUM SPECIMEN THICKNESS REQUIREMENTS OF 2.5(KISCC/TYS)SQUARED

TABLE 6.20.3.1

ALLOY STEEL 18NI(280)(MAR) K(ISCC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	------SPECIMEN-------- WIDTH (IN) W	THICK (IN) B	DESIGN (*=SG)	CRACK LENGTH (IN) A	K(G) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
1500F 1HR AC 900F 3HR	P	----	R.T	---	277.0	3.5 PCT NACL	0.750	0.750	CANT	----	60.00	14.00			14400	1971	82164

TABLE 6.21.1.1

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL 18NI(300)MAR

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT H H A AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
-----	FORGING	0.05	2.00						22.2	
	FORGING	0.67	2.00				1.51	9.38		

TABLE 6.21.2.1

ALLOY STEEL 18NI(300)(MAR) K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	------SPECIMEN------ WIDTH (IN) W	THICK (IN) B	DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	STAN DEV	DATE	REFER
1700F 1HR,AC, 1500F 1 HR,AC, 900F 6 HR	F	10.00	- 65	L-R	----	1.000	0.500	NB	0.500	----	54.00			1970	78425
1700F 1HR,AC, 1500F 1 HR,AC, 900F 6 HR	F	10.00 10.00	R.T.	L-R	280.0 300.0	1.000 1.000	0.500 0.500	NB NB	0.500 0.500	0.16 0.11	71.20 64.20	67.7/	4.9	1970 1970	78425 78425
1700F 1HR,AC, 1500F 1 HR,AC, 900F 6 HR	F	10.00 10.00	R.T.	R-C	280.0 299.0	1.000 1.000	0.500 0.500	NB NB	0.500 0.500	0.18 0.11	75.50 62.50	69.0/	9.2	1970 1970	78425 78425
900 F AGED	P	1.00	R.T	L-T	276.0	0.800	0.400	CT	0.400	----	----			1971	86582 (1)

NOTES:
(1) COMPOSITION(WT PERCENT) 0.017C, 0.05MN, 0.004P, 0.007S, 0.09SI, 18.8NI, 4.95MO, 7.2CB, 0.58TI, 0.13AL

TABLE 6.21.2.2

ALLOY STEEL 18NI(300)MAR K(C)

CONDITION	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) S(O)	GROSS STRESS MAX (KSI) S(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																			
----------	S	0.03	- 423	L-T	386.0	4.000	0.026	1.250	1.290	---	63.80	95.20			97.12			1964	60578
		0.03			386.0	4.010	0.029	1.250	1.400	---	56.50	84.28			90.70			1964	60578
		0.03			386.0	4.010	0.028	1.230	1.230	---	55.80	82.39			82.39			1964	60578
		0.03			386.0	4.010	0.029	1.250	1.250	---	55.00	82.04			82.04			1964	60578
		0.03			386.0	4.020	0.028	1.170	1.170	---	55.80	79.86	84 8/ 6.0		79.86	86.4/ 7.3		1964	60578
----------	S	0.03	- 320	L-T	336.0	2.020	0.025	0.590	0.590	---	150.00	152.50			152.50			1964	60578
		0.03			336.0	2.020	0.025	0.590	0.590	---	141.00	143.35			143.35			1964	60578
		0.03			336.0	2.020	0.025	0.590	0.590	---	141.00	143.35			143.35			1964	60578
		0.03			336.0	2.020	0.025	0.580	0.580	---	131.00	131.80			131.80			1964	60578
		0.03			336.0	2.020	0.025	0.600	0.600	---	138.00	141.76	142 6/ 7.4		141.76	142.6/ 7.4		19_4	60578
----------	S	0.03	- 320	L-T	336.0	3.950	0.026	1.230	1.230	---	76.50	113.18			113.18			1964	60578
		0.03			336.0	4.010	0.027	1.240	1.250	---	89.50	132.83			133.50			1964	60578
		0.03			336.0	4.020	0.026	1.240	1.240	---	88.00	130.56			130.56			1964	60578
		0.03			336.0	4.020	0.027	1.240	1.240	---	81.90	121.51			121.51			1964	60578
		0.03			336.0	4.020	0.027	1.240	1.240	---	82.50	122.40	124 1/ 7.9		122.40	124.2/ 8.0		1964	60578
----------	S	0.03	R.T.	L-T	277.0	2.010	0.026	0.580	0.580	---	125.00	125.83			125.83			1964	60578
		0.03			277.0	2.020	0.025	0.580	0.580	---	130.00	130.80			130.80			1964	60578
		0.03			277.0	2.020	0.025	0.580	0.580	---	133.00	133.81			133.81			1964	60578
		0.03			277.0	2.020	0.025	0.550	0.550	---	136.00	132.52			132.52			1964	60578
		0.03			277.0	2.020	0.026	0.580	0.600	---	134.00	134.82	131.6/ 3.5		137.65	132.1/ 4.3		1964	60578
----------	S	0.03	R.T.	L-T	277.0	4.000	0.028	1.240	1.240	---	83.80	124.41			124.41			1964	60578
		0.03			277.0	4.000	0.028	1.240	1.240	---	89.20	132.42			132.42			1964	60578
		0.03			277.0	4.000	0.028	1.240	1.240	---	87.40	129.75			129.75			1964	60578
		0.03			277.0	4.000	0.028	1.240	1.260	---	83.00	123.22			124.47			1964	60578
		0.03			277.0	4.000	0.029	1.230	1.240	---	88.50	130.72	128 1/ 4.1		131.39	128.5/ 3.8		1964	60578
----------	S	0.03	R.T.	L-T	277.0	17.700	0.025	5.490	5.490	---	34.70	108.40			108.40			1964	60578
----------	S	0.03	R.T.	L-T	277.0	18.060	0.025	5.490	5.500	---	33.10	103.14			103.26			1964	60578
		0.03			277.0	18.100	0.022	5.470	5.470	---	33.70	104.74			104.74			1964	60578
		0.03			277.0	18.100	0.025	5.480	5.480	---	39.50	122.91	110 3/11.0		122.91	110.3/10.9		1964	60578

TABLE 6.21.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.21.3.1 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 18NI(300)MAR
CONDITION:

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. H.H.A.			
DELTA K MIN	A:	20.16	2.64			
	B:					
	C:					
	D:					
		25.00	6.05			
		30.00	8.81			
		35.00	11.3			
		40.00	14.0			
		50.00	22.2			
		60.00	39.9			
DELTA K MAX	A:	67.79	41.0			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 14.25

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM: 0.13"TH FORGING
SPECIMEN TYPE: CCP
ORIENTATION: L-T
STRESS RATIO: +0.06
FREQUENCY: 2.00 HZ

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK: 0.125"
SPECIMEN WIDTH: 3.000"
REFERENCES:78425

ALLOY STEEL

18NI (300) MAR

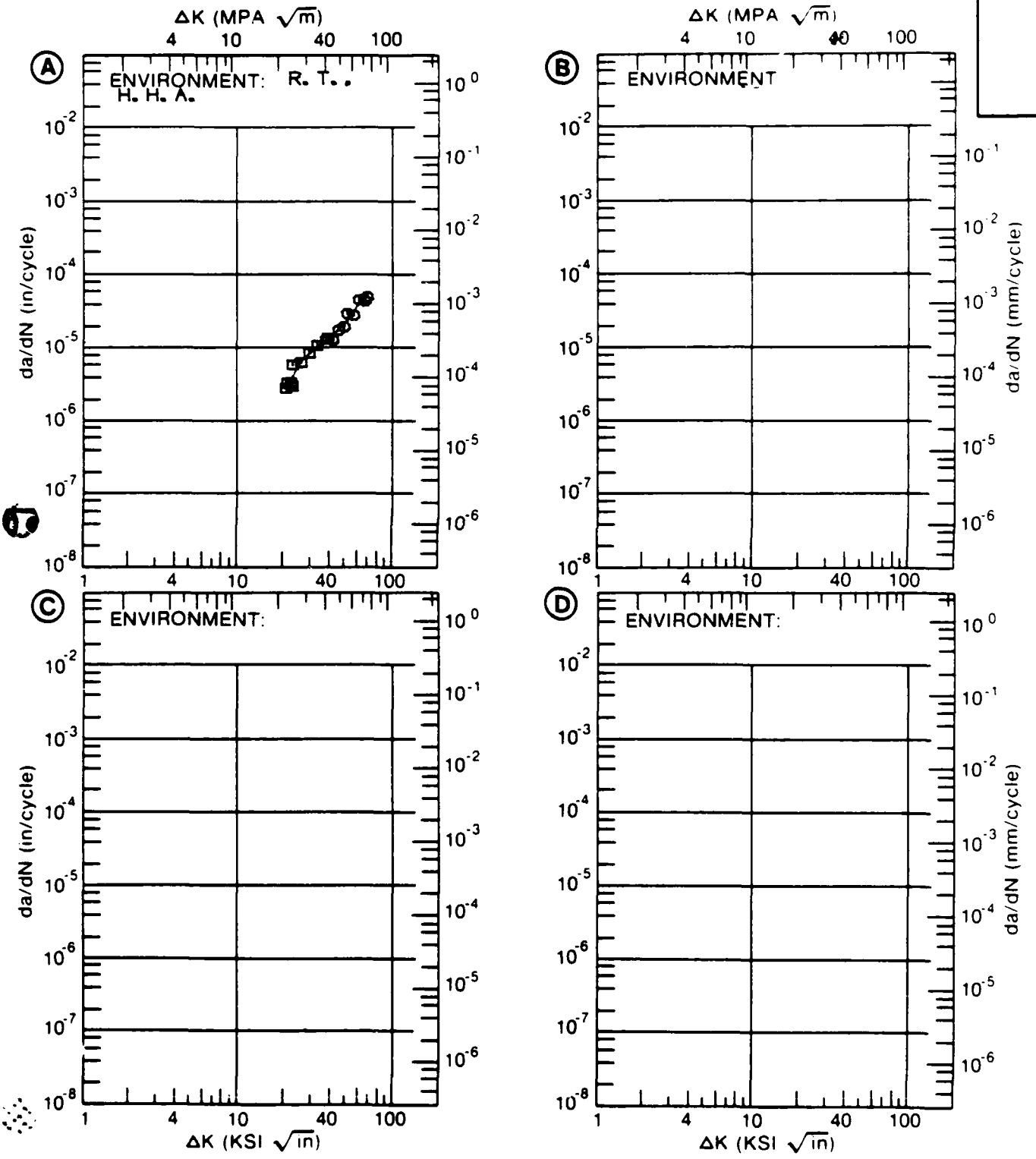


Figure 6.21.3.1

TABLE 6.21.3.2

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.21.3.2 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 18NI(300)MAR
CONDITION:

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. L.H.A.	E= R.T. H.H.A.	E= R.T. 3.5% NACL	
DELTA K MIN	A:	6.67	.474			
	B:	6.85		.435		
	C:	14.61			3.56	
	D:					
		7.00	.561	.472		
		8.00	.847	.753		
		9.00	1.16	1.10		
		10.00	1.49	1.51		
		13.00	2.63	3.11		
		16.00	4.15	5.30	4.82	
		20.00	7.42	9.38	10.2	
DELTA K MAX	A:	24.71	15.1			
	B:	22.98		13.6		
	C:	22.60			16.4	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			11.13	14.20	7.07	

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM: 0.13"TH FORGING
SPECIMEN TYPE: CCP
ORIENTATION: L-T
STRESS RATIO: +0.67
FREQUENCY: 2.00 HZ

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK: 0.125"
SPECIMEN WIDTH: 3.000"
REFERENCES:78425

ALLOY STEEL

18NI (300) MAR

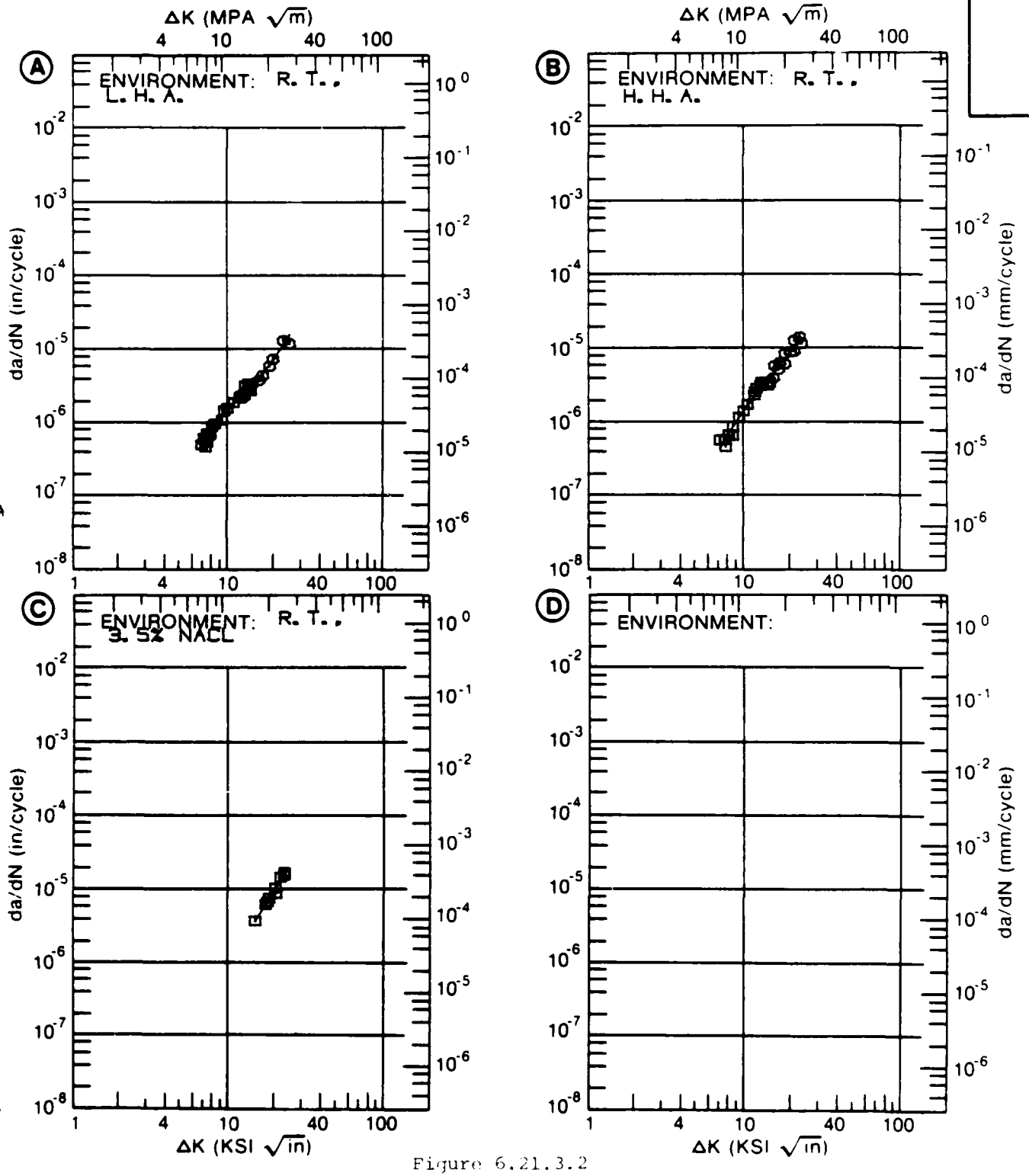


Figure 6.21.3.2

TABLE 6.21.3.3

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.21.3.3 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 18NI(300)MAR
CONDITION: AGED

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		E= R.T. AIR	E= R.T. DRY ARGON		
DELTA K MIN	A:				
	B: 8.77		.107		
	C:				
	D:				
	9.00		.102		
	10.00		.148		
	13.00		.529		
	16.00		.950		
	20.00		1.97		
	25.00		3.70		
	30.00		4.98		
DELTA K MAX	A:				
	B: 30.62		5.05		
	C:				
	D:				
ROOT MEAN SQUARE PERCENT ERROR		0.00	19.14		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: AGED
FORM:
SPECIMEN TYPE:
ORIENTATION:
STRESS RATIO: +0.05
FREQUENCY: 20.00 HZ

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK:
SPECIMEN WIDTH:
REFERENCES:91838

ALLOY STEEL

18NI (300) MAR

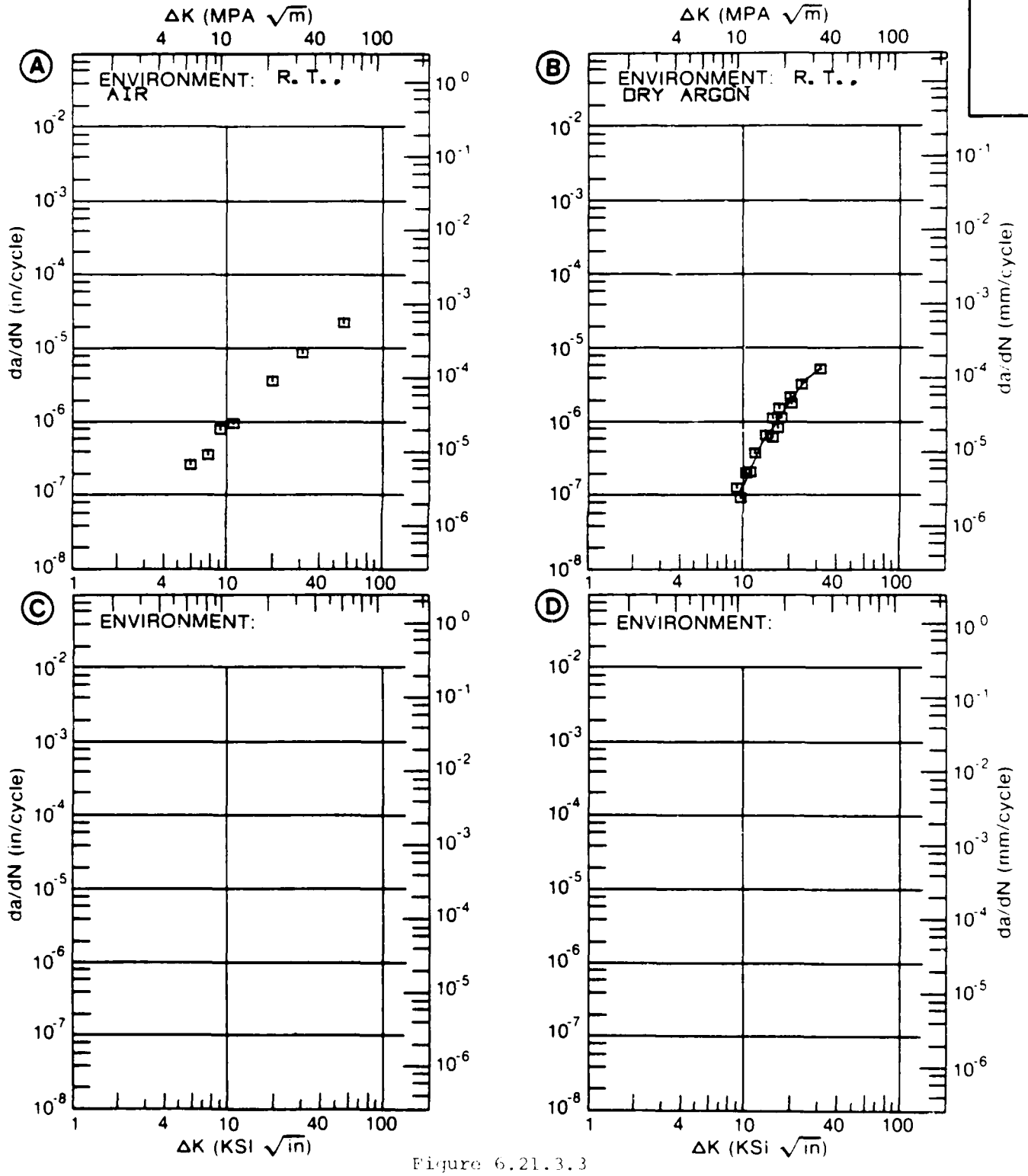


Figure 6.21.3.3

TABLE 6.21.3.4

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.21.3.4 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 18NI(300)MAR
CONDITION: ANNEALED

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. AIR	E= R.T. DRY ARGON		
DELTA K MIN	A:					
	B:	9.05		.101		
	C:					
	D:					
		10.00		.214		
		13.00		.519		
		16.00		1.09		
		20.00		2.14		
		25.00		3.68		
		30.00		5.19		
		35.00		6.72		
		40.00		8.78		
DELTA K MAX	A:					
	B:	44.46		11.7		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			0.00	10.47		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: ANNEALED
FORM:
SPECIMEN TYPE:
ORIENTATION:
STRESS RATIO: +0.05
FREQUENCY: 20.00 HZ

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK:
SPECIMEN WIDTH:
REFERENCES:91838

ALLOY STEEL

18NI (300) MAR

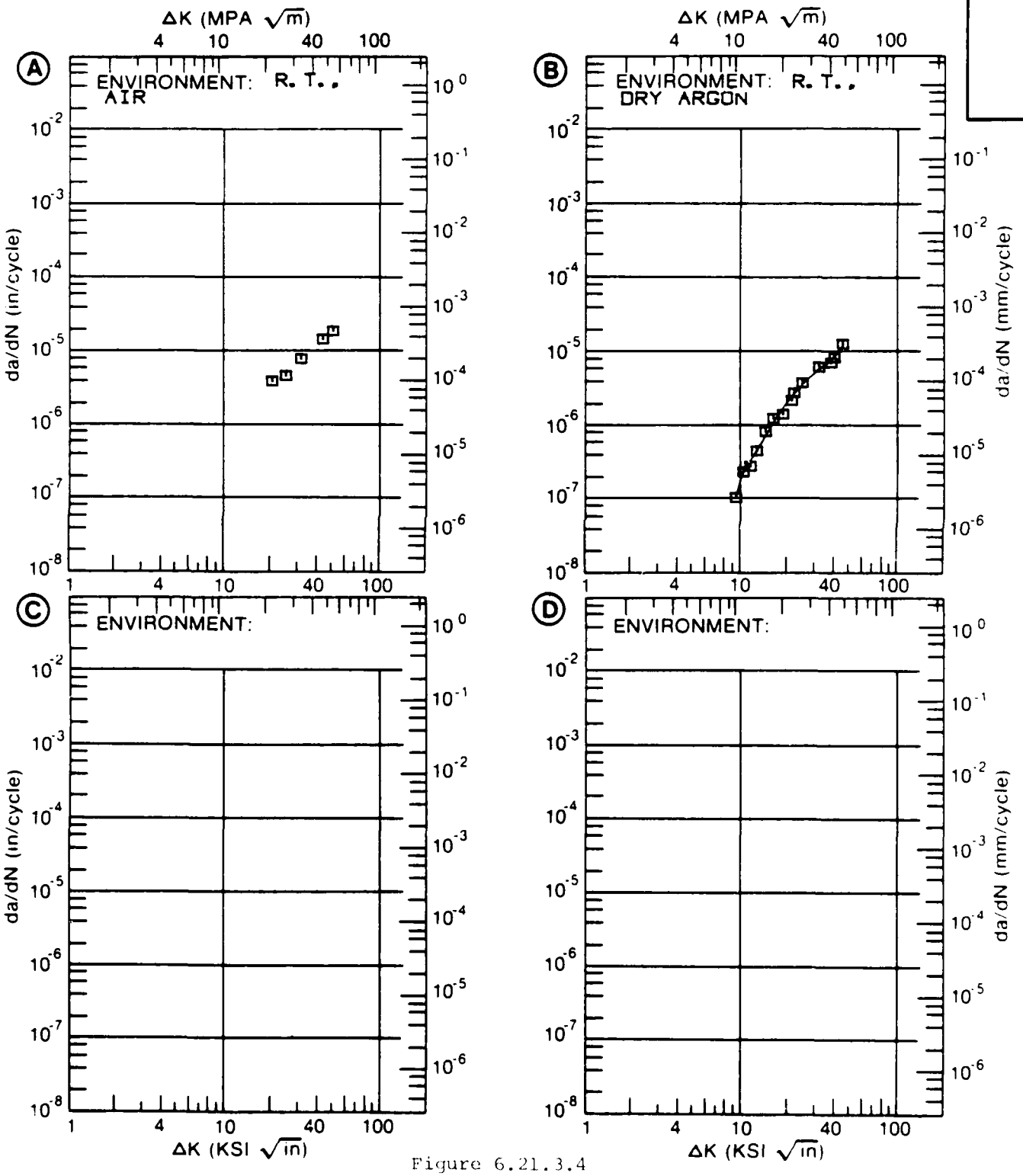


Figure 6.21.3.4

TABLE 6.21.3.5

SUSTAINED CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.21.3.5 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 18NI(300)
CONDITION:

K MAX (KSI*IN**1/2)			DA/DT (10**-3 IN/HOUR) A	B	C	D
			E= HYDROGEN	E= 3.5% NACL		
K MAX MIN	A:	12.60	920.			
	B:					
	C:					
	D:					
		13.00	2465.			
		16.00	13691.			
		20.00	18844.			
K MAX MAX	A:	22.20	21037.			
	B:					
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			8.44	0.00		

CONDITION/HT:
FORM:
SPECIMEN TYPE:
ORIENTATION:
YIELD STRENGTH:
ULT. STRENGTH:

SPECIMEN THK: 0.500"
SPECIMEN WIDTH: 1.500"
CRACK LENGTH (A_O):
K_{ISCC}:
REFERENCES:84310, 74719

ALLOY STEEL

18NI (300)

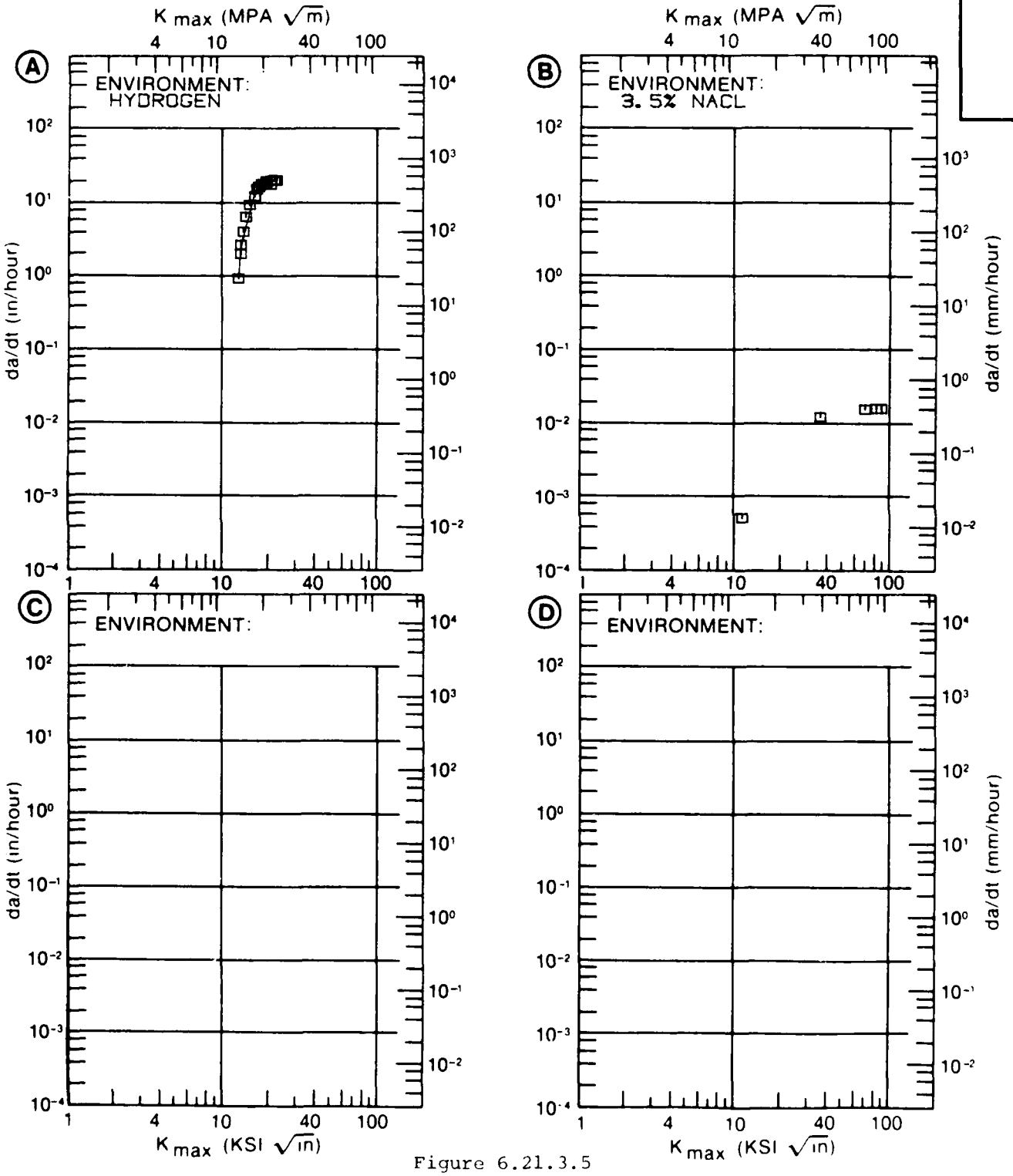


Figure 6.21.3.5

TABLE 6.21.3.6

ALLOY STEEL 18NI(300)(MAR) K(ISCC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN (*=SG)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
AGE 900F 6HR	F	1.00	R.T.	L-T	302.0	3.5 PCT NACL	1.500	0.480	CANT	----	70.00	7.00			----	1970	78425
AGE 900F 6HR	F	1.00	R.T.	T-L	302.0	3.5 PCT NACL	1.500	0.480	CANT	----	70.00	7.00			----	1970	78425
		9.00			204.3		1.000	0.500	CANT	----	72.40	5.00			----	1972	84356
													6.0/	1.4			
AGE 950F 12HR	F	1.00	R.T.	T-L	302.0	3.5 PCT NACL	1.500	0.480	CANT	----	68.00	6.00			----	1970	78425
CRACK PRESTRESSED TO 50 PCT KIC	F	9.00	R.T.	T-L	284.3	3.5 PCT NACL	1.000	0.500	CANT	----	72.40	5.00			----	1972	84356
CRACK PRESTRESSED TO 25 PCT KIC	F	9.00	R.T.	T-L	284.3	3.5 PCT NACL	1.000	0.500	CANT	----	72.40	5.00			----	1972	84356
CRACK PRESTRESSED TO 80 PCT KIC	F	9.00	R.T.	T-L	284.3	3.5 PCT NACL	1.000	0.500	CANT	----	72.40	10.00			----	1972	84356
1500F 0.5HR AC + 700F 3HR	P	0.25	R.T.	L-S	285.8	DIST. WATER	1.000	0.250	CANT*	0.200	63.10	60.00			> 10000	1965	63061
		0.25			285.8		1.000	0.250	CANT*	0.200	93.90	36.00			> 10000	1965	63061
													48.0/	17.0			
1500F 2HR 800F 10HR	B	----	R.T.	L-S	280.0	DIST. WATER	0.625	0.500	CANT*	----	120.00	9.00			> 1500	1970	77716
1500F 2HR 800F 10HR	B	----	R.T.	L-S	280.0	1N H2SO4	0.625	0.500	CANT*	----	120.00	10.00			> 1500	1970	77716
1500F 2HR 800F 10HR	B	----	R.T.	L-S	280.0	3% NACL PH1.7	0.625	0.500	CANT*	----	120.00	9.00			> 10000	1970	77716
1500F 2HR 800F 10HR	B	----	R.T.	L-S	280.0	3% NACL PH6.3	0.625	0.500	CANT*	----	120.00	10.00			> 8500	1970	77716

TABLE 6.21.3.6 (Con't)

ALLOY STEEL 18NI(300)(MAR) K(ISCC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN (*=SC)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
1500F 2HR 900F 3.5HR	B	----	R.T.	L-S	280.0	1.5 PCT NA2CR2O7	0.625	0.500	CANT*	----	99.00	12.00			----	1970	77716
1500F 2HR 900F 100HR	B	----	R.T.	L-S	280.0	1N H2SO4	0.625	0.500	CANT*	----	70.00	9.00			----	1970	77716
1500F 2HR 900F 100HR	B	----	R.T.	L-S	280.0	3% NACL -0.4V TO -1.2V	0.625	0.500	CANT*	----	70.00	9.00			----	1970	77716
1500F 2HR 900F 100HR	B	----	R.T.	L-S	280.0	3% NACL O2SAT	0.625	0.500	CANT*	----	70.00	10.00			----	1970	77716
1500F 2HR 900F 100HR	B	----	R.T.	L-S	280.0	3% NACL PH1.7	0.625	0.500	CANT*	----	70.00	15.00			10000	1970	77716
1500F 2HR 900F 3.5HR	B	----	R.T.	L-S	280.0	3% NACL PH1.7	0.625	0.500	CANT*	----	99.00	10.00			> 10000	1970	77716
1500F 2HR 900F 3.5HR	B	----	R.T.	L-S	280.0	3% NACL PH11	0.625	0.500	CANT*	----	99.00	12.00			----	1970	77716
1500F 2HR 900F 3.5HR	B	----	R.T.	L-S	280.0	3% NACL PH3.9	0.625	0.500	CANT*	----	99.00	17.00			----	1970	77716
1500F 2HR 900F 100HR	B	----	R.T.	L-S	280.0	3% NACL PH6.3	0.625	0.500	CANT*	----	70.00	10.00			> 8500	1970	77716
1500F 2HR 900F 3.5HR	B	----	R.T.	L-S	280.0	3% NACL PH6.3	0.625	0.500	CANT*	----	99.00	8.00			> 8500	1970	77716
1500F,1500F AGED 900F 6HR	F	2.00	R.T.	T-L	284.0	3.5 PCT NACL	1.000	0.400	CHAR	----	72.40	7.50			> 9000	1970	78761
2200F 1HR 1700F 4HR,900F 100HR	B	----	R.T.	L-S	280.0	1N H2SO4	0.625	0.500	CANT*	----	53.00	10.00			----	1970	77716

TABLE 6.21.3.6 (Con't)

ALLOY STEEL 18NI(300)(MAR) K(ISCC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN (*=SG)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
2300F 1HR 1700F 4HR 800F 10HR	B	----	R.T.	L-S	280.0	3% NACL PH1.7	0.625	0.500	CANT*	----	58.00	14.00			> 2500	1970	77716
2300F 1HR 1700F 4HR 900F 100HR	B	----	R.T	L-S	280.0	3% NACL PH1.7	0.625	0.500	CANT*	----	53.00	10.00			> 2500	1970	77716
2300F 1HR 1700F 4HR 900F 3 5HR	B	----	R.T	L-S	280.0	3% NACL PH1.7	0.625	0.500	CANT*	----	57.00	8.00			> 2500	1970	77716
2300F 1HR 1700F 4HR 800F 10HR	B	----	R.T	L-S	280.0	3% NACL PH6.3	0.625	0.500	CANT*	----	58.00	13.00			> 2500	1970	77716
2300F 1HR 1700F 4HR 900F 100HR	B	----	R.T.	L-S	280.0	3% NACL PH6.3	0.625	0.500	CANT*	----	53.00	9.00			> 2500	1970	77716
2300F 1HR 1700F 4HR 900F 3 5HR	B	----	R.T.	L-S	280.0	3% NACL PH6.3	0.625	0.500	CANT*	----	57.00	9.00			> 2500	1970	77716
900F 3HR 950F 3HR	F	1.00	R.T.	T-L	306.0	3.5 PCT NACL	1.500	0.480	CANT	----	70.00	5.00			----	1970	78425

TABLE 6.22.3.1

SUSTAINED CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.22.3.1 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 18NI(350)
CONDITION: AGED 8HR 800F

K MAX (KSI*IN**1/2)			DA/DT (10**-3 IN/HOUR)			
			A	B	C	D
			E= 3.5% NACL			
K MAX MIN	A:	13.00	392.			
	B:					
	C:					
	D:					
		16.00	930.			
		20.00	1502.			
		25.00	2053.			
		30.00	2898.			
K MAX MAX	A:	32.00	3454.			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 9.79

CONDITION/HT: AGED 8HR 800F
FORM:
SPECIMEN TYPE: NB
ORIENTATION:
YIELD STRENGTH: 330.0 KSI
ULT. STRENGTH:

SPECIMEN THK: 0.394"
SPECIMEN WIDTH: 0.394"
CRACK LENGTH (A_O):
K_{ISCC}:
REFERENCES:74719

ALLOY STEEL

18NI (350)

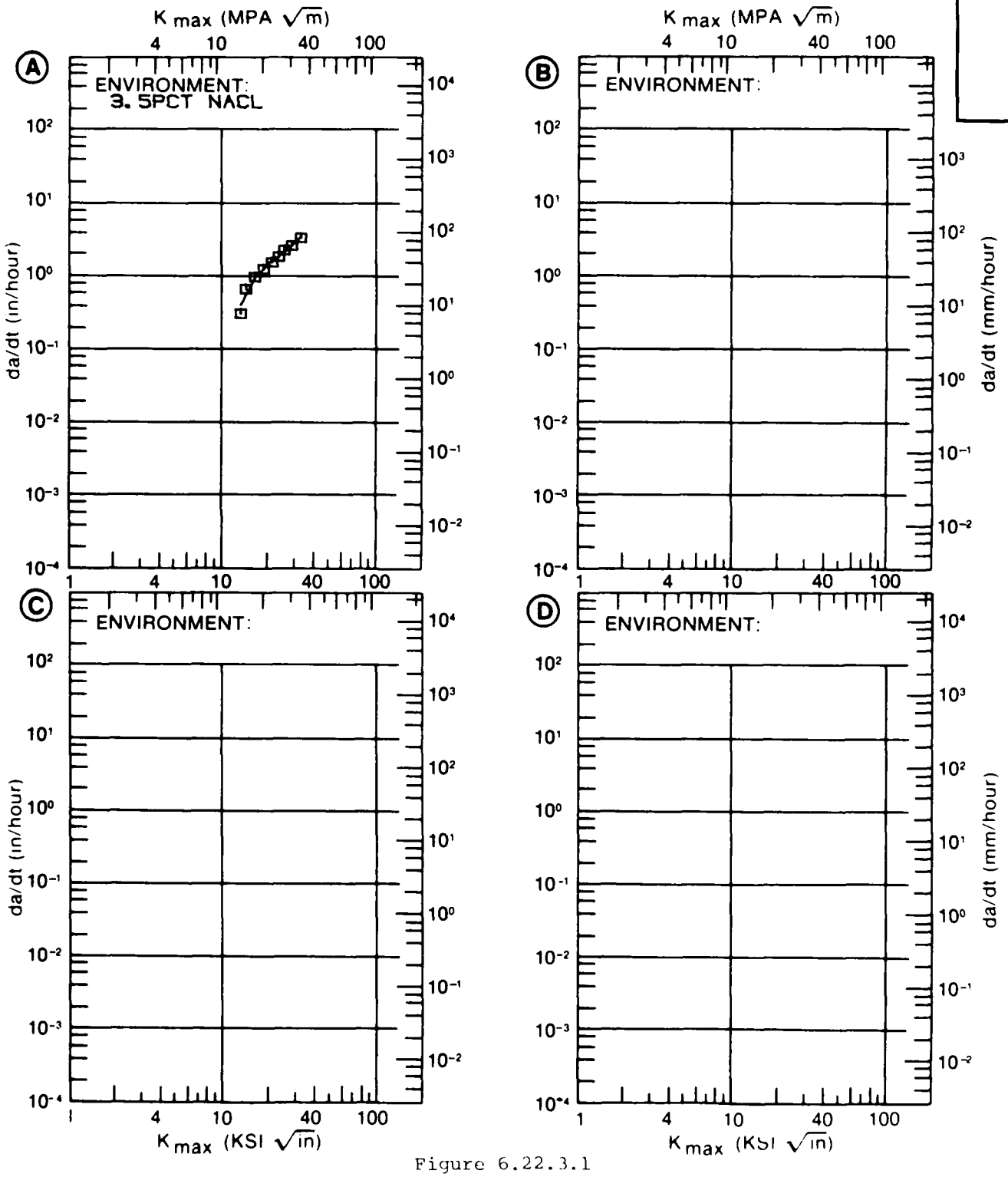


Figure 6.22.3.1

TABLE 6.22.3.2

ALLOY STEEL 18NI(350)(MAR) K(ISCC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN (*=SG)	CRACK LENGTH (IN) A	K(G) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
AGE 800F 8HR	FB	----	R.T.	---	299.0	3.5 PCT NACL	0.394	0.394	CHAR	----	30.00	5.00			----	1971	84351
AGE 900F 3HR	FB	----	R.T.	---	330.0	3.5 PCT NACL	0.394	0.394	CHAR	----	42.00	10.00			----	1971	84351
AGE 900F 8HR	FB	----	R.T.	---	335.0	3.5 PCT NACL	0.394	0.394	CHAR	----	36.00	10.00			----	1971	84351
1500F 1HR 800F 8HR	F	4.00	R.T.	L-S	299.0	3.5 PCT NACL	0.394	0.394	--	----	70.10	5.00			> 3000	1969	75677
1500F 1HR 900F 8HR	F	4.00	R.T.	L-S	325.0	3.5 PCT NACL	0.394	0.394	--	----	35.00	10.00			> 8500	1969	75677
1500F 1HR 950F 3HR	F	4.00	R.T.	L-S	325.0	3.5 PCT NACL	0.394	0.394	--	----	40.00	10.00			> 6300	1969	75677

TABLE 6.23.1.1

MEAN PLANE STRAIN FRACTURE TOUGHNESS DATA OF
ALLOY STEEL 300M AT ROOM TEMPERATURE

CONDITION/HT	MEAN KIC ± STANDARD DEVIATION (KSI SQRT(IN))		(NUMBER OF SPECIMENS)
		PLATE	
CONDITION/HT	L-T	T-L	S-L
HEAT TREATED TO 54 RC HARDNESS	-----	58.6 ± 3.5 (2)	-----
1700F 1HR AC, 1600F 1HR OQ, 600F 2HR AC (AMS 6419)	51.8 ± 0.7 (3)	-----	-----
		FORGING	
CONDITION/HT	L-T	T-L	S-L
-----	52.6 ± 2.3 (4)	52.9 ± 2.0 (4)	-----
1600F 1.25 HR, OQ, 600F 2+2HR	54.6 ± 2.5 (4)	50.6 ± 1.7 (2)	54.1 ± 1.1 (4)
		BAR	
CONDITION/HT	L-T	T-L	S-L
2190F 1HR, FC TO 1600F, HOLD 0.5HR, OQ, 475F 1HR	47.9 ± 3.8 (2)	-----	-----

TABLE 6.23.1.2

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL 300M

IESI CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT: L H A. AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
UTS-280-300KSI	BILLET	-1.00	10.00					3.18	188	
UTS=280-300KSI	BILLET	0.00	10.00					2.96	38.0	
UTS=280-300KSI	BILLET	0.50	10.00				0.65	6.97		
1700F 1 5HRS AC, 1600F 1 5HRS OQ, 600F 2+2HRS	FORGING	0.30	6.00					4.88		
1700F 1 5HRS AC, 1600F 1 5HRS OQ, 600F 2+2HRS	FORGING	0.50	6.00				0.90	6.83		
1700F 1 5HRS AC, 1600F 1 5HRS OQ, 600F 2+2HRS	FORGING	0.08	1.00					3.67		
1700F 1 5HRS AC, 1600F 1 5HRS OQ, 600F 2+2HRS	FORGING	0.08	6.00				0.65	4.03		

TABLE 6.23.1.3

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL 300M

IPSI CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT LAB AIR AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
--- -	FORGING	0.02	0.10-20.00				0.71	3.83	82.7	
TUS-280-300KSI	BAR	-1.00	10.00					3.79	42.4	
TUS-280-300KSI	BAR	0.02	10.00					3.56	47.0	
TUS-280-300KSI	BAR	0.50	10.00				1.02	6.52		

TABLE 6.23.1.4

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL 300M

IPSI CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT 3.5% NACL AT R.T.

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
TUS 280-300KSI	BILLET	0.00	1.00					4.20	105	
TUS=280-300KSI	BILLET	0.00	10.00					2.24	100	

TABLE 6.23.1.5

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL 300M

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT ALT IMMERSION IN SEA WATER-IMMERSED AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2 5	5	10	20	50	100
TUS-280-300KSI	BILLET	0.00	1.00					8.04		
TUS-280-300KSI	BILLET	0.00	10.00					2.61		

TABLE 6.23.1.6

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL 300M

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT: ALT IMMERSION IN SEA WATER-1ST HALF DRY CYCLE AT R.T.

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS: (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
TUS-280-300KSI	BILLET	0.00	1.00					7.06	50.6	
TUS=280 300KSI	BILLET	0.00	10.00					2.17		

TABLE 6.23.1.7

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL 300M

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT ALT IMMERSION IN SEA WATER-2ND HALF DRY CYCLE AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
TUS=280-300KSI	BILLET	0.00	1.00					2.61		
TUS=280-300KSI	BILLET	0.00	10.00					2.05		

TABLE 6.23.2.1

ALLOY STEEL 300M K(IC)

CONDITION	FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
- - - -	F	1.25	R T	T-T	239.0	2.504	1.267	CT	1.293	0.12	53.59			1977	MA005
		1.25			239.0	2.509	1.249	CT	1.279	0.13	55.50			1977	MA005
		1.25			246.5	2.505	1.251	CT	1.267	0.10	50.80			1977	MA005
		1.25			246.5	2.490	1.251	CT	1.286	0.10	50.70	52.6/	2.3	1977	MA005
- - - - - -	F	1.25	R T	T-L	240.0	2.476	1.256	CT	1.271	0.13	55.50			1977	MA005
		1.25			240.0	2.512	1.254	CT	1.288	0.12	53.50			1977	MA005
		1.25			246.5	2.507	1.247	CT	1.228	0.10	51.70			1977	MA005
		1.25			246.5	2.508	1.252	CT	1.296	0.10	50.90	52.9/	2.0	1977	MA005
HEAT TREATED	P	1.00	R T	T-L	250.0	0.904	0.447	NB	0.485	0.12	56.10			1971	84029 (1)
TO 54 RC		1.00			250.0	0.903	0.448	NB	0.473	0.15	61.10			1971	84029 (1)
HARDNESS												50.6/	3.5		
1600F 0.5 HR,	F	5.50	- 65	--	245.0	1.505	0.747	CT	0.752	0.10	48.40			1970	84280 (2)
50,1000F		5.50			245.0	1.503	0.750	CT	0.758	0.10	48.00			1970	84280 (2)
0.5+1.0 HR, OQ		5.50			245.0	1.501	0.750	CT	0.734	0.07	41.50			1970	84280 (2)
R@-180F 25 MIN, 575F 2+2HR												46.0/	3.9		
1600F 0.5 HR,	F	5.50	0	--	231.0	1.499	0.745	CT	0.735	0.14	55.30			1970	84280 (2)
50,1000F		5.50			231.0	1.503	0.746	CT	0.742	0.16	58.70			1970	84280 (2)
0.5+1.0 HR, OQ		5.50			231.0	1.501	0.750	CT	0.736	0.15	57.20			1970	84280 (2)
R@-180F 25 MIN, 575F 2+2HR												57.1/	1.7		
1600F 0.5 HR,	F	5.50	R T	--	230.0	1.501	0.749	CT	0.737	0.19	64.30			1970	84280 (2)
50,1000F		5.50			230.0	1.499	0.750	CT	0.735	0.20	64.60			1970	84280 (2)
0.5+1.0 HR, OQ		5.50			230.0	1.504	0.750	CT	0.739	0.20	65.70			1970	84280 (2)
R@-180F 25 MIN, 575F 2+2HR												64.9/	0.7		
1600F 0.5 HR,	F	5.50	200	--	220.0	1.499	0.745	CT	0.734	0.24	68.10			1970	84280 (2)
50,1000F		5.50			220.0	1.500	0.746	CT	0.734	0.24	67.70			1970	84280 (2)
0.5+1.0 HR, OQ		5.50			220.0	1.502	0.749	CT	0.729	0.25	68.90			1970	84280 (2)
R@-180F 25 MIN, 575F 2+2HR												68.2/	0.6		

NOTES
(1) COMPOSITION(WT PERCENT) 0.43C,0.65MN,0.009P,0.006S,1.65SI,1.77NI,0.82CR,0.08V
(2) ORIENTATION=L, FORTI FLAP TRACK

TABLE 6.23.2.1 (Con't)

ALLOY STEEL 300M K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	------SPECIMEN------ WIDTH (IN) W	THICK (IN) B	DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	STAN DEV	DATE	REFER
1600F 1.25 HR, OQ, 600F 2+2HR	F	3.00	R.T.	L-T	237.0	1.000	0.249	CT	0.495	0.13	51.50			1973	85836
		3.00			237.0	1.002	0.248	CT	0.502	0.14	53.80			1973	85836
		3.00			237.0	1.002	0.247	CT	0.491	0.15	56.10			1973	85836
		3.00			237.0	1.002	0.247	CT	0.495	0.15	57.10	54.6/	2.5	1973	85836
1600F 1.25 HR, OQ, 600F 2+2HR	F	3.00	R.T.	T-L	240.0	1.002	0.248	CT	0.507	0.13	51.80			1973	85836
		3.00			240.0	0.987	0.247	CT	0.492	0.12	49.40	50.6/	1.7	1973	85836
1600F 1.25 HR, OQ, 600F 2+2HR	F	3.00	R.T.	S-L	230.0	1.005	0.248	CT	0.496	0.14	55.10			1973	85836
		3.00			230.0	1.002	0.248	CT	0.497	0.13	52.80			1973	85836
		3.00			230.0	1.004	0.247	CT	0.504	0.14	54.90			1973	85836
		3.00			230.0	1.000	0.248	CT	0.485	0.14	53.60	54.1/	1.1	1973	85836
1600F 1HR, OQ, 475F 1HR	B	0.62	R.T.	L-T	240.0	2.000	0.600	CT	1.000	0.05	34.80			1973	87241 (1)
1600F 1HR, OQ, 1HR, WQ, 475F 1HR	B	0.62	R.T.	L-T	240.0	2.000	0.600	CT	1.000	0.05	34.30			1973	87241 (1)
1600F 1HR, OQ, 615F 1 HR	B	0.62	R.T.	L-T	245.0	2.000	0.600	CT	1.000	0.17	64.80			1973	87241 (1)
1600F 1HR, OQ, 575F 1HR	B	0.62	R.T.	L-T	245.0	2.000	0.600	CT	1.000	0.15	59.40			1973	87241 (1)
1600F 1HR, OQ, 745F 1HR	B	0.62	R.T.	L-T	245.0	2.000	0.600	CT	1.000	0.15	60.90			1973	87241
1600F, OQ, 550F 2+2HR	P	0.56	R.T.	L-L	235.0	1.500	0.500	NB	----	0.20	66.00			1970	78305 (2)
1675F AC, 1575F OQ, 800F 2HR (RC 47.5)	P	1.00	R.T.	--	220.0	1.988	1.010	CT	1.088	0.12	47.30			1973	85883 (3)

NOTES
(1) COMPOSITION(WT PERCENT) 0.41C,0.75MN,0.008P,0.002S,1.59SI,1.85NI,0.75CR,0.08V,0.04CU
(2) COLD ROLLED 50% WITH INTERMEDIATE ANNEALS AT 1275F TO GET FINE GRAIN SIZE
(3) COMPOSITION(WT PERCENT) 0.38C,0.85MN,0.008P,0.003S,1.61SI,1.80NI,0.89CR,0.08V (ESTIMATED TYS)

TABLE 6.23.2.1 (Con't)

ALLOY STEEL 300M K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	------SPECIMEN------ WIDTH (IN) W	THICK (IN) B	DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	STAN DEV	DATE	REFER
1675F AC, 1575F	P	1 00	R. T.	--	220.0	1.994	1.010	CT	1.068	0.13	49.80			1973	85883 (1)
00, 800F 2HR		1 00			220.0	1.998	1.010	CT	1.122	0.13	50.10			1973	85883 (1)
(RC 47 5)		1 00			220.0	1.995	1.010	CT	1.081	0.13	49.60			1973	85883 (1)
												49.2/	1.3		
1675F, AC 1575F	P	1 00	R. T.	--	240.0	2.001	1.010	CT	1.147	0.09	45.90			1973	85883 (1)
00, 500F 2HR		1 00			240.0	1.996	1.010	CT	1.065	0.12	51.80			1973	85883 (1)
(RC 51 5)		1 00			240.0	1.995	1.010	CT	1.054	0.09	46.20			1973	85883 (1)
		1 00			240.0	2.001	1.010	CT	1.092	0.12	52.60			1973	85883 (1)
												49.1/	3.6		
1675F, AC, 1575F	P	1 00	R. T.	--	200.0	1.996	1.010	CT	1.123	0.43	82.90			1973	85883 (1)
00, 1100F 2HR		1 00			200.0	2.000	1.009	CT	1.103	0.36	76.20			1973	85883 (1)
(RC 39)		1 00			200.0	1.997	1.012	CT	1.137	0.42	81.50			1973	85883 (1)
		1 00			200.0	1.989	1.010	CT	1.139	0.45	84.80			1973	85883 (1)
												81.4/	3.7		
1700F 1HR AC,	P	1 00	R T	L-T	236.0	0.991	0.501	NB	0.485	0.12	52.00			1974	88136
1600F 1HR OQ,		1 00			236.0	0.995	0.502	NB	0.491	0.12	51.00			1974	88136
600F 2HR AC		1 00			236.0	1.000	0.500	NB	0.490	0.12	52.40			1974	88136
(AMS 6419)												51.8/	0.7		
2190F 1HR, FC	B	0 62	R T.	L-T	235.0	2.000	0.600	CT	1.000	0.12	50 60			1973	87241
TO 1600F, HOLD		0 62			235.0	2.000	0.600	CT	1 000	0 09	45 20			1973	87241
0 5HR, OQ, 475F 1HR												47.9/	3 8		
2190F 1HR, FC	B	0 62	R. T.	L-T	240.0	2 000	0.600	CT	1 000	0.12	52 70			1973	87241
TO 1600F, HOLD 0 5HR, OQ, 615F 1HR															
2190F 1HR, FC	B	0 62	R T	L-T	240 0	2 000	0.600	CT	1 000	0 18	63 50			1973	87241
TO 1600F, HOLD 0 5HR, OQ, 745F 1HR															

NOTES

(1) COMPOSITION(WT PERCENT) 0 39C, 0 85MN, 0 008P, 0 005S, 1 61SI, 1 80NI, 0 85CR, 0 08V (ESTIMATED TYS)

TABLE 6.23.2.1 (Con't)

ALLOY STEEL 300M K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	------SPECIMEN------ WIDTH (IN) W	THICK (IN) B	DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	STAN DEV	DATE	REFER
2190F 1HR,OQ, 400F 1HR	B	0.62	R.T.	L-T	219.0	2.000	0.600	CT	1.000	0.29	75.00			1973	87241
2190F 1HR,OQ, 475F 1HR	B	0.62	R.T.	L-T	230.0	2.000	0.600	CT	1.000	0.23	69.20			1973	87241
2190F 1HR,OQ, 475F 1HR,WQ,475F 1HR	B	0.62	R.T.	L-T	232.0	2.000	0.600	CT	1.000	0.24	71.80			1973	87241
2190F 1HR,OQ, 615F 1HR	B	0.62	R.T.	L-T	236.0	2.000	0.600	CT	1.000	0.26	75.50			1973	87241
2190F 1HR,OQ, 745F 1HR	B	0.62	R.T.	L-T	240.0	2.000	0.600	CT	1.000	0.24	74.70			1973	87241

TABLE 6.23.2.2

ALLOY STEEL 300M K(C)

CONDITION	PRODUCT FORM	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) S(O)	GROSS STRESS MAX (KSI) S(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																			
AMS 6434	S	0.13	R.T.	L-T	239.0	5.000	0.119	1.880	----	---	71.10	134.06			----			1968	73988
UTS=280-300KSI		0.13			239.0	5.000	0.123	2.530	----	---	63.30	150.78			----			1968	73988
		0.13			239.0	5.000	0.130	1.170	----	---	98.60	138.37	141.1/	8.7	----	----/	---	1968	73988
BUCKLING OF CRACK EDGES NOT RESTRAINED																			
AMS 6434	P	0.38	R.T.	L-T	209.0	5.000	0.374	1.300	----	---	50.40	75.18			----			1968	73988
UTS=220-240KSI		0.38			209.0	5.000	0.370	1.850	----	---	35.90	66.94			----			1968	73988
		0.38			209.0	5.000	0.370	1.750	----	---	36.10	64.82			----			1968	73988
		0.38			209.0	5.000	0.374	2.440	----	---	36.10	83.27			----			1968	73988
		0.38			209.0	5.000	0.372	2.500	----	---	30.30	71.41			----			1968	73988
		0.38			209.0	5.000	0.371	1.320	----	---	43.20	65.02	71.1/	7.2	----	----/	---	1968	73988
BUCKLING OF CRACK EDGES NOT RESTRAINED																			
AMS 6434	P	0.38	R.T.	L-T	234.0	5.000	0.369	2.080	----	---	33.00	66.94			----			1968	73988
UTS=260-280KSI		0.38			234.0	5.000	0.368	1.710	----	---	44.30	78.33			----			1968	73988
		0.38			234.0	5.000	0.371	2.500	----	---	27.00	63.63			----			1968	73988
		0.38			234.0	5.000	0.370	1.240	----	---	52.40	76.04			----			1968	73988
		0.38			234.0	5.000	0.374	2.540	----	---	32.80	78.41			----			1968	73988
		0.38			234.0	5.000	0.372	1.380	----	---	41.90	64.76	71.4/	7.0	----	----/	---	1968	73988
BUCKLING OF CRACK EDGES NOT RESTRAINED																			
AMS 6434	P	0.38	R.T.	L-T	238.0	5.000	0.372	1.900	----	---	46.40	88.14			----			1968	73988
UTS=280-300KSI		0.38			238.0	5.000	0.372	2.280	----	---	38.30	83.46			----			1968	73988
		0.38			238.0	5.000	0.372	1.050	----	---	61.20	80.81	84.1/	3.7	----	----/	---	1968	73988

TABLE 6.23.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.23.3.1 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL ALLOY STEEL 300M
CONDITION

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE) A	DA/DN (10**-6 IN./CYCLE) B	C	D
			E= R.T. LAB AIR	E= R.T. SIM SEA WATER		
DELTA K MIN	A	5.02	.113			
	B	9.06		.488		
	C					
	D					
		6.00	.192			
		7.00	.293			
		8.00	.415			
		9.00	.555			
		10.00	.716	.740		
		13.00	1.33	1.51		
		16.00	2.18	2.17		
		20.00	3.83	3.30		
		25.00	7.04	5.90		
		30.00	12.2	10.8		
		35.00	20.5	20.0		
		40.00	33.3	36.9		
		50.00	82.7	158.		
DELTA K MAX	A	52.48	103.			
	B	51.27		548.		
	C					
	D					
ROOT MEAN SQUARE PERCENT ERROR			23.32	32.26		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM: 1.25"TH FORGING
SPECIMEN TYPE: WOL
ORIENTATION: L-T
STRESS RATIO: +0.02
FREQUENCY: 0.10- 20.00 HZ

YIELD STRENGTH: 239.0- 246.5 KSI
ULT. STRENGTH: 291.0- 297.0 KSI
SPECIMEN THK: 1.250"
SPECIMEN WIDTH: 5.000"
REFERENCES: MA005

ALLOY STEEL

300M

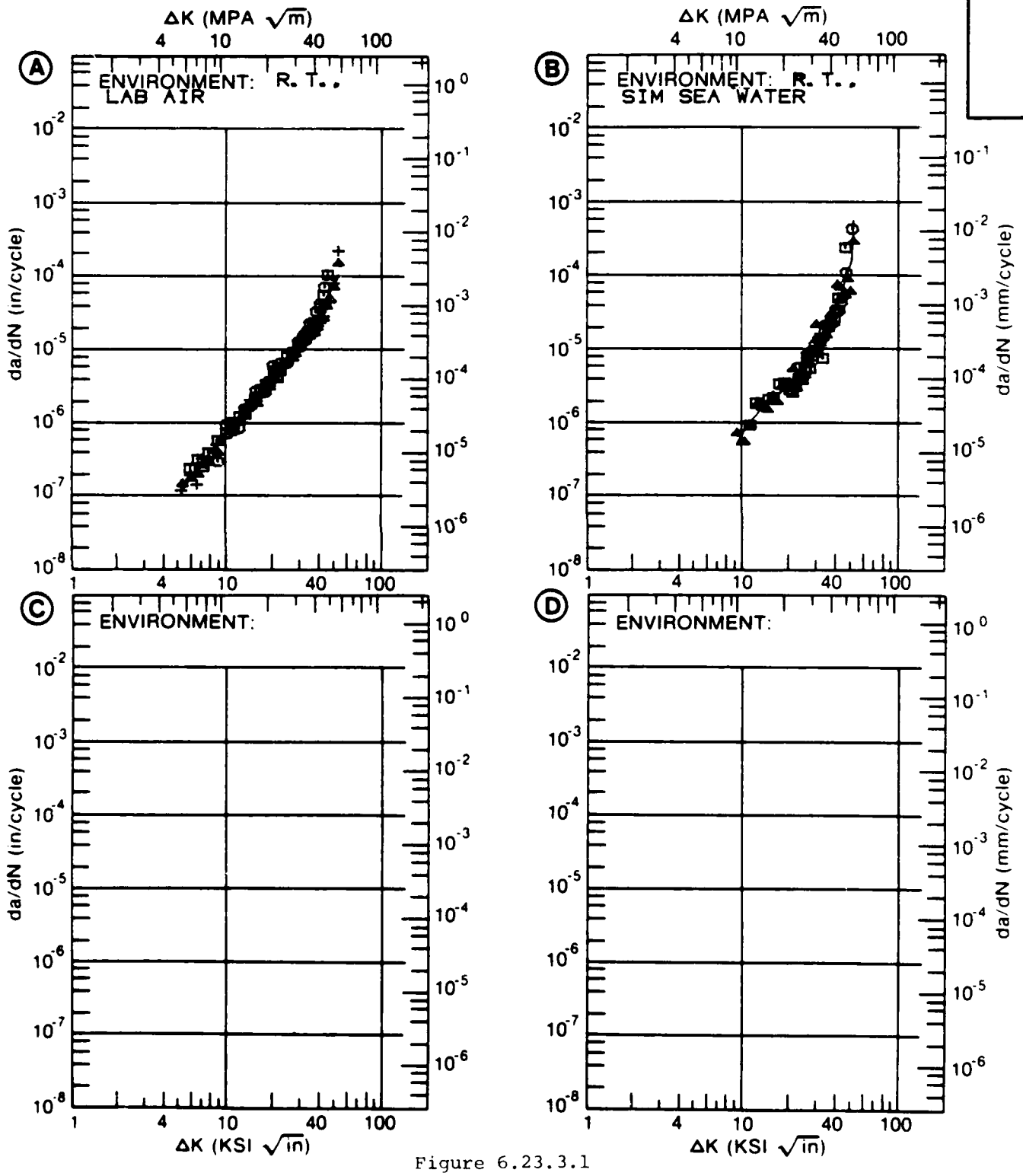


Figure 6.23.3.1

TABLE 6.23.3.2

FATIQUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.23.3.2 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 300M
CONDITION:

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE) A E= R.T. LAB AIR	B E= R.T. SIM SEA WATER	C	D
DELTA K MIN	A: 4.96	.115			
	B: 7.19		.440		
	C:				
	D:				
	5.00	.118			
	6.00	.206			
	7.00	.315			
	8.00	.442	.560		
	9.00	.587	.708		
	10.00	.749	.856		
	13.00	1.36	1.32		
	16.00	2.21	1.89		
	20.00	3.87	2.99		
	25.00	7.31	5.44		
	30.00	13.2	10.3		
	35.00	23.4	20.1		
	40.00	40.5	40.1		
	50.00	117.			
DELTA K MAX	A: 52.52	151.			
	B: 48.66		138.		
	C:				
	D:				
ROOT MEAN SQUARE PERCENT ERROR		27.12	28.80		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM: 1.25"TH FORGING
SPECIMEN TYPE: WOL
ORIENTATION: T-L
STRESS RATIO: +0.02
FREQUENCY: 0.10- 20.00 HZ

YIELD STRENGTH: 240.0- 246.5 KSI
ULT. STRENGTH: 290.5- 299.0 KSI
SPECIMEN THK: 1.250"
SPECIMEN WIDTH: 5.000"
REFERENCES: MA005

ALLOY STEEL

300M

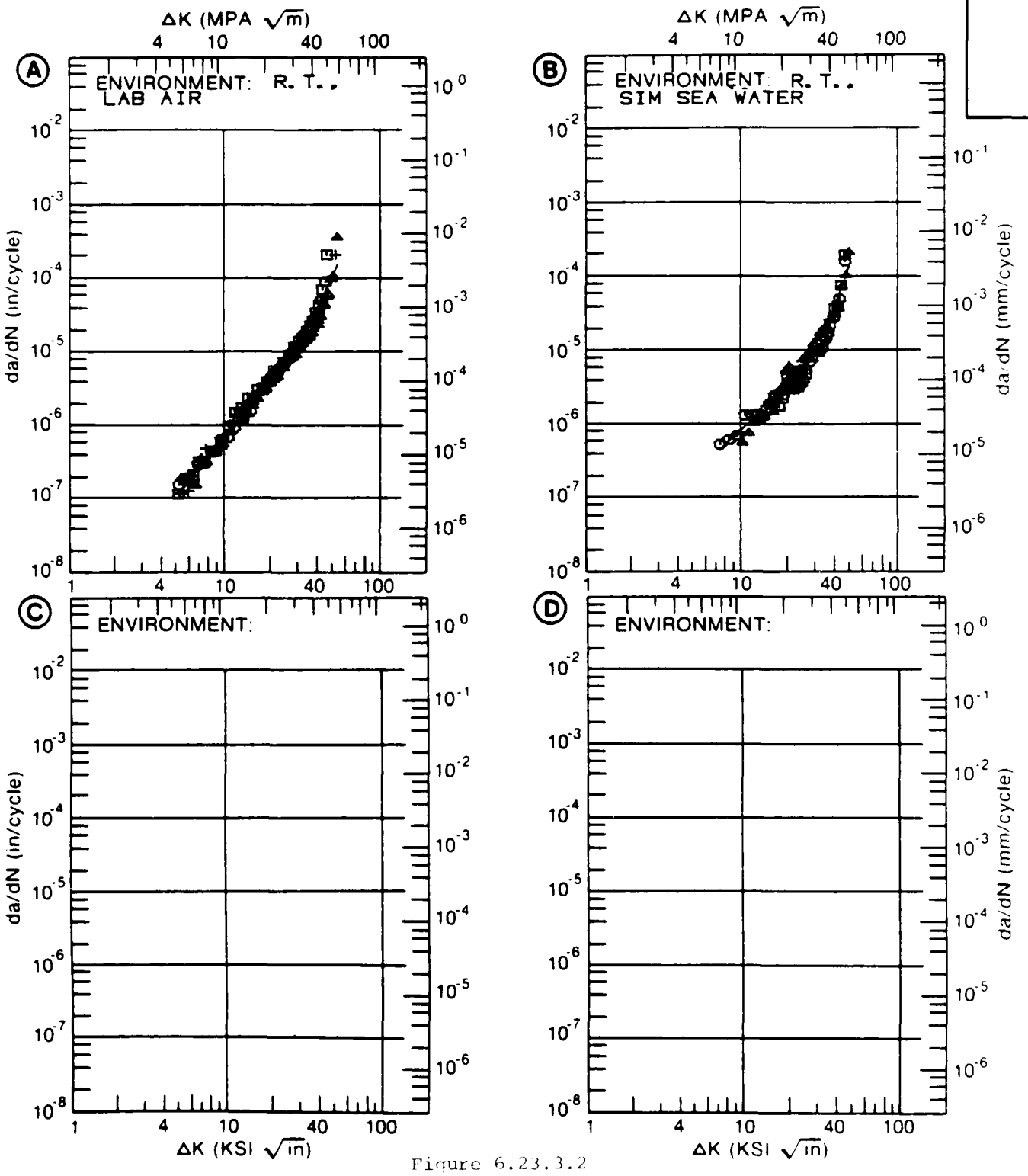


Figure 6.23.3.2

TABLE 6.23.3.3

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.23.3.3 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL 300M
CONDITION: TUS=280-300KSI
ENVIRONMENT: R.T. ,LAB AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=-1.00	R=+0.02	R=+0.50	
DELTA K MIN	A:	12.40	.968			
	B:	12.11		.803		
	C:	8.73			.670	
	D:					
		9.00			.738	
		10.00			1.02	
		13.00	1.16	1.05	2.11	
		16.00	2.26	2.03	3.64	
		20.00	3.79	3.56	6.52	
		25.00	5.83	5.85	12.1	
		30.00	8.37	8.89	21.1	
		35.00	12.1	13.3		
		40.00	17.8	20.0		
		50.00	42.4	47.0		
		60.00	113.	232.		
DELTA K MAX	A:	64.78	187.			
	B:	66.09		2803.		
	C:	31.97			46.4	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			10.81	7.40	4.65	

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: TUS-280-300KSI
FORM: 4.25"TH BAR
SPECIMEN TYPE: CCP
ORIENTATION: L-T
FREQUENCY: 10.00 HZ
ENVIRONMENT: R.T., LAB AIR

YIELD STRENGTH: 234.5 KSI
ULT. STRENGTH: 282.5 KSI
SPECIMEN THK: 0.250"
SPECIMEN WIDTH: 4.000"
REFERENCES: MA006

ALLOY STEEL

300M

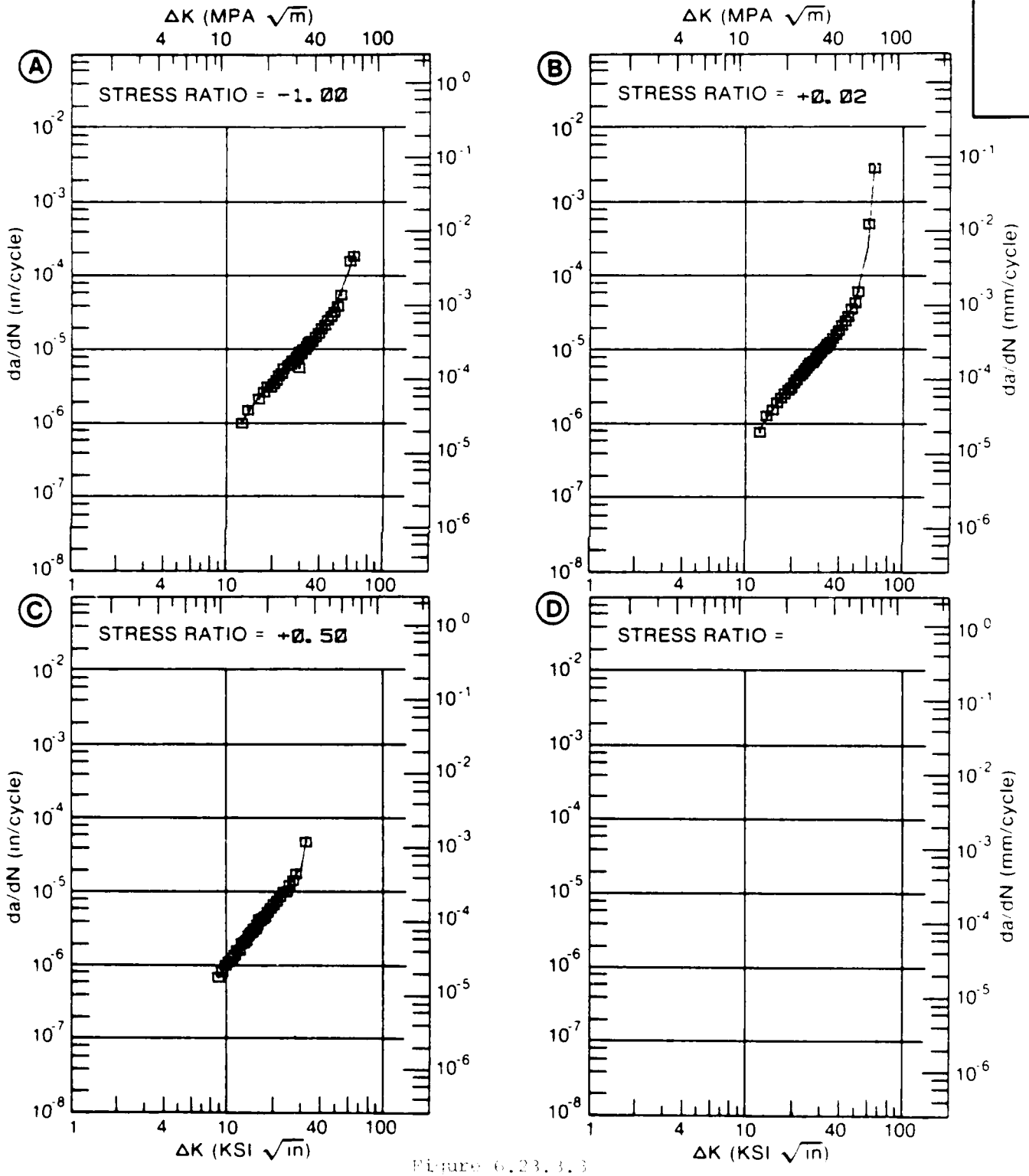


Figure 6.23.3.3

TABLE 6.23.3.4

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.23.3.4 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL 300M
CONDITION: UTS=280-300KSI
ENVIRONMENT: R.T. ,L.H.A.

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		R=-1.00	R=+0.00	R=+0.50	
DELTA K MIN	A: 11.61	.39			
	B: 11.83		.45		
	C: 6.00			.17	
	D:				
	7.00			.272	
	8.00			.382	
	9.00			.508	
	10.00			.657	
	13.00	.684	.664	1.32	
	16.00	1.67	1.42	2.65	
	20.00	3.18	2.96	6.97	
	25.00	5.47	5.73	25.1	
	30.00	9.27	9.53		
	35.00	17.0	14.5		
	40.00	34.4	20.7		
	50.00	188.	38.0		
	60.00		63.8		
	70.00		102.		
DELTA K MAX	A: 55.73	573.			
	B: 79.71		154.		
	C: 27.15			286.	
	D:				
ROOT MEAN SQUARE PERCENT ERROR		22.63	21.35	26.95	

LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: UTS=280-300KSI
FORM: 3.50"TH BILLET
SPECIMEN TYPE: CCP
ORIENTATION: L-T
FREQUENCY: 10.00 HZ
ENVIRONMENT: R.T., L.H.A.

YIELD STRENGTH: 248.0- 250.0 KSI
ULT. STRENGTH: 295.5- 298.0 KSI
SPECIMEN THK: 0.250"
SPECIMEN WIDTH: 3.900- 4.000"
REFERENCES: MA007, MA010

ALLOY STEEL

300M

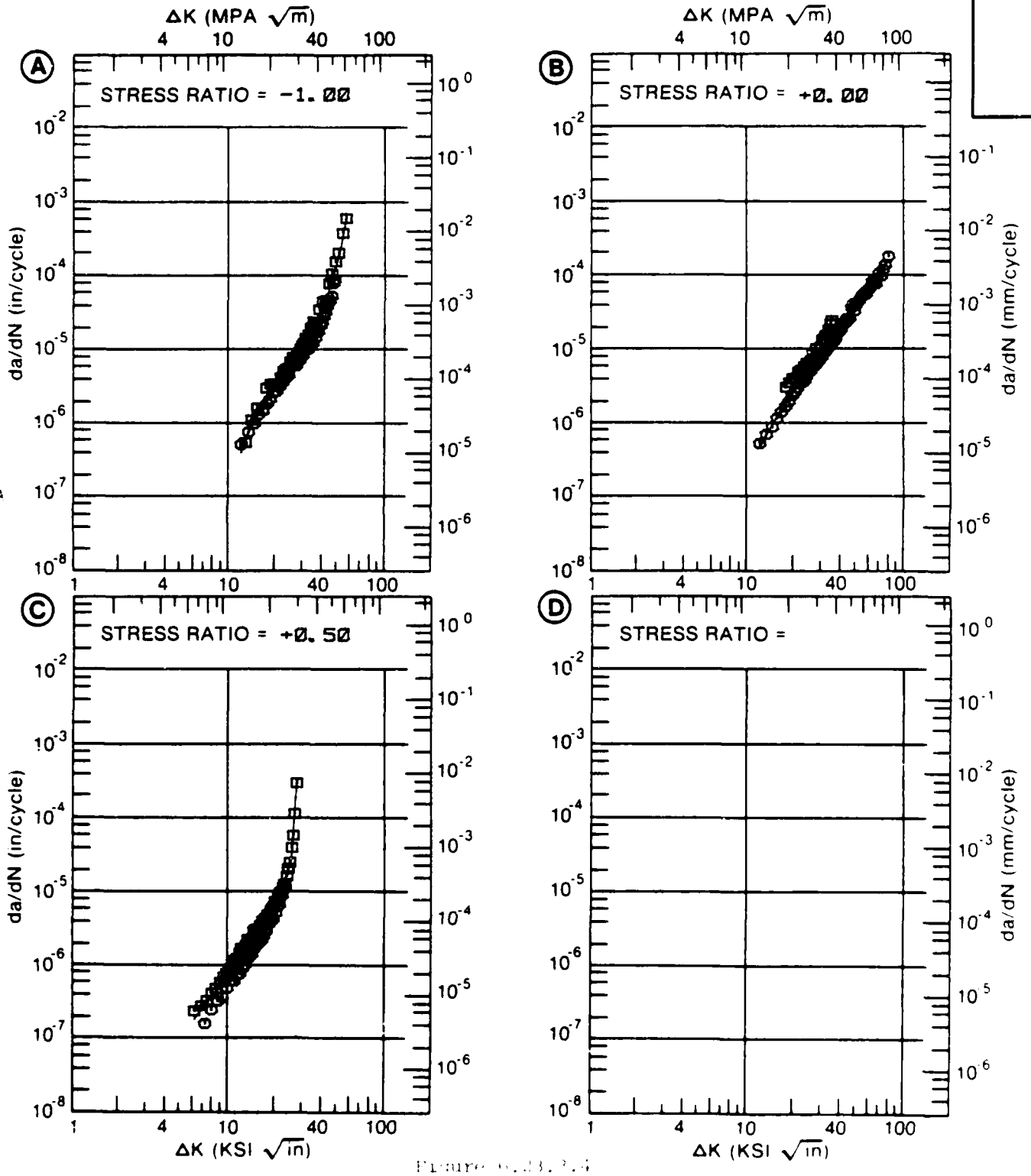


Figure 6.23.2.4

TABLE 6.23.3.5

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.23.3.5 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 300M
CONDITION: TUS=280-300KSI

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. 3.5% NACL	E= R.T. ALT IMMERSION IN SEA WATER-IMMERSED	E= R.T. ALT IMMERSION IN SEA WATER-1ST HALF DRY CYC	E= R.T. ALT IMMERSION IN SEA WATER-2ND HALF DRY CYC
DELTA K MIN	A:	16.55	.723			
	B:	11.30		.983		
	C:	11.22			.382	
	D:	11.50				.386
		13.00		1.08	.543	.524
		16.00		1.51	1.01	.971
		20.00	2.24	2.61	2.17	2.05
		25.00	6.17	4.99	4.65	4.41
		30.00	12.3	8.51	8.12	7.89
		35.00	21.5		11.9	12.1
		40.00	35.9			16.5
		50.00	100.			
DELTA K MAX	A:	55.70	186.			
	B:	32.23		10.4		
	C:	37.07			13.4	
	D:	40.07				16.5
ROOT MEAN SQUARE PERCENT ERROR			39.88	8.55	18.05	19.59

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: TUS=280-300KSI
FORM: 3.50"TH BILLET
SPECIMEN TYPE: CCP
ORIENTATION: L-T
STRESS RATIO: +0.00
FREQUENCY: 10.00 HZ

YIELD STRENGTH: 248.0- 250.0 KSI
ULT. STRENGTH: 295.5- 298.0 KSI
SPECIMEN THK: 0.250"
SPECIMEN WIDTH: 3.900- 4.000"
REFERENCES: MA007, MA010

ALLOY STEEL

300M

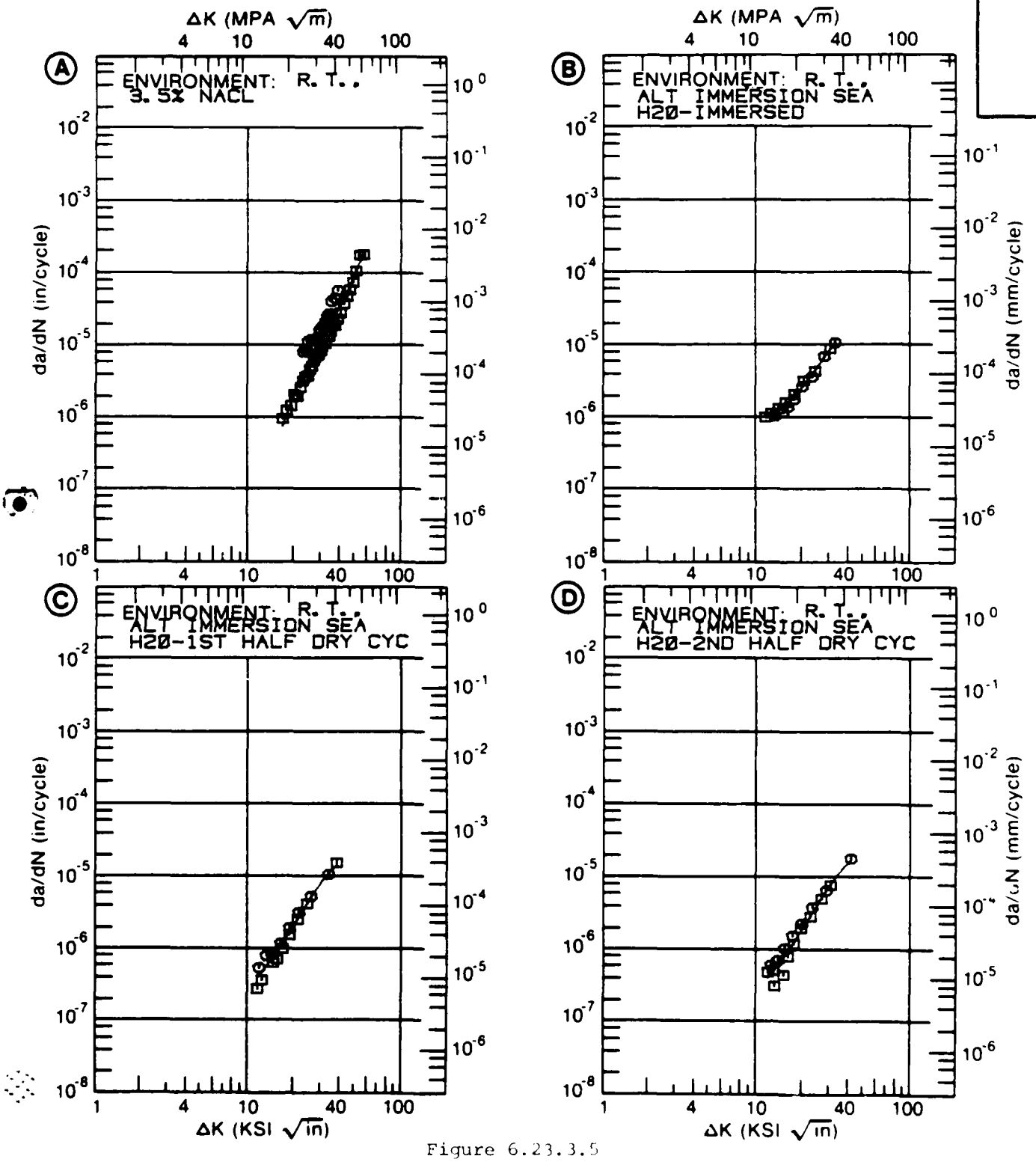


Figure 6.23.3.5

TABLE 6.23.3.6

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.23.3.6 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 300M
CONDITION: TUS=280-300KSI

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. 3.5% NACL	E= R.T. ALT IMMERSION IN SEA WATER-IMMERSED	E= R.T. ALT IMMERSION IN SEA WATER-1ST HALF DRY CYC	E= R.T. ALT IMMERSION IN SEA WATER-2ND HALF DRY CYC
DELTA K MIN	A:	18.02	2.84			
	B:	14.75		1.68		
	C:	14.74			1.42	
	D:	14.64				.575
		16.00		2.95	2.51	.955
		20.00	4.20	8.04	7.06	2.61
		25.00	7.61	12.8	11.7	5.44
		30.00	11.4	16.0	14.8	8.94
		35.00	17.4	19.9	18.0	13.5
		40.00	28.7	27.2	23.3	19.8
		50.00	105.		50.6	
DELTA K MAX	A:	57.63	367.			
	B:	44.10		38.1		
	C:	51.60			59.3	
	D:	48.51				38.8
ROOT MEAN SQUARE PERCENT ERROR			9.87	36.02	42.11	34.38

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: TUS=280-300KSI
FORM: 3.50"TH BILLET
SPECIMEN TYPE: CCP
ORIENTATION: L-T
STRESS RATIO: +0.00
FREQUENCY: 1.00 HZ

YIELD STRENGTH: 248.0- 250.0 KSI
ULT. STRENGTH: 295.5- 298.0 KSI
SPECIMEN THK: 0.250"
SPECIMEN WIDTH: 3.900- 4.000"
REFERENCES: MA007, MA010

ALLOY STEEL

300M

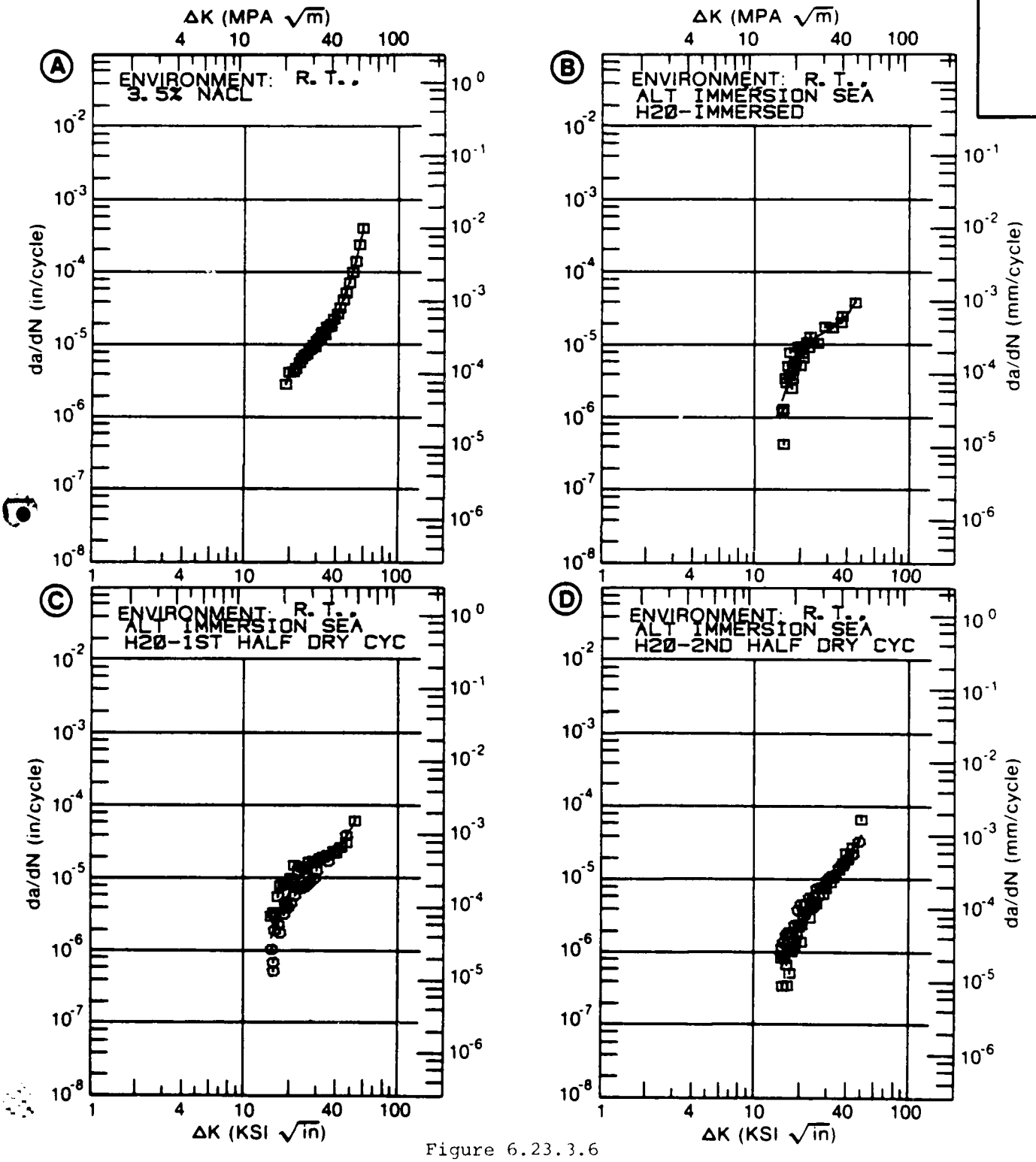


Figure 6.23.3.6

TABLE 6.23.3.7

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.23.3.7 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL 300M
CONDITION: 1700F 1.5HRS AC, 1600F 1.5HRS OQ, 600F 2+2HRS
ENVIRONMENT: R.T., L.H.A.

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.08	R=+0.30	R=+0.50	
DELTA K MIN	A:	5.76	.191			
	B:	10.47		.788		
	C:	9.74			.832	
	D:					
		6.00	.206			
		7.00	.283			
		8.00	.381			
		9.00	.503			
		10.00	.651		.901	
		13.00	1.28	1.52	1.84	
		16.00	2.22	2.71	3.23	
		20.00	4.03	4.88	6.83	
		25.00	7.18	8.69		
		30.00	11.2	15.3		
DELTA K MAX	A:	30.13	11.4			
	B:	34.66		30.4		
	C:	23.72			14.6	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			5.37	10.19	9.34	

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 1700F 1.5HRS AC. 1600F 1.5HRS OQ. 600F 2+2HRS
FORM: 3.00"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 6.00 HZ
ENVIRONMENT: R. T., L. H. A.
YIELD STRENGTH: 238.0 KSI
ULT. STRENGTH: 287.0 KSI
SPECIMEN THK: 1.000"
SPECIMEN WIDTH: 7.400"
REFERENCES: RI006

ALLOY STEEL

300M

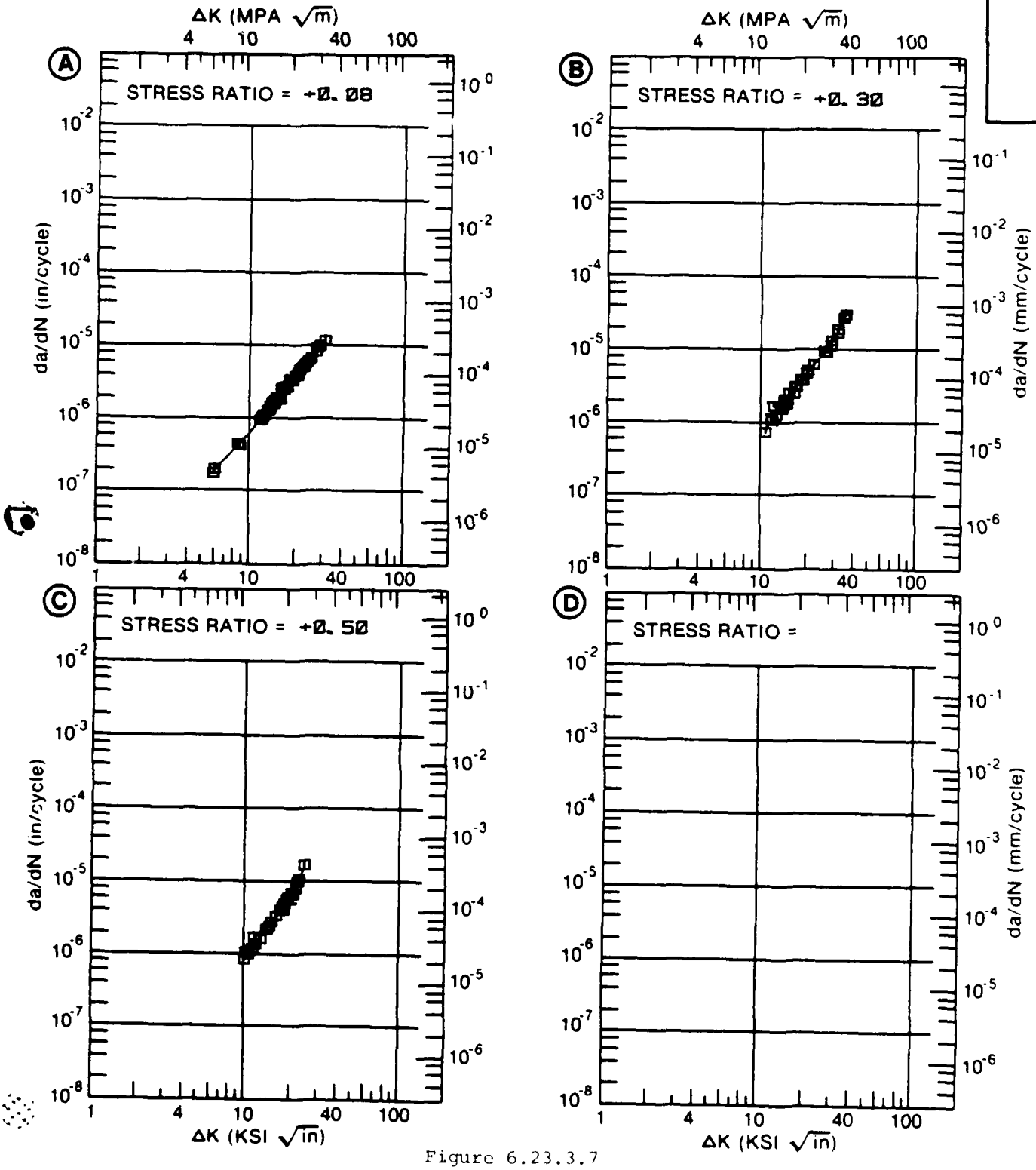


Figure 6.23.3.7

TABLE 6.23.3.8

FATIQUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.23.3.8 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 300M
CONDITION: 1700F 1.5HRS AC, 1600F 1.5HRS OQ, 600F 2+2HRS

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=- 65F L.H.A. 6HZ	E= R.T. L.H.A. 1HZ		
DELTA K MIN	A:	11.83	.577			
	B:	10.87		.744		
	C:					
	D:					
		13.00	.803	1.20		
		16.00	1.56	2.05		
		20.00	3.04	3.67		
		25.00	5.93	6.62		
		30.00	10.7	10.9		
		35.00	18.7	16.8		
DELTA K MAX	A:	38.05	26.0			
	B:	37.57		20.6		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			7.48	10.79		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 1700F 1.5HRS AC. 1600F 1.5HRS OQ. 600F 2+2HRS
FORM: 3.00"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.08
FREQUENCY:

YIELD STRENGTH: 238.0 KSI
ULT. STRENGTH: 287.0 KSI
SPECIMEN THK: 1.000"
SPECIMEN WIDTH: 7.400"
REFERENCES: RI006

ALLOY STEEL

300M

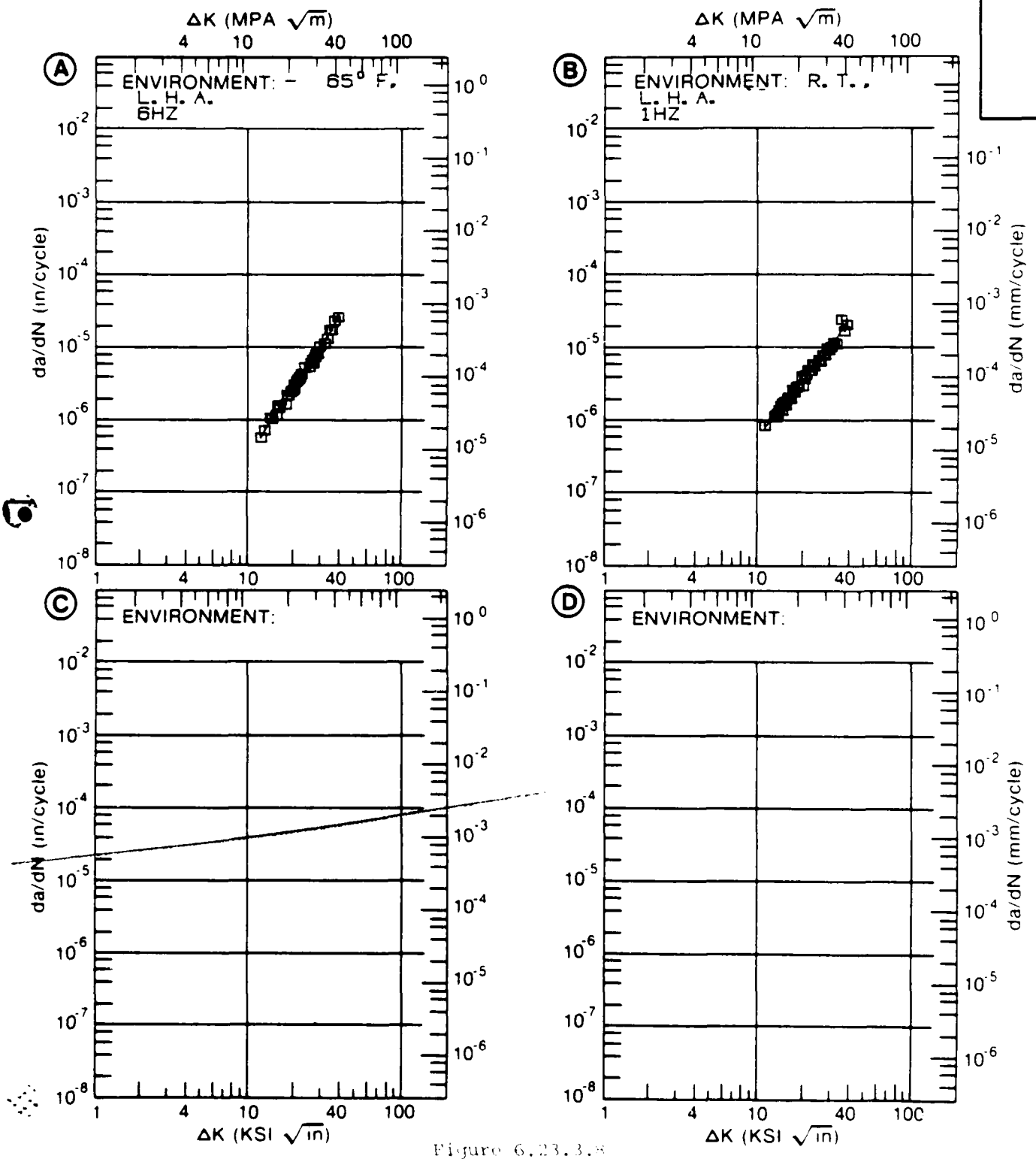


Figure 6.23.3.8

TABLE 6.23.3.9

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.23.3.9 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 300M
CONDITION: 1700F 1.5HRS AC, 1600F 1.5HRS OQ, 600F 2+2HRS

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. L.H.A. 6HZ	E= R.T. S.T.W. 1HZ		
DELTA K MIN	A:	10.91	698			
	B:	8.05		1.93		
	C:					
	D:					
		9.00		3.13		
		10.00		4.28		
		13.00	1.34	7.12		
		16.00	2.41	12.0		
		20.00	4.01			
		25.00	6.73			
		30.00	11.4			
		35.00	20.1			
		40.00	37.4			
DELTA K MAX	A:	45.45	78.3			
	B:	18.47		22.5		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			11.83	10.20		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 1700F 1.5HRS AC, 1600F 1.5HRS OQ, 600F 2+2HRS
FORM: 3.00"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: T-L
STRESS RATIO: +0.08
FREQUENCY:

YIELD STRENGTH: 236.0 KSI
ULT. STRENGTH: 281.0 KSI
SPECIMEN THK: 1.000"
SPECIMEN WIDTH: 7.400"
REFERENCES: RI006

ALLOY STEEL

300M

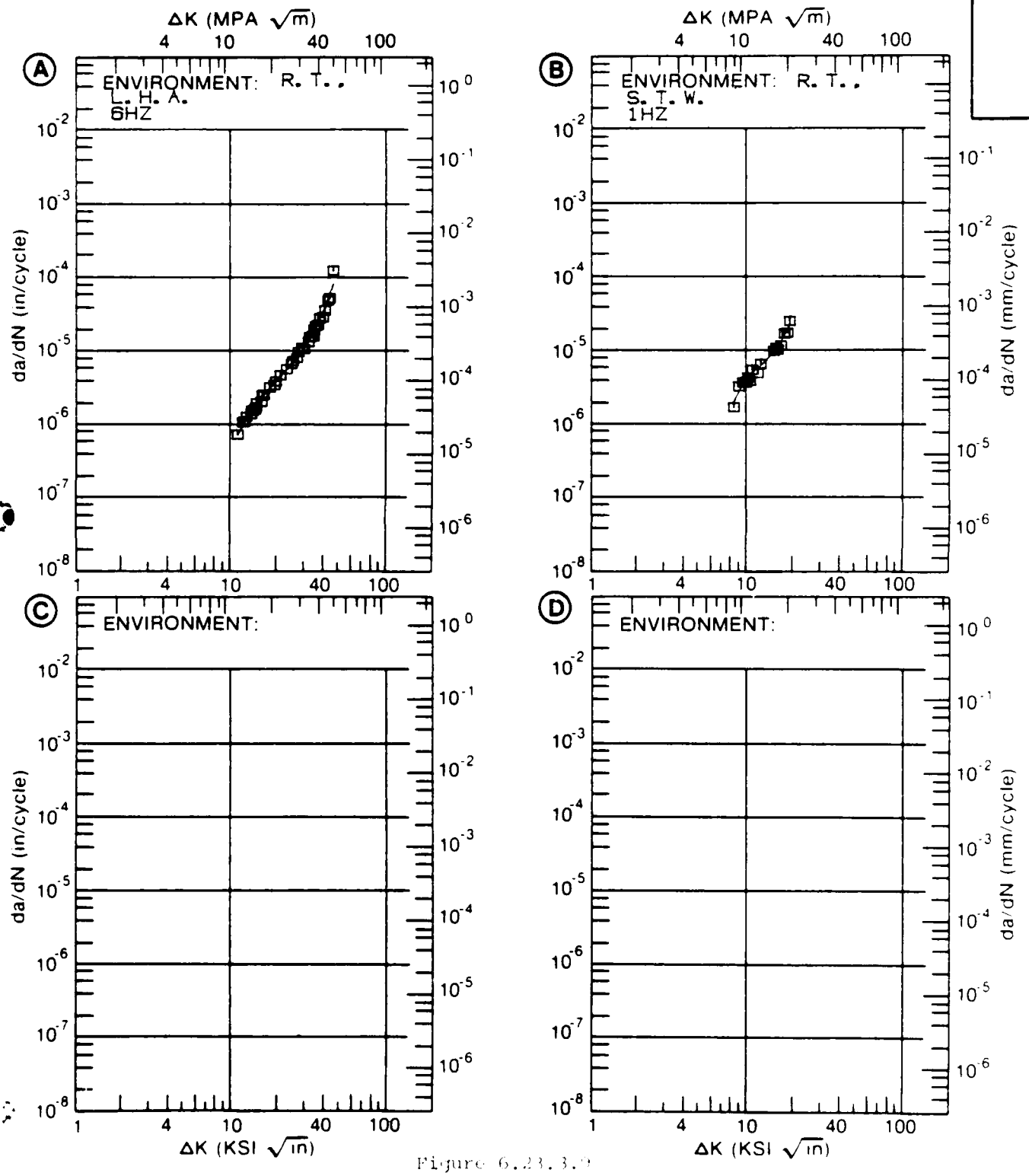


Figure 6.23.3.9

TABLE 6.23.3.10

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.23.3.10 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 300M
CONDITION: 1700F 1.5HRS AC, 1600F 1.5HRS OQ, 600F 2+2HRS

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E=- 65F L.H.A. 6HZ	E= R.T. L.H.A. 6HZ	E= R.T. S.T.W. 1HZ	
DELTA K MIN	A:	12.73	.751			
	B:	15.42		2.08		
	C:					
	D:					
		13.00	.775			
		16.00	1.27	2.29		
		20.00	2.72	4.09		
		25.00	5.91	7.59		
		30.00		13.6		
		35.00		24.2		
DELTA K MAX	A:	29.53	9.36			
	B:	36.05		27.3		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			10.41	6.22	0.00	

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 1700F 1.5HRS AC. 1600F 1.5HRS OQ. 600F 2+2HRS
FORM: 3.00"TH FORGING
SPECIMEN TYPE: CT
ORIENTATION: S-L
STRESS RATIO: +0.08
FREQUENCY:

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK: 1.000"
SPECIMEN WIDTH: 3.100"
REFERENCES:R1006

ALLOY STEEL

300M

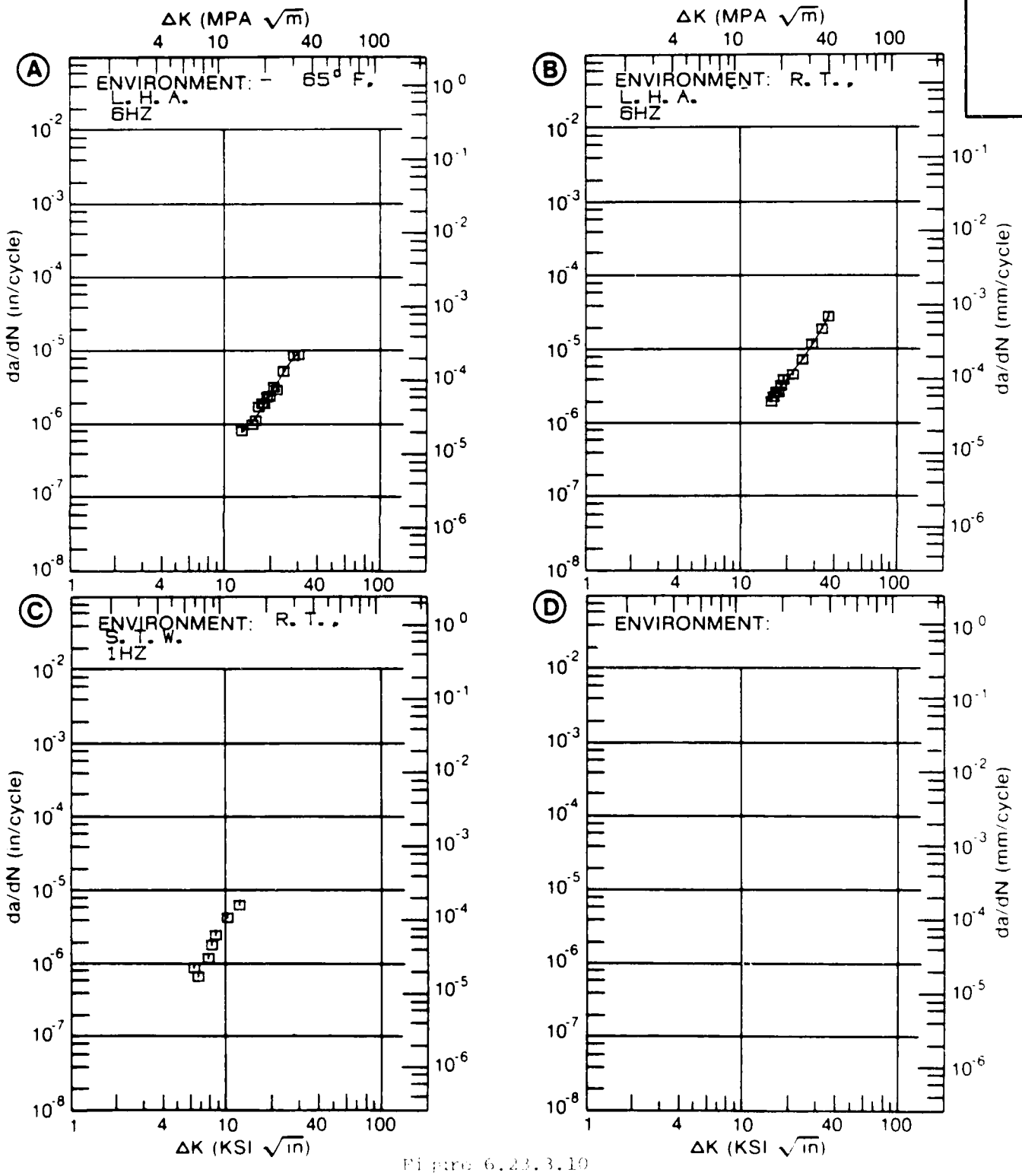


Figure 6.23.3.10

TABLE 6.23.3.11

SUSTAINED CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.23.3.11 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 300M
CONDITION:

K MAX (KSI*IN**1/2)		DA/DT (10**-3 IN/HOUR)			
		A	B	C	D
		E= 3.5% NACL			
K MAX MIN	A:				
	B:				
	C:				
	D:				
200.00					
K MAX MAX	A:				
	B:				
	C:				
	D:				

ROOT MEAN SQUARE PERCENT ERROR 0.00

CONDITION/HT:
FORM:
SPECIMEN TYPE: TDCB
ORIENTATION:
YIELD STRENGTH:
ULT. STRENGTH:

SPECIMEN THK
SPECIMEN WIDTH
CRACK LENGTH (A_o)
K_{ISCC}
REFERENCES 78313

ALLOY STEEL

300M

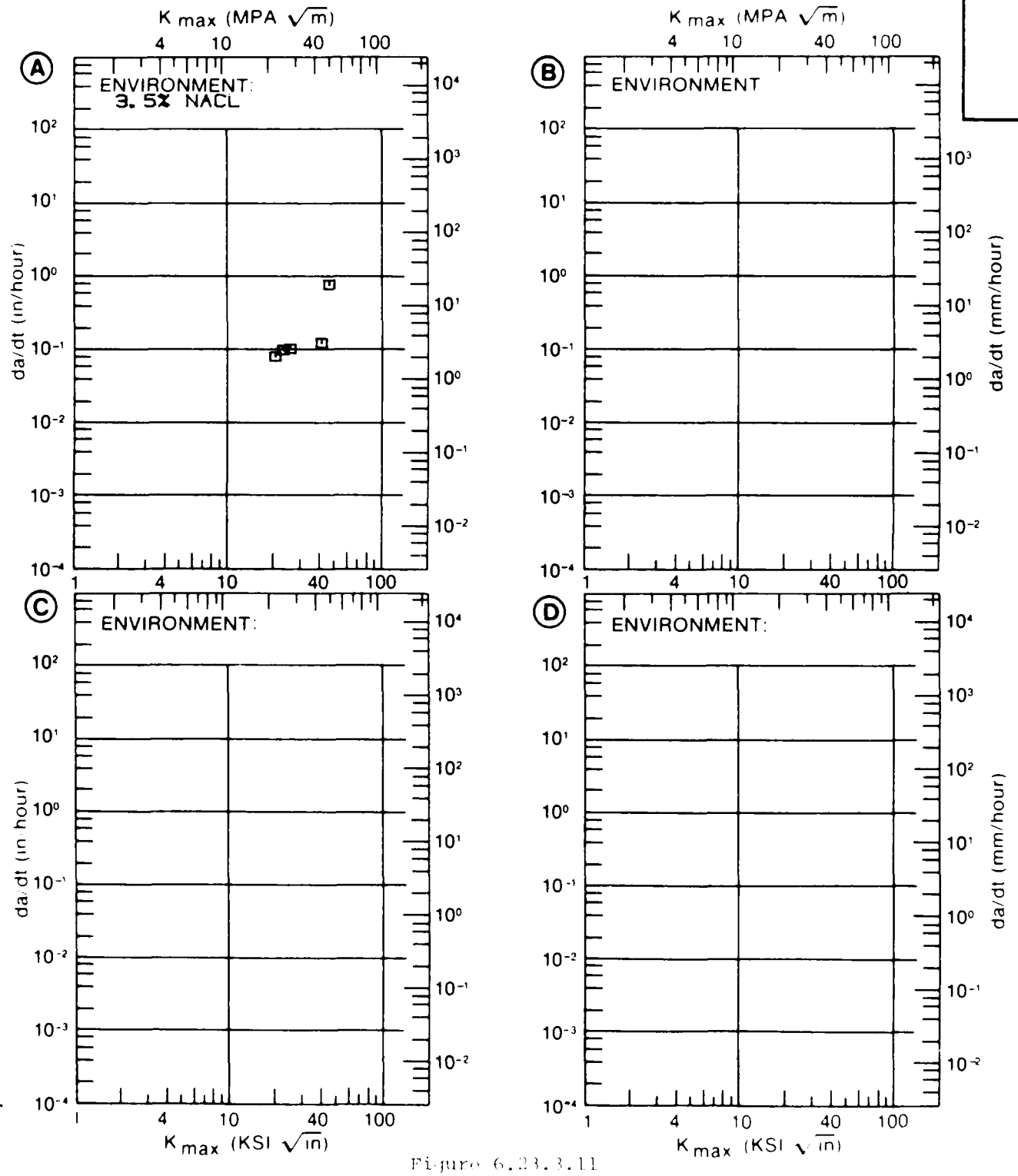


Figure 6.23.3.11

TABLE 6.23.3.12

SUSTAINED CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.23.3.12INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 300M
CONDITION: 1600F OQ, 575F 2+2HR

K MAX (KSI*IN**1/2)			DA/DT (10**-3 IN/HOUR) A E= R.T. DIST. WATER	B	C	D
K MAX MIN	A:	12.80	3.10			
	B:					
	C:					
	D:					
		13.00	23.7			
		16.00	147.			
		20.00	290.			
		25.00	368.			
		30.00	399.			
		35.00	436.			
		40.00	490.			
		50.00	682.			
		60.00	1059.			
		70.00	1793.			
		80.00	3897.			
K MAX MAX	A:	82.00	7300.			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 34.18

CONDITION/HT: 1600F OQ. 575F 2+2HR
FORM: Ø.1"TH SHEET
SPECIMEN TYPE: DCB
ORIENTATION: T-L
YIELD STRENGTH: 245.Ø KSI
ULT. STRENGTH:

SPECIMEN THK: Ø.1ØØ"
SPECIMEN WIDTH:
CRACK LENGTH (A_O):
K_{ISCC}:
REFERENCES:85545

ALLOY STEEL

300M

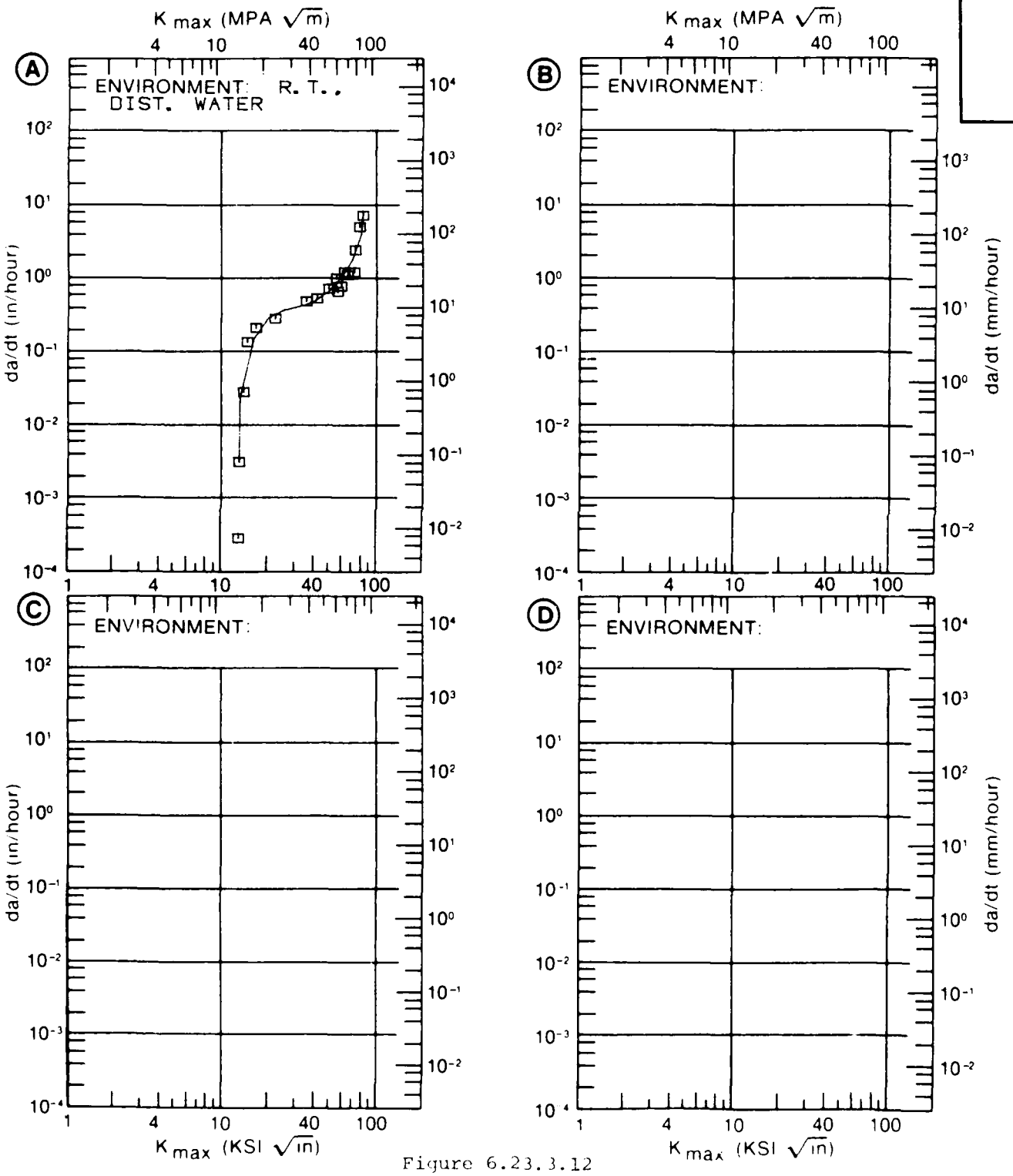


Figure 6.23.3.12

TABLE 6.23.3.13

ALLOY STEEL 300M K(ISCC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	DESIGN (*=SG)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
--- ----------	P	----	R.T.	---	289.0	3.5 PCT NACL	1.500	0.500	CANT*	0.300	89.00	12.00			----	1971	84351
-- ------ -----	P	0.48	R.T.	L-S	236.0	3.5 PCT NACL	1.500	0.480	NB	----	76.00	13.00			----	1967	74302
--- ----------	F	1.25	R.T	S-T	240.2	SIM. SEA WATER	3.091	1.242	BWOL	1.351	------	15.40			86400	1977	MA005
		1.25			240.2		3.088	1.247	BWOL	1.348	------	15.40			86400	1977	MA005
		1.25			240.2		3.101	1.249	BWOL	1.355	------	15.70			86400	1977	MA005
		1.25			240.2		3.091	1.251	BWOL	1.366	------	15.60			86400	1977	MA005
													15.5/	0.2			
1500F 0.5HR OQ	P	0.56	R.T.	---	202.0	3.5 PCT NACL	1.500	0.500	CANT*	----	36.00	12.00			----	1970	78305
400F 2+2 HR (COARSE GRAINED STRUCTURE)																	
1500F 0.5HR OQ	P	0.56	R.T.	---	232.0	3.5 PCT NACL	1.500	0.500	CANT*	----	42.00	15.00			----	1970	78305
550F 2+2 HR (COARSE GRAINED STRUCTURE)																	
1500F 0.5HR OQ	P	0.56	R.T	---	247.0	3.5 PCT NACL	1.500	0.500	CANT*	----	56.00	15.00			----	1970	78305
550F 2+2 HR (FINE GRAINED STRUCTURE)																	
1500F 0.5HR OQ	P	0.56	R.T.	---	245.0	3.5 PCT NACL	1.500	0.500	CANT*	----	60.00	12.00			----	1970	78305
400F 2+2 HR (FINE GRAINED STRUCTURE)																	
1550F 0.5HR OQ	P	0.56	R.T	---	248.0	3.5 PCT NACL	1.500	0.500	CANT*	----	64.00	15.00			----	1970	78305
550F 2+2 HR (FINE GRAINED STRUCTURE)																	
1550F 0.5HR OQ	P	0.56	R.T	---	241.0	3.5 PCT NACL	1.500	0.500	CANT*	----	53.00	15.00			----	1970	78305
400F 2+2 HR (FINE GRAINED STRUCTURE)																	
1550F 0.5HR OQ	P	0.56	R.T	---	246.0	3.5 PCT NACL	1.500	0.500	CANT*	----	60.00	15.00			----	1970	78305
550F 2+2 HR (COARSE GRAINED STRUCTURE)																	

TABLE 6.23.3.13 (Con't)

ALLOY STEEL 300M K(ISCC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN (*=SC)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
1550F 0 5HR OQ P 400F 2+2 HR (COARSE GRAINED STRUCTURE)		0 56	R T	---	240 0	3 5 PCT NACL	1 500	0 500	CANT*	----	53 00	15 00			----	1970	78305
1600F 0 5HR OQ P 400F 2+2 HR (COARSE GRAI STRUCTURE)		0 5				5 PCT NACL	1 500	0 500	CANT*	----	67 00	12 00			----	1970	78305
1600F 0 5HR OQ P 550F 2+2 HR (COARSE GRAINED STRUCTURE)		0 56	R			T NACL	1 500	0 500	CANT*	----	65 00	12 00			----	1970	78305
1600F 0 5HR OQ P 550F 2+2 HR (FINE GRAINED STRUCTURE)		0 56	R T	---		T NACL	1 500	0 500	CANT*	----	65 00	12 00			----	1970	78305
1550F 1625F OQ F 400F 2+2HR		5 00	R T	---	247 0	AIR-90PCT RH	1 500	0 480	PTSC	0 140	73 90	71 00			----	1965	74718
1550F 1600F OQ 400F 1+1 HR	F	4 00	R T	L-S	251 5	3 5 PCT NACL	1 500	0 480	CANT	----	63 50	19 60			----	1965	74718
1550F 1 5HR OQ 400F 2+2HR	F	3 00	R T	L-T	238 0	F C S	2 000	1 000	DCB	----	150 00	21 00			----	1976	R1006
A 1550F 1 5HR OQ 400F 2+2HR		3 00			238 0		2 000	1 000	DCB	----	150 00	29 00			----	1976	R1006
		3 00			238 0		2 000	1 000	DCB	----	150 00	30 00			----	1976	R1006
1550F 1 5HR OQ 400F 2+2HR	F	3 00	R T	L-T	238 0	S C S	2 000	1 000	DCB	----	150 00	39 00			116760	1976	R1006
A 1550F 1 5HR OQ 400F 2+2HR		3 00			238 0		2 000	1 000	DCB	----	150 00	39 00			116760	1976	R1006
		3 00			238 0		2 000	1 000	DCB	----	150 00	36 00			116760	1976	R1006
													38 0/	1 7			
1550F 1 5HR OQ 400F 2+2HR	F	3 00	R T	L-T	238 0	S T W	2 000	1 000	DCB	----	150 00	25 00			----	1976	R1006

TABLE 6.23.3.13 (Con't)

ALLOY STEEL 300M K(ISCC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN (*=SG)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
1700F 1 5HR	F	3 00	R T	L-T	238.0	S.T.W.	2.000	1.000	DCB	----	150.00	< 21.00			----	1976	R1006
AC, 1600F 1 5HR 00, 600F 2+2HR																	
1700F 1 5HR	F	3 00	R T	S-L	----	S.T.W.	2.000	1.000	DCB	----	150.00	< 25.00			----	1976	R1006
AC, 1600F 1 5HR		3 00			----		2.000	1.000	DCB	----	150.00	< 25.00			----	1976	R1006
00, 600F 2+2HR		3 00			----		2.000	1.000	DCB	----	150.00	16.00			76200	1976	R1006
		3 00			----		2.000	1.000	DCB	----	150.00	15.00			76200	1976	R1006
													15.5/	0.7			
1710F+1610F	D	0 63	R T.	L-T	250.0	3.5 PCT NACL	1.000	0.500	NB	----	58.90	18.00			----	1971	84087
610F		0 63			250.0		1.000	0.500	NB	----	59.80	17.60			----	1971	84087
		0 63			250.0		1.000	0.500	NB	----	54.70	16.70			----	1971	84087
													17.4/	0.7			
1710F+1610F	D	0.63	R.T.	T-L	250.0	3.5 PCT NACL	----	0.500	CT	----	61.20	18.90			----	1971	84087
610F		0 63			250.0		----	0.500	CT	----	51.50	16.30			----	1971	84087
		0 63			250.0		----	0.500	CT	----	55.30	18.00			----	1971	84087
		0 63			250.0		----	0.500	CT	----	55.90	17.30			----	1971	84087
													17.6/	1.1			

TABLE 6.24.1.1

MEAN PLANE STRAIN FRACTURE TOUGHNESS DATA OF
ALLOY STEEL 300M (AM) AT ROOM TEMPERATURE

CONDITION/HT	MEAN KIC ± STANDARD (KSI SQRT(IN)) DEVIATION	(NUMBER OF SPECIMENS)

FORGING

CONDITION/HT	L-T	T-L	S-L
1650F 1 HR.AC. 1550F 1 HR.OQ. -320F 0.5 HR. 600F 2+2HR.AC	46.5 ± 3.8 (3)	-----	-----

TABLE 6.24.2.1

ALLOY STEEL 300M (AM) K(IC)

CONDITION	PRODUCT FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5*(K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
1650F 1 HR,AC,	F	4.00	R.T	L-T	262.0	1.800	0.900	NB	----	0.07	43.60			1968	73300 (1)
1550F 1 HR,OQ,		4.00			262.0	1.800	0.900	NB	----	0.07	45.10			1968	73300 (1)
3?0F 0.5 HR,		4.00			262.0	1.800	0.900	NB	----	0.09	50.80			1968	73300 (1)
?00F 2+2HR,AC												46.5/	3.8		

NOTES
(1) (AM)=AIR MELTED

TABLE 6.25.1.1

MEAN PLANE STRAIN FRACTURE TOUGHNESS DATA OF
ALLOY STEEL 300M (VAR) AT ROOM TEMPERATURE

CONDITION/HT	MEAN KIC ± STANDARD DEVIATION (KSI SQRT(IN))	(NUMBER OF SPECIMENS)

FORGING

CONDITION/HT	L-T	T-L	S-L
1650F 1 HR.AC. 1550F 1 HR.OQ. -320F 0.5 HR. 600F 2+2HR.AC	52.2 ± 1.3 (4)	-----	-----

TABLE 6.25.2.1

ALLOY STEEL 300M (VAR) K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	------SPECIMEN------ WIDTH (IN) W	THICK (IN) B	DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	STAN DEV	DATE	REFER
1650F 1 HR,AC,	F	4.50	R.T.	L-T	259.0	1.800	0.900	NB	----	0.10	51.10			1968	73300 (1)
1550F 1 HR,OQ,		4.50			259.0	1.800	0.900	NB	----	0.11	53.60			1968	73300 (1)
320F 0.5 HR,		4.50			259.0	1.800	0.900	NB	----	0.11	53.00			1968	73300 (1)
600F 2+2HR,AC		4.50			259.0	1.800	0.900	NB	----	0.10	51.20			1968	73300 (1)
												52.2/	1.3		

NOTES
(1) (VAR)=VACUUM ARC REMELTED

TABLE 6.26.1.1

MEAN PLANE STRAIN FRACTURE TOUGHNESS DATA OF
ALLOY STEEL 300M(VM) AT ROOM TEMPERATURE

CONDITION/HT	MEAN KIC ± STANDARD DEVIATION (KSI SQRT(IN))	(NUMBER OF SPECIMENS)

PLATE

CONDITION/HT	L-T	T-L	S-L
1500F, OQ, 400F 2+2HR	48.0 ±17.0 (2)	-----	-----
1500F, OQ, 550F 2+2HR	49.5 ±10.6 (2)	-----	-----
1550F, OQ, 550F 2+2HR	62.5 ± 3.5 (2)	-----	-----

BILLET

CONDITION/HT	L-T	T-L	S-L
1700F, AC, 1600F 1 HR, OQ, 550F 2+2 HR	-----	55.3 ± 0.3 (3)	-----
1700F, AC, 1600F 1 HR, SQ 975F, OQ, 575F 2+2 HR	-----	58.6 ± 2.2 (3)	-----
1700F, AC, 1600F 1 HR, SQ 400F, AC, 550F 2+2 HR	-----	58.0 ± 3.4 (3)	-----

TABLE 6.26.2.1

ALLOY STEEL 300M(VM) K(IC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
1550F.00.400F	P	0.56	R.T	L-T	202.0	1.500	0.500	NB	----	0.08	36.00			1970	78305 (1)
24/28R		0.56			245.0	1.500	0.500	NB	----	0.15	60.00			1970	78305 (2)
												48.0/	17.0		
1550F.00.550F	P	0.56	R.T	L-T	233.0	1.500	0.500	NB	----	0.08	42.00			1970	78305 (1)
24/28R		0.56			248.0	1.500	0.500	NB	----	0.13	57.00			1970	78305 (2)
												49.5/	10.6		
1550F.00.400F	P	0.56	R.T	L-T	242.0	1.500	0.500	NB	----	0.12	53.00			1970	78305 (1)
24/28R															
1550F.00.550F	P	0.56	R.T	L-T	248.0	1.500	0.500	NB	----	0.15	60.00			1970	78305 (1)
24/28R		0.56			248.0	1.500	0.500	NB	----	0.17	65.00			1970	78305 (2)
												62.5/	3.5		
1550F.00.400F	P	0.56	R.T	L-T	220.0	1.500	0.500	NB	----	0.22	66.00			1970	78305 (1)
24/28R															
1550F.00.550F	P	0.56	R.T	L-T	233.0	1.500	0.500	NB	----	0.20	66.00			1970	78305 (1)
24/28R															
1650F.AC.1650F	BT	5.50	R.T	T-L	239.0	2.500	1.000	CT	----	0.14	55.60			1972	84278 (3)
1650F.AC.550F		5.50			239.0	2.500	1.000	CT	----	0.13	55.30			1972	84278 (3)
24/28R		5.50			239.0	2.500	1.000	CT	----	0.13	55.00			1972	84278 (3)
												55.3/	0.3		
1650F.AC.1650F	BT	5.50	R.T	T-L	242.0	2.500	1.000	CT	----	0.14	56.40			1972	84278 (3)
1650F.AC.550F		5.50			242.0	2.500	1.000	CT	----	0.15	50.50			1972	84278 (3)
24/28R		5.50			242.0	2.500	1.000	CT	----	0.16	60.80			1972	84278 (3)
												58.6/	2.2		
1650F.AC.1650F	BT	5.50	R.T	T-L	244.0	2.500	1.000	CT	----	0.13	55.40			1972	84278 (3)
1650F.AC.550F															

NOTES

(1) (VACUUM MELTED) THESE DATA ARE AVERAGE VALUES

(2) (VACUUM MELTED) WITH INTERMEDIATE ANNEALS AT 1275F TO GET FINE GRAIN SIZE

(3) (VIM) (VACUUM MELTED)

TABLE 6.26.2.1 (Con't)

ALLOY STEEL 300M(VM) K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	------SPECIMEN------ WIDTH (IN) W	THICK (IN) B	DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
1700F, AC, 1600F	BT	5.50	R.T	T-L	244.0	2.500	1.000	CT	----	0.14	56.70			1972	84278 (1)
1 HR, SQ 400F,		5.50			244.0	2.500	1.000	CT	----	0.16	61.80			1972	84278 (1)
AC, 550F 2+2 HR												58.0/	3.4		

NOTES
(1) (VM)-(VACUUM MELTED)

TABLE 6.27.1.1

MEAN PLANE STRAIN FRACTURE TOUGHNESS DATA OF
ALLOY STEEL 4140 AT ROOM TEMPERATURE

CONDITION/HT	MEAN KIC ± STANDARD DEVIATION (KSI SQRT(IN))	(NUMBER OF SPECIMENS)

FORGED BAR

CONDITION/HT	L-T	T-L	S-L
2010F 1 HR,OQ, 475F 1 HR	52.1 ± 7.4 (2)	-----	-----
2190F 1 HR,OQ, 400F 1 HR	81.1 ±13.2 (2)	-----	-----
2190F 1 HR,OQ, 475F 1 HR	66.1 ± 2.7 (2)	-----	-----

TABLE 6.27.2.1

ALLOY STEEL 4140 K(IC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5*(K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
1600F 1 HR,OQ, 400F 1HR	FB	0.62	R.T.	L-T	210.0	2.000	0.600	CT	1.000	0.09	39.90			1973	87241 (1)
1600F 1 HR,OQ, 745F 1HR	FB	0.62	R.T.	L-T	220.0	2.000	0.600	CT	1.000	0.13	50.60			1973	87241 (1)
1600F 1 HR,OQ, 535F 1HR	FB	0.62	R.T.	L-T	230.0	2.000	0.600	CT	1.000	0.12	50.00			1973	87241 (1)
1600F 1HR,	P	1.00	- 65	T-L	176.3	2.003	0.994	CT	1.033	0.31	62.50			1980	MR002
1550F 1HR, OQ		1.00			176.3	2.002	0.994	CT	1.022	0.44	74.69			1980	MR002
AT 150-175F, 900F 1HR												68.6/	8.6		
1600F 1HR,	P	1.00	- 65	T-L	198.1	2.001	0.994	CT	1.034	0.10	41.30			1980	MR002
1550F 1HR, OQ		1.00			198.1	2.003	0.994	CT	1.055	0.09	38.90			1980	MR002
AT 150-175F, 800F 1HR												40.1/	1.7		
1600F 1HR,	P	1.00	R.T.	T-L	159.4	2.003	0.994	CT	1.024	0.71	85.30			1980	MR002
1550F 1HR, OQ AT 150-175F, 900F 1HR															
1600F 1HR,	P	1.00	R.T.	T-L	175.0	2.003	0.994	CT	1.040	0.28	58.70			1980	MR002
1550F 1HR, OQ AT 150-175F, 800F 1HR															
1600F 1HR,	P	1.00	165	T-L	156.0	2.000	0.990	CT	0.991	0.73	84.40			1980	MR002
1550F 1HR, OQ		1.00			156.0	1.998	0.994	CT	1.015	0.73	84.60			1980	MR002
AT 150-175F, 900F 1HR												84.5/	0.1		
1600F 1HR,	P	1.00	165	T-L	167.7	2.002	0.994	CT	1.045	0.44	71.10			1980	MR002
1550F 1HR, OQ		1.00			167.7	2.000	0.990	CT	1.037	0.38	66.19			1980	MR002
AT 150-175F, 800F 1HR												68.6/	3.5		
2010F 1 HR,OQ, 400F 1 HR	FB	0.62	R.T.	L-T	200.0	2.000	0.600	CT	1.000	0.22	59.20			1973	87241 (1)
2010F 1 HR,OQ, 475F 1 HR	FB	0.62	R.T.	L-T	210.0	2.000	0.600	CT	1.000	0.12	46.80			1973	87241 (1)

NOTES

(1) COMPOSITION(WT PERCENT) 0.40C,0.94MN,0.008P,0.012S,0.28SI,0.09NI,0.90CR,00.17CU

TABLE 6.27.2.1 (Con't)

ALLOY STEEL 4140 K(IC)

CONDITION	PRODUCT FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
2510F 1 HR,OQ, 435F 1 HR	FB	0.62	R T	L-T	210.0	2.000	0.600	CT	1.000	0.19	57.30	52.1/	7.4	1973	87241 (1)
2130F 1 HR,OQ, 400F 1 HR	FB	0.62	R T	L-T	200.0	2.000	0.600	CT	1.000	0.51	90.40			1973	87241 (1)
		0.62			200.0	2.000	0.600	CT	1.000	0.32	71.70	81.1/	13.2	1973	87241 (1)
2190F 1 HR,OQ, 660F 1 HR	FB	0.62	R T	L-T	202.0	2.000	0.600	CT	1.000	0.17	53.20			1973	87241 (1)
2130F 1 HR,OQ, 615F 1 HR	FB	0.62	R T	L-T	205.0	2.000	0.600	CT	1.000	0.14	48.50			1973	87241 (1)
2190F 1 HR,OQ, 475F 1 HR	FB	0.62	R T,	L-T	210.0	2.000	0.600	CT	1.000	0.26	68.00			1973	87241 (1)
		0.62			210.0	2.000	0.600	CT	1.000	0.23	64.20	66.1/	2.7	1973	87241 (1)

NOTES
(1) COMPOSITION(WT PERCENT) 0.40C,0.94MN,0.008P,0.012S,0.28SI,0.09NI,0.90CR,00.17CU

TABLE 6.27.3.1

ALLOY STEEL 4140 K(ISCC)

CONDITION	PRODUCT FORM	THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN (*=SG)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
1550F 1HR OQ 1250F 1HR AC	P	----	R T	---	105.0	WATER SAT H2S	3.250	1.000	CT	1.000	------	36 00			----	1972	84963
1550F 1HR OQ 1000F 1HR AC, 1125F 1HR AC	P	----	R T	---	147.5	WATER SAT H2S	3.250	1.000	CT	1.000	------	17 50			----	1972	84963
1700F, 1600F OQ 750F 1+1 HR	P	0 25	R T	---	195.0	DIST. WATER	1.000	0.250	CANT*	0.200	49.40	15 00			> 6000	1965	63061
1700F, 1600F OQ 600F 1+1 HR	P	0 25	R.T.	---	241.0	DIST. WATER	1.000	0.250	CANT*	0.200	40.10	11.00			> 7000	1965	63061

TABLE 6.28.1.1

MEAN PLANE STRAIN FRACTURE TOUGHNESS DATA OF ALLOY STEEL 4330V MOD AT ROOM TEMPERATURE

CONDITION/HT	MEAN KIC ± STANDARD (KSI SQRT(IN)) DEVIATION		(NUMBER OF SPECIMENS)
	PLATE		
CONDITION/HT	L-T	T-L	S-L
HEAT TREATED TO 46 RC HARDNESS	-----	74.7 ± 0.8 (2)	-----
	FORGED BAR		
CONDITION/HT	L-T	T-L	S-L
1600F 1 HR, OQ, 535F 1 HR	96.7 ± 3.8 (2)	-----	-----
	BILLET		
CONDITION/HT	L-T	T-L	S-L
1650F 1 HR, AC, 1575F 1 HR, OQ, 800F 2+2 HR	96.1 ± 3.2 (3)	-----	-----
1650F 1 HR, AC, 1575F 1 HR, OQ, 525F 2+2 HR	81.6 ± 2.3 (6)	-----	-----

TABLE 6.28.2.1

ALLOY STEEL 4330V MOD K(IC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
----------	BT	2.20	- 65	L-T	194.5	2.502	1.259	CT	1.155	0.14	45.30			1974	MA011
		2.20			194.5	2.507	1.260	CT	1.153	0.13	44.30	44.8/	0.7	1974	MA011
----------	BT	2.20	R.T	L-T	194.5	2.504	1.253	CT	1.164	0.43	80.70			1974	MA011
HEAT TREATED	P	0.62	R.T	T-L	193.0	1.502	0.750	NB	0.762	0.38	75.20			1971	B4029
1D 46 RC		0.62			193.0	1.498	0.750	NB	0.758	0.37	74.10			1971	B4029
HARDNESS												74.7/	0.8		
1600F 1 HR,OQ, 400F 1 HR	FB	0.62	R.T.	L-T	198.0	2.000	0.600	CT	1.000	0.49	88.00			1973	B7241 (1)
1600F 1 HR,OQ,	FB	0.62	R.T	L-T	202.0	2.000	0.600	CT	1.000	0.60	99.40			1973	B7241 (1)
535F 1 HR		0.62			202.0	2.000	0.600	CT	1.000	0.54	94.00			1973	B7241 (1)
												96.7/	3.8		
1650F 1 HR,AC,	BT	6.00	R.T	L-T	191.0	2.500	1.000	CT	1.400	0.68	99.70			1972	B4277
1575F 1 HR,OQ,		6.00			191.0	2.500	1.000	CT	1.400	0.60	93.80			1972	B4277
900F 2+2 HR		6.00			191.0	2.500	1.000	CT	1.400	0.61	94.70	96.1/	3.2	1972	B4277
1650F 1 HR,AC,	BT	6.00	R.T	L-T	203.0	2.500	1.000	CT	1.400	0.48	84.20			1972	B4277
1575F 1 HR,OQ,		6.00			203.0	2.500	1.000	CT	1.400	0.34	77.50			1972	B4277
525F 2+2 HR		6.00			203.0	2.500	1.000	CT	1.400	0.45	81.20			1972	B4277
		6.00			203.0	2.500	1.000	CT	1.400	0.46	82.20			1972	B4277
		6.00			203.0	2.500	1.000	CT	1.400	0.39	82.80			1972	B4277
		6.00			203.0	2.500	1.000	CT	1.400	0.38	81.60	81.6/	2.3	1972	B4277

NOTES
(1) COMPOSITION(WT PERCENT) 0.28C,1.02MN,0.009P,0.003S,0.28SI,1.80NI,0.85CR,00.07V,0.01CU

TABLE 6.28.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.28.3.1 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL 4330V (MOD)
CONDITION:
ENVIRONMENT: R.T. ,LAB AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.02			
DELTA K MIN	A:	9.72	1.88			
	B:					
	C:					
	D:					
		10.00	2.11			
		13.00	4.61			
		16.00	6.32			
		20.00	7.44			
		25.00	8.24			
		30.00	9.30			
		35.00	11.2			
		40.00	14.3			
		50.00	28.4			
DELTA K MAX	A:	54.34	40.8			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 14.16

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT:
FORM: 2.20"TH BILLET
SPECIMEN TYPE: WOL
ORIENTATION: L-T
FREQUENCY: 1.00- 30.00 HZ
ENVIRONMENT: R.T., LAB AIR

YIELD STRENGTH: 194.5 KSI
ULT. STRENGTH: 231.0 KSI
SPECIMEN THK: 1.250"
SPECIMEN WIDTH: 5.000"
REFERENCES: MA011

ALLOY STEEL

4330V (MOD)

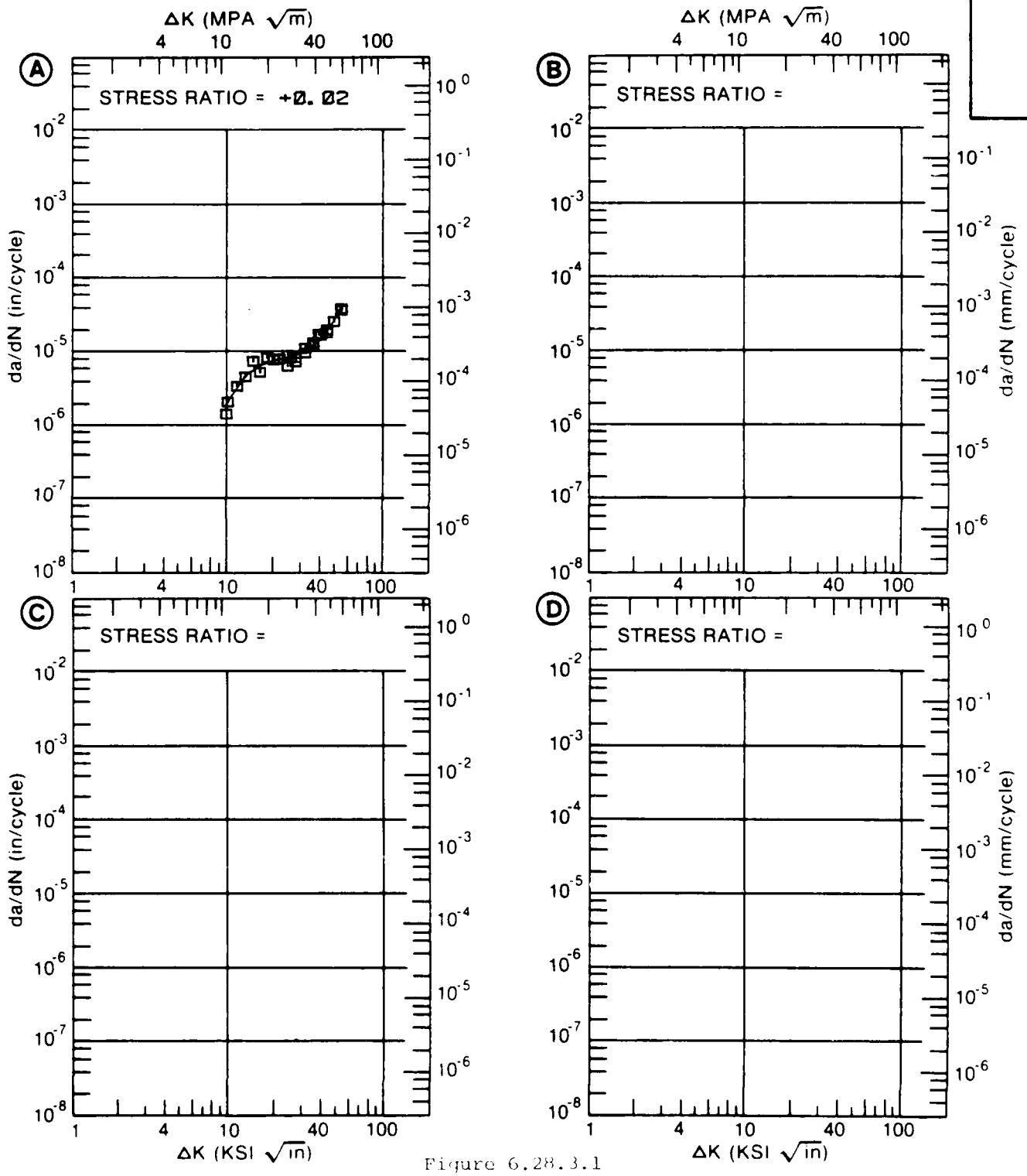


Figure 6.28.3.1

ALLOY STEEL

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	[illegible]	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
QUENCHED + TEMPERED AT 500F	P	0.48	R T	L S	196	0.3.5 PCT NACL	[illegible]			----	1971	B4351

TABLE 6.29.1.1

MEAN PLANE STRAIN FRACTURE TOUGHNESS DATA OF
ALLOY STEEL 4340 AT ROOM TEMPERATURE

CONDITION/HT	MEAN KIC ± STANDARD (KSI SQRT(IN)) DEVIATION		(NUMBER OF SPECIMENS)
	PLATE		
CONDITION/HT	L-T	T-L	S-L
HEAT TREATED TO 51 RC HARDNESS	-----	51.7 ± 1.3 (2)	-----
1550F, OQ, TEMPERED 800F	76.6 ± 4.6 (2)	-----	-----
1550F, OQ, TEMPERED 500F	45.3 ± 2.9 (4)	-----	-----
1600F 1HR, 1525F 2.5HR, OQ AT 150-175F, 900F 1HR	-----	88.2 ± 1.5 (2)	-----
	FORGED BAR		
CONDITION/HT	L-T	T-L	S-L
1600F 1 HR, OQ, 535F 1 HR	60.9 ± 0.8 (2)	-----	-----
2190F 1HR, FC TO 1600F, HOLD 0.5HR, 400F 1 HR	76.8 ± 0.1 (2)	-----	-----
2190F 1HR, FC TO 1600F, HOLD 0.5HR, 660F 1 HR	60.8 ± 0.8 (2)	-----	-----
2190F 1HR, FC TO 1600F, HOLD 0.5HR, 535F 1 HR	60.1 ± 3.2 (2)	-----	-----

TABLE 6.29.1.1 (Con't)

MEAN PLANE STRAIN FRACTURE TOUGHNESS DATA OF
ALLOY STEEL 4340 AT ROOM TEMPERATURE

CONDITION/HT	MEAN KIC ± STANDARD DEVIATION (KSI SQRT(IN))	(NUMBER OF SPECIMENS)

BILLET

CONDITION/HT	L-T	T-L	S-L
1650F 1 HR, AC, 1525F 1 HR, OQ, 800F 2 HR	76.3 ± 3.6 (6)	-----	-----

TABLE 6.29.1.2

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL 4340

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT LAB AIR AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2 5	5	10	20	50	100
MARTEMPERED	PLATE	0 02	----				492	3 12	23 0	111 0
UTS = 160 KSI	ROUND BAR	0 10	7 00					2 47		
UTS = 160 KSI	ROUND BAR	0 50	7 00			0 09				
UTS = 160 KSI	ROUND BAR	0 50	7 00				0 61	3 60		
UTS = 180 KSI	ROUND BAR	0 10	20 00-30 00				0 90	2 96	23 2	
UTS = 180 KSI	ROUND BAR	0 50	7 00			0 09				
UTS = 180 KSI	ROUND BAR	0 50	7 00				0 63			

TABLE 6.29.1.3

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL 4340

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT AIR AT 650 F

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2.5	5	10	20	50	100
UTS = 180 KSI	ROUND BAR	0.10	7.00					2.78	39.7	
UTS = 180 KSI	ROUND BAR	0.50	7.00				0.96	5.28		
UTS = 180 KSI	ROUND BAR	0.50	20.00				1.04			

TABLE 6.29.1.4

FATIGUE CRACK GROWTH RATE AT DEFINED LEVELS OF THE STRESS-INTENSITY FACTOR

ALLOY STEEL 4340

TEST CONDITIONS

SPECIMEN ORIENTATION L-T

ENVIRONMENT H H A AT R T

CONDITION/HT	PRODUCT FORM	STRESS RATIO	FREQ (HZ)	DELTA K LEVELS (KSI SQRT(IN))	FATIGUE CRACK GROWTH RATES (MICRO IN/CYCLE) 2 5	5	10	20	50	100
TUS=180 200KSI	BAR	0 05	3 00					2 94	17 8	
TUS 180 200KSI	BAR	0 50	3 00				0 71	3 78		

TABLE 6.29.2.1

ALLOY STEEL 4340 K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	------SPECIMEN------ WIDTH (IN) W	THICK (IN) B	DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	STAN DEV	DATE	REFER
HEAT TREATED	P	0.62	R.T.	T-L	220.0	0.999	0.499	NB	0.540	0.14	52.60			1971	84029
TO 51 RC		0.62			220.0	0.998	0.498	NB	0.534	0.13	50.80			1971	84029
HARDNESS												51.7/	1.3		
UTS = 180 KSI	BR	4.50	R.T.	L-T	192.9	2.007	0.992	CT	0.933	0.77	107.20			1979	DA001
1550F,OQ,	P	1.00	R.T.	L-T	206.0	0.160	0.800	CT	0.800	0.37	73.30			1971	86582
TEMPERED 800F		1.00			206.0	0.160	0.800	CT	0.800	----	79.80	76.6/	4.6	1971	86582
1550F,OQ,	P	1.00	R.T.	L-T	238.0	0.160	0.800	CT	0.800	----	45.80			1971	86582
TEMPERED 500F		1.00			238.0	0.160	0.800	CT	0.800	----	46.00			1971	86582
		1.00			238.0	0.160	0.800	CT	0.800	0.09	41.20			1971	86582
		1.00			238.0	0.160	0.800	CT	0.800	----	48.00	45.3/	2.9	1971	86582
1600F 1 HR,OQ,	FB	0.62	R.T.	L-T	195.0	2.000	0.600	CT	1.000	0.23	59.50			1973	87241 (1)
400F 1 HR															
1600F 1 HR,OQ,	FB	0.62	R.T.	L-T	210.0	2.000	0.600	CT	1.000	0.47	91.20			1973	87241 (1)
745F 1 HR															
1600F 1 HR,OQ,	FB	0.62	R.T.	L-T	217.0	2.000	0.600	CT	1.000	0.34	79.80			1973	87241 (1)
660F 1 HR															
1600F 1 HR,OQ,	FB	0.62	R.T.	L-T	218.0	2.000	0.600	CT	1.000	0.19	61.40			1973	87241 (1)
535F 1 HR		0.62			218.0	2.000	0.600	CT	1.000	0.19	60.30			1973	87241 (1)
												60.9/	0.8		
1600F 1HR,	P	1.00	- 65	T-L	190.3	1.998	1.004	CT	1.022	0.54	89.19			1980	MR002
1525F 2 5HR,OQ		1.00			190.3	1.997	1.004	CT	1.026	0.57	91.00			1980	MR002
AT 150-175F, 900F 1HR												90.1/	1.3		
1600F 1HR,	P	1.00	R.T.	T-L	179.4	2.000	1.030	CT	1.022	0.61	89.30			1980	MR002
1525F 2 5HR,OQ AT 150-175F, 900F 1HR															

NOTES
(1) COMPOSITION(WT PERCENT) 0.40C,0.80MN,0.010S,0.24SI,1.65NI,0.72CR,0.24MO,0.19CU

TABLE 6.29.2.1 (Con't)

ALLOY STEEL 4340 K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	------SPECIMEN------ WIDTH (IN) W	THICK (IN) B	DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	STAN DEV	DATE	REFER
1600F 1HR, 1525F 2.5HR,OQ AT 150-175F, 900F 1HR	P	1.00	R.T.	T-L	179.4	1.997	1.005	CT	1.027	0.59	87.19	88.2/	1.5	1980	MR002
1600F 1HR, 1525F 2.5HR,OQ AT 150-175F, 900F 1HR	P	1.00	165	T-L	171.1	1.999	0.994	CT	1.029	0.74	93.60			1980	MR002
		1.00			171.1	2.010	1.030	CT	0.990	0.55	80.50	87.1/	9.3	1980	MR002
1650F 1 HR,AC, 1525F 1 HR,OQ, 800F 2 HR	BT	10.00	R.T.	L-T	197.0	2.500	1.000	CT	1.400	0.37	75.80			1972	84277
		10.00			197.0	2.500	1.000	CT	1.400	0.41	79.70			1972	84277
		10.00			197.0	2.500	1.000	CT	1.400	0.38	76.50			1972	84277
		10.00			211.0	2.500	1.000	CT	1.400	0.29	71.90			1972	84277
		10.00			211.0	2.500	1.000	CT	1.400	0.30	73.00			1972	84277
		10.00			211.0	2.500	1.000	CT	1.400	0.37	81.10	76.3/	3.6	1972	84277
2190F 1HR, FC TO 1600F,HOLD 0 5HR, 400F 1 HR	FB	0.62	R.T.	L-T	195.0	2.000	0.600	CT	1.000	0.39	76.70			1973	87241 (1)
		0.62			195.0	2.000	0.600	CT	1.000	0.39	76.90	76.8/	0.1	1973	87241 (1)
2190F 1HR, FC TO 1600F,HOLD 0 5HR, 660F 1 HR	FB	0.62	R.T.	L-T	200.0	2.000	0.600	CT	1.000	0.24	61.40			1973	87241 (1)
		0.62			200.0	2.000	0.600	CT	1.000	0.23	60.20	60.8/	0.8	1973	87241 (1)
2190F 1HR, FC TO 1600F,HOLD 0 5HR, 535F 1 HR	FB	0.62	R.T.	L-T	202.0	2.000	0.600	CT	1.000	0.20	57.80			1973	87241 (1)
		0.62			202.0	2.000	0.600	CT	1.000	0.24	62.30	60.1/	3.2	1973	87241 (1)
2190F 1HR,OQ, 475F 1HR	FB	0.62	R.T.	L-T	200.0	2.000	0.600	CT	1.000	0.42	82.40			1973	87241 (1)
2190F 1HR,OQ, 535F 1HR	FB	0.62	R.T.	L-T	202.0	2.000	0.600	CT	1.000	0.24	62.80			1973	87241 (1)

NOTES
(1) COMPOSITION(WT PERCENT) 0.40C,0.80MN,0.010S,0.24SI,1.65NI,0.72CR,0.24MO,0.19CU

TABLE 6.29.3.1

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.29.3.1 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 4340
CONDITION: MARTEMPERED

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		E= R.T. LAB AIR	E= R.T. DIST. WATER		
DELTA K MIN	A: 7.13	.209			
	B: 8.73		.280		
	C:				
	D:				
	8.00	.277			
	9.00	.373	.321		
	10.00	.492	.495		
	13.00	1.00	1.14		
	16.00	1.75	1.91		
	20.00	3.12	3.21		
	25.00	5.33	5.49		
	30.00	8.04	8.51		
	35.00	11.2	12.2		
	40.00	14.7	16.3		
	50.00	23.0	25.7		
	60.00	33.3	37.4		
	70.00	46.2	53.0		
	80.00	62.7	74.5		
	90.00	83.9	105.		
	100.00	111.	148.		
	130.00	258.	428.		
	160.00	603.	1287.		
DELTA K MAX	A: 188.45	1360.			
	B: 189.12		3830.		
	C:				
	D:				
ROOT MEAN SQUARE PERCENT ERROR		21.77	20.96		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: MARTEMPERED
FORM: 0.50"TH PLATE
SPECIMEN TYPE: CCP
ORIENTATION: L-T
STRESS RATIO: +0.02
FREQUENCY:

YIELD STRENGTH: 191.0- 201.5 KSI
ULT. STRENGTH: 196.0- 209.0 KSI
SPECIMEN THK: 0.246- 0.251"
SPECIMEN WIDTH:
REFERENCES:MA012

ALLOY STEEL

4340

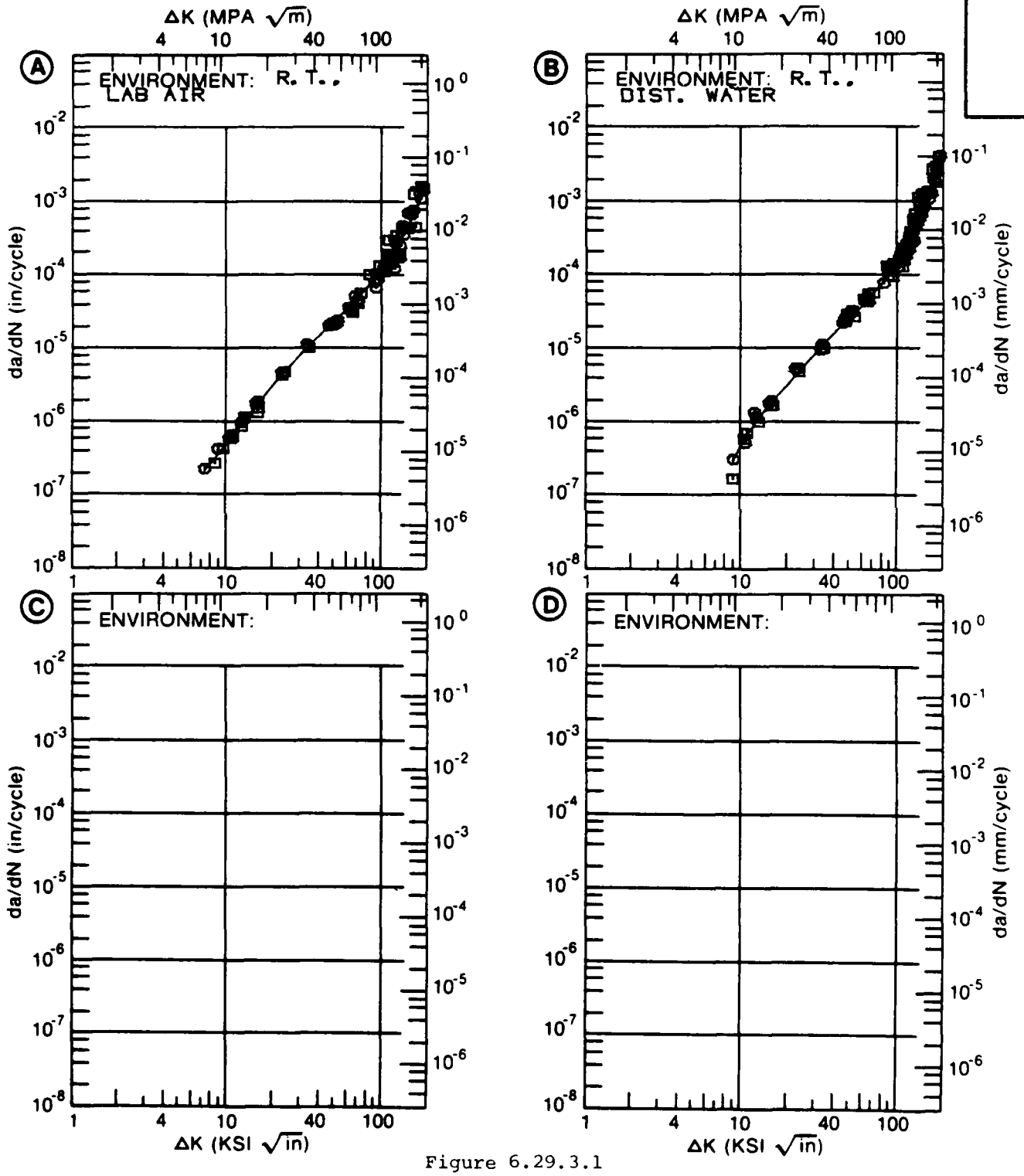


Figure 6.29.3.1

TABLE 6.29.3.2

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.29.3.2 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL 4340
CONDITION: UTS = 160 KSI
ENVIRONMENT: R.T. ,LAB AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.50			
DELTA K MIN	A:	3.99	.0454			
	B:					
	C:					
	D:					
		4.00	.0460			
		5.00	.0930			
DELTA K MAX	A:	5.53	.123			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 3.21

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: UTS = 160 KSI
FORM: 4.25"TH ROUND BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 7.00 HZ
ENVIRONMENT: R.T., LAB AIR

YIELD STRENGTH: 158.5 KSI
ULT. STRENGTH: 168.1 KSI
SPECIMEN THK: 0.250"
SPECIMEN WIDTH: 2.000"
REFERENCES: DA001

ALLOY STEEL
4340

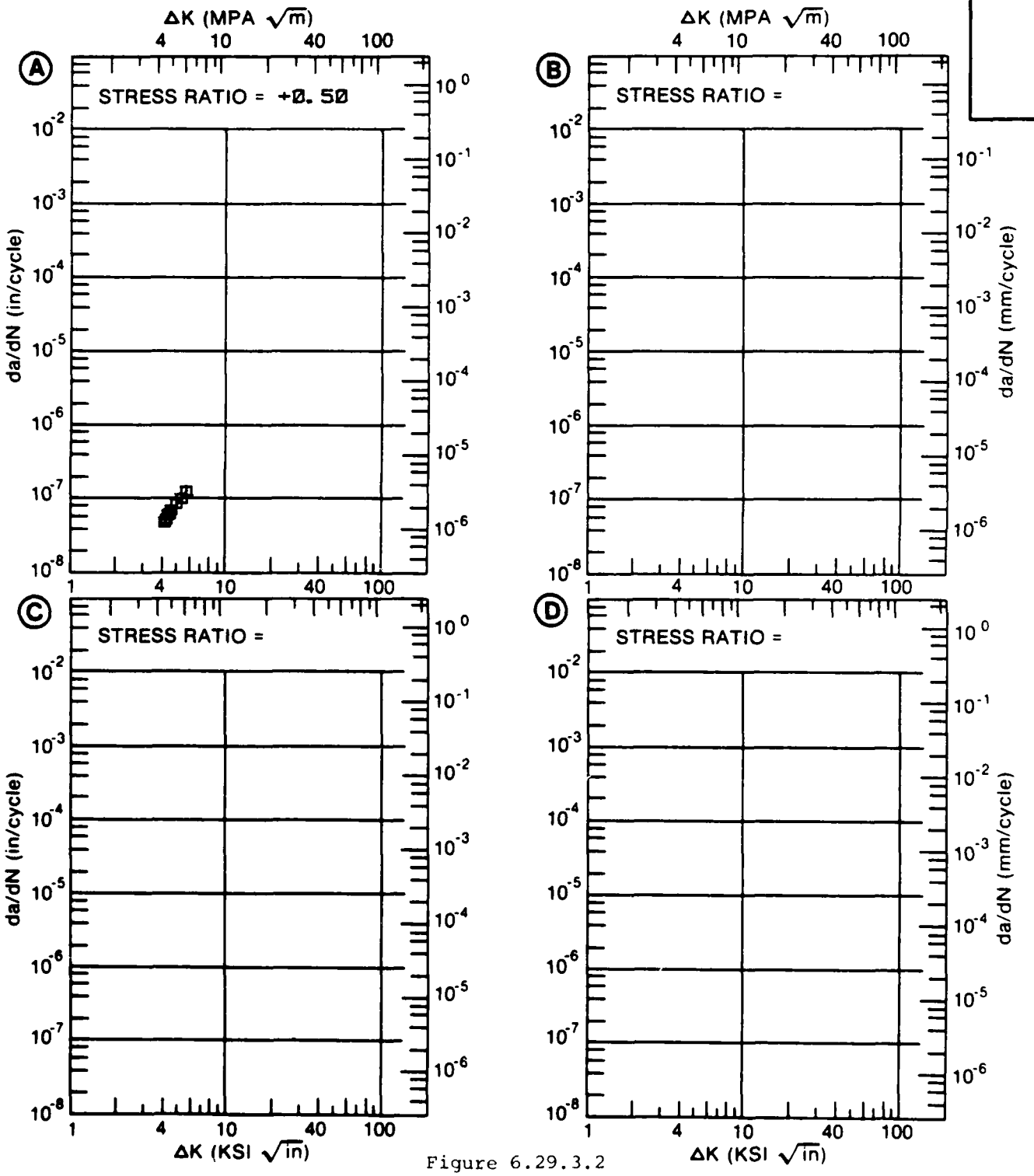


Figure 6.29.3.2

TABLE 6.29.3.3

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.29.3.3 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL 4340
CONDITION: UTS = 160 KSI
ENVIRONMENT: R.T. ,LAB AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.10	R=+0.50		
DELTA K MIN	A:	12.63	.780			
	B:	6.83		.229		
	C:					
	D:					
		7.00		.244		
		8.00		.344		
		9.00		.466		
		10.00		.611		
		13.00	.847	1.20		
		16.00	1.44	2.05		
		20.00	2.47	3.60		
		25.00	4.72	6.27		
		30.00		9.78		
		35.00		14.1		
		40.00		19.3		
DELTA K MAX	A:	26.50	5.79			
	B:	47.14		27.9		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			5.24	6.09		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: UTS = 160 KSI
FORM: 4.25"TH ROUND BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 7.00 HZ
ENVIRONMENT: R.T..LAB AIR

YIELD STRENGTH: 158.5 KSI
ULT. STRENGTH: 168.1 KSI
SPECIMEN THK: 0.500"
SPECIMEN WIDTH: 2.000"
REFERENCES: DA001

ALLOY STEEL

4340

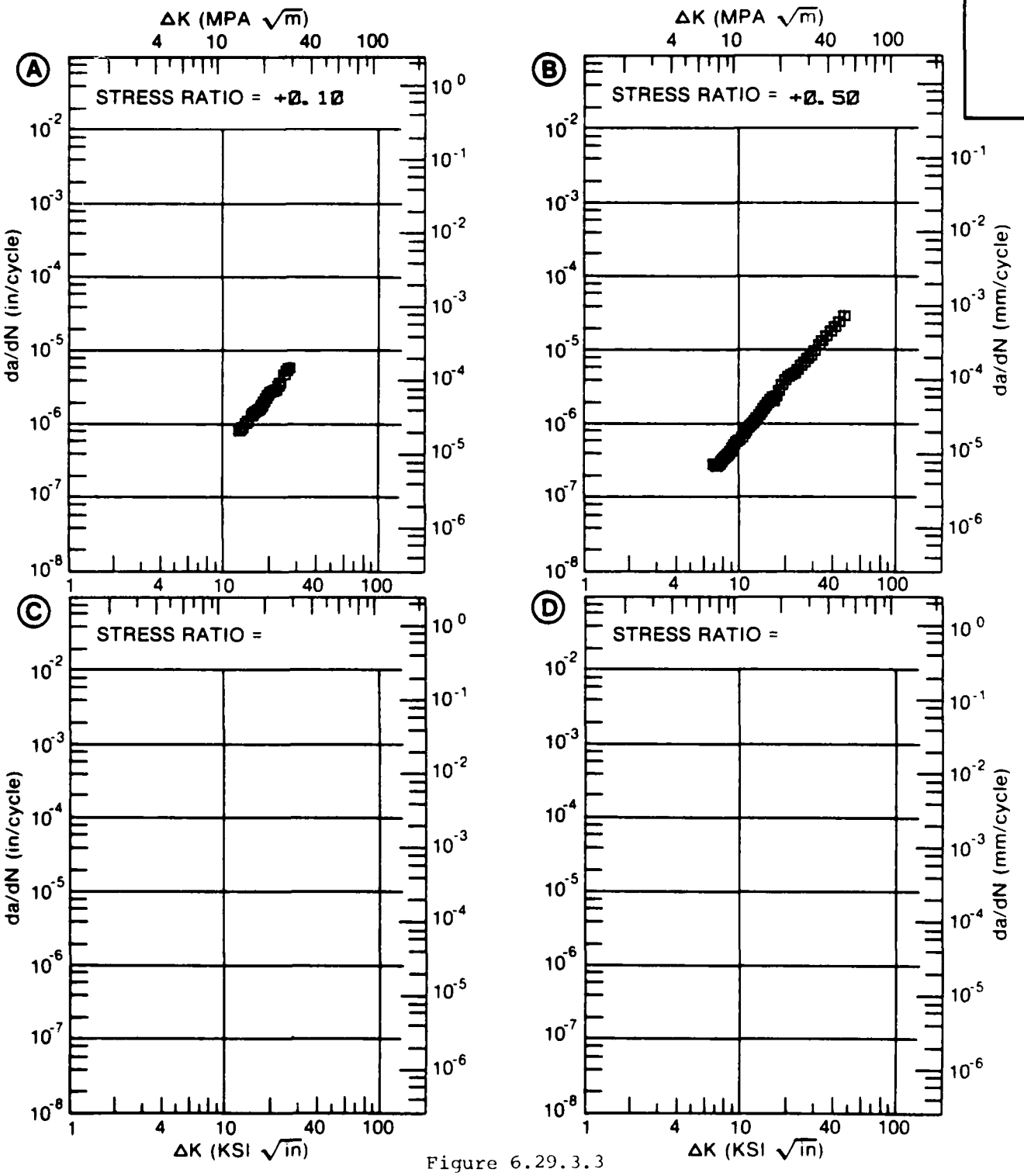


Figure 6.29.3.3

TABLE 6.29.3.4

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.29.3.4 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL 4340
CONDITION: UTS = 180 KSI
ENVIRONMENT: R.T. ,LAB AIR

DELTA K (KSI*IN**1/2)		DA/DN (10**-6 IN./CYCLE)			
		A	B	C	D
		R=+0.10			
DELTA K MIN	A: 5.69	.0439			
	B:				
	C:				
	D:				
	6.00	.0586			
	7.00	.125			
	8.00	.223			
	9.00	.351			
	10.00	.507			
	13.00	1.10			
	16.00	1.83			
	20.00	2.96			
	25.00	4.64			
	30.00	6.72			
	35.00	9.36			
	40.00	12.8			
	50.00	23.2			
	60.00	41.4			
DELTA K MAX	A: 64.66	54.0			
	B:				
	C:				
	D:				

ROOT MEAN SQUARE PERCENT ERROR 37.57

LIFE PREDICTION RATIO SUMMARY (NP/NA)	0.0-0.5	1
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: UTS = 180 KSI
FORM: 4.25"TH ROUND BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 20.00- 30.00 HZ
ENVIRONMENT: R.T., LAB AIR

YIELD STRENGTH: 192.9 KSI
ULT. STRENGTH: 204.1 KSI
SPECIMEN THK: 0.251- 0.501"
SPECIMEN WIDTH: 1.975- 1.978"
REFERENCES: DA001

ALLOY STEEL

4340

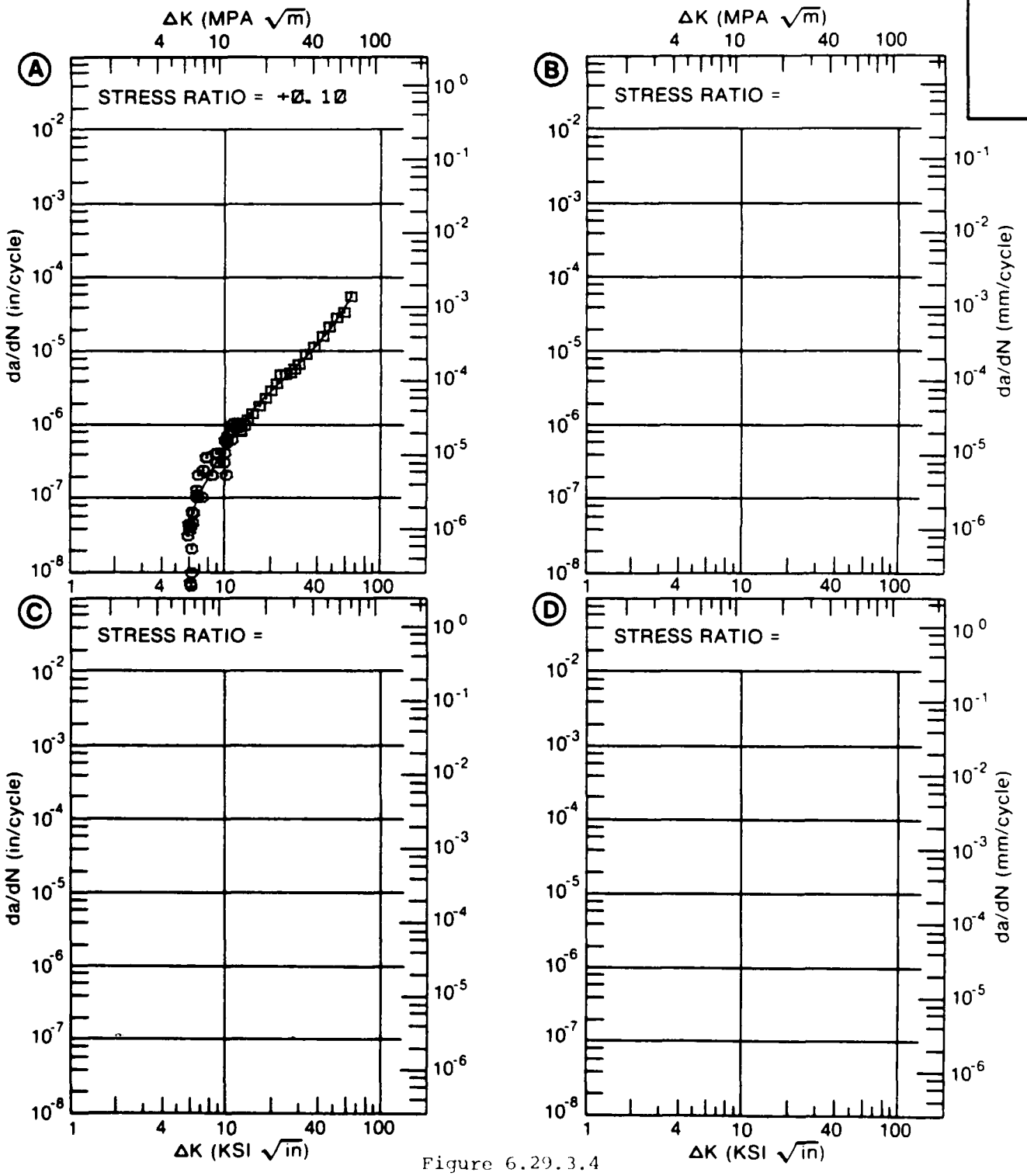


Figure 6.29.3.4

TABLE 6.29.3.5

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.29.3.5 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL 4340
CONDITION: UTS = 180 KSI
ENVIRONMENT: R.T. ,LAB AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.50			
DELTA K MIN	A:	6.47	.198			
	B:					
	C:					
	D:					
		7.00	.247			
		8.00	.356			
		9.00	.486			
		10.00	.637			
		13.00	1.20			
		16.00	1.92			
DELTA K MAX	A:	17.26	2.26			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 5.19

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: UTS = 180 KSI
FORM: 4.25"TH ROUND BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 7.00 HZ
ENVIRONMENT: R.T., LAB AIR

YIELD STRENGTH: 192.9 KSI
ULT. STRENGTH: 204.1 KSI
SPECIMEN THK: 0.500"
SPECIMEN WIDTH: 1.970"
REFERENCES:DA001

ALLOY STEEL

4340

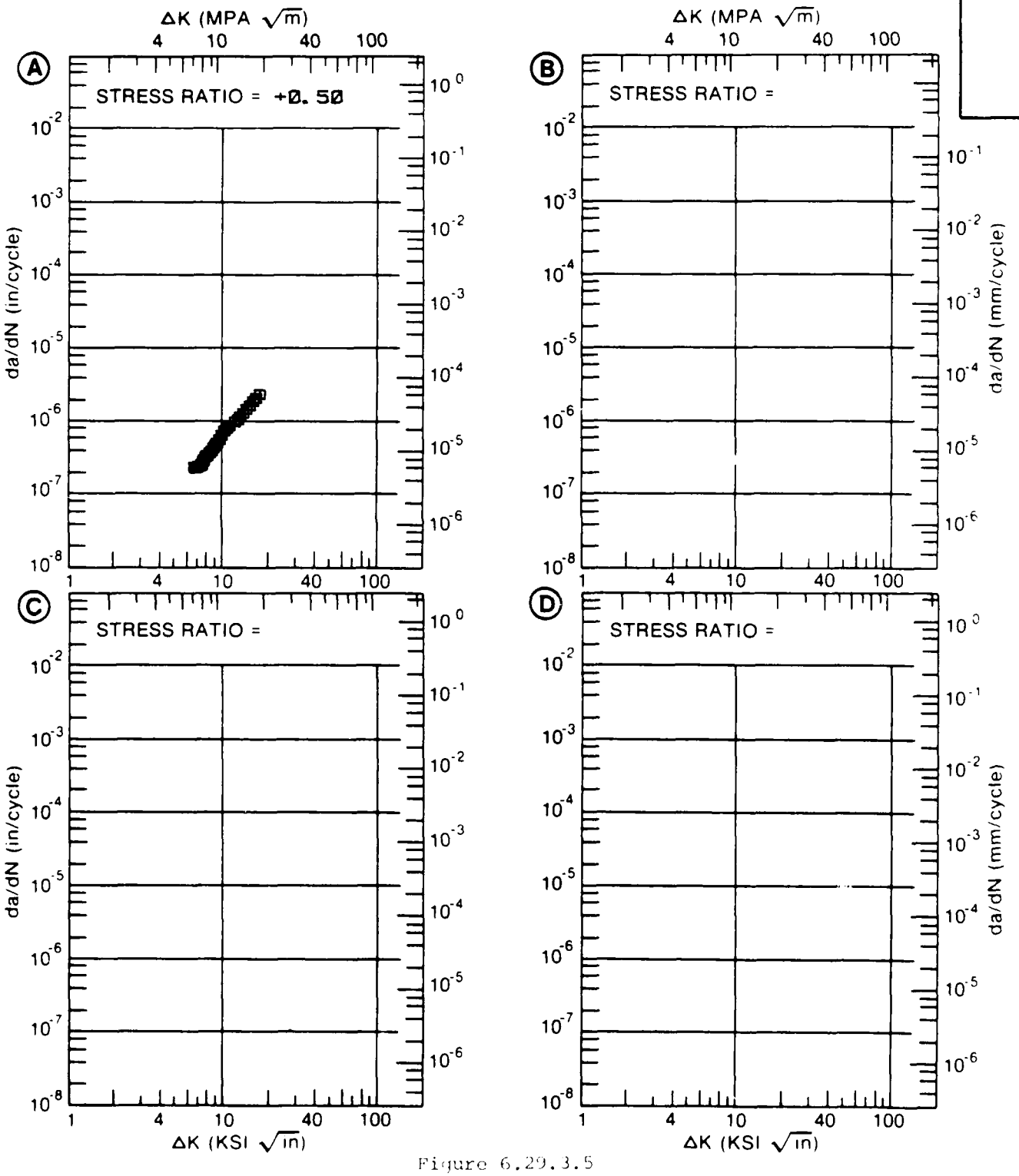


Figure 6.29.3.5

TABLE 6.29.3.6

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.29.3.6 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL 4340
CONDITION: UTS = 180 KSI
ENVIRONMENT: + 650F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.10	R=+0.50		
DELTA K MIN	A:	10.52	.249			
	B:	7.52		.511		
	C:					
	D:					
		8.00		.675		
		9.00		.813		
		10.00		1.04		
		13.00	.997			
		16.00	1.95			
DELTA K MAX	A:	18.00	2.92			
	B:	10.96		2.00		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			15.53	11.46		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8	2			
		0.8-1.25		2		
		1.25-2.0				
		>2.0				

CONDITION/HT: UTS = 180 KSI
FORM: 4.25"TH ROUND BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 20.00 HZ
ENVIRONMENT: + 650° F, AIR

YIELD STRENGTH: 192.9 KSI
ULT. STRENGTH: 204.1 KSI
SPECIMEN THK: 0.250"
SPECIMEN WIDTH: 2.000"
REFERENCES: DA001

ALLOY STEEL

4340

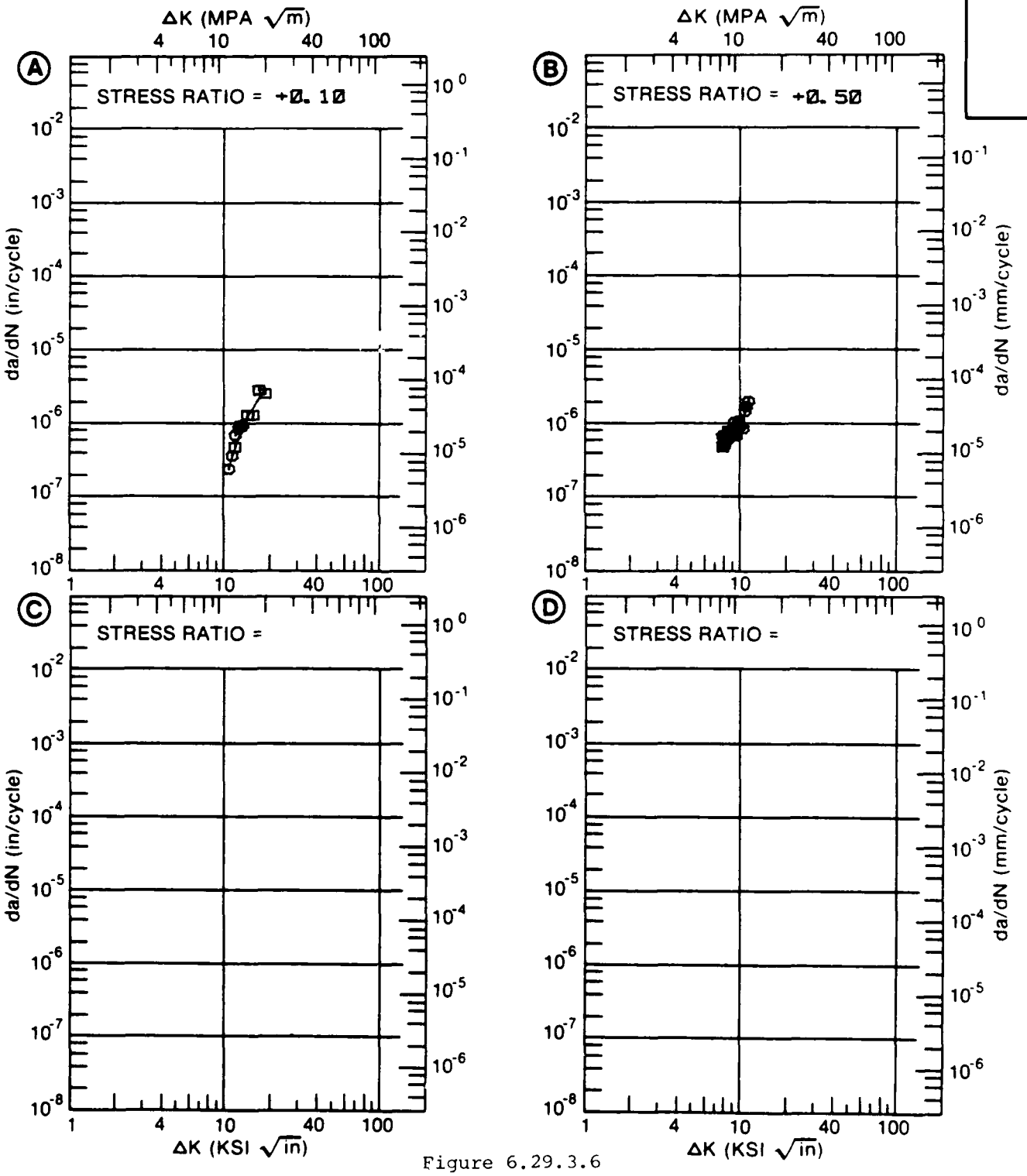


Figure 6.29.3.6

TABLE 6.29.3.7

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.29.3.7 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL 4340
CONDITION: UTS = 180 KSI
ENVIRONMENT: + 650F, AIR

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.10			
DELTA K MIN	A:	17.58	1.91			
	B:					
	C:					
	D:					
		20.00	2.78			
		25.00	5.16			
		30.00	8.47			
		35.00	13.0			
		40.00	19.3			
		50.00	39.7			
		60.00	78.0			
		70.00	149.			
DELTA K MAX	A:	73.82	190.			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 11.96

LIFE PREDICTION RATIO SUMMARY (NP/NA)		
	0.0-0.5	
	0.5-0.8	
	0.8-1.25	1
	1.25-2.0	
	>2.0	

CONDITION/HT: UTS = 180 KSI
FORM: 4.25"TH ROUND BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
FREQUENCY: 7.00 HZ
ENVIRONMENT: + 650° F, AIR

YIELD STRENGTH: 192.9 KSI
ULT. STRENGTH: 204.1 KSI
SPECIMEN THK: 0.500"
SPECIMEN WIDTH: 2.000"
REFERENCES: DA001

ALLOY STEEL

4340

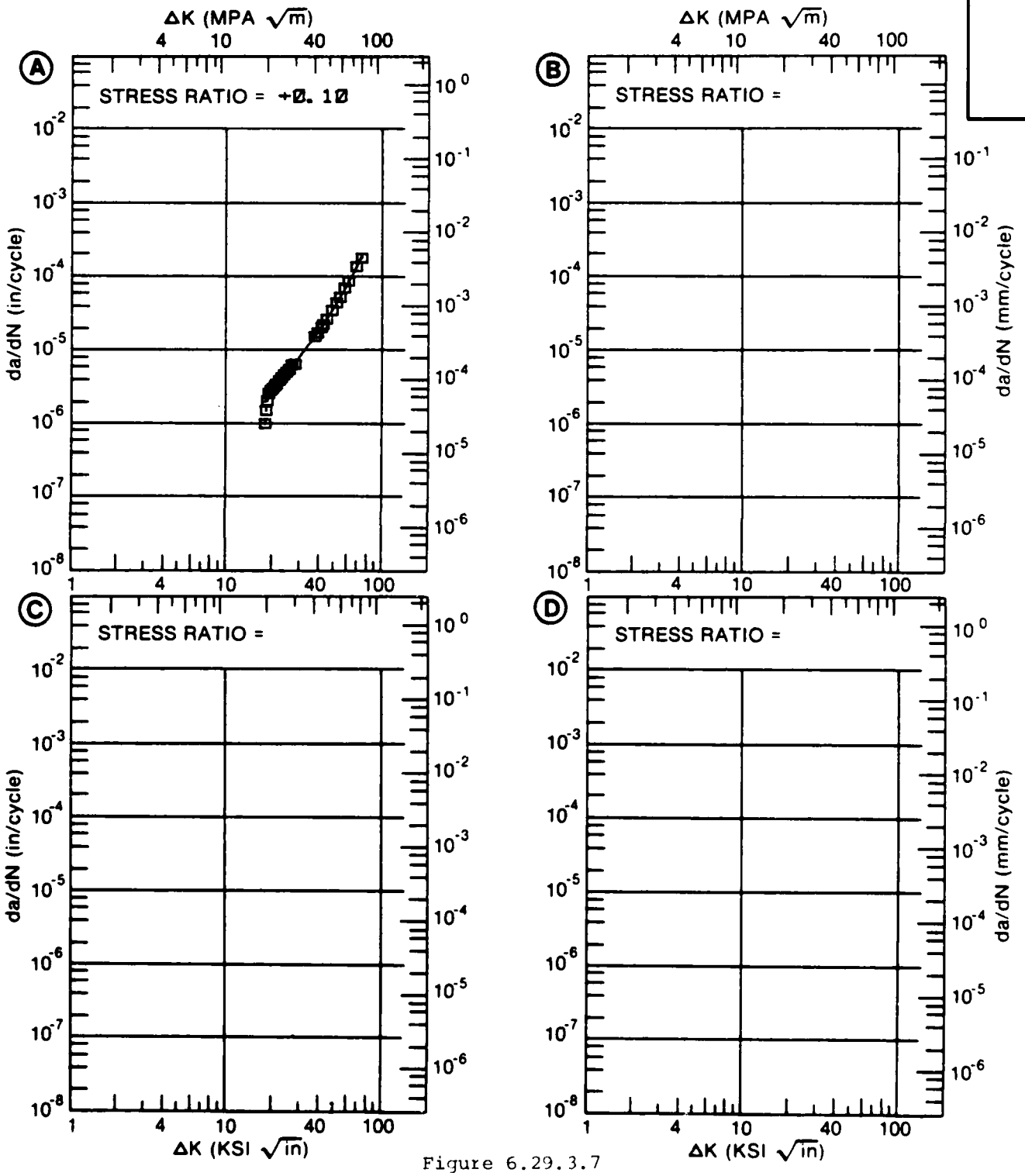


Figure 6.29.3.7

TABLE 6.29.3.8

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.29.3.8 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 4340
CONDITION: UTS = 180 KSI

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. LAB AIR	E=+ 650F AIR		
DELTA K MIN	A:	4.08	.0528			
	B:	5.72		.282		
	C:					
	D:					
		5.00	.0924			
		6.00	.178	.317		
		7.00		.454		
		8.00		.606		
		9.00		.773		
		10.00		.960		
		13.00		1.68		
		16.00		2.78		
		20.00		5.28		
DELTA K MAX	A:	6.20	.224			
	B:	22.85		8.29		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			11.27	4.65		
LIFE PREDICTION RATIO SUMMARY (NP/NA)		0.0-0.5				
		0.5-0.8				
		0.8-1.25	1	1		
		1.25-2.0				
		>2.0				

CONDITION/HT: UTS = 180 KSI
FORM: 4.25"TH ROUND BAR
SPECIMEN TYPE: CT
ORIENTATION: L-T
STRESS RATIO: +0.50
FREQUENCY: 7.00 HZ

YIELD STRENGTH: 192.9 KSI
ULT. STRENGTH: 204.1 KSI
SPECIMEN THK: 0.250- 0.375"
SPECIMEN WIDTH: 1.500- 2.000"
REFERENCES:DA001

ALLOY STEEL

4340

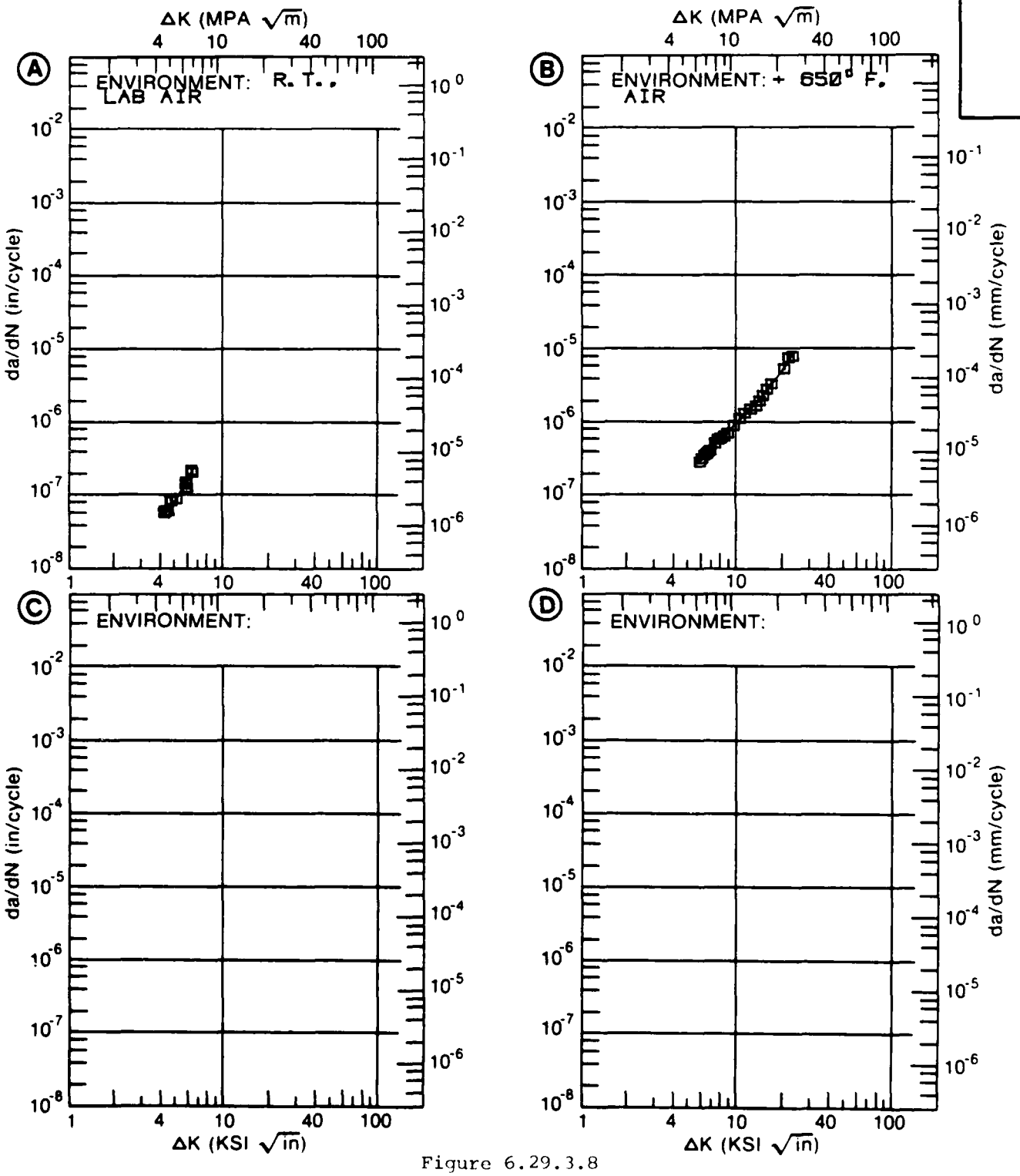


Figure 6.29.3.8

TABLE 6.29.3.9

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.29.3.9 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL 4340
CONDITION: UTS=180-200KSI
ENVIRONMENT: R. T. , H. H. A.

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.00	R=+0.50		
DELTA K MIN	A:	18.90	2.60			
	B:	22.90		4.62		
	C:					
	D:					
		20.00	2.68			
		25.00	3.87	5.83		
		30.00	6.12	9.11		
		35.00	8.98	13.4		
		40.00	11.6	19.7		
		50.00		45.1		
		60.00		115.		
DELTA K MAX	A:	44.30	12.8			
	B:	66.10		214.		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			9.44	11.17		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: UTS=180-200KSI
FORM: 1.00"TH PLATE
SPECIMEN TYPE: CCP
ORIENTATION:
FREQUENCY: 10.00 HZ
ENVIRONMENT: R. T., H. H. A.

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK: 0.163"
SPECIMEN WIDTH: 5.000"
REFERENCES:BW002

ALLOY STEEL

4340

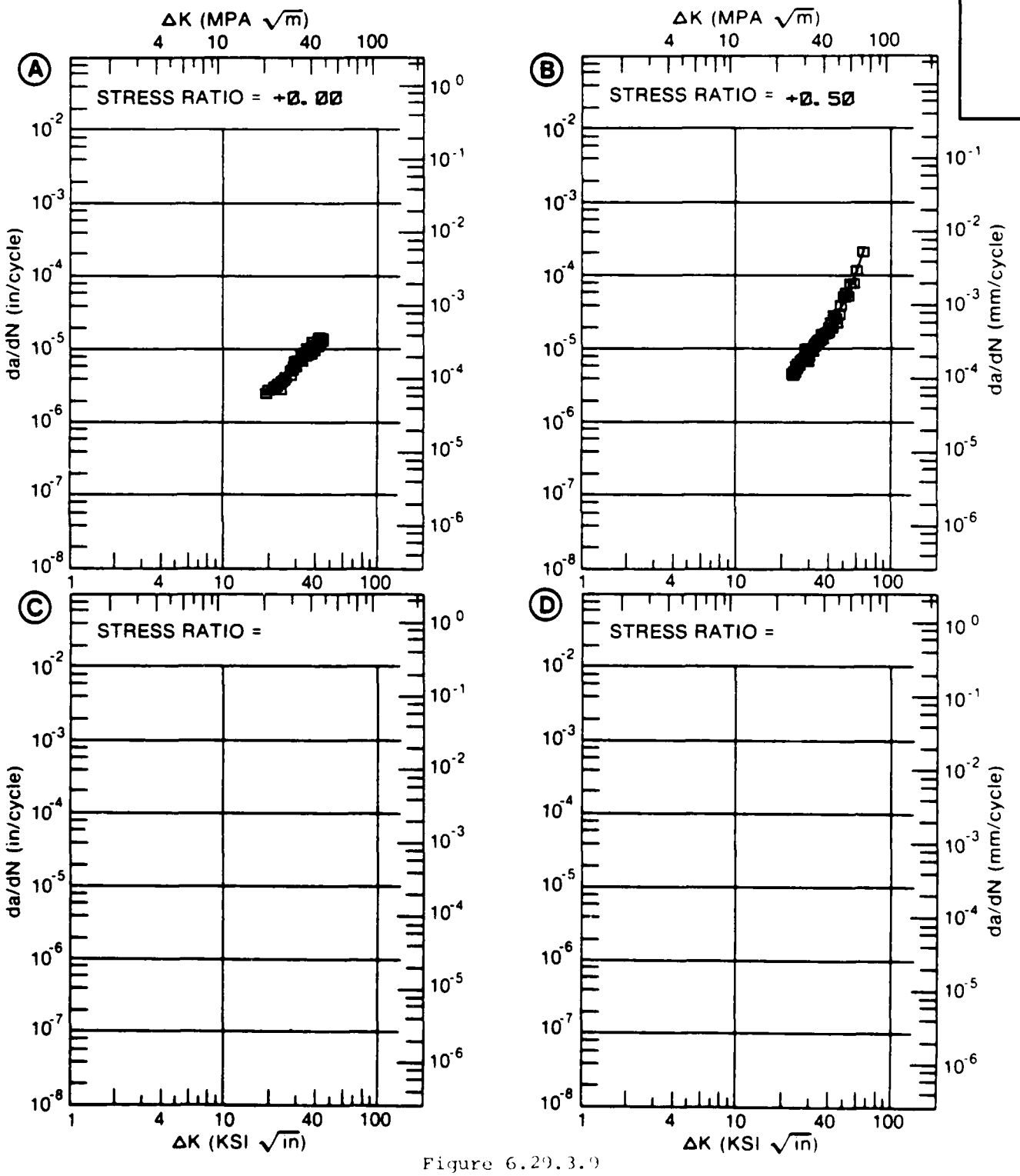


Figure 6.29.3.9

TABLE 6.29.3.10

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.29.3.10INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL 4340
CONDITION: TUS=180-200KSI
ENVIRONMENT: R. T. , H. H. A.

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=+0.05	R=+0.50		
DELTA K MIN	A:	17.32	1.97			
	B:	9.47		.647		
	C:					
	D:					
		10.00		.714		
		13.00		1.29		
		16.00		2.21		
		20.00	2.94	3.78		
		25.00	5.01			
		30.00	7.27			
		35.00	9.66			
		40.00	12.2			
		50.00	17.8			
		60.00	24.4			
		70.00	32.5			
		80.00	42.7			
		90.00	55.5			
DELTA K MAX	A:	93.91	61.5			
	B:	24.31		5.43		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			11.52	8.24		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: TUS=180-200KSI
FORM: 1.00"TH BAR
SPECIMEN TYPE: CCP
ORIENTATION: L-T
FREQUENCY: 3.00 HZ
ENVIRONMENT: R.T., H.H.A.

YIELD STRENGTH: 182.5 KSI
ULT. STRENGTH: 193.7 KSI
SPECIMEN THK: 0.400"
SPECIMEN WIDTH: 4.000"
REFERENCES:BW001

ALLOY STEEL

4340

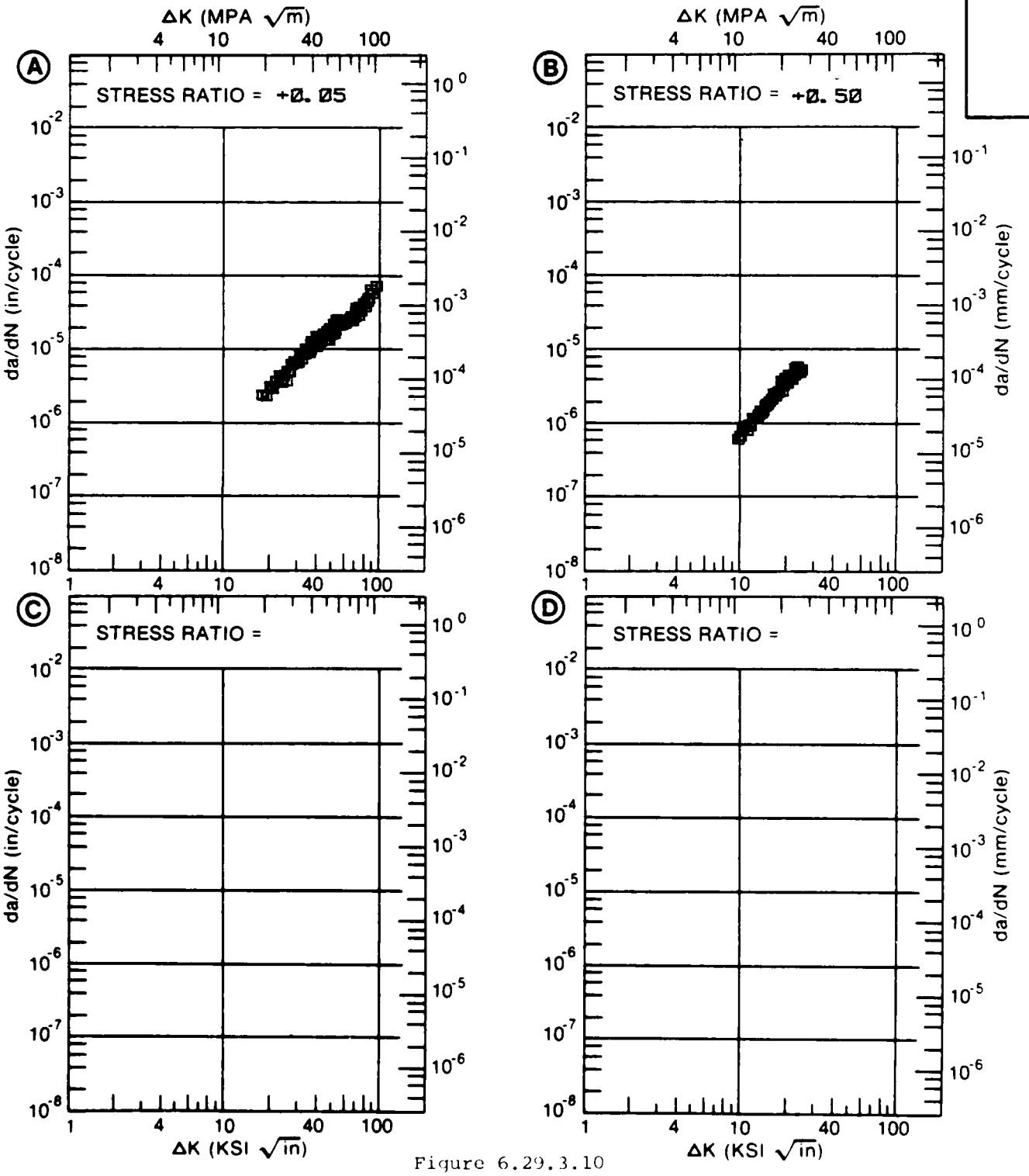


Figure 6.29.3.10

TABLE 6.29.3.11

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.29.3.11INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 4340
CONDITION: 450F TEMPER

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			E= R.T. DIST. WATER	E= R.T. ARGON		
DELTA K MIN	A:	10.39	174.			
	B:	14.27		1.03		
	C:					
	D:					
		13.00	216.			
		16.00	247.	1.74		
		20.00	274.	3.21		
		25.00	298.	4.48		
		30.00	320.	5.93		
		35.00	344.	8.66		
		40.00	372.	14.6		
		50.00	443.			
		60.00	542.			
DELTA K MAX	A:	60.89	553.			
	B:	47.16		30.9		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			2.83	10.57		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 450F TEMPER
FORM:
SPECIMEN TYPE:
ORIENTATION:
STRESS RATIO:
FREQUENCY: 0.40 HZ

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK:
SPECIMEN WIDTH:
REFERENCES:89311

ALLOY STEEL

4340

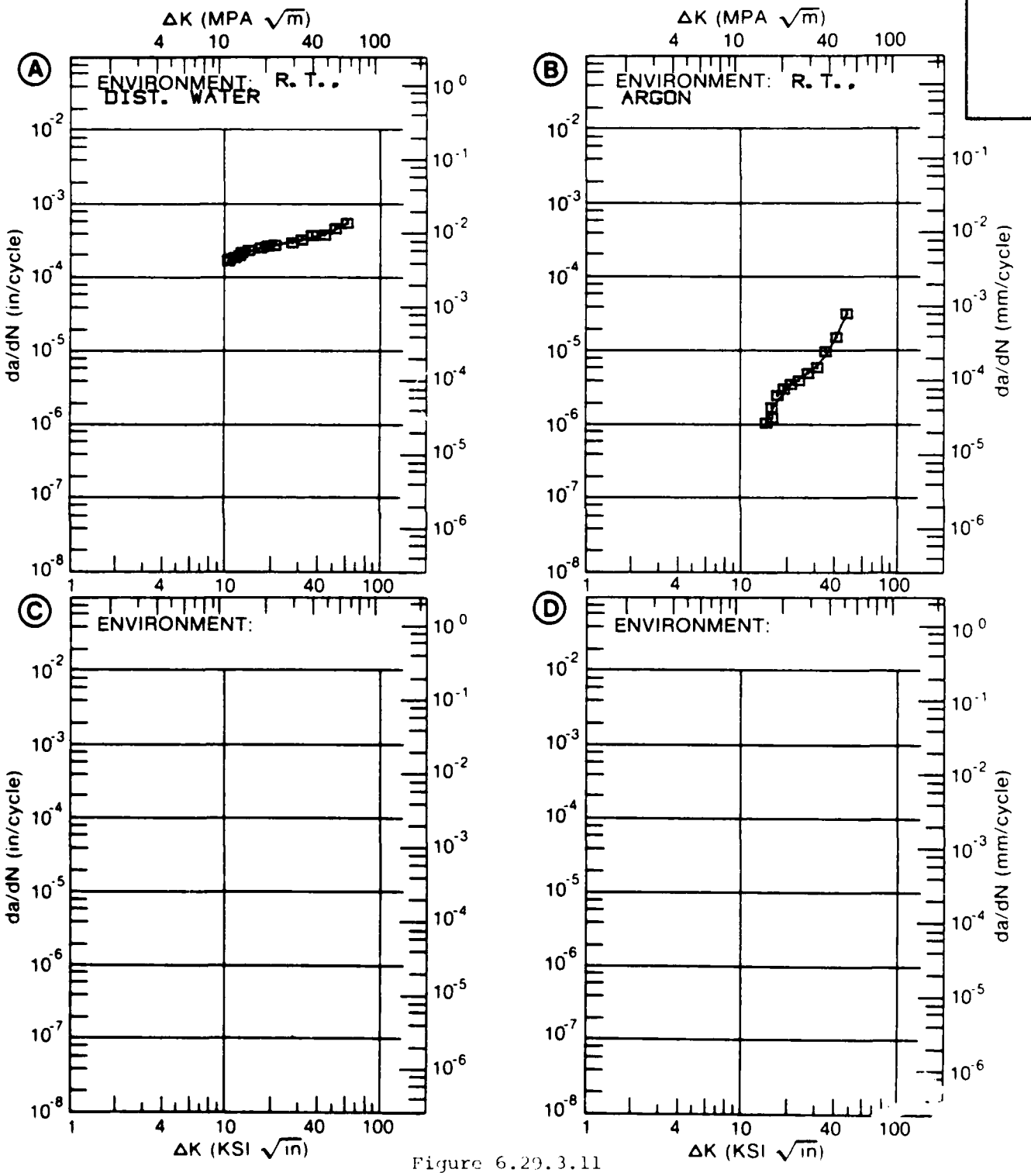


Figure 6.29.3.11

TABLE 6.29.3.12

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.29.3.12 INDICATING EFFECT

OF STRESS RATIO

MATERIAL: ALLOY STEEL 4340
CONDITION: 750F TEMPER
ENVIRONMENT: R.T. , ARGON

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			R=			
DELTA K MIN	A:	15.20	1.14			
	B:					
	C:					
	D:					
		16.00	1.40			
		20.00	2.92			
		25.00	5.08			
		30.00	7.35			
		35.00	9.82			
		40.00	12.7			
		50.00	20.8			
		60.00	34.4			
DELTA K MAX	A:	63.54	41.5			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 10.54

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 750F TEMPER
FORM:
SPECIMEN TYPE:
ORIENTATION:
FREQUENCY: Ø. 4Ø HZ
ENVIRONMENT: R. T., ARGON

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK:
SPECIMEN WIDTH:
REFERENCES: 89311

ALLOY STEEL

4340

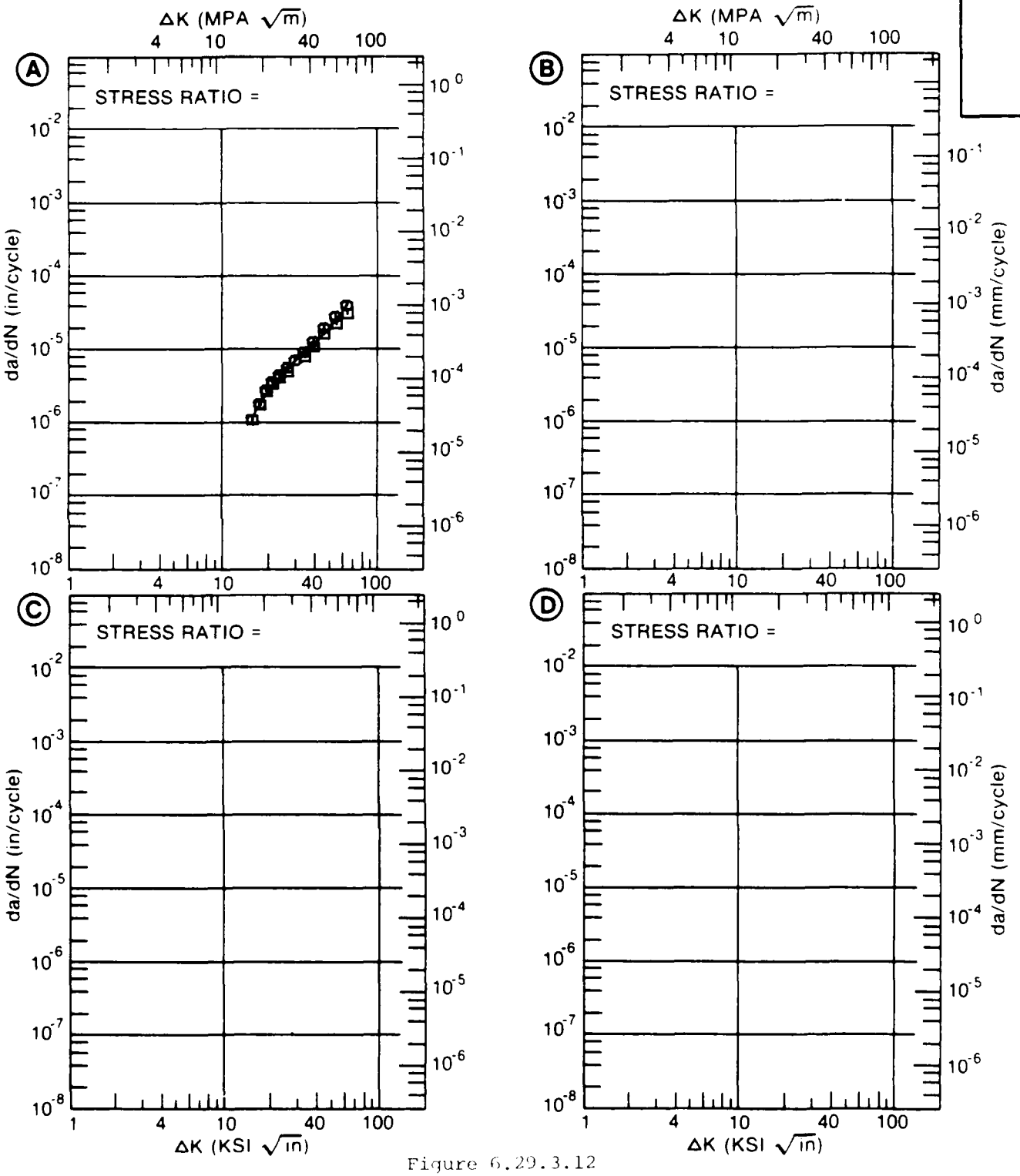


Figure 6.29.3.12

TABLE 6.29.3.13

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.29.3.13INDICATING EFFECT

OF FREQUENCY

MATERIAL: ALLOY STEEL 4340
CONDITION: 750F TEMPER
ENVIRONMENT: + 32F, DIST. WATER

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			F(HZ)= 0.04	F(HZ)= 0.40		
DELTA K MIN	A:	15.03	37.3			
	B:	15.64		17.7		
	C:					
	D:					
		16.00	61.0	19.5		
		20.00	217.	38.8		
		25.00	426.	54.4		
		30.00	546.	61.7		
		35.00	596.	66.1		
		40.00	623.	71.1		
		50.00	708.	90.8		
DELTA K MAX	A:	52.38	745.			
	B:	52.38		98.6		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			18.78	6.08		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 750F TEMPER
FORM:
SPECIMEN TYPE:
ORIENTATION:
STRESS RATIO:
ENVIRONMENT: + 32° F, DIST. WATER

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK:
SPECIMEN WIDTH:
REFERENCES: 89311

ALLOY STEEL

4340

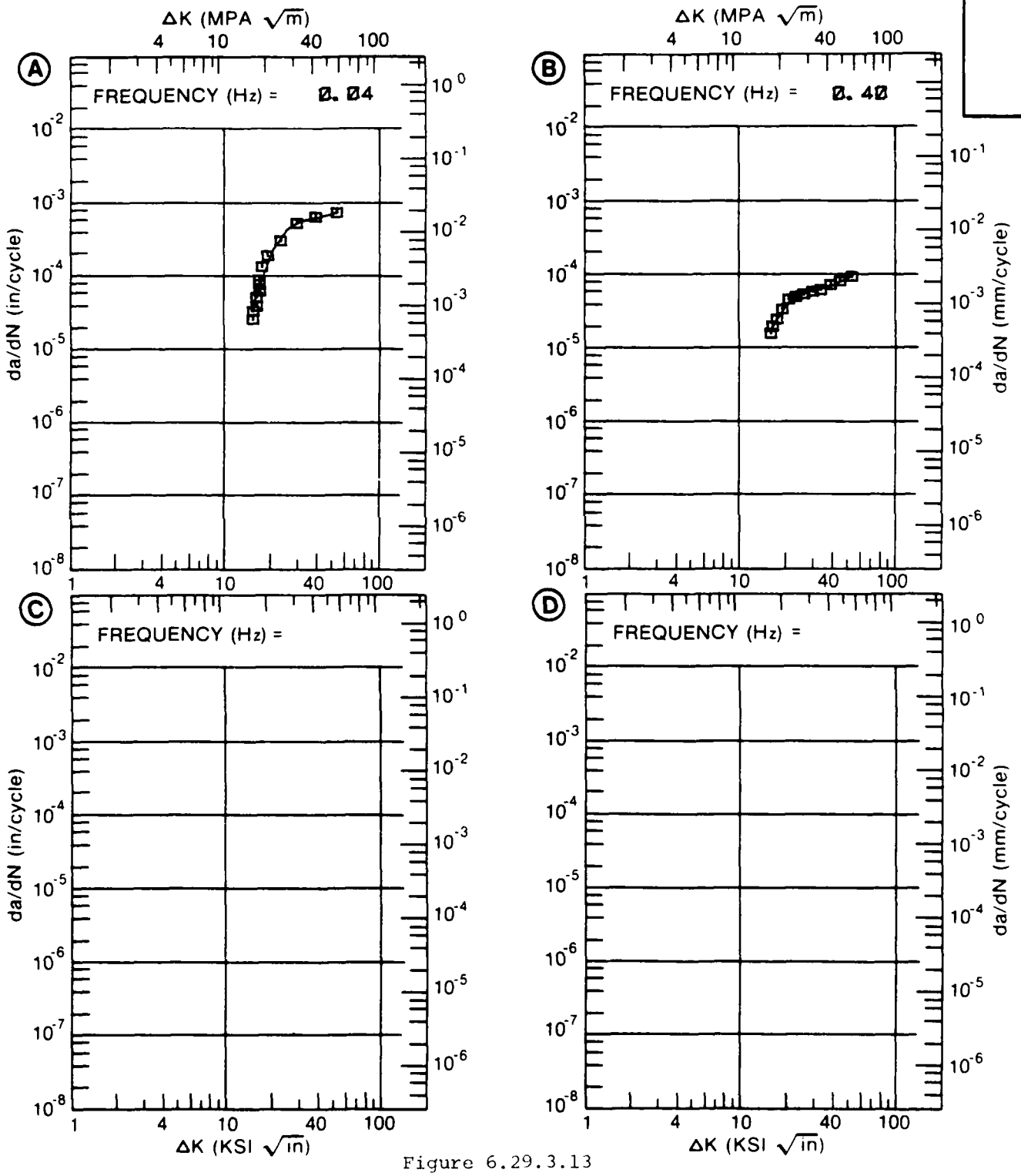


Figure 6.29.3.13

TABLE 6.29.3.14

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.29.3.14 INDICATING EFFECT

OF FREQUENCY

MATERIAL: ALLOY STEEL 4340
CONDITION: 750F TEMPER
ENVIRONMENT: R.T. ,DIST. WATER

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE)			
			A	B	C	D
			F(HZ)= 0.04	F(HZ)= 0.20	F(HZ)= 0.40	
	A:	12.35	374.			
DELTA K	B:	12.41		89.0		
MIN	C:	12.64			55.2	
	D:					
		13.00	383.	90.6	55.5	
		16.00	416.	97.8	58.8	
		20.00	452.	106.	65.0	
		25.00	489.	116.	74.8	
		30.00	522.	126.	86.1	
		35.00	555.	136.	98.7	
		40.00	587.	147.	113.	
		50.00		172.	144.	
		60.00		201.		
	A:	47.13	633.			
DELTA K	B:	64.55		216.		
MAX	C:	52.32			151.	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			1.76	2.33	1.41	

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
	0.0-0.5
	0.5-0.8
	0.8-1.25
	1.25-2.0
	>2.0

CONDITION/HT: 750F TEMPER
FORM:
SPECIMEN TYPE:
ORIENTATION:
STRESS RATIO:
ENVIRONMENT: R. T., DIST. WATER

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK:
SPECIMEN WIDTH:
REFERENCES: 89311

ALLOY STEEL

4340

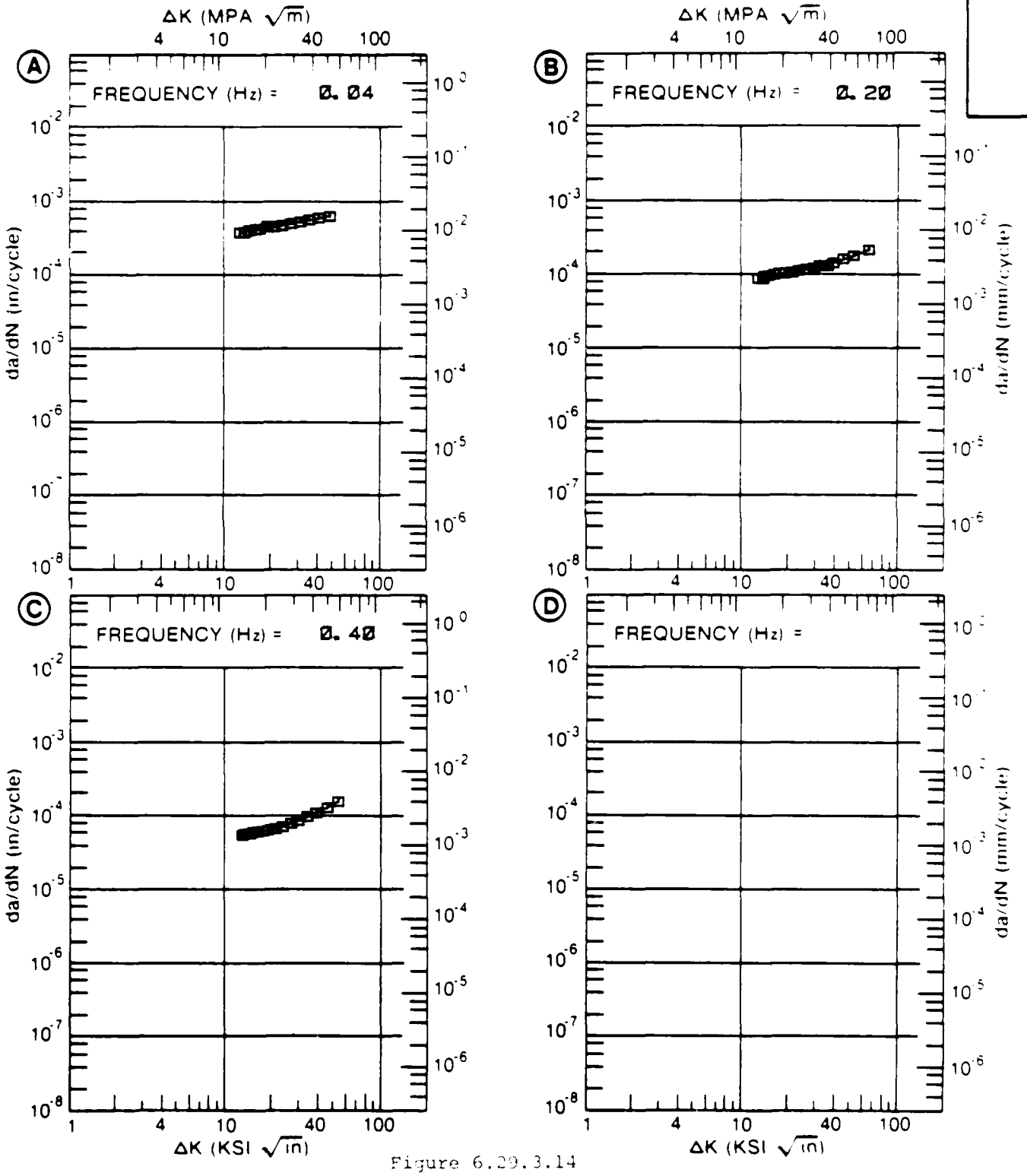


Figure 6.20.3.14

TABLE 6.29.3.15

FATIGUE CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.29.3.15INDICATING EFFECT

OF FREQUENCY

MATERIAL: ALLOY STEEL 4340
CONDITION: 750F TEMPER
ENVIRONMENT: + 212F, DIST. WATER

DELTA K (KSI*IN**1/2)			DA/DN (10**-6 IN./CYCLE) A	B	C	D
			F(HZ)= 0.04	F(HZ)= 0.40		
DELTA K MIN	A:	10.86	1604.			
	B:	10.49		323.		
	C:					
	D:					
		13.00	2025.	337.		
		16.00	2608.	499.		
		20.00	4019.	935.		
		25.00		1812.		
DELTA K MAX	A:	20.01	4025.			
	B:	27.12		2241.		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			4.95	13.38		

LIFE PREDICTION RATIO SUMMARY (NP/NA)	
0.0-0.5	0
0.5-0.8	0
0.8-1.25	2
1.25-2.0	0

CONDITION/HT: 750F TEMPER
FORM:
SPECIMEN TYPE:
ORIENTATION:
STRESS RATIO:
ENVIRONMENT: + 212° F, DIST. WATER

YIELD STRENGTH:
ULT. STRENGTH:
SPECIMEN THK:
SPECIMEN WIDTH:
REFERENCES: 89311

ALLOY STEEL

4340

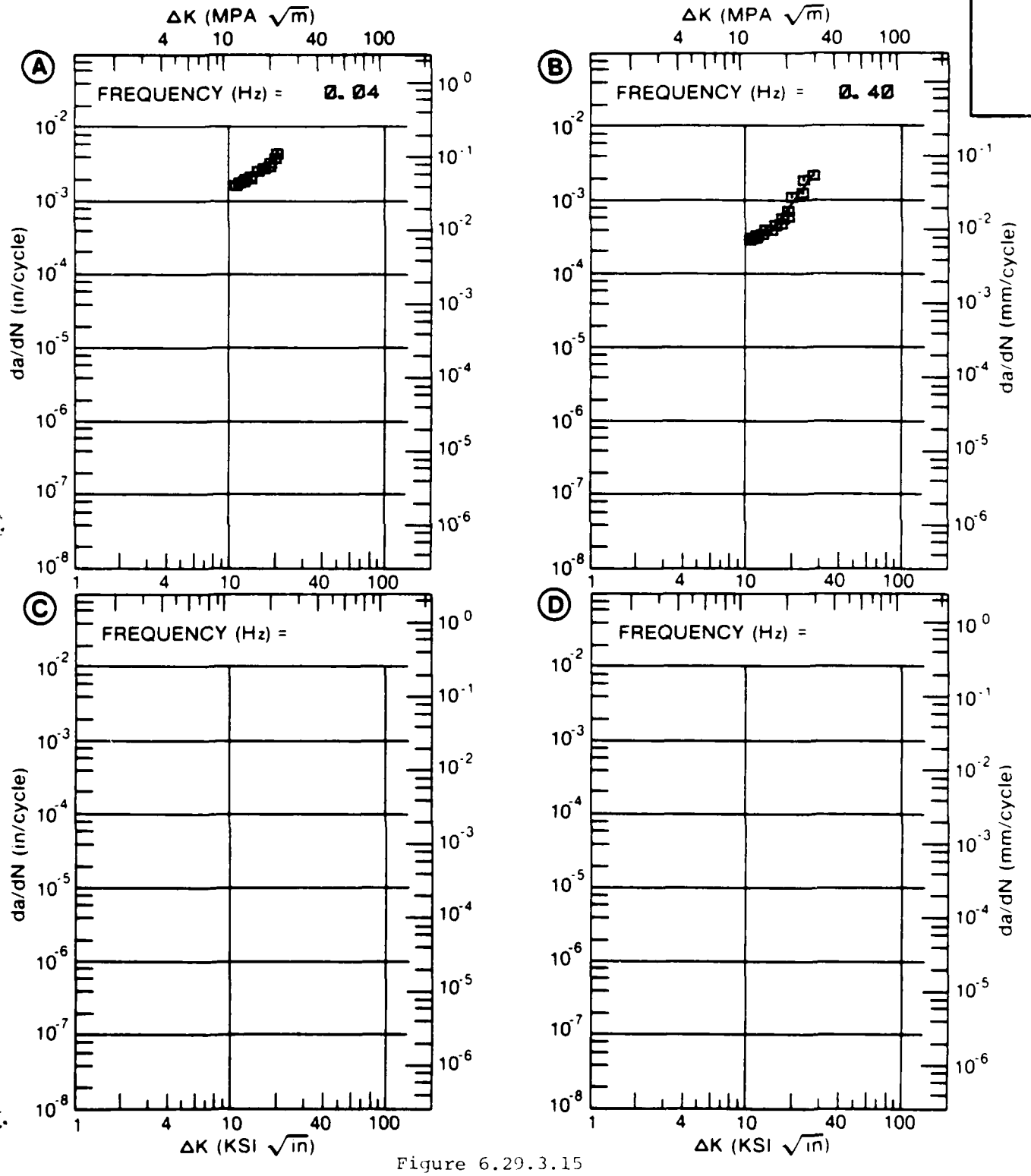


Figure 6.29.3.15

TABLE 6.29.3.16

SUSTAINED CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.29.3.16INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 4340
CONDITION:

K MAX (KSI*IN**1/2)		DA/DT (10**-3 IN/HOUR)			
		A	B	C	D
		E= HYDROGEN			
K MAX MIN	A:				
	B:				
	C:				
	D:				
200.00					
K MAX MAX	A:				
	B:				
	C:				
	D:				

ROOT MEAN SQUARE PERCENT ERROR 0.00

CONDITION/HT:
FORM:
SPECIMEN TYPE:
ORIENTATION:
YIELD STRENGTH:
ULT. STRENGTH:

SPECIMEN THK:
SPECIMEN WIDTH:
CRACK LENGTH (A_o):
K_{ISCC}:
REFERENCES:84310

ALLOY STEEL

4340

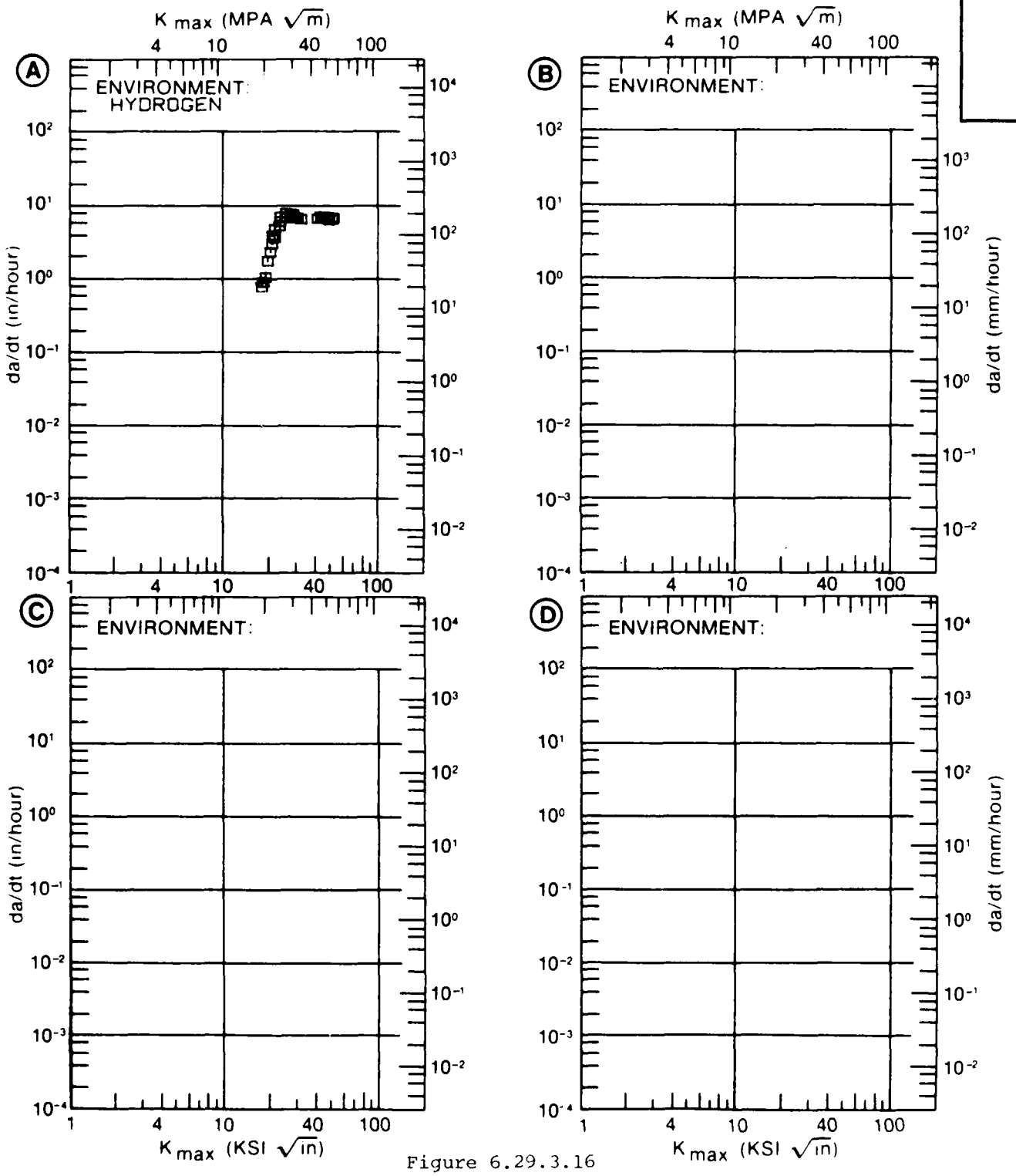


Figure 6.29.3.16

TABLE 6.29.3.17

SUSTAINED CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.29.3.17 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 4340
CONDITION:

K MAX (KSI*IN**1/2)			DA/DT (10**-3 IN/HOUR) A E= 3.5% NACL, BUFFERED	DA/DT (10**-3 IN/HOUR) B E= 3.5% NACL	C	D
K MAX MIN	A:	20.80	441.			
	B:	11.00		107.		
	C:					
	D:					
		13.00		342.		
		16.00		690.		
		20.00		832.		
		25.00	722.	829.		
		30.00	764.	952.		
		35.00	1105.	1410.		
		40.00	2989.	2717.		
K MAX MAX	A:	41.50	4613.			
	B:	42.00		3782.		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			18.79	43.66		

CONDITION/HT:
FORM: 12.0"TH FORGING
SPECIMEN TYPE: SENT
ORIENTATION:
YIELD STRENGTH: 220.0 KSI
ULT. STRENGTH:

SPECIMEN THK: 0.502"
SPECIMEN WIDTH: 3.000"
CRACK LENGTH (A_O):
K_{ISCC}: 10.00 KSI (SQRT IN)
REFERENCES:81814

ALLOY STEEL

4340

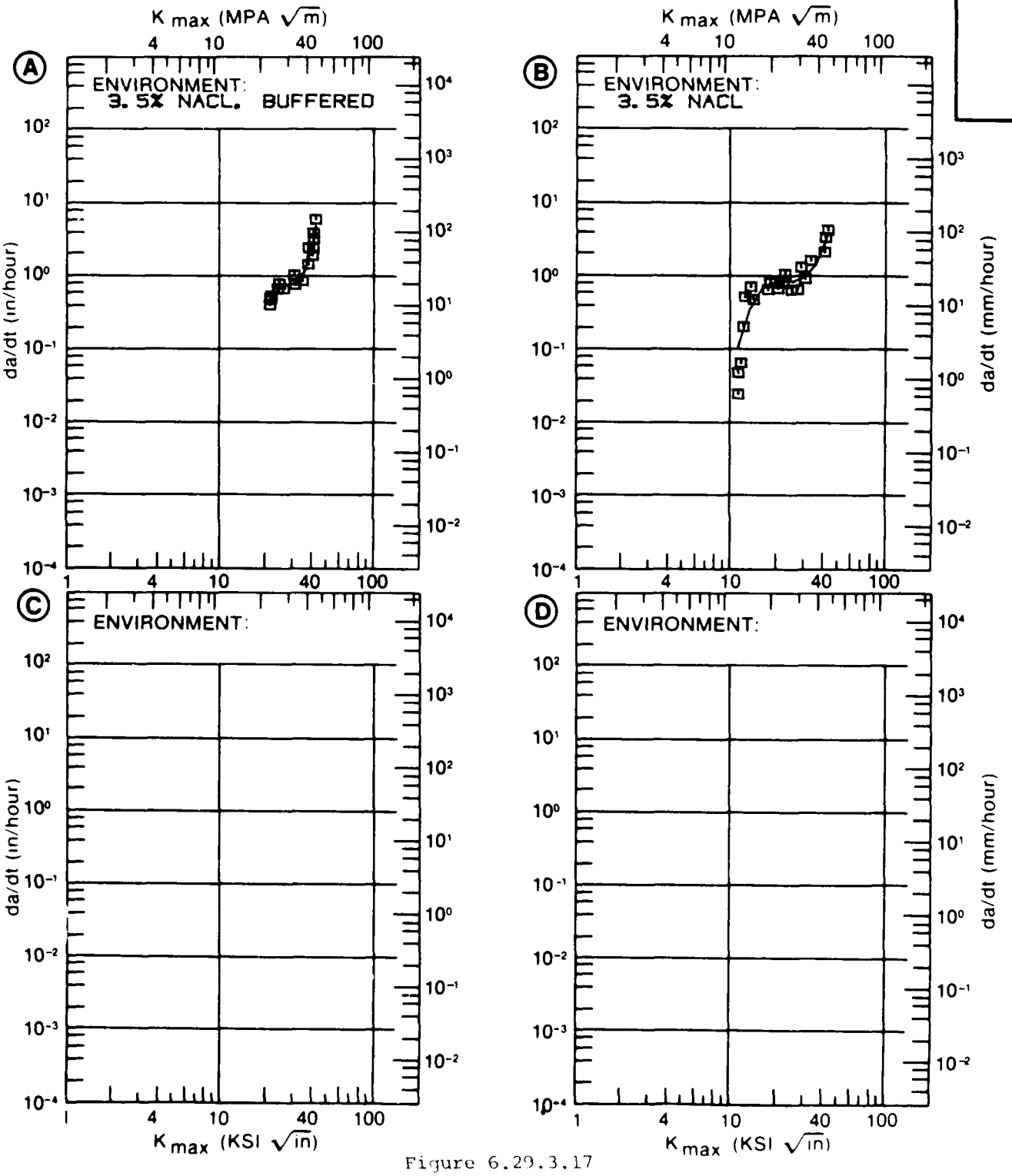


Figure 6.29.3.17

TABLE 6.29.3.18

SUSTAINED CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.29.3.18 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 4340
CONDITION: TEMPER 400F 1HR

K MAX (KSI*IN**1/2)			DA/DT (10**-3 IN/HOUR)			
			A	B	C	D
			E= DRY ARGON-CNT	E= DIST. WATER-CNT	E= SEAWATER-CANT	E= DRY HYDROGEN-CNT
	A:	70.00	.836			
K MAX	B:	24.00		224.		
MIN	C:	18.80			403.	
	D:	24.00				1579.
		20.00			421.	
		25.00		266.	860.	2166.
		30.00		521.	1630.	5801.
		35.00		817.	2480.	8872.
		40.00		1114.	3517.	10742.
		50.00		1610.	7298.	13608.
		60.00		1923.		
		70.00	.836	2073.		
		80.00	1.17	2106.		
		90.00	5.73			
	A:	95.30	25.2			
K MAX	B:	88.00		2079.		
MAX	C:	60.00			18700.	
	D:	53.00				14919.
ROOT MEAN SQUARE PERCENT ERROR			36.34	11.28	7.72	3.27

CONDITION/HT: TEMPER 400F 1HR
FORM: 0.2"TH PLATE
SPECIMEN TYPE:
ORIENTATION:
YIELD STRENGTH: 195.0- 225.0 KSI
ULT STRENGTH:

SPECIMEN THK: 0.250"
SPECIMEN WIDTH: 2.000"
CRACK LENGTH (A_0):
K_{ISCC}:
REFERENCES: 84309, 70887

ALLOY STEEL

4340

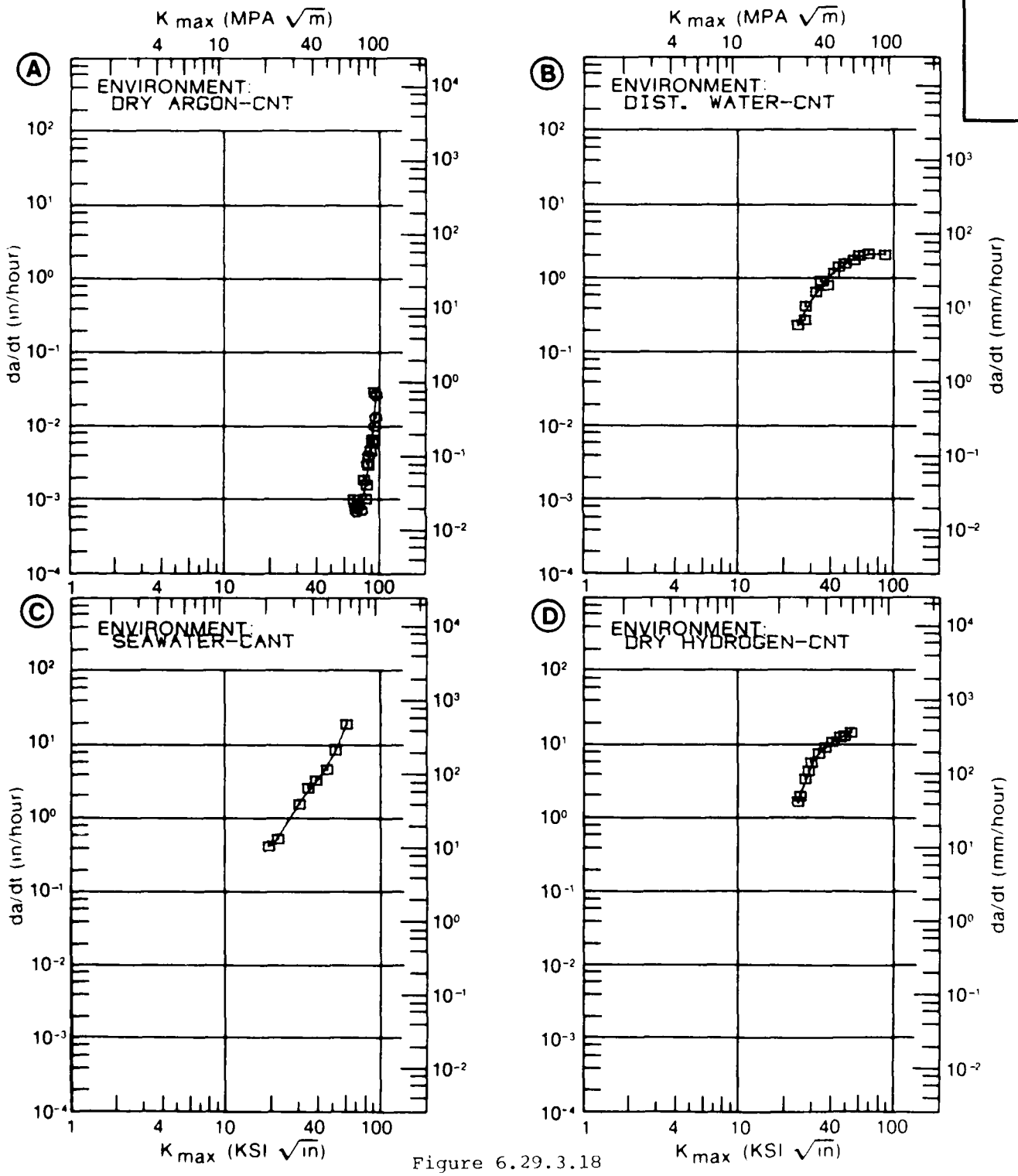


Figure 6.29.3.18

TABLE 6.29.3.19

SUSTAINED CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.29.3.19INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 4340
CONDITION: TEMPER 400F 1HR

K MAX (KSI*IN**1/2)			DA/DT (10**-3 IN/HOUR)			
			A	B	C	D
			E= DIST. WATER; 50F	E= DIST. WATER; 75F	E= DIST. WATER; 127F	E= DIST. WATER; 167F
	A:	51.00	256.			
K MAX	B:	14.50		83.0		
MIN	C:	26.00			2215.	
	D:	22.50				5804.
		16.00		112.		
		20.00		218.		
		25.00		412.		8072.
		30.00		663.	3694.	11332.
		35.00		947.	5200.	12816.
		40.00		1236.	6117.	13293.
		50.00		1737.	6730.	13718.
		60.00	893.	2040.	6825.	15332.
		70.00	1384.	2125.	7099.	
		80.00	1383.	2033.		
	A:	81.00	1367.			
K MAX	B:	84.00		1962.		
MAX	C:	80.00			7842.	
	D:	64.00				16594.
ROOT MEAN SQUARE PERCENT ERROR			10.41	9.95	10.87	10.02

CONDITION/HT: TEMPER 400F 1HR
FORM: Ø.2"TH PLATE
SPECIMEN TYPE: CNT
ORIENTATION:
YIELD STRENGTH: 195.Ø KSI
ULT STRENGTH:

SPECIMEN THK: Ø.250"
SPECIMEN WIDTH: 2.ØØØ"
CRACK LENGTH (A_O):
K_{ISCC}:
REFERENCES:84309

ALLOY STEEL

4340

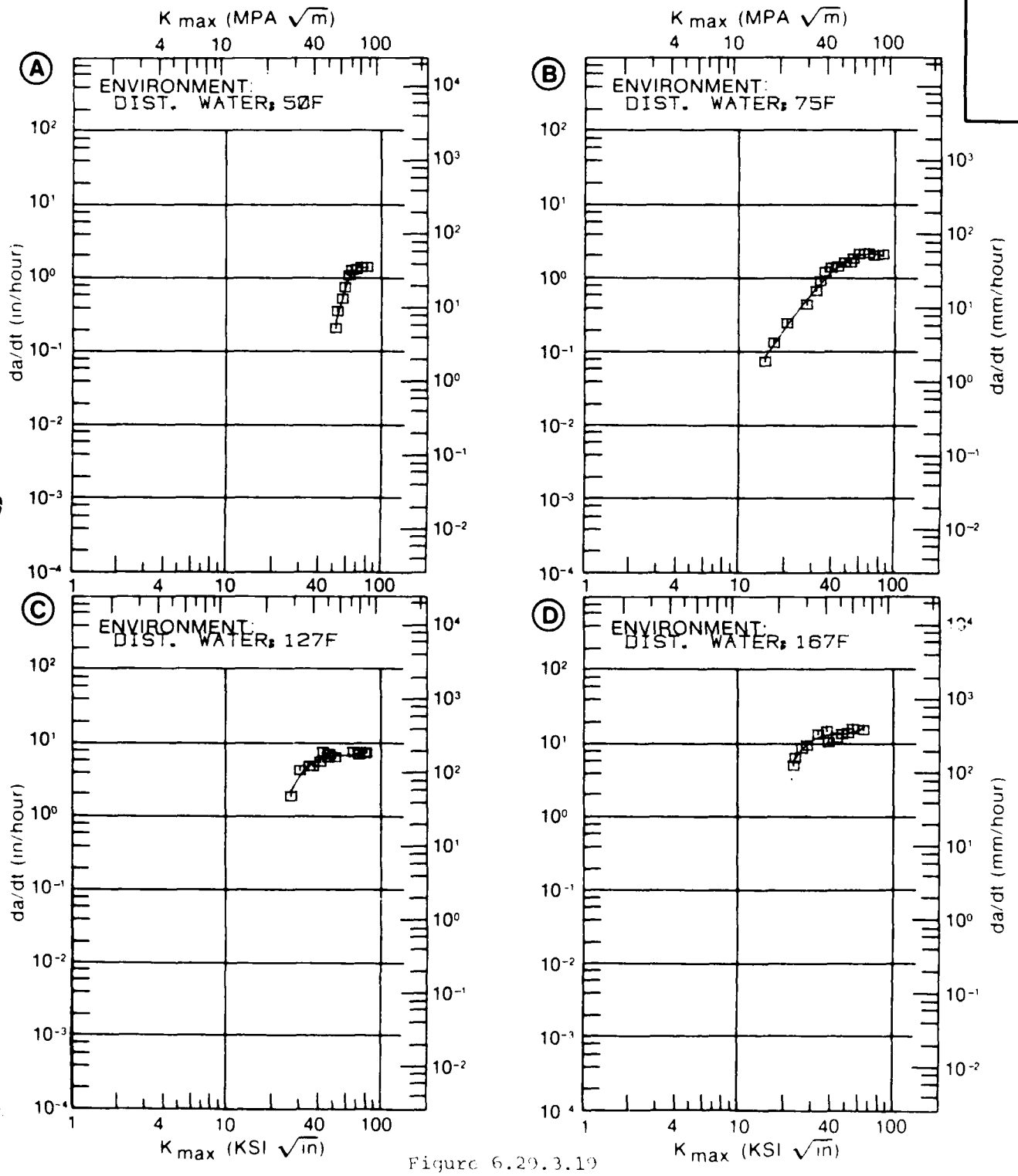


Figure 6.29.3.19

TABLE 6.29.3.20

SUSTAINED CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.29.3.20 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 4340
CONDITION: TEMPERED 400F

K MAX (KSI*IN**1/2)			DA/DT (10**-3 IN/HOUR)			
			A	B	C	D
			E= DIST. WATER KI=19KSI SQRT(IN)	E= DIST. WATER KI=24KSI SQRT(IN)	E= DIST. WATER KI=31KSI SQRT(IN)	E= DIST. WATER KI=41KSI SQRT(IN)
	A:	20.00	83.8			
K MAX	B:	26.00		300.		
MIN	C:	33.80			579.	
	D:					
		25.00	603.			
		30.00	900.	787.		
		35.00		1383.	756.	
		40.00		1744.	1533.	
		50.00			2341.	
		60.00			2553.	
	A:	33.30	1206.			
K MAX	B:	50.00		2136.		
MAX	C:	67.50			2932.	
	D:					
ROOT MEAN SQUARE PERCENT ERROR			7.25	6.54	8.60	0.00

CONDITION/HT: TEMPERED 400F
FORM:
SPECIMEN TYPE:
ORIENTATION:
YIELD STRENGTH:
ULT. STRENGTH:

SPECIMEN THK:
SPECIMEN WIDTH:
CRACK LENGTH (A_O):
K_{ISCC}:
REFERENCES:84313, 84310

ALLOY STEEL

4340

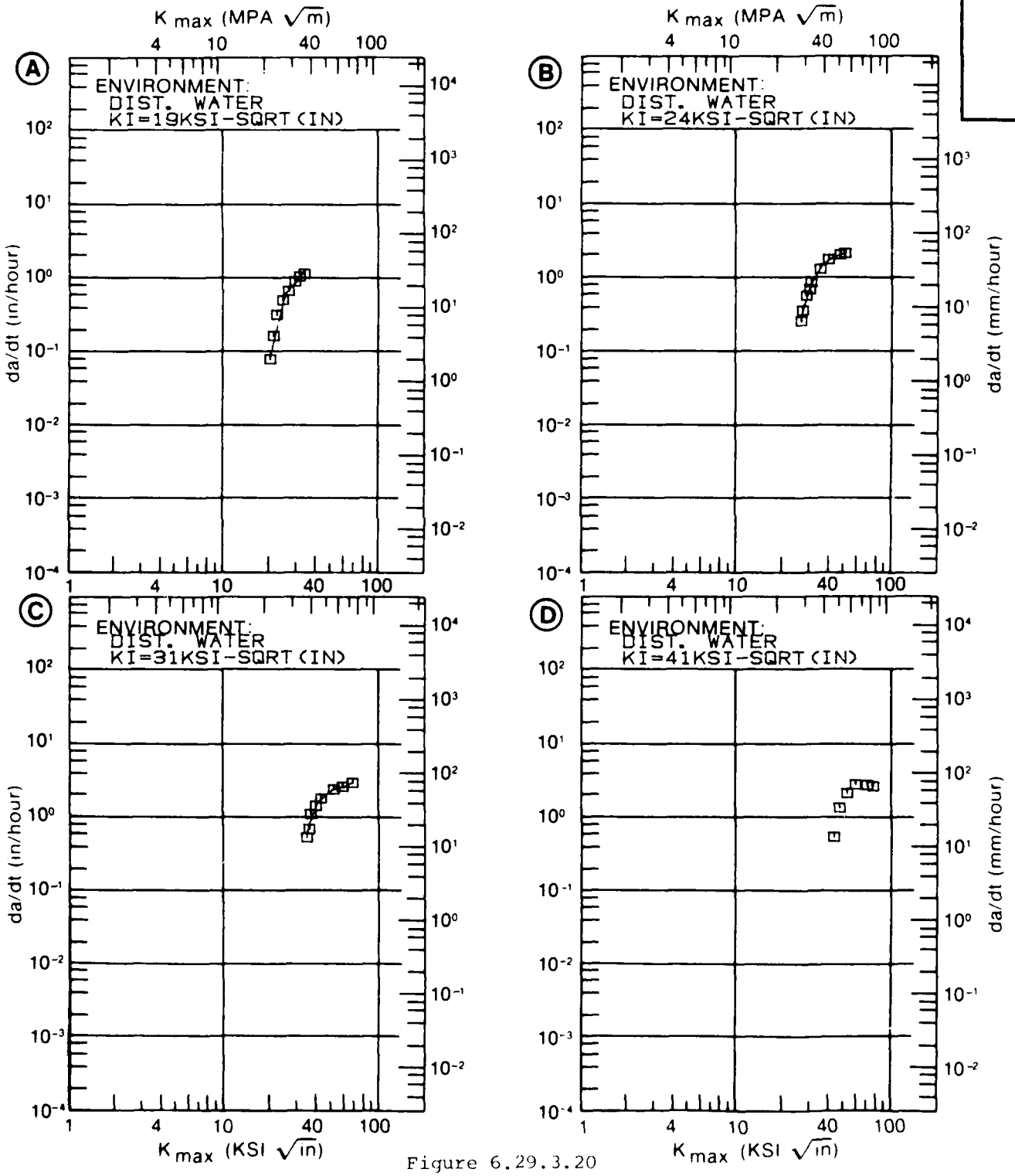


Figure 6.29.3.20

TABLE 6.29.3.21

SUSTAINED CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.29.3.21INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 4340
CONDITION: TYS=200-240KSI

K MAX (KSI*IN**1/2)		DA/DT (10**-3 IN/HOUR)			
		A	B	C	D
		E= 3.5% NACL - .09 WT % SI IN ALLOY	E= 3.5% NACL - .54 WT % SI IN ALLOY	E= 3.5% NACL - 1.08 WT % SI IN ALLOY	E= 3.5% NACL - 1.58 WT % SI IN ALLOY
K MAX MIN	A:				
	B:				
	C:				
	D:				
200.00					
K MAX MAX	A:				
	B:				
	C:				
	D:				
ROOT MEAN SQUARE PERCENT ERROR		0.00	0.00	0.00	0.00

CONDITION/HT: TYS=200-240KSI
FORM: 1.5"TH EXTRUSION
SPECIMEN TYPE: NB
ORIENTATION: L-S
YIELD STRENGTH: 202.0- 240.0 KSI
ULT. STRENGTH:

SPECIMEN THK: 0.480"
SPECIMEN WIDTH: 1.500"
CRACK LENGTH (A_o):
K_{ISCC}: 14.00 KSI (SQRT IN)
REFERENCES: 74718

ALLOY STEEL

4340

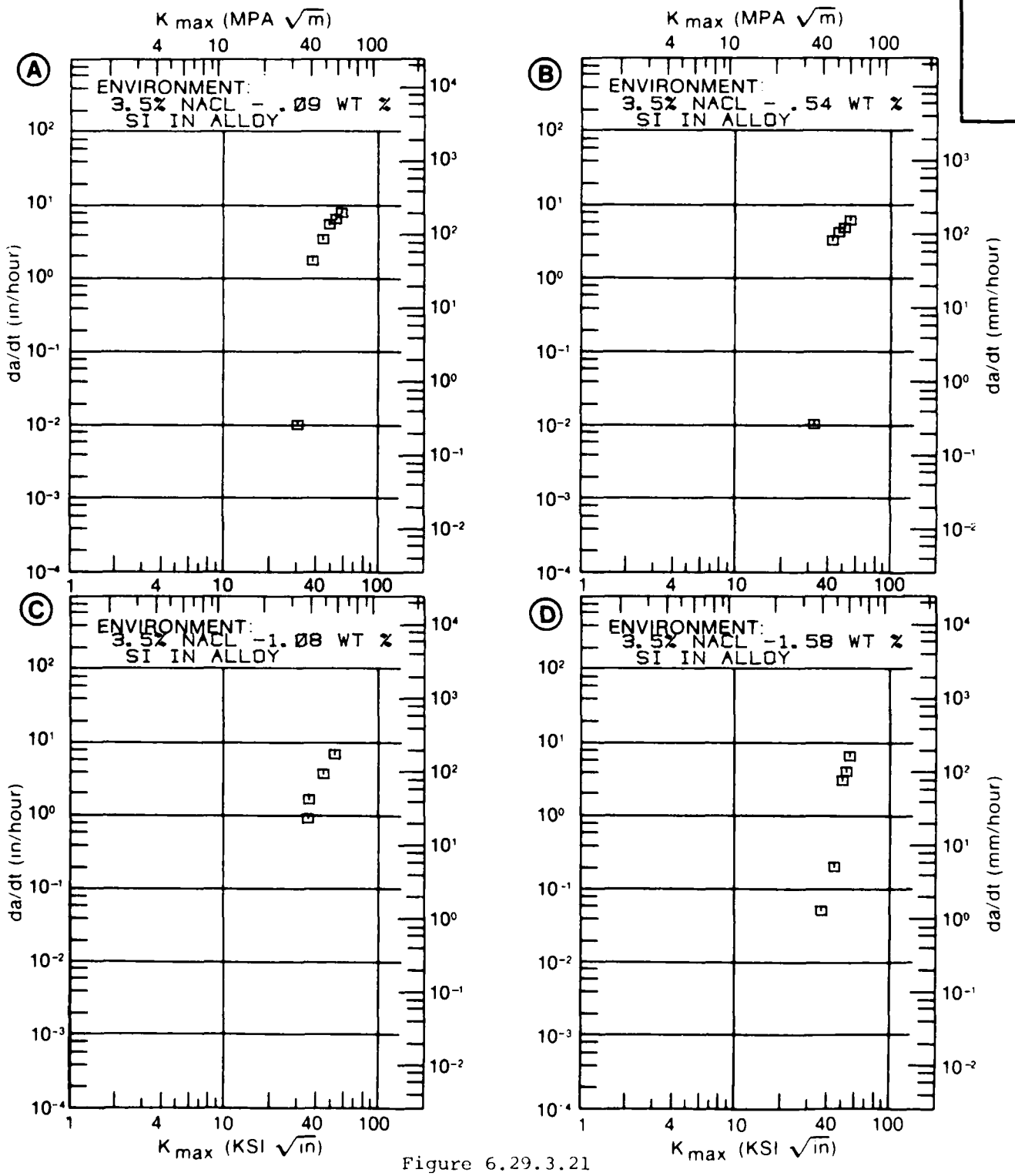


Figure 6.29.3.21

TABLE 6.29.3.22

ALLOY STEEL 4340 K(ISCC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN (*=SG)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
-- ----------	S	----	R.T.	---	----	3.5 PCT NACL	----	----	CNT	----	80.00	10.00			----	1968	84290
		----		---	----		----	----	PTSC	----	67.00	10.00			----	1968	84290
													10.0/	0.0			
----------	P	----	R.T.	L-T	----	3.5 PCT NACL	----	----	CANT	----	57.00	10.00			----	1968	84290
-- -- -------	F	0.40	R.T.	---	200.0	DIST WATER	0.394	0.394	CANT*	----	88.00	45.00			> 48800	1969	76972
TYS=125KSI	P	----	R.T.	T-L	125.0	SEAWATER	----	----	CANT	----	89.00	70.00*			----	1967	70887
TYS=150KSI	P	----	R.T.	T-L	150.0	SEAWATER	----	----	CANT	----	85.00	59.00			----	1967	70887
TYS=175KSI	P	----	R.T.	T-L	175.0	SEAWATER	----	----	CANT	----	75.00	27.00			----	1967	70887
TYS=200KSI	P	----	R.T.	T-L	200.0	SEAWATER	----	----	CANT	----	59.00	10.00			----	1967	70887
TYS=225KSI	P	----	R.T.	T-L	225.0	SEAWATER	----	----	CANT	----	63.00	5.00			> 1200	1967	70887
1350F 00 750F 1 2HR	P	1.00	R.T.	T-S	194.0	3.5 PCT NACL	1.000	0.400	CANT	----	72.20	8.50			> 20000	1970	79761
1550F 00 750F CRACK PRESTRESSED TO 60PCT KIC	P	1.00	R.T.	---	194.2	3.5 PCT NACL	1.000	0.500	NB *	----	72.20	23.00			> 20000	1972	84356

*NOTE-DATA WHICH DO NOT MEET MINIMUM SPECIMEN THICKNESS REQUIREMENTS OF 2.5(KISCC/TYS)SQUARED

TABLE 6.29.3.22 (Con't)

ALLOY STEEL 4340 K(ISCC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN (*=SC)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
1550F OQ 750F 1HR CRACK PRESTRESSED TO 20PCT KIC	P	1.00	R.T.	---	194.2	3.5 PCT NACL	1.000	0.500	NB *	----	72.20	8.00			> 20000	1972	84356
1550F OQ 750F CRACK PRESTRESSED TO 80PCT KIC	P	1.00	R.T.	---	194.2	3.5 PCT NACL	1.000	0.500	NB *	----	72.20	24.00			> 20000	1972	84356
1550F OQ 750F CRACK PRESTRESSED TO 20PCT KIC	P	1.00	R.T.	---	194.2	3.5 PCT NACL	1.000	0.500	NB *	----	72.20	12.00			> 20000	1972	84356
1550F OQ 750F CRACK PRESTRESSED TO 40PCT KIC	P	1.00	R.T.	---	194.2	3.5 PCT NACL	1.000	0.500	NB *	----	72.20	17.00			> 20000	1972	84356
1575F OQ 675F 4HR	P	0.75	R.T.	---	209.6	DIST WATER	0.665	0.250	CANT*	0.125	48.80	9.80			> 7500	1965	63061
1575F OQ 800F 4HR	P	0.75	R.T.	---	222.4	DIST WATER	0.665	0.250	CANT*	0.125	48.60	9.80			> 2640	1965	63061
1600F 1HR OQ 600F 1+1HR	F	12.00	R.T.	---	220.0	3.5 PCT NACL	3.000	0.502	SENT	0.800	------	10.00			----	1971	81814
1625F Q 1525F OQ 400F 2+2HR 1625F Q 1525F OQ	F	8.00	R.T.	---	212.2	AIR 90 PCT PH	1.500	0.480	PTSC	0.140	63.00	27.00			200	1965	74718
		8.00		---	220.8		1.500	0.480	PTSC	0.140	63.60	57.00	42.0/	21.2	1200	1965	74718

TABLE 6.29.3.22 (Con't)

ALLOY STEEL 4340 K(ISCC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN (*=SG)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
1650F 1HR AC 1600F 2HR OQ,LN 0.25HR,400F 1+1HR OQ	B	1.50	R.T.	L-T	245.0	3.5 PCT NACL	1.450	0.575	CANT*	----	51.00	15.00			> 3500	1969	75025
1650F 1HR AC 1480F 2HR OQ,LN 0.25HR,400F 1+1HR OQ	B	1.50	R.T.	L-T	249.0	3.5 PCT NACL	1.450	0.575	CANT*	----	51.00	15.00			> 1800	1969	75025
1700F 0.25HR AC 1550F OQ 600F 1+1HR	S	0.08	R.T.	---	206.0	DIST WATER	2.000	0.050	CNT	----	------	29.00*			> 1000	1968	72283
1700F 0.25HR AC 1550F OQ,600F 1+1HR	S	0.08	R.T.	---	206.0	3.5 PCT NACL	2.000	0.050	CNT	----	------	29.00			> 1000	1968	72283
1800F Q,600F 1+1HR	F	1.00	R.T.	L-S	210.0	3.5 PCT NACL	----	1.000	CANT	----	82.00	30.00			----	1971	80423
		1.00			210.0		1.000	1.000	CANT	----	78.00	25.00			----	1971	80423
		1.00			210.0		1.000	1.000	CANT	----	78.00	24.00			----	1971	80423
		1.00			210.0		1.000	1.000	CANT	----	78.00	23.00			----	1971	80423
		1.00			210.0		1.000	1.000	CANT	----	82.00	25.00			----	1971	80423
		1.00			210.0		1.000	1.000	CANT	----	78.00	22.00			----	1971	80423
		1.00			210.0		1.000	1.000	CANT	----	82.00	25.00			----	1971	80423
		1.00			210.0		1.000	1.000	CANT	----	82.00	24.00			----	1971	80423
		1.00			210.0		1.000	1.000	CANT	----	78.00	24.00			----	1971	80423
		1.00			210.0		1.000	1.000	CANT	----	82.00	31.00			----	1971	80423
		1.00			210.0		1.000	1.000	CANT	----	78.00	26.00			----	1971	80423
		1.00			210.0		1.000	1.000	CANT	----	82.00	23.00			----	1971	80423
													25.2/	2.7			

*NOTE-DATA WHICH DO NOT MEET MINIMUM SPECIMEN THICKNESS REQUIREMENTS OF 2.5(KISCC/TYS)SQUARED

TABLE 6.30.1.1

MEAN PLANE STRAIN FRACTURE TOUGHNESS DATA OF
ALLOY STEEL 4340 (AM) AT ROOM TEMPERATURE

CONDITION/HT	MEAN KIC ± STANDARD (KSI SQRT(IN)) DEVIATION	(NUMBER OF SPECIMENS)	
	FORGING		
CONDITION/HT	L-I	I-L	S-L
1600F 1 HR.AC. 1550F 1 HR.OQ. -320F 0.5 HR. 400F 2 HR.AC	40.5 ± 0.5 (3)	-----	-----

TABLE 6.30.2.1

ALLOY STEEL 4340 (AM) K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	------SPECIMEN------ WIDTH (IN) W	THICK (IN) B	DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
1600F 1 HR,AC,	F	4.00	R.T.	L-T	241.0	1.800	0.900	NB	----	0.07	41.00			1968	73300 (1)
1550F 1 HR,OQ,		4.00			241.0	1.800	0.900	NB	----	0.07	40.60			1968	73300 (1)
-320F 0.5 HR,		4.00			241.0	1.800	0.900	NB	----	0.07	40.00			1968	73300 (1)
400F 2 HR,AC												40.5	0.5		

NOTES:
(1) (AM)=AIR MELTED

TABLE 6.31.1.1

MEAN PLANE STRAIN FRACTURE TOUGHNESS DATA OF
ALLOY STEEL 4340 (DH) AT ROOM TEMPERATURE

CONDITION/HT	MEAN KIC ± STANDARD DEVIATION (KSI SQRT(IN))	(NUMBER OF SPECIMENS)

FORGING

CONDITION/HT	L-T	T-L	S-L
1600F 1 HR.AC. 1550F 1 HR.OQ. -320F 0.5 HR. 400F 2 HR.AC	51.0 ± 3.0 (7)	-----	-----

BILLET

CONDITION/HT	L-T	T-L	S-L
1550F.OQ. 900F 1 HR	-----	66.3 ± 6.2 (4)	-----

TABLE 6.31.2.1

ALLOY STEEL 4340 (DH) K(IC)

CONDITION	PRODUCT FORM	PRODUCT THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5* (K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
1550F,0Q,	BT	1.00	-100	L-T	----	2.000	1.000	CT	1.023	----	88.00			1970	84280
900F 1 HR		1.00			----	2.000	1.000	CT	1.030	----	103.00			1970	84280
		1.00			----	2.000	1.000	CT	1.030	----	109.00			1970	84280
		1.00			----	2.000	1.000	CT	1.026	----	94.00	98.5/	9.3	1970	84280
1550F,0Q,	BT	1.00	-77	L-T	----	2.000	1.000	CT	1.045	----	107.00			1970	84280
900F 1 HR															
1550F,0Q,	BT	1.00	-60	T-L	----	2.000	1.000	CT	1.015	----	62.00			1970	84280
900F 1 HR		1.00			----	2.000	1.000	CT	1.000	----	62.00			1970	84280
		1.00			----	2.000	1.000	CT	1.005	----	57.00	60.3/	2.9	1970	84280
1550F,0Q,	BT	1.00	RT	T-L	----	2.000	1.000	CT	1.000	----	75.00			1970	84280
900F 1 HR		1.00			----	2.000	1.000	CT	1.025	----	66.00			1970	84280
		1.00			----	2.000	1.000	CT	1.010	----	63.00			1970	84280
		1.00			----	2.000	1.000	CT	1.020	----	61.00	66.3/	6.2	1970	84280
1600F 1 HR,AC,	F	4.00	RT	L-T	229.0	1.800	0.900	NB	----	0.12	51.10			1968	73300
1550F 1 HR,0Q,		4.00			229.0	1.800	0.900	NB	----	0.14	54.30			1968	73300
-320F 0.5 HR,		4.00			229.0	1.800	0.900	NB	----	0.15	55.30			1968	73300
400F 2 HR,AC		4.00			229.0	1.800	0.900	NB	----	0.12	51.30			1968	73300
		4.00			231.0	1.800	0.900	NB	----	0.12	49.70			1968	73300 (1)
		4.00			231.0	1.800	0.900	NB	----	0.10	46.90			1968	73300 (1)
		4.00			231.0	1.800	0.900	NB	----	0.11	48.40			1968	73300 (1)
												51.0/	3.0		
1600F 1 HR,AC,	F	4.00	RT	T-S	233.0	1.800	0.900	NB	----	0.13	52.50			1968	73300 (1)
1550F 1 HR,0Q,		4.00			233.0	1.800	0.900	NB	----	0.13	52.50			1968	73300 (1)
-320F 0.5 HR,		4.00			233.0	1.800	0.900	NB	----	0.13	52.50			1968	73300 (1)
400F 2 HR,AC												52.5/	0.0		

NOTES
(1) (DH)=DEGASED

TABLE 6.32.3.1

SUSTAINED CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.32.3.1 INDICATING EFFECT

OF ENVIRONMENT

MATERIAL: ALLOY STEEL 4340(EFM)
CONDITION: 1550F .5HR, 400F 4HR

K MAX (KSI*IN**1/2)			DA/DT (10**-6 IN/HOUR)			
			A	B	C	D
			E= 0.05% SODIUM DICHROMATE			
K MAX MIN	A:	19.00	340000.			
	B:					
	C:					
	D:					
		20.00	356822.			
		25.00	457075.			
		30.00	572661.			
		35.00	690962.			
		40.00	801767.			
		50.00	972434.			
		60.00	1053339.			
K MAX MAX	A:	65.00	1060000.			
	B:					
	C:					
	D:					

ROOT MEAN SQUARE PERCENT ERROR 9.39

CONDITION/HT: 1550F . 5HR. 400F 4HR
FORM: Ø. 5"TH PLATE
SPECIMEN TYPE: TDCB
ORIENTATION: T-L
YIELD STRENGTH: 240. Ø KSI
ULT. STRENGTH:

SPECIMEN THK: Ø. 300"
SPECIMEN WIDTH: 6. ØØØ"
CRACK LENGTH (A_O)
K_{ISCC}:
REFERENCES: 83611

ALLOY STEEL

4340 (EFM)

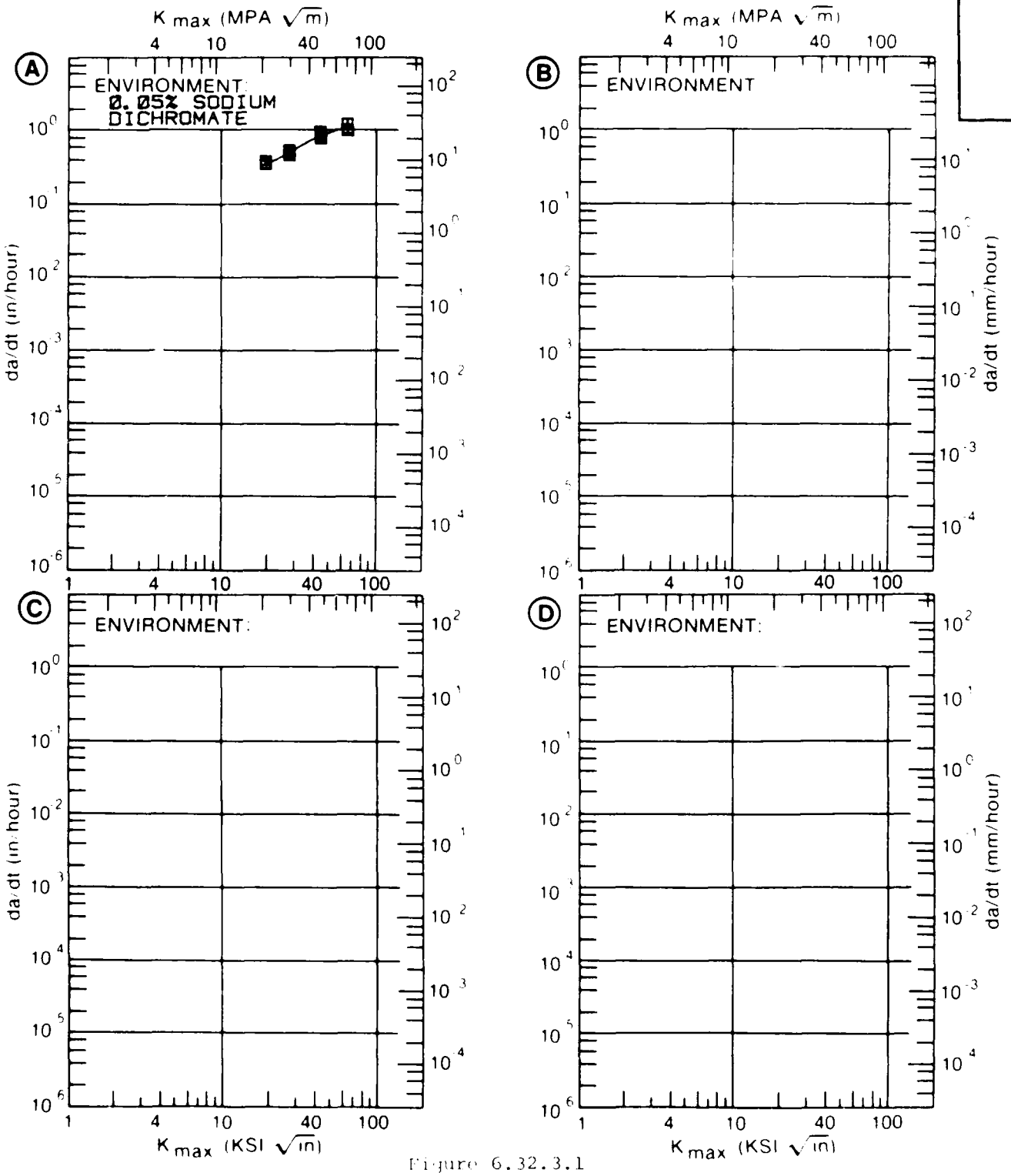


Figure 6.32.3.1

TABLE 6.33.3.1

SUSTAINED CRACK GROWTH RATES AT DEFINED LEVELS
OF STRESS INTENSITY FACTOR

DATA ASSOCIATED WITH FIGURE 6.33.3.1 INDICATING EFFECT

OF YIELD STRENGTH

MATERIAL: ALLOY STEEL 4340V
CONDITION:
ENVIRONMENT:

K MAX (KSI*IN**1/2)			DA/DT (10**-6 IN/HOUR)			
			A	B	C	D
			Y(KSI)=200.0	Y(KSI)=186.0	Y(KSI)=142.0	
K MAX MIN	A:	41.00	25343.			
	B:	55.00		885.		
	C:					
	D:					
		50.00	101411.			
		60.00	174099.	4149.		
		70.00	234544.	6304.		
		80.00		8155.		
K MAX MAX	A:	75.00	279053.			
	B:	85.00		8927.		
	C:					
	D:					
ROOT MEAN SQUARE PERCENT ERROR			6.42	3.87	0.00	

CONDITION/HT:
FORM: 2.4"TH EXTRUSION
SPECIMEN TYPE: CANT
ORIENTATION:
ENVIRONMENT:
ULT STRENGTH:

SPECIMEN THK: Ø.394"
SPECIMEN WIDTH: Ø.394"
CRACK LENGTH (A_o):
K_{ISCC}: 103.0, 83.0, 45.0 KSI(SQRT IN)
REFERENCES: 76972

ALLOY STEEL

4340V

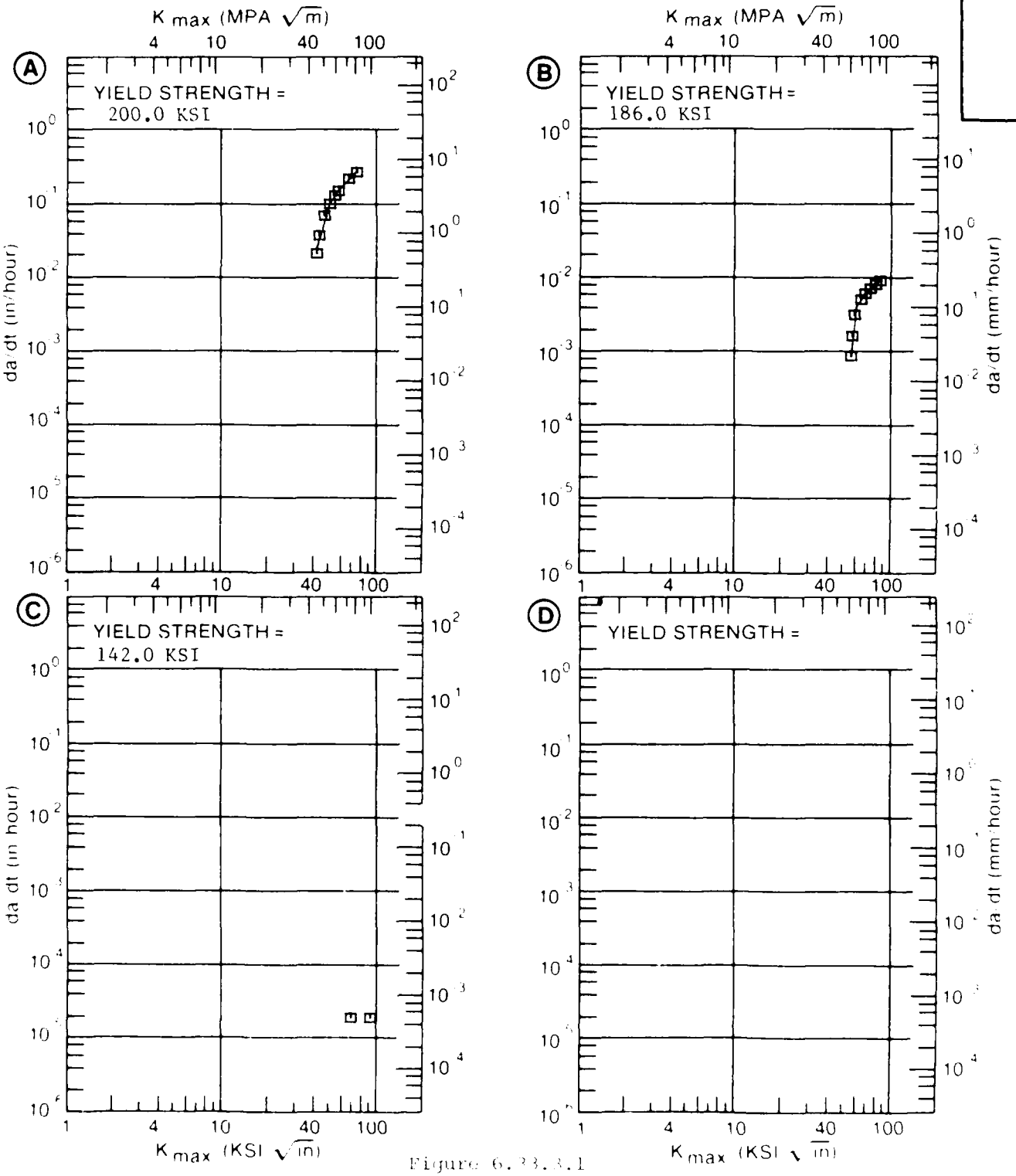


Figure 6.33.3.1

TABLE 6.34.1.1

MEAN PLANE STRAIN FRACTURE TOUGHNESS DATA OF
ALLOY STEEL 4340 (VAR) AT ROOM TEMPERATURE

CONDITION/HT	MEAN KIC ± STANDARD DEVIATION (KSI SQRT(IN))	(NUMBER OF SPECIMENS)

FORGING

CONDITION/HT	L-T	T-L	S-L
1600F 1 HR, AC, 1550F 1 HR, OQ, -320F 0.5 HR, 400F 2 HR, AC	55.0 ± 4.4 (8)	-----	-----

TABLE 6.34.2.1

ALLOY STEEL 4340 (VAR) K(IC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPECIMEN ORIENT	YIELD STRENGTH (KSI)	SPECIMEN WIDTH (IN) W	SPECIMEN THICK (IN) B	SPECIMEN DESIGN	CRACK LENGTH (IN) A	2.5*(K(IC)/TYS)**2 (IN)	K(IC) (KSI*SQRT IN)	K(IC) MEAN	K(IC) STAN DEV	DATE	REFER
1600F 1 HR,AC,	F	4.00	R.T.	L-T	240.0	1.800	0.900	NB	----	0.13	55.00			1968	73300 (1)
1550F 1 HR,OQ,		4.00			240.0	1.800	0.900	NB	----	0.16	61.30			1968	73300 (1)
1000F 0.5 HR,		4.00			240.0	1.800	0.900	NB	----	0.12	51.80			1968	73300 (1)
900F 2 HR,AC		4.00			240.0	1.800	0.900	NB	----	0.15	59.20			1968	73300 (1)
		4.00			241.0	1.800	0.900	NB	----	0.10	48.60			1968	73300
		4.00			241.0	1.800	0.900	NB	----	0.13	54.60			1968	73300
		4.00			241.0	1.800	0.900	NB	----	0.11	51.10			1968	73300
		4.00			241.0	1.800	0.900	NB	----	0.15	58.60	55.0/	4.4	1968	73300

NOTES

(1) COMPOSITION(WT PERCENT) 0.42C,0.81MN,0.008P,0.004S,0.36SI,1.63NI,0.84CR,0.22MO,0.001AL,0.002CA,0.0022N (VAR)=(VACUUM ARC REMELTED)

TABLE 6.35.3.1

ALLOY STEEL 4340(MOD) K(ISCC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	------SPECIMEN-------- WIDTH (IN) W	THICK (IN) B	DESIGN (*=SQ)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
1650F 1HR, 1600F 1HR OQ 1+1 600F (0 09 SI)	B	1 50	R T	T-L	204 2	3 5 PCT NACL	1 500	0 480	CANT	----	78 00	18 00			> 5000	1965	74718
1650F 1HR, 1600F 1HR OQ 1+1 400F (0 09 SI)	B	1 50	R T	T-L	201 8	3 5 PCT NACL	1 500	0 480	CANT	----	73 00	13 00			> 5000	1965	74718
1800F 0 460F 1+1HR (0 20C)	F	1 00	R T	L-S	195 0	3 5 PCT NACL	1 000	1 000	CANT	----	87 00	56 00			----	1971	80423
1800F 0 500F 1+1HR (0 21C)	F	1 00	R T	L-S	195 0	3 5 PCT NACL	1 000	1 000	CANT	----	87 00	52 00			----	1971	80423
1800F 0 600F 1HR (0 20C)	F	1 00	R T	L-S	195 0	3 5 PCT NACL	1 000	1 000	CANT	----	98 00	72 00			----	1971	80423
1800F 0 650F 1HR (0 24C)	F	1 00	R T	L-S	195 0	3 5 PCT NACL	1 000	1 000	CANT	----	92 00	62 00			----	1971	80423
1800F 0 650F 1+1HR (0 28C)	F	1 00	R T	L-S	195 0	3 5 PCT NACL	1 000	1 000	CANT	----	87 00	35 00			----	1971	80423
1800F 0 700F 1HR (0 21C)	F	1 00	R T	L-S	195 0	3 5 PCT NACL	1 000	1 000	CANT	----	85 00	42 00			----	1971	80423
1800F 0 780F 1+1HR (0 33C)	F	1 00	R T	L-S	195 0	3 5 PCT NACL	1 000	1 000	CANT	----	87 00	32 00			----	1971	80423

TABLE 6.35.3.1 (Con't)

ALLOY STEEL 4340(MOD) K(ISCC)

CONDITION	--PRODUCT-- FORM	THICK (IN)	TEST TEMP (F)	SPEC OR	YIELD STR (KSI)	ENVIRONMENT	------SPECIMEN-------- WIDTH (IN) W	THICK (IN) B	DESIGN (*=SQ)	CRACK LENGTH (IN) A	K(Q) (KSI*SQRT IN)	K(ISCC) (KSI*SQRT IN)	MEAN	STAN DEV	TEST TIME (MIN)	DATE	REFER
1800F @ 800F 1HR (@ 46C)	F	1.00	R.T.	L-S	195.0	3.5 PCT NACL	1.000	1.000	CANT	----	78.00	20.00			----	1971	B0423
1800F @ 900F 1HR (@ 64C)	F	1.00	R.T.	L-S	195.0	3.5 PCT NACL	1.000	1.000	CANT	----	65.00	30.00			----	1971	B0423
1800F @ 925F 1+1HR (@ 53C)	F	1.00	R.T.	L-S	195.0	3.5 PCT NACL	1.000	1.000	CANT	----	87.00	42.00			----	1971	B0423

TABLE 6.36

REFERENCES FOR ALLOY STEEL DATA

60578 18Ni (300)MAR K_c

Christian, J. L., Yang, C. T., and Witzell, W. E., "Physical and Mechanical Properties of Pressure Vessel Materials for Application in a Cryogenic Environment", ASD-TDR-62-258, Part III, General Dynamics/Astronautics (December 1964).

63061
D6AC K_{Iscc}
18Ni(300)MAR K_{Iscc}
4140 K_{Iscc}
4340 K_{Iscc}

Mulherin, J. H., and Hess, E. H., "Stress-Corrosion Susceptibility of Ultrahigh Strength Steel Evaluated in Terms of Fracture Toughness", Technical Report R-1782, Frankford Arsenal, Philadelphia, PA, (November 1965).

65166
12Ni-5Cr-3Mo K_{Iscc}
18Ni (180)MAR K_{Iscc}
18Ni (250)MAR K_{Iscc}

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69162 18Ni(200)MAR K_{Iscc}

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12Ni-5Cr-3Mo K_{Iscc}
18Ni (200)MAR K_{Iscc}
18Ni (250)MAR da/dt
4340 da/dt, K_{Iscc}

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D6AC K_{Iscc}
HP9-4-.45 K_{Iscc}
H11 K_{Iscc}
18Ni (250)MAR K_{Iscc}
4340 K_{Iscc}

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300M (VAR) K_{Ic}
4340 (AM) K_{Ic}
4340 (DH) K_{Ic}

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300M K_{Iscc}

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4340 K_{Iscc}, da/dt
4340(MOD) K_{Iscc}

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18Ni (350)MAR da/dt

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18Ni (200) MAR K_{Ic}

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4340V da/dt

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300M(VM) K_{Ic}

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300M da/dt

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78425 18Ni (300) MAR K_{Iscc}, da/dN

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4340 K_{Iscc}

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4340 (MOD) K_{Iscc}

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18Ni (200) MAR K_{Iscc}

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18Ni (250) MAR K_{Iscc}

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83613
HP 9-4-.20 K_{Iscc}
12Ni-5Cr-3Mo K_{Iscc}
18Ni (180)MAR K_{Iscc}
18Ni (200)MAR K_{Iscc}
18Ni (250)MAR K_{Iscc}

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18Ni (200) MAR K_{Ic}
18Ni (250) MAR K_{Ic}

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84029
D6AC K_{Ic}
HP 9-4-.30 K_{Ic}
300M K_{Ic}
4330V (MOD) K_{Ic}
4340 K_{Ic}

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84277
D6AC K_{Ic}
4330V (MOD) K_{Ic}
4340 K_{Ic}

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300M K_{Ic}
4340 (DH) K_{Ic}

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4340 da/dt

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4340 da/dt

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H11 K_{Iscc}
18Ni (250) MAR K_{Iscc}
18Ni (350) MAR K_{Iscc}
300M K_{Iscc}
4330V K_{Iscc}

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84356 18Ni (300) MAR K_{Iscc}
4340 K_{Iscc}

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300M K_{Ic}

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85837 HP 9-4-.20 da/dN
HP 9-4-.30 da/dN

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85857 HP 9-4-.20 K_{Ic}

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85879 HP 9-4-.20 K_{Ic}

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	4140	K_{Ic}
	4330V (MOD)	K_{Ic}
	4340	K_{Ic}

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	HP 9-4-.30	K_{Ic}, da/dN
	300M	K_{Ic}

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88579	HP 9-4-.20	da/dN
	HP 9-4-.30	da/dN

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90011	HP 9-4-.20	K_{Ic}
	HP 9-4-.30	K_{Ic}

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90012 HP 9-4-.20 K_{Ic}

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91838 18Ni (300) MAR da/dN

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BW001 4340 da/dN

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BW002 4340 da/dN

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DA001 H11 da/dN
HY-180 da/dN
12-9-2 MAR K_{Ic}, da/dN
4340 K_{Ic}, da/dN

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MA004 AF1410 da/dN

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TABLE 6.36 (Cont)

MA005 HP 9-4-.20 K_{Ic}, K_{Iscc}, da/dN
HP 9-4-.30 K_{Ic}, K_{Iscc}, da/dN
300M K_{Ic}, K_{Iscc}, da/dN

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MA007 HP 9-4-.30 da/dN
300M da/dN

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MA010 HP 9-4-.30 da/dN
300M da/dN

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MA011 4330V (MOD) K_{Ic}, da/dN

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4340 K_{Ic}

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NC001 HP 9-4-.20 K_{Ic}

Plane Strain Fracture Toughness Data Sets on Aluminum, Steel and Titanium Alloys, Data sent from P. G. Porter of Northrop Corporation, March 1, 1982.

TABLE 6.36 (Cont)

NC002 HP 9-4-.20 (CEVM) da/dN

Fatigue Crack Growth Rate Data on Aluminum, Steel and Titanium Alloy. Data sent from P. G. Porter of Northrop Corporation, March 1, 1982.

RI001 AF 1410 (VIM-VAR) K_{Ic}, da/dN

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RI006 HP 9-4-.20 K_{Iscc}
300M K_{Iscc}, da/dN

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