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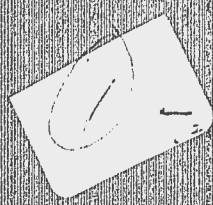
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WATERTOWN ARSENAL LABORATORY



EXPERIMENTAL REPORT

NO. WAL 640/123

WELDING OF ARMOR

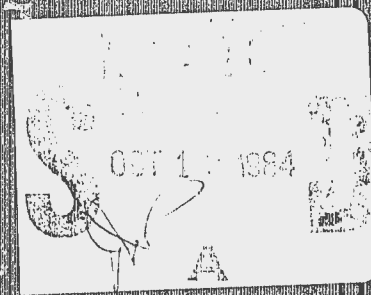
Summary of Ballistic Test Results of
Homogeneous Armor Plate Welded with Ferritic Electrodes
and Tested at Aberdeen Proving Ground during the
Period of 25 January 1943 through 25 February 1944

By

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DATE 15 July 1944

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Watertown Arsenal Laboratory
Report No. WAL 640/123
Problem No. D-3.3

15 July 1944

WELDING OF ARMOR

Summary of Ballistic Test Results of Homogeneous
Armor "H" Plates Welded with Ferritic Electrodes and Tested at
Aberdeen Proving Ground During the Period of
25 February 1943 through 25 February 1944

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OBJECT

To tabulate firing record data for subject plates and to present
a brief summary of shock test results.

SUMMARY

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1. Data from 125 Aberdeen Proving Ground firing records have been tabulated on attached charts.
2. The manganese-molybdenum ferritic electrode with stainless type coating, which appeared to have interesting possibilities in earlier ferritic tests (Report No. WAL 640/73, 26 April 1943) has been further improved and plates welded with one brand of this electrode consistently exceeded ballistic requirements for equivalent H plates welded with austenitic electrodes. Some very favorable results were obtained for plates welded with a second brand on 1/2 inch thick armor H plates.
3. The necessity for special precaution in use of all ferritic electrodes, including a preheat of 200° to 300° F. for welding of heavier gage (1-1/2 inch thick) plate, and the failure of several brands of electrodes of the same nominal alloy and coating type to give consistently good results, are evident reasons which prevent extensive utilization of this type of electrode for welding of armor.
4. The practice of grinding the weld reinforcement flush with the plate appears to have more beneficial effect on ballistic performance than any other variable.
5. Preheat (within the range used to prevent weld cracking) and armor composition do not materially affect ballistic performance for plates welded with the best ferritic electrode. Advantages are apparent for liberal root gap and for use of combination of beads and weaves in body of weld and annealing bead technique at crown.
6. Ballistic performance of one plate welded with the best ferritic electrode and given a full armor heat treatment after welding

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was excellent. Three plates, welded with other electrodes and given full heat treatment after welding and one plate stress relieved after welding, were borderline or inferior in ballistic performance.

7. Five of six plates (three 1/2 inch thick and three 1-1/2 inch thick H plates - weld reinforcement removed) ballistically tested at subnormal (-32° to -10° F.) temperature had excellent ballistic shock properties. One of the 1/2 inch plates failed by excessive plate cracking on the first impact.

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INTRODUCTION

On the accompanying charts (Appendix A) are tabulated data taken from 125 firing records representing development tests of H plates welded with ferritic electrodes. The tabulation includes all firing records received by this arsenal for H plates welded with ferritic electrodes and tested at Aberdeen Proving Ground during the period of 25 February 1943 through 25 February 1944. An earlier report* summarized results on H plates welded with ferritic electrodes and tested at Aberdeen Proving Ground prior to 25 February 1943.

An index to Fabricators, Armor Manufacturers and Electrode Manufacturers is given in Table I. A summary of current ballistic shock test specification requirements for H plates welded with austenitic electrodes and a key to the tabulation method and symbols is included in Appendix A.

GENERAL COMMENTS

Conclusions of the previous report based on data from 107 Aberdeen Proving Ground firing records for H plates welded with ferritic electrodes and fired at Aberdeen Proving Ground prior to 25 February 1943 were:

a. Twenty-one of the 107 plates (1 and 1-1/2 inch thick homogeneous armor) had sufficient resistance to have passed the ballistic shock test** for equivalent H plates welded with austenitic electrodes. Of the twenty-one, fourteen were subjected to some form of stress relieving treatment; four were made from armor with carbon content below the usual commercial limits. The other three were welded with special alloy ferritic electrodes coated with a stainless type coating.

b. It is indicated that ferritic welding may be developed for use on certain subassemblies for which a practical method of stress relieving would be acceptable.

c. A manganese-molybdenum ferritic electrode with stainless type coating appears to have interesting possibilities.

Since 25 February 1943, work on development of procedures for ferritic welding of armor carried out in connection with two projects under sponsorship of the National Defense Research Committee has been largely concerned with development of manganese-molybdenum ferritic

* Report No. WAL 640/73, "Welding of Armor - Summary of Ballistic Test Results on 1 and 1-1/2 Inch Homogeneous Armor H Plates Welded with Ferritic Electrodes and Tested at Aberdeen Proving Ground through February 25, 1943," dated 26 April 1943.

** As specified in AXS-497, Rev. 3 (See summary of ballistic shock test specifications, Appendix A).

electrodes with stainless type coatings and a majority of the plates included in the present report were welded under NDRC sponsorship and supervision. Two progress reports have been issued by NDRC on this work during the year.* These reports establish the possibilities and limitations of this type electrode as originally developed by Arcos (Manganend 2MS) and later somewhat improved by other electrode manufacturers in conjunction with the NDRC program.

A stainless type electrode coating on ferritic electrodes makes possible their use without development of underbead cracks when armor type steel compositions are welded without preheat.** The problem is then reduced to depositing sound ferritic weld metal of reasonably high impact resistance without developing weld metal cracks during or after deposition.

The Mn-Mo electrodes with stainless type coating used in most of the NDRC work appear to fulfill these requirements when: (1) special precautions (including heating of electrodes prior to welding) are taken to prevent excessive porosity of weld metal; (2) a preheat of 200° - 300° F. is used in welding of plate of greater than 1 inch thickness to prevent cracking of weld metal during or soon after deposition.

The necessity for observing the above precautions, together with difficulties in preparation of an adequate electrode specification which would insure consistent weld metal physical properties and electrode operating characteristics for the various ferritic electrodes, has prevented any extensive utilization of ferritic electrodes of this type for welding of armor in spite of the very satisfactory ballistic shock performance observed in many H plate tests.

The development of ferritic electrodes for use on certain sub-assemblies for which a practical method of stress relieving would be acceptable has not been carried forward to any great extent either in conjunction with the NDRC programs or by industrial fabricators.

Plates Tested at Normal Temperatures

Comparison of Various Electrode Brands

Table II shows a comparison of all electrode brands used in welding the subject plates on the basis of average ballistic cracking for all fair rounds at each velocity range. It is apparent that the

* NDRC Report dated 16 August 1943, OSRD 1744, Serial M-97, Armor Welding Electrodes - Part I, Development of Ferritic Electrodes for Welding of Armor Plate (E.C. Chapman & R.E. Lorentz, Jr. - Combustion Engineering Co.) - Part II, Additional Tests of Ferritic Armor Welding Electrodes (G.S. Mikhalapov & J.H. Humberstone - War Metallurgy Committee)

NDRC Report dated 30 December 1943, OSRD 3857, Serial M-185, Welding of Experimental H Plates with Manganese-Molybdenum Electrodes (G.S. Mikhalapov, C.H. Jennings, & J.H. Humberstone - War Metallurgy Comm.)

** See W.A. Report No. 642/115, "Arc Welding of Alloy Steels - Study of Base Metal Cracks Associated with Effects of Arc Welding Process," dated 12 June 1943, for discussion of this phenomenon.

Harnischfeger AW2C electrode was the only electrode which gave consistently satisfactory ballistic performance. The latest of the several modifications of the Combustion Engineering electrode showed up very well in tests on 1/2 inch thick hand welded plates. Average cracking figures for Unionmelt welded plates of 3/4 and 1/2 inch thicknesses were low but the consistency of performance among individual plates was poor. The practice of grinding reinforcement flush with plate surface greatly improved ballistic performance by removing notch and stress concentration area at weld metal-plate junction but is not representative of production weldments. Plates which firing record data indicated were tested without reinforcement are tabulated separately in Table I, but it is believed that this information was omitted in firing records of several plates listed as tested with reinforcement in place.

Because of the large variation in ballistic performance among various electrodes and since 1/2 inch and 1-1/2 inch thick plates welded with Harnischfeger electrodes are the only groups for which a sufficient number of plates were tested to provide a comparison of the effects of other variables, all subsequent tables will include only these two plate groups.

Armor and Preheat Temperature (Table III)

It is indicated that preheating of 1-1/2 inch thick plate within the temperature range (200° - 300° F.) necessary to prevent cracking during welding has no large effect on ballistic performance. Nor were any definite influences of armor variables reflected in ballistic performance at ballistic testing levels equivalent to those specified for H plates welded with austenitic electrodes.

Joint Design (Tables IVa and IVb)

Best ballistic performance was obtained for 1-1/2 inch thick plates with 60° DV bevel and reinforcement removed, but several plates with 30° DV bevel tested with reinforcement in place met requirements for 1-1/2 inch thick plates with austenitic electrodes. For 1/2 inch thick plates tested with reinforcement in place, an increase of included angle resulted in an improvement in ballistic performance.

Root gap of less than 5/32 inch appears undesirable for 1/2 inch thick plates, but for either 1-1/2 or 1/2 inch thick plates increase of root gap from 3/16 to 3/8 inch has no noticeable effect.

Welding Procedure (Table V)

Total number of passes used for welding 1-1/2 inch plate varied from 16 to 21 and for 1/2 inch plate, from 4 to 12. No significant effect of this variable was observed within these ranges.

Multiple overlapping beads were used for body of all welds in 1-1/2 inch thick plate and annealing bead technique was used for all

crowns. These procedures have been shown to be most favorable in summary reports for 1-1/2 inch thick plates welded with austenitic electrodes. The use of a combination of layers and beads appears better than either a straight weave or stringer bead technique for body of weld in 1/2 inch thick plates. The use of a multiple pass crown in which the last bead does not touch the base metal also appears best for 1/2 inch thick plates.

Radiographic Inspection (Table VI)

There is no correlation between results of radiographic inspection and ballistic performance for these two groups of plates.

Postheat Treatment

Four plates were quenched and drawn (full armor heat treatment) after welding. Very excellent ballistic performance was obtained for one plate welded with Harnischfeger AW2C electrode. The other three plates were welded respectively with A. O. Smith SW 101, Arcos 2MS, and a Metal and Thermit electrode; the first two were borderline, the third failed ballistic shock test. Ballistic performance of one plate stress relieved for 3 hours at 1150° F. after welding was very poor.

Plates Tested at Subnormal Temperatures

Charts 59 and 60 (Appendix A) give results of ballistic testing of six plates welded with ferritic electrodes and tested at temperatures ranging between -32° and -10° F. Weld reinforcements of all six plates were ground flush with plate surface before testing. Three 1-1/2 inch thick plates, welded with Harnischfeger AW2C electrode and Jones and Laughlin armor at 200° F. preheat withstood without excessive ballistic cracking ballistic impacts equal to and as much as 200 ft./sec. in excess of velocities specified for equivalent austenitic welded H plates. Three 1/2 inch thick plates welded with Combustion Engineering electrode, without preheat, and with Great Lakes, Jones and Laughlin, and Carnegie-Illinois armor compositions were tested. The Great Lakes plate failed by severe armor cracking on the first round. The other two plates withstood impacts equal to and as much as 100 ft./sec. in excess of velocities specified for equivalent austenitic welded H plates.

TABLE I

Index to Plates

Chart No.	No. of Plates	Fabricator	Armor Mfr.	Electrode Mfr.
<u>1-1/2 inch Hand Welded Plates</u>				
1 - 2	6	Baldwin Locomotive	Carnegie-Illinois Disston & Sons Jones & Laughlin	Arcos Corp. Harnischfeger R. G. LeTourneau
3 - 4	3	Fisher Tank	Jones & Laughlin Republic Steel	Harnischfeger
5	1	General Electric	Carnegie-Illinois	A. O. Smith
6 - 8	7	Harnischfeger	Carnegie-Illinois Great Lakes Jones & Laughlin	Harnischfeger
9 - 12	6	International Harvester	Disston & Sons Great Lakes Jones & Laughlin	Combustion Eng. Harnischfeger Metal & Thermit
13	1	Midland Steel	Carnegie-Illinois	Harnischfeger
14	3	Standard Steel Spring	Jones & Laughlin	A. O. Smith Arcos Corp. Metal & Thermit
15	1	Sun Oil Co.	Great Lakes	Champion Rivet
<u>1-1/2 inch Unionmelt Welded Plates</u>				
16	1	Midland Steel	Carnegie-Illinois	Linde Air Products
<u>1 inch Hand Welded Plates</u>				
17	1	Buick Motor Div.	Republic Steel	Harnischfeger
18 - 19	4	Cadillac Motor	Jones & Laughlin Youngstown	Harnischfeger
<u>3/4 inch Hand Welded Plates</u>				
20	2	Fisher Tank	Jones & Laughlin	Harnischfeger
<u>3/4 Inch Unionmelt Welded Plates</u>				
21 - 22	5	Fisher Tank	Great Lakes Jones & Laughlin Republic Steel	Harnischfeger Linde Air Products
<u>1/2 inch Hand Welded Plates</u>				
23	1	American Locomotive	Youngstown	Harnischfeger
24	1	Buick Motor Div.	Republic Steel	Harnischfeger
25 - 32	17	Combustion Engineering	Carnegie-Illinois Great Lakes Jones & Laughlin	Combustion Eng.

TABLE I (Cont.)

Chart No.	No. of Plates	Fabricator	Armor Mfgr.	Electrode Mfgr.
33 - 46	36	Fisher Tank	Carnegie-Illinois Great Lakes Jones & Laughlin Standard Steel Spr.	Harnischfeger McKay Metal & Thermit Reid Avery
47	1	Yellow Truck & Coach	Jones & Laughlin	Harnischfeger
<u>1/2 inch Unionmelt Welded Plates</u>				
48	1	American Car & Fdry.	Jones & Laughlin	Linde Air Products
49	3	Fisher Tank	Jones & Laughlin	Linde Air Products
50 - 51	6	General Motors	Great Lakes Jones & Laughlin Youngstown	Linde Air Products
52 - 53	4	International Harvester	Dominion Fdry. & Steel	Linde Air Products
54 - 55	5	Union Carbide & Carbon Res. Lab.	Great Lakes	Linde Air Products
<u>3/8 inch Hand Welded Plates</u>				
56	1	Buick Motor Div.	Republic Steel	Harnischfeger
<u>1/4 inch Hand Welded Plates</u>				
57	1	Buick Motor Div.	Republic Steel	Harnischfeger
58	1	Fisher Tank	Jones & Laughlin	Harnischfeger
<u>Plates Tested at Subnormal Temperature</u>				
<u>1-1/2 inch Hand Welded Plates</u>				
59	3	International Harvester	Jones & Laughlin	Harnischfeger
<u>1/2 inch Hand Welded Plates</u>				
60	3	Combustion Eng.	Great Lakes Jones & Laughlin Carnegie-Illinois	Combustion Eng.

TABLE II (Cont.)

Electrode Mfr. & Type	Reinforcement in Place		Reinforcement Removed	
	Velocity	No. Fair Rounds	Av. Cracking per Weld	Av. Cracking per Round Plate
Harnischfeger - AW2C	700 - 750	11	4.64	1.39
	751 - 800	4	21.1	4.0
Harnischfeger - AW2C	below 775 775 - 825	<u>1 inch Hand Welded Plates</u>		
		<u>75 mm. T21 Projectile</u>		
Linde Air - Oxweld #36 and Harnischfeger - AW2C	775 - 825	<u>3/4 inch Hand Welded Plates</u>		
		<u>57 mm. T1 Projectile</u>		
Linde Air - Oxweld #36 and Harnischfeger - AW2C	775 - 825	<u>3/4 inch Unionmelt Welded Plates</u>		
		<u>37 mm. H.E. M54 Projectile</u>		
Combustion Engineering	below 2500	2	3.8	0
	2500 - 2550	12	16.1	.41
Harnischfeger - AW2C	2551 - 2600	3	14.0	9.8
	2601 - 2700	11	6.5	2.7
McKey - Fluralloy	2701 - 2800			1.5
	below 2500			.50
Metal & Thermit	2500 - 2550	33	8.4	0
	2551 - 2600	3	3.8	4.3
Metal & Thermit	2601 - 2650	1	11.5	5.5
	2500 - 2550	4	14.0	8.0
Metal & Thermit	2500 - 2550	3	4.8	1.2
	2551 - 2600	1	12.0	0

TABLE II (Cont.)

<u>Reinforcement in Place</u>			<u>Reinforcement Removed</u>		
<u>Electrode Mfr. & Type</u>	<u>Velocity</u>	<u>No. Fair Rounds</u>	<u>Avg. Cracking per Round Weld</u>	<u>No. Fair Rounds</u>	<u>Avg. Cracking per Round Weld</u>
Reid Avery	2500 - 2550	3	20.0		6.3
<u>1/2 inch Hand Welded Plates (Cont.)</u>					
<u>1/2 inch Unionmelt Welded Plates</u>					
Linde Air - Oxweld #36	2500 - 2550	12	8.1	10	4.7
	2551 - 2600	5	7.9	2	7.1
	2601 - 2650			1	20.7
Linde Air - Oxweld #40	2500 - 2550	11	4.8	5	7.2
	2551 - 2600				3.8
<u>3/8 inch Hand Welded Plates</u>					
Harnischfeger - AW2C	below 2000	1	10.0		0
	2000 - 2050	2	17.8		2.3
<u>1/4 inch Hand Welded Plates</u>					
Harnischfeger - AW2C	1500 - 1600	5	9.5		5.8

TABLE III

Armor Data for Plates Welded with Harnischfeger Electrode

Armor Mfr.	Reinforcement in Place		Reinforcement Removed		
	Preheat ° F.	No. Fair Rounds	No. Fair Rounds	Av. Cracking per Round	
Velocity	Av. Cracking per Round	Plate	Weld	Plate	
<u>1-1/2 inch Rolled Plates</u>					
<u>75 mm. T21 Projectile</u>					
Carnegie I	below	1175	0	0	
	1175 - 1225		3.5	0	
	1226 - 1275		0	0	
	1276 - 1325		7.3	1.3	
	1326 - 1375		11.8	6.9	
	1376 - 1425		33.5	0	
	1426 - 1511		0	0	
	1512 - 1584		0	0	
Disston I	below	1175	0	0	0
	1175 - 1225		0	0	0
	1226 - 1275		12.5	.25	0
	1276 - 1325				
	1326 - 1375				
	1376 - 1425				0
	1426 - 1511				3.3
	1512 - 1584				.75
Great Lakes IV	below	1175	0	0	0
	1175 - 1225		0	0	1.5
	1226 - 1275		0	0	0
	1276 - 1325		8.0	1.9	0
	1326 - 1375		4.5	10.0	0
	1376 - 1425		.33	8.1	8.0
	1426 - 1511		.96	0	0
	1512 - 1584		3.4	0	0
Jones & Laughlin III	below	1175	.20	0	0
	1175 - 1225		.14	0	0
	1226 - 1275		0	0	0
	1276 - 1325		.75	4.13	0
	1326 - 1375		7.9		0
	1376 - 1425				
	1426 - 1511				
	1512 - 1584				

* = 200° F. Preheat in "Reinforcement Removed" group.

TABLE III (Cont.)

Armor Mfr.	Velocity	Reinforcement in Place		1-1/2 inch Rolled Plates (Cont.)		Reinforcement Removed		
		Preheat ° F.	No. Fair Rounds	Avg. Cracking per Round Weld	Plate	No. Fair Rounds	Avg. Cracking per Round Weld	Plate
Jones & Laughlin III (Cont.)	1376 - 1425	200	6	9.0	4.3	1	5.3	0
	1426 - 1511		4	4.0	3.0			
	1512 - 1584		2	5.7	17.2			
Republic I	below 1175	200	2	3.0	1.3			
	1175 - 1225		1	16.8	6.5			
<u>1/2 inch Rolled Plates</u>								
<u>37 mm. H.E. M54 Projectile</u>								
Carnegie-Illinois I	2500 - 2550	None	9	7.3	.72			
Great Lakes V	2500 - 2550	"	9	5.5	3.3	7	4.9	.71
	2551 - 2600					1	8.0	0
	2601 - 2650					1	8.0	1.5
Jones & Laughlin III	below 2500	"				1	0	0
	2500 - 2550		13	7.7	1.0	29	4.2	.1
	2551 - 2600		2	5.7	.50	5	6.3	.50
Republic I	2601 - 2650		1	11.5	4.5			
	2500 - 2550	"	2	12.4	6.3			
Youngstown III	2500 - 2550	"	2	22.3	1.5			

TABLE IVa

Joint Design Data for Plates Welded with Harnischfeger Electrode

Angle of Bevel	Reinforcement in Place			Reinforcement Removed		
	Velocity	No. Fair Rounds	Average Cracking per Round Weld	No. Fair Rounds	Average Cracking per Round Weld	Reinforcement Removed
30° DW	below 1175	4	0	0	0	0
	1175 - 1225	1	0	0	0	0
	1226 - 1275	1	1.25	0	0	0
	1276 - 1325	1	13.0	0	0	0
	1326 - 1375	1	1.6	1.1	0	0
	below 1175	4	6.7	2.5	0	0
	1175 - 1225	3	4.8	0	0	0
	1226 - 1275	1	2.3	2.3	0	0
	1276 - 1325	2	13.3	8.13	0	0
	1326 - 1375	2	7.2	6.8	0	0
45° DW	below 1175	8	0	0	0	0
	1175 - 1225	7	0.96	0	0	0
	1226 - 1275	5	2.5	0	0	0
	1276 - 1325	8	5.9	0.31	0	0
	1326 - 1375	4	6.7	0.68	0	0
	1376 - 1425	7	0.80	4.9	0	0
	1426 - 1510	2	7.5	1.3	0	0
	1511 - 1584	2	16.8	11.9	0	0
	below 1175	8	0	0	0	0
	1175 - 1225	7	0.96	0	0	0
60° DW	below 1175	8	0	0	0	0
	1175 - 1225	7	0.96	0	0	0
	1226 - 1275	5	2.5	0	0	0
	1276 - 1325	8	5.9	0.31	0	0
	1326 - 1375	4	6.7	0.68	0	0
	1376 - 1425	7	0.80	4.9	0	0
	1426 - 1510	2	7.5	1.3	0	0
	1511 - 1584	2	16.8	11.9	0	0
	below 1175	8	0	0	0	0
	1175 - 1225	7	0.96	0	0	0
45° SW	below 2500	6	15.54	2.5	0	0
	2500 - 2550	3	3.8	0.33	0	0
	2551 - 2600	1	11.5	4.5	0	0
	2601 - 2650	1	11.5	4.5	0	0
	below 2500	6	15.54	2.5	0	0
	2500 - 2550	3	3.8	0.33	0	0
	2551 - 2600	1	11.5	4.5	0	0
	2601 - 2650	1	11.5	4.5	0	0
	below 2500	6	15.54	2.5	0	0
	2500 - 2550	3	3.8	0.33	0	0

1-1/2 inch Rolled Plates
75 mm. T21 Projectile

1/2 inch Rolled Plates
37 mm. H.E. M54 Projectile

TABLE IVa (Cont.)

Angle of Bevel	Reinforcement in Place		1/2 inch Rolled Plates (Cont.)		Reinforcement Removed		
	Velocity	No. Fair Rounds	Av. Cracking per Weld	Round Plate	No. Fair Rounds	Av. Cracking per Weld	Round Plate
45° DW	2500 - 2550	6	7.1	1.08	2	4.3	0
60° SV	2500 - 2550	10	7.6	1.25			
90° SV	2500 - 2550	12	6.0	2.5			

TABLE IV b

Joint Design Data for Plates Welded with Harnischfeger Electrode

Root Gap (in.)	Velocity	Reinforcement in Place		Av. Cracking per Round Weld	1-1/2 inch Rolled Plates		No. Fair Rounds	Reinforcement Removed		
		No. Fair Rounds	Weld		No. Fair Rounds	Av. Cracking per Round Weld				
5/32	below	1175	2	0	0	1	1	0	0	
	1175 - 1225	1225	2	.25	0	2	2	1.8	.75	
	1226 - 1275	1275	1	1.0	0	3	3	1.1	0	
	1276 - 1325	1325	3	2.2	0	2	1	10.0	0	
	1326 - 1375	1375	2	5.9	0	2	2	0	8.0	
	1376 - 1425	1425	2	4.6	6.8	1	1	3.3	0	
	1426 - 1511	1511	1	9.8	2.0	1	1	.75	2.5	
	1512 - 1584	1584	1	0	23.8	1	1	0	0	
	3/16	below	1175	10	.64	.45	1	1	0	0
		1175 - 1225	1225	8	3.3	.94	2	2	1.0	0
		1226 - 1275	1275	5	3.2	0	3	3	3.7	0
		1276 - 1325	1325	7	6.4	1.0	2	2	10.8	0
		1326 - 1375	1375	2	7.5	1.4	2	2	0	0
		1376 - 1425	1425	7	10.4	5.3	2	2	0	0
1426 - 1511		1511	4	6.7	5.2	2	2	0	0	
1512 - 1584		1584	1	33.5	0	2	2	0	0	
3/8		below	1175	4	.69	0	4	4	0	0
		1175 - 1225	1225	1	0	0	1	1	0	0
	1226 - 1275	1275	1	1.3	0	1	1	0	0	
	1276 - 1325	1325	1	13.0	0	1	1	0	0	
None	2500 - 2550	2550	9	8.2	3.3	2	2	9.8	0	
	2500 - 2550	2550	10	6.9	.65	10	10	0	0	
	2500 - 2550	2550	10	8.6	2.5	10	10	0	0	

1/2 inch Rolled Plates
37 mm. H.E. M54 Projectile

TABLE V

Welding Procedure Data for Plates Welded with Harnischfeger Electrode

Body Deposition Type	Velocity	Reinforcement in Place			Reinforcement Removed		
		No. Fair Rounds	Avg. Cracking per Round Weld	Cracking per Round Plate	No. Fair Rounds	Avg. Cracking per Round Weld	Cracking per Round Plate
<u>1/2 inch Rolled Plates</u>							
<u>37 mm. H.E. M54 Projectile</u>							
I	2500 - 2550	26	8.7	2.2	19	4.2	.10
	2551 - 2600	3	3.8	.33	5	8.0	.50
	2601 - 2650	1	11.5	4.5	1	8.0	1.5
II	2500 - 2550				3	7.1	0
	2551 - 2600						
	2601 - 2650						
III	below 2500				1	0	0
	2500 - 2550	8	7.2	.81	14	4.0	1.1
	2551 - 2600				1	0	0
	2601 - 2650						
<u>1/2 inch Rolled Plates</u>							
<u>37 mm. H.E. M54 Projectile</u>							
I	below 2500				12	3.9	.14
	2500 - 2550	20	8.2	2.7	3	8.0	0
	2551 - 2600				1	8.0	1.5
II	below 2500				5	6.2	0
	2500 - 2550						
	2551 - 2600						
III	below 2500	14	8.7	.67	1	0	0
	2500 - 2550	3	3.8	.33	19	4.2	.78
	2551 - 2600	1	11.5	4.5	3	5.2	.83
	2601 - 2650						

TABLE VI

Radiographic Data for Plates Welded with Harnischfeger Electrode

Radiographic Results	Velocities	Reinforcement in Place		Reinforcement Removed	
		No. Fair Rounds	Avg. Cracking per Weld	No. Fair Rounds	Avg. Cracking per Round Plate
Passed	below 1175	15	.57	2	0
	1175 - 1225	10	2.5	2	1.8
	1226 - 1275	6	2.8	1	0
	1276 - 1325	10	5.2	5	2.3
	1326 - 1375	5	8.0	1	10.0
	1376 - 1425	8	9.1	3	1.8
	1426 - 1510	4	6.2	1	3.3
	1511 - 1584	2	16.8	1	.75
	below 1175	1	.50		
	1175 - 1225	1	2.0		
	1226 - 1275	1	1.0	1	2.0
1276 - 1325	1	1.0	1	2.8	
1326 - 1375	1	9.0	1	16.3	
1376 - 1425	1	10.0			
1426 - 1510	1	11.8			
1511 - 1584	1	10.8			
Passed	below 2500	32	8.0	1	0
	2500 - 2550	3	3.8	18	6.1
	2551 - 2600	1	11.5	4	7.9
	2601 - 2650	2	14.3	18	2.5
Failed	below 2500			2	4.0
	2500 - 2550			1	8.0
	2551 - 2600				
	2601 - 2650				
Passed	below 1175	15	.30	2	0
	1175 - 1225	10	.75	2	.75
	1226 - 1275	6	0	1	0
	1276 - 1325	10	.70	5	0
	1326 - 1375	5	.55	1	0
	1376 - 1425	8	5.1	3	5.3
	1426 - 1510	4	3.0	1	0
	1511 - 1584	2	11.8	1	2.5
	below 1175	1	0		
	1175 - 1225	1	0		
	1226 - 1275	1	0	1	0
1276 - 1325	1	0	1	0	
1326 - 1375	1	10.0	1	0	
1376 - 1425	1	10.8			
1426 - 1510	1	10.8			
1511 - 1584	1	10.8			
Passed	below 2500	32	1.8	1	0
	2500 - 2550	3	.33	18	.34
	2551 - 2600	1	4.5	4	.62
	2601 - 2650	2	3.3	18	.55
Failed	below 2500			2	0
	2500 - 2550			1	1.5
	2551 - 2600				
	2601 - 2650				

APPENDIX A

1. Key to tabulation method and symbols.
2. Specification requirements for H plates welded with austenitic electrodes.
3. Tabulation of firing record data for H plates welded with ferritic electrodes.

KEY TO TABULATION METHOD AND SYMBOLS

1. Identification of Test

Information in the first column identifies the test.

2. Armor Data

A. Plate Thickness

Subject plates vary in thickness from 1/4 inch to 1-1/2 inches.

B. Type Armor

Armor compositions are typed as follows:

R (Rolled)

		<u>Typical Analyses</u>						
	<u>Type</u>	<u>C</u>	<u>Mn</u>	<u>Si</u>	<u>Cr</u>	<u>Mo</u>	<u>Ni</u>	<u>Zr</u>
I	Mn-Ni-Cr-Mo	.26	1.15	.20	.60	.20	1.00	B added .002
II	Mn-Cr-Mo	.27	1.30	.25	.55	.42		
III	Mn-Mo	.25	1.60	.22	---	.37		B added .002
IV	Mn-Cr-Mo-Si	.27	.86	.79	.62	.17		.09
V	Special	(Special compositions to be noted in tabulation.)						

C. Carbon Content

Carbon content is listed as given.

D. Brinell Hardness Number (BHN)

The Brinell hardness numbers on both the front and back of plate are tabulated.

E. Process

This refers to the melting practice and is given as basic open hearth (B.O.H.), acid open hearth (A.O.H.), basic electric (B. Elec.) and acid electric (A. Elec.).

F. Heat Treatment

The temperature, time of hold, and type of quench and draw are recorded as given in the firing record.

3. Electrode Data

These data are listed as given in each firing record.

A. Type

Ferritic (F) was the only type used in welding the plates included in this tabulation.

B. and C. Trade Name and Coating

Trade names and type coating are listed.

D. Current and Polarity

These are to be tabulated as DC straight (str.), DC reversed (rev.), or AC.

4. Joint Design

A. Groove, etc.

This item notes the type of groove - single vee (SV) bevel or double vee (DV) bevel - the included angle, and the width of the root face (RF).

B. Root Gap

This is the distance in inches between the plates as set up for welding.

C. Plate Preparation

This indicates whether the plate edges to be welded together were flame cut, ground, machined, buttered, etc.

5. Welding Procedure

A. Backing

Backing if used, i.e. back-up bar, chill, filler, and spacer strips, is noted.

B. Deposition

Figure 1 shows how the weld is broken up into root, body, and crown types. The size electrode is noted with the number of passes, type of passes, and the current and voltage. Passes are divided into two kinds: (a) layer, if the pass bridges the gap; and (b) bead, if the pass does not bridge the gap. SB designates seal bead.

C. Total Welding Time and Interpass Temperature

These are listed as given.

D. Remarks

Any comments on chipping, grinding, and other special techniques used, not noted above but which might affect ballistic properties of welded armor plate, are noted under "remarks."

6. Heat

Preheat and postheat of weldment are tabulated.

7. Ballistic Results

The type projectile used in testing is noted for each plate. Hits, velocity, and location of each, cracking and remarks on cracking, are recorded. Symbols used are as follows:

H. - hit
F/S - feet per second
L.L. - left leg
R.L. - right leg
CB. - crossbar
LOC. - location
R - right of
L - left of
X - on weld
U - above
D - below
IMP - running from or through impact
O - not running from or through impact.

Types of cracking:

I - Weld (includes weld, fusion zone, and heat-affected zone cracking within 1/8 inch from weld)
IV - Star plate cracking
V - Linear plate cracks.

Cracking is measured on the back of the plate.

8. The remarks on cracking and results of radiographic examination are recorded in the last column. P signifies the welded plate passed radiographic inspection, and F that it failed.

SPECIFICATION REQUIREMENTS FOR "H" PLATES

WELDED WITH AUSTENITIC ELECTRODES

Figure ii shows the construction and intended aiming points for the ballistic shock test plate.

As of 25 June 1943, the following requirements were in effect (as abstracted from Specification AXS-497, Rev. 5, 15 December 1943):

"F-3. Ballistic tests. Test plates required by paragraph F-2a(1)a shall be supported solidly on each of the two sides parallel to the longest welds and with these welds upright. The plate shall be tested for compliance with the requirements of Table II.

TABLE II

Thickness of shock test plate, inches	Type of homogeneous armor	Projectile	Striking velocity f/s, plus or minus 25 f/s	Allowable weld cracking, inches, maximum
1-1/2	rolled	75 mm. T21	1200	15
1-1/2	cast	"	1050	10
1	rolled	"	725	17
1	cast	57 mm. T1	975	6
3/4	rolled	"	800	12
1/2	rolled	37 mm. H.E. M54	2525	12
3/8	rolled	"	2025	15
1/4	rolled	"	1625	12

"F-3a. Cracks in the armor parallel to the weld and within 1/8 inch of the edge of the weld shall be considered in the total weld cracking.

"F-3b. All impact velocities specified for cast homogeneous armor are subject to variation depending on the actual armor thickness. This variation shall be based on the velocities specified for testing primary armor and results in velocity of 6 f/s for each increase of 0.01 inch in armor thickness.

"F-3c. Cracking of the plate outside a circle of 6 inches radius, the center of which is the center of impact, or plate cracks greater than 6 inches in length not passing through the point of impact shall be considered cause for reporting 'no test.' Other types of armor cracking which indicate that the test of the welding procedure is insufficient may also be cause for reporting 'no test.' The phrase 'no test' is defined as that condition existing when the results of the ballistic test are such that it is impossible to arrive at a decision as to the acceptability of the welding procedure.

"F-3d. The impact of the 75 mm. proof projectile T21 or the 57 mm. proof projectile T1 shall touch the edge of the weld to be considered as conforming to the requirements of the test.

"F-3e. The impact of the 37 mm. H.E. projectile M54 shall be within 1-3/4 inches of the weld as measured from the center of the impact to the center of the weld to be considered as conforming to the requirements of the test.

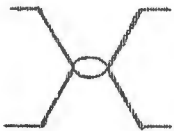
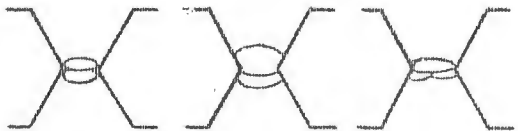
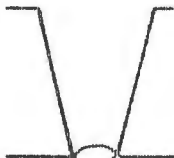

"F-3f. Impacts, the edges of which are more than 2 inches from the edge of the crossbar weld, which cause cracking in the crossbar either


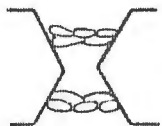

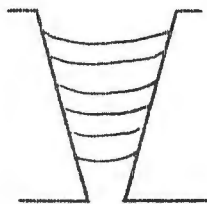
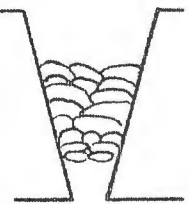
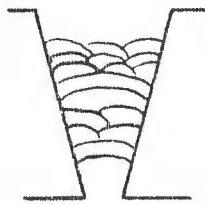
on the front or back of the plate, which is not an extension of cracking a leg weld, shall be cause for rejection of the welding procedure.

"F-3g. Any inconsistency in the quality of the welding procedure revealed by impact on a ballistic test plate may be considered cause for reporting 'no test' at the discretion of the proof officer.

"F-3h. Any length of weld cracking revealed as a result of an impact outside the acceptable limits for impacts shall be cause for rejection of the welding procedure.

"F-3i. Impacts less than 6 inches from the top or bottom edge of the plate, which cause excessive weld cracking, shall be considered as not conforming to the requirements of the test. If, however, the cracking is not excessive and the requirements referred to in paragraph F-3d are met, the impact will be considered acceptable."

Root types	Type I	Type II
Double V bevel	 <p>Single root bead at center of root</p>	 <p>More than one bead at root etc.</p>
Single V bevel	 <p>Single bead bridging root gap</p>	 <p>More than one bead bridging root gap etc.</p>

Body types	Type I	Type II	Type III	Type IV	Type V
Double V bevel	 <p>Layers only</p>	 <p>Beads only</p>	 <p>Layers & beads</p>	Unionmelt	Special
Single V bevel	 <p>Layers only</p>	 <p>Beads only</p>	 <p>Layers & beads</p>	Unionmelt	Special



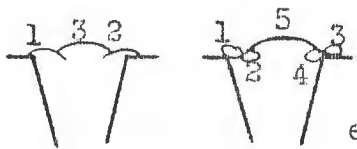
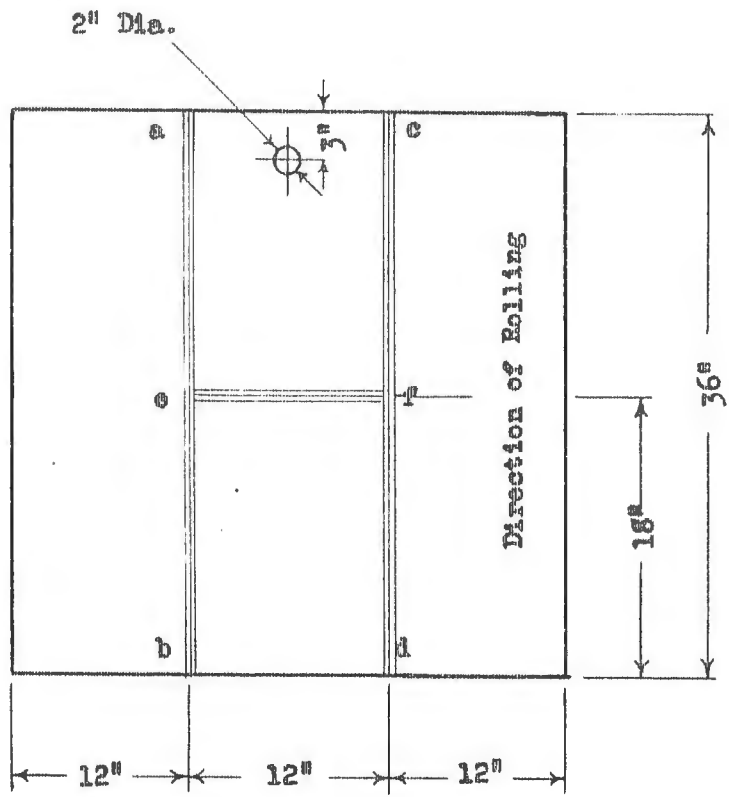
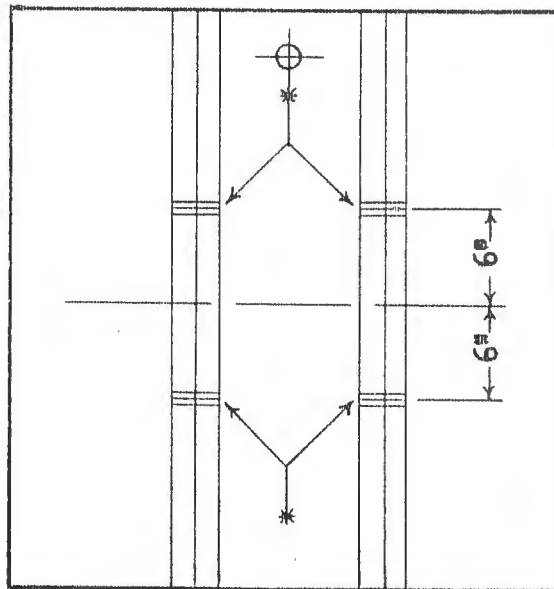
Crown types	Type I	Type II	Type III
Double V & Single V bevel	 <p>Single Crown Single pass bridges gap</p>	 <p>Multiple Crown Last bead touches parent metal</p>	 <p>Multiple Crown Last bead does not touch parent metal etc.</p>

Fig. 1 Weld Metal Deposition Types

Weld Sequence:
ab, cd, fe.



QUALIFICATION SHOCK TEST PLATE



* Intended Aiming Points

FIG. 11

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING PROCEDURE	HEAT	BALLISTIC RESULTS			REMARKS ON CRACKING
						VEL. F/S	LOCATION OF HIT	CRACKING	
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFG. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BHN E. PROCESS F. HEAT TREATMENT TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROW TYPE C. TOTAL WELDING TIME & ENTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	VEL. F/S	LOCATION OF HIT L.L. R.L. C.B.	CRACKING LOC. TYPE AMT	
A. AD 915 B. 10/4/43 C. 61 D. Carnegie-ill. Steel Corp. E. Arcos Corp. F. Baldwin Locomotive Works.	A. 1-1/2" B. R I .25% .0751 C. .0255 .016P D. 1-20Cr E. 3.21Ni F. .27Co D. Face 286 Back 293 E. O.F. F. not known	A. F .102C 1. 35Vn .33S1 .026S .036P .27Mo B. Manganend 2MS C. Stainless Type D. DC-REV	A. 60° DV B. 1/8" C. Flame cutting, grinding.	A. 1183 B. 1220 C. 582" D. 75mm Proof projectile T21	A. None B. None	1 2	1" L 5" D 582"	I 19% V 3" I 58" 582"	P Moderate slag and porosity.
A. A1202 B. 11/30/43 C. B&W 64 D. Jones & Laughlin E. Arcos Corp. F. Baldwin Locomotive Works.	A. 1-1/2" B. R III .16% .21S1 C. .0195 .024P D. .47% E. Face 280 Back 280 F. Elec. F. not known	A. F .09C 1. 45Vn .36S1 .028 .04P .60Mo B. Manganend 2MS C. Stainless Type D. DC-REV	A. 60° DV B. 1/8" C. Flame cutting, grinding.	A. 1212 B. 1192 C. 75mm Proof projectile T21	A. None B. None	1 2	1/4" L 5" L 75mm Proof projectile T21	I 15% V 1 I 16 V 21% 32-9/16"	F Weld cracks.
A. A 12345 B. 2/12/44 C. 65 D. Henry Disston & Sons E. Arcos Corp. F. Baldwin Locomotive Works.	A. 1-1/2" B. R C. not known D. Face 269 Back 289 E. B.O.H. F. not known	A. F 1. 79Mn .25S1 .012S .023P .31% .12C B. Manganend 2MS C. Stainless Type D. DC-REV	A. DV B. 1/4" C. Flame cutting, grinding.	A. 1211 B. 1258 C. 1247 D. 1240 E. 75mm Proof projectile T21	A. None B. None	1 2 3 4	X 10 1/2" 10" 8 1/2" 9 3/4" 7 1/8"	I 4% I 4% V 4% I 7% I 4% I 31% I 31%	P

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING PROCEDURE	BEAT	BALLISTIC RESULTS					REMARKS ON CRACKING
						H	VEL. F/S	LOC. OF H	CRACKING	RADIOGRAPHIC RESULTS, ETC	
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFG. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BHN E. PROCESS F. HEAT TREATMENT G. TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. CURRENT & POLARITY D. LIME	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROUN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	H	VEL. F/S	LOC. OF H	CRACKING	RADIOGRAPHIC RESULTS, ETC	
A. AD-752 B. 7/20/43 C. NR-95, H-94 D. Jones & Laughlin Steel Corp. E. Harnischfeger Corp. F. Fisher Tank Division	A. 1-1/2" B. R-III (1.64Mn, .22Si, .027Cr, .024 Ni, .46Mn) C. Face 262 Back 248 D. B.O.H. E. 1350 F. Water F. 1100 F. AIR	A. F (.135C, 1.79 Mn, .27Si, .39Mo)* B. AW-2-C C. Lime D. DC REV	A. 45° DV, 1/16" B. 3/16" RF C. Flame Cutting Grinding	A. Copper on leg welds only. B. 1. II 5/32" 2a 145 - 28 2. III 3/16" 2a 225 - 28 1/4" 2b 325 - 36 3. III 3/16" 2a 325 - 36 1/4" 2b 325 - 36 3/16" 2b 225 - 28 C. 3-34 hrs. 235° - 280 F. D. Intermittent cracking developed on the back side of root bead. Ground out and repaired with pass No. 4	A. 200° B. None	1 2 3 4 5	1107 1204 1310 1406 1511	2" R 1" L 1" R 1" L 5 1/2" R	Imp II Imp III Imp II Imp II Imp II	Failed radiograph Excessive incomplete fusion and porosity 3/8" fine crack at right junction	
A. AD-752 B. 7/20/43 C. NR-96, F-95 D. Jones & Laughlin Steel Corp. E. Harnischfeger Corp. F. Fisher Tank Division	A. 1-1/2" B. R-III (1.64Mn, .22Si, .027Cr, .024 Ni, .46Mn, .048Cu) C. Face 262 Back 248 D. B.O.H. E. 1650 F. 1/2 hr. Water F. 1100 F. 1/2 hr. AIR	A. F (.135C, 1.79Mn, .27Si, .39Mo)* B. AW-2-C C. Lime D. DC REV	A. 45° DV B. 3/16" C. Flame Cutting Grinding Buttering	A. None B. 1. II 5/32" 1a 135 - 20 5/32" 1a 145 - 22 2. III 3/16" 2a 225 - 26 1/4" 2a 325 - 36 3. III 3/16" 4b 225 - 26 1/4" 2b 325 - 36 C. 4:52 hrs. 220° - 300 F. D. Buttering 45 minutes Grinding time 5 hours.	A. 200° B. None	1 2 3 4 5 6 7 8	1118 1203 1247 1303 1382 1433 1454 1452	2" L 1" L 1" L 1" R 1" L 7 1/2" L 1 1/2" L 1 1/2" L 1 1/2" L	Imp V Imp II Imp II Imp II Imp II Imp II Imp II Imp II Imp II	Passed radiograph Moderate amount of porosity and slag	
		*Weld Metal					75mm Proof	projectile	T-21		

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING	PROCEDURE	HEAT	BALLISTIC RESULTS				REMARKS ON CRACKING	
							VEL. F/S	LOC. OF H. L.L.	R.L.	C.B.		CRACKING LOC. TYPE AMT.
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFCR. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BRN E. PROCESS F. HEAT TREATMENT TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. CROWN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	A. 200 F B. None	1 2 3	1193 1166 1152	1" L 1" D 3" 8" L	9 7/8" U 11" D 8" U	IMP I 16 5/8 IMP IV 6 1/2 IMP V 2 1/2 0 I 1 3/8 IMP I 4 1/8 0 I 1/2 31 5/8"	P Moderate amount of slag and porosity.
A. A 11627 B. 1/15/44 C. F 146 D. Republic Steel Corp. E. Harnischfeger F. Fisher Tank Division.	A. 1 1/2" B. R I .85M .29S1 .009S .011P 1-01Cr 1-16Ni .52Mo C. .29C D. Face 241 Back 241 E. -- F. Unknown	A. F .22C 1-81Mn .27Si .009S .018P .22Cr Tr.Ni .32Mo B. AW-2C C. Lime D. DC-REV	A. 45° DV B. 3/16" C. Flame cutting. Grinding.	A. None B. 1. I 5/32" 1a 165 22 2. III 3/16" 2a 225 22 1/4" 2a 325 22 5/32" 1a 175 22 1/4" 4b 325 22 3. III 3/16" 4b 225 22 1/4" 2b 325 22 C. 3 hours 27 minutes. D. Grinding time 61 minutes.	A. 200 F B. None	1 2 3	1193 1166 1152	1" L 1" D 3" 8" L	9 7/8" U 11" D 8" U	IMP I 16 5/8 IMP IV 6 1/2 IMP V 2 1/2 0 I 1 3/8 IMP I 4 1/8 0 I 1/2 31 5/8"	P Moderate amount of slag and porosity.	

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING	PROCEDURE	HEAT	BALLISTIC RESULTS				REMARKS ON CRACKING
							VEL. F/S	LOC. OF B.	CRACKING	RADIOGRAPHIC RESULTS, ETC.	
A. Firing Record No. B. Date of Test C. Plate No. D. Armor Manufacturer E. Electrode Mfg. F. Armor Fabricator	A. Plate Thickness B. Type C. Carbon Content D. Brn E. Process F. Heat Treatment Temp. Time Quench	A. Type B. Trade Name C. Coating D. Current & Polarity	A. Groove, Included Angle, Root Face B. Root Gap C. Plate Preparation	A. Backing B. Deposition Size El. No. Type Amp. V. 1. Root Type 2. Body Type 3. Grov Type C. Total Welding Time & Inter Pass Temperature D. Remarks	A. Pre B. Post	H	VEL. F/S	LOC. OF B.	CRACKING	RADIOGRAPHIC RESULTS, ETC.	
A. AD-421 B. 5/13/43 C. 14 D. Jones & Laughlin Steel Corp. E. Harnischfeger Corp. F. Harnischfeger Corp.	A. 1-1/2" B. R-III (.164Mn, .22Si, .027C, .024N, .49Mo) C. .28 D. Face 252 Back 252 E. --- F. 1600-1650 1/2 hr. Water 1050-1100 2 hrs. Air	A. F (.135C, 1.79 Mn, .27Si, .39Mo)* (.158C, 1.95 Mn, .28Si, .40)* B. AW-2-C C. Stainless D. DC REV	A. DV 30° B. 3/8" C. Flame Cutting Buttering	A. None B. II 3/16" 2a 200 - 24 III 1/4" 5a 300 - 28 III 3/16" 4b 175 - 23 1/4" 2b 300 - 28 C. 4:30 hrs. 200° D. Chipping after each pass. All surface edges were buttered Grinding time 4 hours.	A. 200° F.	1	1104	1" R	6" D	passed radiograph	
A. AD-435 B. 5/16/43 C. 15 D. Jones & Laughlin Steel Corp. E. Harnischfeger Corp. F. Harnischfeger Corp.	A. 1-1/2" B. R- C. --- D. --- E. --- F. ---	A. F (.135C, 1.79 Mn, .27Si, .39Mo)* (.158C, 1.95 Mn, .28Si, .40)* B. AW-2-C C. DC REV	A. 60° DV B. 3/16" C. Flame Cutting Buttering	A. None B. I 5/32" 2a 120 - III 3/16" 1a 220 - 1/4" 3a 320 - III 3/16" 4b 280 - 1/4" 2b 320 - C. 5:27 hrs. 200° D. Chipping after each pass. All edges buttered. Grinding time 2:30 hours.	A. 200° F. B. None	1	1123	1" L	7 1/2" U	Passed radiograph Moderate slag inclusions in cross-bar and lower right leg	
						2	1186	1" R	6 1/2" D		
						3	1253	1" R	6" D		
						4	1312	1" R	7 1/2" U		
						5	1362	1 1/2" R	1" D		
						6	1403	1 1/2" L	1 1/2" D		
							75mm	Proof	Projectile T21		

IDENTIFICATION A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFGN. F. ARMOR FABRICATOR	ARMOR DATA A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BRN E. PROCESS F. HEAT TREATMENT G. TEMP. TIME QUENCH	ELECTRODE DATA A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	JOINT DESIGN A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	WELDING PROCEDURE A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROW TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	BEAT A. PRE B. POST	BALLISTIC RESULTS			REMARKS ON CRACKING RADIOGRAPHIC RESULTS, ETC
						VEL. F/S	LOC. OF H. L.L. R.L. C. B. LOC.	CRACKING TYPE AMT	
A. AD-747 B. 7/17/43 C. NR-72 D. Jones & Laughlin Steel Corp. E. Farnischfeger Corp. F. Farnischfeger Corp.	A. 1-1/2" B. R-III C. (1.84Mn, .22Si, .087Cr, .02Al, .46Mo, .048Cu) D. 28 E. E.O.H. F. 1600-1650° F. 1/2 hr. Water 1100 F. 2 hrs. Air	A. F (.155C, 1.76Mn, .22Si, .087Cr, .02Al, .46Mo, .048Cu) B. 1.82Mn, (.143C, .22Si, .38Mo)* C. (.177C, 1.92Mn, .24Si, .38Mo)* D. Stainless E. DC REV	A. 60° DV B. 3/16" C. Flame Cutting Buttering	A. None B. 1. II 5/32" 1a 150 - 24 3/16" 1a 225 - 27 2. III 3/16" 2a 225 - 27 1/4" 2a 3. III 3/16" 3a 325 - 31 1/4" 2b 325 - 31 3/16" 2b 225 - 27 C. 5:30 hrs. 150 - 200 F. Chipping and grinding after first and fourth passes - root, chipping after all the others. All edges were buttered. Chipping and grinding time was 3:45 hrs.	A. 200° F. B. None	1 1124 2 1189 3 1231 4 1289 5 1344 6 1402	10" R 7 1/2" R 3 1/2" L 5 1/2" L 5 1/2" R 1 1/2" R 7 1/2" R	II 3" III 1" Imp Imp Imp 0 II 1/2" III 8" V 4 1/2" 42 1/2"	Passed radiograph Small amount of porosity. 3/8" incomplete fusion.
A. AD-777 B. 8/5/43 C. NR-73 D. Carnegie-Illinois E. Farnischfeger Corp. F. Farnischfeger Corp.	A. 1-1/2" B. R-I C. (1.21Mn, .15Si, .08Cr, 1.02Ni, .21Mo) D. .27 E. Face 277 Back 277 F. B.O.H. 1560 F. 45 mins. Water 1085 F. 1-3/4 hrs. Water	A. F (.159C, 1.95Mn, .28Si, .08Cr, .40Mo)* B. AW-2-C C. Stainless D. DC REV	A. 60° DV B. 3/16" C. Flame Cutting Buttering	A. None B. 1. II 5/32" 1a 150 - 24 5/32" 1a 190 - 25 2. III 3/16" 2a 225 - 27 1/4" 2a 3. III 3/16" 3a 325 - 31 1/4" 4b 225 - 27 1/4" 2b 325 - 31 C. 4:25 hrs. 250 F. All edges buttered.	A. 250° F. B. None	1 1108 2 1206 3 1300 est. 4 1344 5 1391	2" L 9 1/2" R 4" L 3" R 7 1/2" R	Imp Imp Imp 0 0 Imp II 2 1/2" III 6 1/2" V 2" II 1" II 2 1/2" III 6 1/2" V 13 1/2" 39 1/2"	Passed radiograph Small amount of slag and porosity throughout lower right leg weld
		*Weld Metal				75mm	Proof Projectile TEL		

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING PROCEDURE	BEAT	BALLISTIC RESULTS				REMARKS ON CRACKING RADIOGRAPHIC RESULTS, ETC.
						H	VEL. F/S	LOC. OF H. L.L. R.L. C.B.	CRACKING LOC. TYPE AMT	
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFR. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BRN E. PROCESS F. HEAT TREATMENT G. TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT CAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROD TYPE 2. BODY TYPE 3. GROUN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST					
A. AD-876 B. 9/11/43 C. NR-71A D. Jones & Laughlin Steel Corp. E. Harnischfeger Corp. F. Harnischfeger Corp.	A. 1-1/2" B. R-III (1.64Mn, .28Si, .027Cr, .02Al, .40Mo, .048Cu) C. Face 277 D. Back 277 E. B.O.H. F. 1650°F. to 1050°F. to 1100°F. 2 hrs. Air	A. F (.158C, 1.95Mn, .28Si, .40Mo)* B. AW-2-C C. Stainless D. DC REV	A. 60° DV B. 3/16" C. Flame Cutting Buttering	A. None B. 1. II 5/32" 1a 120 - 23 2. III 5/32" 1a 190 - 25 3/16" 1a 220 - 27 1/4" 2a 2b 320 - 31 1/4" 1a 2b 320 - 31 3. III 3/16" 4b 220 - 27 1/4" 2b 320 - 31 C. 4: 20 hrs. 200°F. D. Chipping after each pass. All edges buttered. Reinforcement ground off. Buttered with 5/32" electrodes. Grinding time 2.25 hrs. Heat treated after welding.	A. 200° F B. Full	1 1111 R 2 1227 3 1284 L 4 1311 5 1407	6" D 5" U 5" U 7 1/2" D 1" U 1" U	IMP II 2" IMP III 6" 0 II 1" IMP II 2" IMP III 2" 0 II 1/2" 13 1/2" T21	Passed radiograph Small amount of porosity in left leg and crossbar	
A. A 10923 B. 11/13/43 C. NR74A D. Great Lakes Steel Corp. E. Harnischfeger Corp. F. Harnischfeger Corp.	A. 1-1/2" B. R IV .93Mn .71Si .025S .023P .70Cr .20Mo .09Zr C. .30C D. Face 285 Back 285 E. B.O.H. F. 1625°F 3 hrs water to 1220°F 3 hrs air	A. F .168C 1.95Mn .28Si .40Mo B. AW-2-C C. Stainless D. DC-REV	A. 60° DV B. 3/16" C. Flame cutting. Grinding.	A. All edges buttered. Chipping after each pass. Reinforcement ground off. B. 1. II 5/32" 1a 150 23 2. III 3/16" 2a 225 27 1/4" 2a 320 31 3. III 1/4" 4b 320 31 3/16" 2b 200 27 3/16" 2b 220 27 1/4" 2b 320 31 C. 4 hours 25 min. 200°F - 240°F D. All edges buttered. Chipping after each pass. Reinforcement ground off.	A. 200° F B. None C. 3	1 1230 2 1279 3 1392	6 1/2" U 6" D 6 1/2" D	IMP I 2" IMP I 2" IMP I 16" 21"	F Cracks appeared. Porosity-bad. Large amount of slag.	
A. A 10923 B. 11/13/43 C. NR71B D. Jones & Laughlin E. Harnischfeger Corp. F. Harnischfeger Corp.	A. 1-1/2" B. R III L.64Mn .018S .22Si .018S .020P .027Cr .02Al .40Mo .048Cu C. .28C D. Face 277 Back 277 E. B.O.H. F. 1650°F water to 1100°F 2 hrs air	A. F .158C 1.95Mn .28Si .40Mo B. AW-2-C C. Stainless D. DC-REV	A. 60° DV B. 3/16" C. Flame cutting.	A. All edges buttered. Chipping after each pass. Grinding time 3 hours. B. 1. II 5/32" 1a 150 23 2. III 3/16" 1a 190 25 3/16" 1a 225 27 1/4" 2a 320 31 3. III 1/4" 4b 320 31 3/16" 2b 200 27 3/16" 2b 220 27 1/4" 2b 320 31 C. 4 hours 50 min. 200°F - 225°F D. All edges buttered. Chipping after each pass. Grinding time 3 hours.	A. 200° F B. None C. 2 D. 3 E. 4	1 1200 2 1263 1 1/2 3 1396 4 1510	7 1/2" L 7 1/2" D 6 1/2" D 6 1/2" U	IMP I 2" IMP I 3" IMP I 5 1/2" IMP V 8" 11 1/2" T21	Moderate amount of slag and porosity	
						75mm Proof	Projectile	Projectile	8.	

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING	PROCEDURE	HEAT	BALLISTIC RESULTS				REMARKS ON CRACKING
							H	VEL. F/S	LOC. L.V.	LOC. R.V.	
A. AD-408 B. 4/30/43 C. 33 D. Jones & Laughlin Steel Corp. E. Combustion Eng. Co. Inc. F. International Harvester Co.	A. PLATE THICKNESS 1-1/2" B. TYPE R-III C. CARBON CONTENT 1.64% Mn, .22% Si, .027% C, .024% N, .48% O D. BHN E. PROCESS F. HEAT TREATMENT TEMP. TIME QUENCH	A. F (1.60MM, .46Si, .29 Mn, .09C) * (1.63MM, .45Si, .54Mn) * B. --- C. DC REV D. DC REV	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE APP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROUN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. 100° F. B. None	1 1112 1° L 2 1213 3 1208 X	5" U 6 1/4" R 7 1/2" D	Imp Imp Imp 0	II I II III IV V VI VII VIII IX X XI XII XIII XIV XV XVI XVII XVIII XIX XX XXI XXII XXIII XXIV XXV XXVI XXVII XXVIII XXIX XXX XXXI XXXII XXXIII XXXIV XXXV XXXVI XXXVII XXXVIII XXXIX XL XLI XLII XLIII XLIV XLV XLVI XLVII XLVIII XLIX L LI LII LIII LIV LV LVI LVII LVIII LIX LX LXI LXII LXIII LXIV LXV LXVI LXVII LXVIII LXIX LXX LXXI LXXII LXXIII LXXIV LXXV LXXVI LXXVII LXXVIII LXXIX LXXX LXXXI LXXXII LXXXIII LXXXIV LXXXV LXXXVI LXXXVII LXXXVIII LXXXIX XL 32"	Passed radiograph	
					C. 6-1/2 hrs. 120 - 220° F. D. Grinding after 1st, 3rd, 5th, 6th, 7th, 13th, 14th and 15th passes. Chipping after all passes except first and fifth. Grinding time 6.46 hours.		75mm Proof Projectile #21				

*Weld Metal

IDENTIFICATION	ANODE DATA	ELECTRODE DATA	JOINT DESIGN	WELDING PROCEDURE		BEAT	BALLISTIC RESULTS				REMARKS ON CRACKING RADIOGRAPHIC RESULTS, ETC.
				BACKING	PROCEDURE		#	VEL. F/S	LOC. OF #	CRACKING TYPE	
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARRON MANUFACTURER E. ELECTRODE MFG. F. ARRON FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. ENH E. PROCESS F. HEAT TREATMENT TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROUN TYPE C. TOTAL WELDING TIME & INTER PASSES TEMPERATURE D. REPAIRS	A. PRE B. POST	F/S	L.I. S.I. C.B. LOC.	CRACKING TYPE	AMT.		
A. AD-751 B. 7/20/43 C. NR-81B-88 D. Jones & Laughlin Steel Corp. E. Harnischfeger Corp. F. International Harvester Co.	A. 1-1/2" B. R-III C. (.64Mn, .28Si, .027C, .024N1, .46Mo) D. .28 E. Face 279 F. Back 283 G. B.O.H. H. 1626 F. 1/2 hr. Water I. 1075 F. 2 hrs. Air	A. F B. (.122C, 1.84Mn, .35Mo, .28Si)* C. (.135C, .39Mn, .38Mo, .29Si)* D. AW-2-C E. Lime F. DC REV	A. 60° DV B. 5/32" C. Flame Cutting D. Grinding	A. None B. 1. II 5/16" 1a 160 - 2. III 1/4" 2a 225 - 3. III 1/4" 4b 275 - 4. III 1/4" 4b 280 - 5. III 5/16" 4b 180 - 6. III 1/4" 2b 280 - C. E. 14 hours 200 - 270 F. D. Grindings after first, fifth and ninth passes. Chipping after all passes. Grinding time 6.44 hours.	A. 200 B. None	1061	2" 6" R D	Imp II	1"	Passed radiograph Small amount of porosity throughout all the welds	
						1106	6" R U	Imp II	1"		
						1137	X 4" U	Imp II	1"		
						1257	5" D	Imp II	1"		
						1307	3" X L	Imp II	2"		
						1355	3 1/2" U	Imp II	2"		
						1404	4" D	Imp II	1"		
						1504	1 1/2" D	Imp II	2"		
						1584	X R	Imp V	2 1/2"		
						75	75mm Projectile	Imp V	50"		

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING	PROCEDURE	HEAT	BALLISTIC RESULTS			REMARKS ON CRACKING	
							VEL.	LOC.	CRACKING		
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFG. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. ZHN E. HEAT TREATMENT F. TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROWN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	H	F/S	L.L. F.L. C.B. LOC. TYPE ANT	CRACKING	RADIOGRAPHIC RESULTS, ETC.	
A. AD-875 B. 9/9/43 C. NR-80B D. Henry Disston & Sons E. Harnischfeger Corp. F. International Harvester Co.	A. 1-1/2" B. R-I C. .80Mn, .26Si, .58Cr, 1.09Ni, .36Mo, .12Cu D. .28 E. Face 295 Back 300 F. E.O.H. Raise 1575 F. 1/2 hr. Water 1150 F. 2 hrs. Air	A. F B. (.11-.13C, 1.65-1.75 Mn, .25-.30Si, .35-.40Mo)* C. AW-2-C D. DC REV	A. 60° DV B. 5/32" C. Flame Cutting Grinding	A. None B. 1. II 3/16" 1a 150 - 3/16" 1a 225 - 1/4" 2a 275 - 1/4" 6b 280 - 3/16" 4b 180 - 1/4" 3b 280 - C. 5.30 hrs. 200° - 275° F. D. Reinforcement ground off.	A. 200° F B. None	1 2 3 4 5 6	1124 1198 1300 1409 1500 1544	1/2" L 1 1/2" R 1 1/2" U 1 1/2" L 1 1/2" D 1 1/2" R 2 1/2" U	4 1/2" D 7 1/2" U 5 1/2" Imp III 4 1/2" D 2 1/2" Imp II 2 1/2" Imp II V 5 1/2" T21	passed radiograph Small amount of slag throughout	
A. AD-877 B. 9/11/43 C. NR-81C D. Jones & Laughlin Steel Corp. E. Metal & Thermit Corp. F. International Harvester Co.	A. 1-1/2" B. R-III C. (1.64Mn, .22Si, .027C, .024Ni, .48Mo) D. .28 E. Face 310 Back 295 F. E.O.H. 1625 F. 1/2 hr. Water 1075 F. 2 hrs. Air	A. F B. (.17-.18C, .36-.40Si, 1.50-1.52 Mn, .28-.34Mo)* C. Purex D. DC REV	A. 60° DV B. 5/32" C. Flame Cutting Grinding	A. None B. 1. II 3/16" 1a 180 - 1/4" 1a 280 - 1/4" 3b 285 - 3/16" 1b 225 - 1/4" 2b 280 - 3/16" 2b 180 - 1/4" 3b 285 - 3/16" 2b 180 - 1/4" 1b 280 - C. 4.40 hrs. 200° - 290° F. D. Reinforcement ground off-1.56 hrs.	A. 200° F B. None	1 2 3 4	1115 1215 1305 1403	1/2" R 1 1/2" R 1/2" R 1" R	6" D 1 1/2" 5 1/2" U 4 1/2" Imp III 4 1/2" Imp III V 15 1/2" T21	Passed radiograph Small amount of porosity	
		*Weld Metal									

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING PROCEDURE	HEAT	BALLISTIC RESULTS					REMARKS ON CRACKING	
						VEL.	LOCATION OF H	CRACKING	RADIOGRAPHIC RESULTS, ETC			
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFG. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BHN E. PROCESS F. HEAT TREATMENT TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. CROWN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	H	F/S	L.L.	R.L.	C. B. LOC.	TYPE	AMT
A. AD 934 B. 10/14/43 C. NR-82-A1 D. Great Lakes Steel Corp. E. Harnischfeger International F. Harvester Co.	A. 1-1/2" B. R IV .94Mn .67S1 .02S .018P .58Cr .15Mo .09Zr C. Face 285 D. Back 283 E. B.O.H. F. 1650 F 3 hrs water 1200 F 3 hrs air	A. F .11-.12C 1.69-1.79 Mn .27-.29Si .35-.38Mo B. AW-2C C. Lime D. DC-REV	A. 80° DV B. 5/32" C. Flame Cutting. Grinding.	A. B. 1. II 3/16" 1a 160 3/16" 1a 225 2. III 1/4" 2a 285 1/4" 4b 280 1/4" 4b 285 3. III 3/16" 4b 185 1/4" 2b 285 C. 4 hours 58 minutes, 200°F - 300°F D. Grinding time 58 minutes Weld reinforcements ground off.	A. 200° B. None	1	1179	1/2" L	5/8" U	IMP	I	5 1/2"
A. AD 934 B. 10/14/43 C. NR-82-A2 D. Great Lakes Steel Corp. E. Harnischfeger International F. Harvester Co.	A. 1-1/2" B. R IV .93Mn .71Si .025S .026P .70Cr .20Mo .09Zr C. Face 285 D. Back 285 E. B.O.H. F. 1625 F 3 hrs water 1220 F 3 hrs air	A. F .11-.12C 1.69-1.75 Mn .27-.29Si .35-.38Mo B. AW-2C C. Lime D. DC-REV	A. 80° DV B. 5/32" C. Flame cutting. Grinding.	A. B. 1. II 3/16" 1a 175 3/16" 1a 225 2. III 1/4" 2a 285 1/4" 4b 285 3. III 3/16" 4b 185 1/4" 2b 285 C. 5 hours 10 minutes, 200°F - 300°F D. Grinding time 1 hr. 30 min.	A. 200° B. None	1	1219	2" L	6" U	-	-	-
						2	1287	2" L	9" U	-	-	-
						3	1293	3" L	3" R	IMP	I	3 1/2"
						4	1349	X	7 1/2" U	IMP	I	9 1/2"
						5	1400	6" L	2 1/2" U	IMP	I	7 1/2"
						6	1395	5" L	1 1/2" U	IMP	I	4 1/2"
								75mm	121	Projectile		

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING	PROCEDURE	HEAT	BALLISTIC RESULTS			REMARKS ON CRACKING			
							H	VEL. F/S	LOCATION OF CRACKING				
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFG. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BHN E. PROCESS F. HEAT TREATMENT G. TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE ARP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROWN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	L.L. R.L. C.S. D.C. E.C. F.S. G.S. H.S. I.S. J.S. K.S. L.S. M.S. N.S. O.S. P.S. Q.S. R.S. S.S. T.S. U.S. V.S. W.S. X.S. Y.S. Z.S.	TYPE	AMT					
A. AD 658 B. 8/27/43 C. NR73-A2 D. Carnegie-Ill Steel Corp. E. Harnischreger Corp. F. Midland Steel Products	A. 1-1/2" B. R I C. .21Mn .15S1 D. .86Cr 1.02Mn E. .21Mo F. .27C G. Face 277 H. Back 277 I. B.O.B. J. 1562 F 1/2 hr water K. 1067 F 1 1/2 hr water	A. F B. .158C C. 1.95Mn D. .28Si E. .40Mo F. AW-2C G. DC REV	A. 60° DV B. 3/16" C. Flame cutting.	A. None B. 1. II 5/32" 1a 125 23 2. III 3/16" 1a 225 25 3. III 3/16" 3a 325 27 4. III 1/4" 4c 325 25 5. III 1/4" 4b 225 25 6. III 1/4" 4d 325 27 C. 6 hours 250° F - 250° F D. Grinding time 1-1/2 hours.	A. 250° F B. None	1 1104 2 1235 3 1295 4 1415 5 1513	1/4" R 3/8" R 1/4" L 1/4" R	1/2" U 6" D 4 1/2" D 6 1/2" U 1" D	- - IMP I IMP V IMP I IMP I O I	- - 4" 1/2" 14 1/2" 14 18 1/2" 52 1/2"	P Small amount of scattered porosity and slag.		
		#Weld metal					75mm Proof projectile T31						

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING	PROCEDURE	BEAT	BALLISTIC RESULTS				REMARKS ON CRACKING
							H	F/S	VEL.	LOCATION OF B	
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFG. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. SRN E. PROCESS F. HEAT TREATMENT TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROOVE 1" IF C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	F/S	L.L. R.L. C.B. LOC.	CRACKING TYPE AMT			
A. AD-332 B. 3/19/43 C. NR-53 D. Jones & Laughlin Steel Corp. E. A. O. Smith F. Standard Steel Spring Co.	A. 1-1/2" B. R-III C. (1.68Mn, .22Si, .44Mo) D. Face 255 Back 262 E. B.O.H. F. 1650 F. 3 hrs. Air 2 hrs. Water 1230 F. 3 hrs. Air	A. F (.12C, .52 Mn, .21Si, .38Cr, 1.72Ni, .77Mo, .12V)* B. SW-101 C. --- D. DC STR	A. DV B. 3/8" C. Flame Cutting Grinding normalized	A. Mild steel B. 1. II 3/16" 1a 220 - 2. I 3/16" 1a 220 - 3. III 3/16" 4b 220 - 1/4" 2b 300 F. C. 14 hrs. 350 - 400 F. D. Heat Treated after welding. Broke in two pieces.	A. 350 400 F. P. Full	1 1098 2 1142 3 1187 4 1299	1 1/2" R 2 1/2" R X 1 1/2" L	4 1/2" D 5 1/2" U 6" U 7" D	Imp II III 36	Passed radiograph Weird is sound.	
A. AD-408 B. 4/30/43 C. NR-51 D. Jones & Laughlin Steel Corp. E. Arcos Corp. F. Standard Steel Spring Co.	A. 1-1/2" B. R-III C. (1.68Mn, .22Si, .44Mo) D. Face 285 Back 277 E. B.O.H. F. 1650 F. 2-1/2 hrs. Water 1230 F. 3-1/2 hrs. Water	A. F (.08C, 1.62 Mn, .70Si, .59Mo)* B. Manganese 2 MS C. Shielded Arc D. DC REV	A. DV 3/4" B. 3/8" C. Flame Cutting Grinding normalized	A. Mild steel B. 1. II 3/16" 2a 220 - 2. I 3/16" 2a 220 - 3. I 1/4" 8a 260 - 1/4" 2a 260 - C. 12 hrs. 300 F. D. Heat treated after welding.	A. 200 F B. Full	1 1109 2 1189 3 1221	1 1/2" R 2 1/2" L 1/2" L	5" U 7 1/2" D 4 1/2" D	Imp II III V Imp II 26	Passed radiograph Small amount of slag throughout. 1-1/8" intermittent incomplete fusion.	
A. AD-422 B. 5/13/43 C. NR-52 D. Jones & Laughlin Steel Corp. E. Metal & Thermit Corp. F. Standard Steel Spring Co.	A. 1-1/2" B. R-III C. (1.68Mn, .22Si, .44Mo) D. Face 289 Back 285 E. B.O.H. F. 1650 F. 2-1/2 hrs. Water 1200 F. 3-1/2 hrs. Water	A. F (.16C, 2.02 Mn, .20Si, .44Mo)* B. --- C. Shielded Arc D. DC REV	A. DV 3/4" B. 3/8" C. Flame Cutting Grinding normalized	A. Mild steel B. 1. II 3/16" 2a 175 - 2. I 3/16" 2a 175 - 1/4" 12a 240 - 1/4" 28 240 - C. 12 hrs. 200 - 250 F. D. Broke in two pieces. Grinding time 10 hours. Heat treated after welding.	A. 200 F B. Full	1 1133 2 1184	1 1/2" R 1/2" R	6 1/2" U 5 1/2" D	Imp I III 36	Failed radiograph Excessive cracking in lower right leg weld Small amount of slag throughout all welds	
		*Weld metal				75mm Proof	Projectile	T21			14.

IDENTIFICATION	ANVIL DATA	ELECTRODE DATA	JOINT DESIGN	WELDING PROCEDURE	HEAT	BALLISTIC RESULTS				REMARKS ON CRACKING
						VEL. F/S	LOC. OF B.	CRACKING TYPE	RADIOLITHOGRAPHIC RESULTS, ETC.	
A. AD-328 B. 3/19/43 C. Nr-50-X D. Great Lakes Steel Corp. E. Champion Rivet Company F. Sun Oil Co.	A. 1-1/2" B. R-IV (.03% Mn, .71% Si, .70% C, .03% P) C. .50 D. O. H. E. 1625 F. 3 hrs. Water F. 1280 F. 3 hrs. Air	A. F (.10C, .81 Mn, .20Si, .50Mo)* B. Blue Devil 100 C. Heavy F.C. D. DC REV	A. DV-Nose 1" from front of plate. Beveled to give 7/8" opening at front of plate, 5/8" opening at back. B. 3/8" C. Flame Cutting - Layer with McKey Type 15 mild steel electrode	A. Mild steel-1/4" dia. welding wire. B. 1. II 3/16" 2a 200 - 30 2. I 3/16" 4a 200 - 30 3. I 1/4" 8a 300 - 30 C. 11 hrs. 400 - 500 F D. Slightly peened Grinding time 7 hours. Stress Relieved 3 hours. 1150 F furnace cooled.	A. PRE 0 B. POST 1150 F 3 hrs.	H 1	VEL. F/S 1094	LOC. OF B. I 6a U III 16	CRACKING TYPE I III 16	Failed radiograph Excessive amount of slag and porosity throughout all the welds

IDENTIFICATION		ARMOR DATA		ELECTRODE DATA		JOINT DESIGN		WELDING PROCEDURE		HEAT		BALLISTIC RESULTS				REMARKS OR CRACKING			
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFR. F. ARMOR FABRICATOR		A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. RPH E. PROCESS F. HEAT TREATMENT G. TEMP. TIME QUENCH		A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY		A. GROOVE, INCLUDED ANGLE, ROOT RICE B. ROOT GAP C. PLATE PREPARATION		A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROWN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS		A. PRE B. POST		H		VEL. LOCATION OF H F/S L.L. F.L. C.B. LOC. TYPE		CRACKING	RADIOGRAPHIC RESULTS, ETC.		
A. A 10932 B. 11/16/43 C. CR7E D. Carnegie-Ill Steel Corp. E. Linde Air Products Co. F. Midland Steel Products.		A. 1-1/2" B. R I C. 1.21Mn .1551 .0275 .014P .86Cr D. 1.02N1 .21Mn .27C E. Face 277 F. Back 277 G. 1562°F 1/2 hr 1067°F 1 1/2 hr water water		A. F .16C B. 933n .5651 C. 021S .45Cr D. 40Ni .15Mo E. 1/32 F. 36 G. - - - H. AC		A. 60° DV 1/8" B. --- C. Flame cutting.		A. --- B. Unionmelt-one side 5/16" UM1a 1480 40 1/4" other side UM1a 1350 45 C. --- 70° - 200°F D. ---		A. None B. None		1		1200		1 1/2" R 7" U IMP I 33"		P	75mm Proof Projectile T21

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING	PROCEDURE	BEAT	BALLISTIC RESULTS				REMARKS ON CRACKING
							VEL. F/S	LOC. OF H.	CRACKING	RADIOGRAPHIC RESULTS, ETC.	
A. Firing Record No. B. Date of Test C. Plate No. D. Armor Manufacturer E. Electrode Mfg. F. Armor Fabricator	A. Plate Thickness B. Type C. Carbon Content D. WRM E. Process F. Heat Treatment Temp. Time Quench	A. Type B. Trade Name C. Coating D. Current & Polarity	A. Groove, Included Angle, Root Face B. Root Gap C. Plate Preparation	A. Backing B. Deposition Size El. No. Type Amp. V. 1. Root Type 2. Body Type 3. Crown Type C. Total Holding Time & Inter Pass Temperature D. Remarks	A. Pre B. Post	H	VEL. F/S	LOC. OF H. L.L. R.L. C.B. LOC.	CRACKING TYPE AMT	RADIOGRAPHIC RESULTS, ETC.	
A. A 10906 B. 11/6/43 C. 198 D. Jones & Laughlin E. Farnischfeger F. Cadillac Motor Car Div.	A. 1" B. R III C. 1.54mm D. .18S1 E. .0078 .025P F. .20Cr Tr. N1 G. .29Mo H. .30C I. Surface 331 J. Core 321 K. Core L. 1650° F ½ hr M. water N. 980° F 1½ hr O. water	A. F B. .15-.17C C. 1.55-1.84 Mn D. .10S1 E. .025-.026 S F. .025P G. Nil Cr H. Nil Ni I. Nil Mo J. AW-2-C K. Lime L. DC-REV	A. 60° DV B. 3/8" C. Flame cutting & grinding	A. Mild steel B. 1. II 3/16" 2a 220 25 C. 2. I 3/16" 2a 220 25 D. 3. II 1/4" 4a 325 25 E. 3. II 1/4" 6b 325 25 F. 3.96 hours 200° F-265° F G. Grinding time 2.05 hours.	A. 200° B. None	1 2 3 4	711 715 788 790	13" R 11" D 5 7/8" U 9" U I 2 1/2"	I 13 1/2 V 4 1/4 I 3 1/2 - I 2 1/2 43"	F 3/16" crack and moderate amount of slag and porosity.	
A. A10906 B. 11/6/43 C. 200 D. Youngstown E. Farnischfeger F. Cadillac Motor Car Div.	A. 1" B. R III C. 1.55mm D. .18S1 E. .0098 F. .025P Nil Cr G. Nil Ni .28Mo H. .27C I. Surface 311 J. Core 302 K. Core L. 1600° F ½ hr M. water N. 875° F 2½ hr O. air	A. F B. .15-.17C C. 1.55-1.84 Mn D. .10S1 E. .025-.026 S F. .025P G. Nil Cr H. Nil Ni I. Nil Mo J. AW 2-C K. Lime L. DC-REV	A. 60° DV B. 3/8" C. Flame cutting & grinding.	A. Mild Steel B. 1. II 3/16" 2a 220 25 C. 2. I 3/16" 6a 220 25 D. 3. II 1/4" 6b 325 25 E. 3.41 hours 200° F - 255° F F. Grinding time 1.56 hours.	A. 212° B. None	1 2 3 4 5	724 741 721 737 703	3 1/2" L 3 1/2" R 1 1/2" R 1" R 1 1/4" L	8 1/2" IMP V U 3 1/2" - 5" IMP I D 7 1/2" IMP I U IMP V 11 1/2" IMP I D 25 1/8"	3 1/2" P - 3" 2 1/2" 2 1/2" 25 1/8"	P

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING	PROCEDURE	BEAT		BALLISTIC RESULTS				REMARKS ON CRACKING		
						A. PRE	B. POST	H	F/S	VEL.	LOCATION OF B.		CRACKING	RADIOGRAPHIC RESULTS, ETC.
A. FIRING RECORD NO.	A. PLATE THICKNESS	A. TYPE	A. GROOVE, INCLUDED ANGLE, ROOT FACE	A. BACKING	PASSES	A. None	A. None	8	824	7"	IMP	I	9 1/2"	
B. DATE OF TEST	B. TYPE	B. TRADE NAME	B. ROOT GAP	B. DEPOSITION SIZE EL. NO. TYPE AMP. V.	1. ROOT TYPE	B. None	B. None	5	800	1/2"	D	I	7"	
C. PLATE NO.	C. CARBON CONTENT	C. COATING	C. PLATE PREPARATION	2. BODY TYPE	2. 165 22			10	803	4 1/2"	IMP	I	6	
D. ARMOR MANUFACTURER	D. HEAT TREATMENT	D. CURRENT & POLARITY		3. CROWN TYPE	3. 225 22					1"	U	V	7	
E. ELECTRODE MFG.	E. TEMP. TIME QUENCH			C. TOTAL WELDING TIME & INTER PASS TEMPERATURE	110 F - 300 F					5 1/2"	IMP	I	16 1/2	
F. ARMOR FABRICATOR				D. REMARKS	52 minutes					D			38 1/2	
A11247 12/7/43 Jones & Laughlin Co. Harnischfeger Fisher Tank Division.	3/4" R III 1.69Mn .010S .016P .38Mo .28C Face 321 Back 331 Unknown	.17C 1.87Mn .013S .020P .39Mo AW2C Lime DC-REV	45° DV 1/8" Flame cutting. Grinding.	I 5/32" 1a 165 22 I 3/16" 4a 225 22 III 3/16" 6b 225 22 2 hours 25 minutes 110 F - 300 F Grinding time 52 minutes		A. None B. None	A. None B. None	8 5 10	824 800 803	7" D 4 1/2" U 5 1/2" D	IMP D IMP U IMP D	I I V I	9 1/2" 6 7 16 1/2 38 1/2	P Small amount of slag and porosity.
A11247 12/7/43 Jones & Laughlin Co. Harnischfeger Fisher Tank Division.	3/4" R III 1.64Mn .010S .016P .38Mo .28C Face 321 Back 331 Unknown	.17C 1.87Mn .013S .020P .39Mo AW2C Lime DC-REV	45° DV 1/8" Flame cutting. Grinding.	I 5/32" 1a 165 22 I 3/16" 4a 225 22 I 3/16" 2a 225 22 1 hour 51 minutes 110 F - 300 F Grinding time 48 minutes		A. None B. None	A. None B. None	4 5 6 7	811 800 769 805	1" L 3" 6" 1 1/2" R 10 1/2" R	IMP D IMP U IMP D IMP U	I V I IV I I I	8" 1 6 1/2 9 1/2 2 1/2 1 28 1/2	P Small amount of slag and porosity.

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING	PROCEDURE	HEAT	BALLISTIC RESULTS			REMARKS ON CRACKING
							VEL.	LOC.	CRACKING	
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFR. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BHM E. PROCESS F. HEAT TREATMENT G. TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AND V. 1. ROOT TYPE 2. BODY TYPE 3. GROWN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	H	F/S	L-L, R-L, C, B, LOC.	TYPE AMT	RADIOGRAPHIC RESULTS, ETC
A. AD-882 B. 9/14/43 C. U-42 D. Jones & Laughlin Steel Corp. E. Linde Air Products Co. F. Fisher Tank Division	A. 3/4" B. R-III (1.75% Mn, .22% Si, .46% Mo) C. .25 D. Face 341 Back 352 E. 1650°F. 1/2 hr. Water 960°F. 1-1/2 hrs. Air	A. F (.17C, .92 Mn, .65Si, .42Mo)* B. Oxweld #36 C. Bare D. AC	A. 60° DV on ong side 90° DV on the other B. 3/16" C. Flame cutting Grinding	A. Copper bar holding union-melt back-up B. Unionmelt 3/16" 2UM 740 - 30 C. 32 mins. each pass. 20 mins. grinding to form flush welds. Weld reinforcement ground off.	A. None B. None	1	803	9 1/2" L	Imp III 21 1/2"	Passed radiograph Small amount of slag
A. AD 937 B. 10/16/43 C. U-35 D. Great Lakes Steel Corp. E. Linde Air Products Co. F. Fisher Tank Division	A. 3/4" B. R IV .89Mn .73Si .029S .020P .32Cr, .36Mo C. .30C D. Face 331 Back 341 E. - - - F. Unknown	A. F .15C .92Mn .70Si .044S .020P .28Cr .20Mo B. Oxweld #36 C. Bare D. AC	A. 60° DV on ong side 90° DV on the other B. 3/16" C. Flame cutting. Grinding	A. Copper bar holding union-melt back-up. B. Unionmelt 1/4" 2UM 740 30-34 C. 33.3 minutes of chipping after each pass. 20 minutes grinding to produce flush welds.	A. None B. None	1 2	798 800	1 1/2" L 1 1/2" R	Imp I 4 1/2" Imp V 9 1/2" Imp I 9 Imp V 13 1/2" 36 1/2"	Small amount of slag.
A. AD 937 B. 10/16/43 C. U-36 D. Great Lakes Steel Corp. E. Linde Air Products Co. F. Harnischfeger Fisher Tank Division	A. 3/4" B. R IV .89Mn .73Si .029S .020P .36Mo C. .30C D. Face 331 Back 341 E. - - - F. Unknown	A. F Linde .08C 1.38Mn .016S .023P .48Mo B. # 36 & AM-2C C. Bare & Lime D. AC DC-REV	A. 60° DV on ong side 90° DV on the other B. 1/8" C. Flame cutting. Grinding.	A. No back-up bar used. B. one side - 1. I 3/16" 1a 200 22 2. II 3/16" 4b 200 22 3. II 3/16" 3b 200 22 other side 5/32" 1a 150 22 Unionmelt 3/16" 1a 740 29 C. 80.7 minutes. 130°F - 380° D. 3 minutes of chipping after each pass. 20 minutes grinding to produce flush welds.	A. None B. None	1 2 3 4 5	803 808 791 779 781	1" L 7" L 1 1/2" L L X	4" U 8" D 7" U 7 1/2" D 8" D Imp I 2 Imp IV 11 1/2" 22"	P
		*Weld Metal						57mm Proof Projectile T1		

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING	PROCEDURE	HEAT	BALLISTIC RESULTS				REMARKS ON CRACKING
							F/S	LOC. OF H	CRACKING	RADIOGRAPHIC RESULTS, ETC.	
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFG. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BHM E. PROCESS F. HEAT TREATMENT TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROUN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	H	VEL.	LOC. OF H	CRACKING	RADIOGRAPHIC RESULTS, ETC.	
A. AD 937 B. 10/16/43 C. U 47 D. Great Lakes Steel Corp. E. Linde F. Fisher Tank Division.	A. 3/4" B. R IV .85Mn .73S1 .029S .020P .52Cr .36Mo C. .30C D. 331 Face 341 Back E. - F. Unknown	A. F .15C .85Mn .025S .021P .26Mo B. Oxweld C. Bare D. AC	A. 60° DV one side 30° DV other side B. 3/16" C. Flame cutting. Grinding.	A. Copper B. Unionmelt - one side 1/4" IUM 740 30 other side 1/4" IUM 760 32 C. 39.4 minutes. 260° - 380°F D. Grinding time 38 minutes.	A. None B. None	1 2 3	782 Lost 819 X	4" R 7 1/2" D 4 1/2" C 1" U 1" D IMP IMP	- - I 2 1/2" V 1 1/8" V 1 1/8" V 1 1/8" V 1 1/8"	P Moderate amount of porosity.	
A. AD 937 B. 10/16/43 C. U 48 D. Republic Steel Corp. E. Linde Air. Harnischfeger F. Fisher Tank Division.	A. 3/4" B. R I 1.22Mn .28S1 .015S .020P .65Cr .98Ni .54Mn C. .33C D. Face 321 Back 321 E. Unknown F. Unknown	A. F .09C 1.03Mn .015S .022P .25Ni .33Mo B. #36 AW-2C C. Bare & Lime D. AC	A. 60° DV one side 30° DV other side B. 1/8" C. Flame Cutting. Grinding.	A. None B. Unionmelt - one side 1/4" IUM 760 30 other side 1/4" IUM 840 32 Two beads at root 5/32" 1a 150 22 3/16" 1a 210 22 C. 34.45 minutes. 100°-380°F D. Grinding time 32 minutes.	A. None B. None	1 2 3 4	799 2 1/2" 808 800 808 57mm Projectile T1	3 1/2" U 6" R 8 1/2" D 8 1/2" D 5 1/2" D 3 1/2" D L U	- - I 1 1/2" V 3" I 8" I 11" T1 T1	P Small amount of slag.	

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING PROCEDURE	HEAT	BALLISTIC RESULTS				REMARKS ON CRACKING RADIOGRAPHIC RESULTS, ETC.		
						VEL. F/S	LOC. TYPE	CRACKING	AMT			
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFG. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BHN E. PROCESS F. HEAT TREATMENT TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROW TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	H 1 2	VEL. F/S 2510 2522	LOC. TYPE I II	CRACKING I II V	AMT 5 1/2" 12 3/4" 3"	Passed radiograph Slag and porosity scattered through out.	
A. AD-749 B. 7/17/43 C. 739 D. Youngstown Sheet & Tube Company E. Harnischfeger Corp. F. American Locomotive Co.	A. 1/2" B. R-III (1.38Mn, .16Si, .50% C) C. 23 D. Face 841 Back 362 E. B.O.H. F. 1-1/2 hrs. hold, 1/2 hr water spray	A. F (.07C, 1.75 Mn, .20Si, .04Cr, .05 Ni, .41% Ni, .15Cu)* B. --- C. Lime+ Titania D. DC REV	A. 45° SV B. 5/32" C. Flame Cutting	A. None B. 1. I 5/32" 1a 140 - 25 2. I 5/16" 1a 220 - 28 3. III 5/32" 2b 150 - 25 5/16" 1b 220 - 28 1/4" 18B 310 - 27 85° - 145° F. C. 10 hrs. D. Cracking after first pass, chipped and ground out, time 9 hrs.	A. None B. None	1 2	2510 2522	I II V	I II	5 1/2" 12 3/4" 3"	Passed radiograph Slag and porosity scattered through out.	
		*Weld Metal										

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING PROCEDURE		HEAT		BALLISTIC RESULTS				REMARKS ON CRACKING RADIOGRAPHIC RESULTS, ETC.			
				A. BACKING	PROCEDURE	A. PRE	H	VEL.	LOCATION OF H	CRACKING					
A. FIRING RECORD NO.	A. PLATE THICKNESS	A. TYPE	A. GROOVE, INCLUDED	A. BACKING	PASSES	A. PRE	H	F/S	L-L.	R-L.	C-B.	LOC.	TYPE	AMT	
B. DATE OF TEST	B. TYPE	B. TRADE NAME	ANGLE, ROOT FACE	B. DEPOSITION SIZE EL. NO. TYPE AMP. V.		B. POST									
C. PLATE NO.	C. CARBON CONTENT	C. COATING	C. PLATE PREPARATION	1. ROOT TYPE											
D. ARMOR MANUFACTURER	D. BHN	D. CURRENT & POLARITY		2. BODY TYPE											
E. ELECTRODE MFR.	E. PROCESS			3. GROWN TYPE											
F. ARMOR FABRICATOR	F. HEAT TREATMENT			C. TOTAL WELDING TIME & INTER PASS TEMPERATURE											
	F. TEMP. TIME QUENCH			D. REMARKS											
A. A 125F7 B. 2/18/44 C. K F8 D. Republic Steel Company E. Farnischlager F. Buick Motor Division.	A. 1/2" B. R I 1.04Mn .2581 .023S .014P .46Cr .43N1 .14Mo C. .32C D. Face 352 Back 352 E. B.O.B. F. 1650 F 2 hrs water spray 860 F 3 hrs water spray	A. F .16C L.75m .24Si .018S .027P .39Mo B. AW-2C C. Lime D. DC-REV	A. 60° SV B. 1/8" Flame cutting. C. Grinding.	A. Mild Steel B. 1. I 5/32" 1a 175 22 2. I 3/16" 1a 225 22 3. I 1/4" 1a 275 22 Seal bead - 3/16" 1a 225 22 C. 56 minutes. 120° F - 240° F D. Grinding time 3 hours 20 minutes. Hotrolled steel backup. Ground out-seal bead used.	A. None B. None	11 2544 12 2524 2 1/4" 15 2526 1/2" R	1 1/4" R 1 1/4" L 9" R	IMP I IMP I IMP V	7 1/2" 7 1/2" 37 1/2"						
								3/100 FE 54 Projectile							

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING	PROCEDURE	HEAT	BALLISTIC RESULTS				REMARKS ON CRACKING	
							H	VEL.	LOC.	CRACKING		
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFG. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BHN E. PROCESS F. HEAT TREATMENT G. TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROOVE TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	FASSES	A. PRE B. POST	F/S	L.L. R.L. C.B. LOC. TYPE AMT	CRACKING	RADIOGRAPHIC RESULTS, ETC.		
A. AD-374 B. 4/7/43 C. V-7847-A D. Great Lakes Steel Corp. E. Combustion Eng. Co. Inc. F. Combustion Eng. Co. Inc.	A. 1/2" B. R-IV (.88Mn, .79Si, .68Cr, .17Mo, .08Zr) C. .27 D. --- E. B.O.H. F. ---	A. F (.07C, 1.41 Mn, .34Si, .20Mo)* B. 1175-2 C. Stainless Lime D. DC REV	A. 60°SV B. 3/8" C. Flame Cutting Grinding	A. Carbon Steel B. 1. I 3/16" 1a 210 - 28 2. I 1/4" 4a 300 - 30 3. II 3/16" 2b 210 - 26 3/16" 3SB 210 - 28 1/4" 1SB 300 - 30 C. --- D. Back groove flame gouged.		A. None B. None	1 2 3 4 5 6	2600 2600 2600 2800 2600 2600	1 ^R 9 ^D 2 ^U 5 ^U 3 ^R 1 1/2 ^U 4 ^R 4 ^D 5 ^U 9 1/2 ^U 6 ^X 1 1/2 ^U	0 III 5 0 III 0 III 9 1/2 Imp III III 7 1/2	Passed radiograph	
A. AD-374 B. 4/7/43 C. V-7847-B D. Great Lakes Steel Corp. E. Combustion Eng. Co. Inc. F. Combustion Eng. Co. Inc.	A. 1/2" B. R-IV (.88Mn, .79Si, .68Cr, .17Mo, .08Zr) C. .27 D. --- E. B.O.H. F. ---	A. F (1.95Mn, .94Si, .34Mo)* B. 1176 C. Stainless Lime D. DC REV	A. 60°SV B. 3/8" C. Flame Cutting Grinding	A. Carbon Steel B. 1. I 3/16" 1a 210 - 28 2. I 3/16" 1a 210 - 26 3a 300 - 30 3. II 3/16" 2b 210 - 28 3/16" 3SB 210 - 26 1/4" 1SB 300 - 30 50 - 150° F. C. --- D. Back groove flame gouged.		A. None B. None	1 2 3 4 5 6 7	2600 2600 2600 2600 2600 2600 2600	7 1/2 ^R 8 1/2 ^U 5 ^L 1 ^U 4 ^L 4 ^D 4 1/2 ^U 5 ^R 5 ^U 3 ^R 7 1/2 ^U 1 ^L 9 ^D	Imp III Imp III Imp III Imp III Imp III Imp III Imp III	Passed radiograph	
		*Weld Metal						37mm HE M-54 Projectile				

IDENTIFICATION	ABSORB DATA	ELECTRODE DATA	JOINT DESIGN	WELDING PROCEDURE	HEAT	BALLISTIC RESULTS			REMARKS ON CRACKING
						H	VEL. F/S	LOCATION OF B	
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFG. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BHN E. PROCESS F. HEAT TREATMENT TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROWN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	LOC.	C.B.	TYPE	AMT
A. AD-429 B. 5/15/43 C. V-7847-C D. Great Lakes Steel Corp. E. Combustion Eng. Co. Inc. F. Combustion Eng. Co. Inc.	A. 1/2" B. R-IV (.88Mn, .79Si, .68Cr, .17Mo, .08Zr) C. .27 D. Face 352 Back 375 E. B.O.H. F. 1600 F. 1/2 hr. Spray 900 F. 1/2 hr. Air	A. F (.09C, 1.60 Mn, .46Si, .29Mo)* (1.63Mn, .45Si, .54Mo)* B. 1186-2 1187 C. Stainless Lime D. DC REV	A. 60° SV B. 3/8" C. Flame Cutting Grinding	A. Carbon Steel B. 1. I 3/16" 1a 210 - 28 2. I 1/4" 3a 300 - 30 3. III 3/16" 2b 210 - 28 1/4" 1b 300 - 30 3/16" 2SB 210 - 28 1/4" 1SB 300 - 30 C. 3 hrs. 60° - 150 F. D. Back groove flame gouged. Weld reinforcement ground off. Chipping and grinding time 2 hrs.	A. None B. None	8" R	7 1/2" U	9-1/8" x 3-1/4" section broke	Passed radiograph
A. AD-429 B. 5/15/43 C. V-7847-D D. Great Lakes Steel Corp. E. Combustion Eng. Co. Inc. F. Combustion Eng. Co. Inc.	A. 1/2" B. R-IV (.88Mn, .79Si, .68Cr, .17Mo, .08Zr) C. .27 D. Face 352 Back 375 E. B.O.H. F. 1600 F. 1/2 hr. Spray 900 F. 1/2 hr. Air	A. F (.09C, 1.60 Mn, .46Si, .29Mo)* (1.63Mn, .45Si, .54Mo)* B. 1186-2 1187 C. Stainless Lime D. DC REV	A. 60° SV B. 3/8" C. Flame Cutting Grinding	A. Carbon steel B. 1. I 3/16" 1a 210 - 28 2. I 1/4" 3a 300 - 30 3. III 3/16" 2b 210 - 28 1/4" 1b 300 - 30 3/16" 2SB 210 - 28 1/4" 1SB 300 - 30 C. 3 hrs. 60° - 150 F. D. Back groove flame gouged. Weld reinforcement left on.	A. None B. None	2 1/2" L	12 1/2" U		Passed radiograph

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING	PROCEDURE	HEAT	BALLISTIC RESULTS			REMARKS ON CRACKING
							H	VEL. F/S	LOC. OF B. C. B. LOC.	
<p>A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. PLATE MANUFACTURER E. ELECTRODE MFR. F. ARMOR FABRICATOR</p>	<p>A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BHN E. PROCESS F. HEAT TREATMENT G. TEMPER. TIME QUENCH</p>	<p>A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY</p>	<p>A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION</p>	<p>A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROWN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS</p>	<p>A. PRE B. POST</p>	<p>VEL. F/S</p>	<p>LOC. OF B. C. B. LOC.</p>	<p>CRACKING TYPE AMT</p>	<p>REMARKS ON CRACKING</p>	
<p>A. AD-429 B. 5/15/43 C. V-7847-E D. Great Lakes Steel Corp. E. Combustion Eng. Co. Inc. F. Combustion Eng. Co. Inc.</p>	<p>A. 1/2" B. R-IV C. (.88Mn, .79Si, .29Mo)* D. .68Cr, .17Mo, .08Zr E. .27 F. Face 352 G. Back 375 H. B.O.H. I. 1600 F. 1/2 hr. Spray J. 900 F. 1/2 hr. Air</p>	<p>A. F B. (.09C, 1.60 Mn, .46Si, .29Mo)* C. (.63Mn, .45Si, .54 Mo)* D. 1186-2 E. 1187 F. Stainless Lime G. DC REV</p>	<p>A. 90° DV B. 5/32" C. Flame D. Cutting E. Grinding</p>	<p>A. None B. 1. I 3/16" 1a 150 - 25 2. & 3. Three layers 3/16" 1a 210 - 28 1/4" 2a 300 - 30 C. 1.45 hrs. 60° - 150° F. D. Weld reinforcement left on.</p>	<p>A. None B. None</p>	<p>2800 2600 2600 2800 37mm HE</p>	<p>6 3/4" R 4 1/2" D 8" U 1 1/2" R 15" Imp 16" D M-54 Projectile</p>	<p>I 3 1/2" V 12 1/2" I 16" V 32"</p>	<p>Passed radiograph Several small gas pockets</p>	
<p>A. AD-429 B. 5/15/43 C. V-7847-F D. Great Lakes Steel Corp. E. Combustion Eng. Co. Inc. F. Combustion Eng. Co. Inc.</p>	<p>A. 1/2" B. R-IV C. (.88Mn, .79Si, .29Mo)* D. .68Cr, .17Mo, .08Zr E. .27 F. Face 352 G. Back 375 H. B.O.H. I. 1600 F. 1/2 hr. Spray J. 900 F. 1/2 hr. Air</p>	<p>A. F B. (.09C, 1.60 Mn, .46Si, .29Mo)* C. (.63Mn, .45Si, .54 Mo)* D. 1186-2 E. 1187 F. Stainless Lime G. DC REV</p>	<p>A. 60° SV B. 5/32" C. Flame D. Cutting E. Grinding</p>	<p>A. Carbon steel B. 1. I 3/16" 1a 210 - 26 2. I 1/4" 2a 300 - 30 3. I 1/4" 1a 300 - 30 4. I 1/4" 1SB 300 - 30 C. 2 hrs. 60° - 150° F. D. Backing strip removed by flame gouging. Weld reinforcement left on.</p>	<p>A. None B. None</p>	<p>2100 2100 2800 2800 37mm HE</p>	<p>2 1/2" R 5" U 4 1/2" D 12 1/2" Imp 11 1/2" U 5 1/2" D 1" D 1 1/2" Imp 2 1/2" V M-54 Projectile</p>	<p>I 11 1/2" V 3 1/2" I 1" V 5 1/2" V 2 1/2" I 23 1/2"</p>	<p>Passed radiograph</p>	
<p>A. AD-707 B. 6/24/43 C. V-7847-H D. Great Lakes Steel Corp. E. Combustion Eng. Co. Inc. F. Combustion Eng. Co. Inc.</p>	<p>A. 1/2" B. R-IV C. (.88Mn, .79Si, .29Mo)* D. .68Cr, .17Mo, .08Zr E. .27 F. Face 352 G. Back 375 H. B.O.H. I. 1600 F. 1/2 hr. Water J. 900 F. 1/2 hr. Air</p>	<p>A. F B. (.09C, 1.60 Mn, .46Si, .29Mo)* C. (.10C, 1.63 Mn, .45Si, .54Mo)* D. 1186-2 E. 1187 F. Stainless Lime G. DC REV</p>	<p>A. 40° SV B. 5/32" C. Flame D. Cutting E. Grinding</p>	<p>A. Carbon Steel B. 1. I 3/16" 1a 210 - 28 2. I 1/4" 2a 300 - 30 3. I 1/4" 1a 300 - 30 4. I 1/4" 1SB 300 - 30 C. 55 mins. 70° - 150° F. D. Backing strip removed and groove made by flame gouging. Reinforcement not removed.</p>	<p>A. None B. None</p>	<p>2540 2550 2509 37mm HE</p>	<p>2" L 3" U 7 1/2" Imp 5 1/2" U M-54 Projectile</p>	<p>I 6 1/2" II 3 1/2" V 1 1/2" I 8 1/2" II 3" V 4" I 17 1/2" II 2" V 1" O 49 1/2"</p>	<p>Passed radiograph Small amount of porosity</p>	
		*Weld Metal								

IDENTIFICATION	ANOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING	PROCEDURE	BEAT	BALLISTIC RESULTS				REMARKS ON CRACKING		
							H	VEL. F/S	VEL. LOCATION OF B. L.L. R.L.	CRACKING LOC. TYPE AMT			
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ANOR MANUFACTURER E. ELECTRODE MFG. F. ANOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BHN E. PROCESS F. HEAT TREATMENT G. TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. C. BODY TYPE D. GROUN TYPE E. TOTAL WELDING TIME & INTER PASS TEMPERATURE F. REMARKS	A. PRE B. POST								
A. J-707 B. 6/24/43 C. V-7847-I D. Jones & Laughlin Steel Corp. E. Combustion Eng. Co. Inc. F. Combustion Eng. Co. Inc.	A. 1/2" B. R-III C. (1.50Mn, .20Si, .32Mo) D. Face 352 Back 363 E. B.O.H. F. 1600 F. 1/2 hr. Water 850 F. 1/2 hr. Air Cool	A. F (.11C, 1.97 Mn, .47Si, .40Mo)* B. 1212 C. Stainless Lime D. DC REV	A. 40°SV B. 3/8" C. Flame Cutting Grinding	A. Carbon steel B. 1. I 1/4" 1a 300 - 30 2. I 1/4" 2a 300 - 30 3. I 1/4" 1a 300 - 30 C. 1:10 mins. 85 - 150 F. D. Backing strip removed and groove made by flame gouging. Weld reinforcement not removed.	A. None B. None	1	2218	1/2" R	6 1/2" U	Imp II	2 1/2"	Passed radiograph	
A. AD-707 B. 6/24/43 C. V-7847-J D. Jones & Laughlin Steel Corp. E. Combustion Eng. Co. Inc. F. Combustion Eng. Co. Inc.	A. 1/2" B. R-III C. (1.50Mn, .20Si, .32Mo) D. Face 352 Back 363 E. B.O.H. F. 1600 F. 1/2 hr. Water 850 F. 1/2 hr. Air Cool	A. F (.10C, 1.63 Mn, .45Si, .54Mo)* B. 1187 C. Stainless Lime D. DC REV	A. 40°SV B. 3/8" C. Flame Cutting Grinding	A. Carbon steel B. 1. I 1/4" 1a 300 - 30 2. I 1/4" 2a 300 - 30 3. I 1/4" 1a 300 - 30 C. 1:15 hrs. 90° - 150 F. D. Backing strip removed and groove made by flame gouging. Reinforcement not removed.	A. None B. None	1	2509	1/2" R	6" U	Imp I	11"	Passed radiograph	
A. AD-738 B. 7/9/43 C. V-7847-K D. Jones & Laughlin Steel Corp. E. Combustion Eng. Co. Inc. F. Combustion Eng. Co. Inc.	A. 1/2" B. R-III C. (1.50Mn, .20Si, .32Mo) D. Face 352 Back 363 E. B.O.H. F. 1600 F. 1/2 hr. Water 850 F. 1/2 hr. Air Cool	A. F (.09C, 1.60 Mn, .46Si, .29Mo)* B. 1187 C. Stainless Lime D. DC REV	A. 40°SV B. 3/8" C. Flame Cutting Grinding	A. Carbon steel B. 1. I 1/4" 1a 300 - 30 2. I 1/4" 3a 300 - 30 3. III 3/16" 2b 210 - 26 1/4" 1b 300 - 30 3/16" 2SB 210 - 26 1/4" 1SB 210 - 30 C. 1:40 mins. 95° - 150 F. D. Backing strip removed and groove made by flame gouging. Chipping and grinding time 2 hours, to remove reinforcement.	A. None B. None	1	2525 est.	1/2" R	6 1/2" D	Imp II	5 1/2"	Passed radiograph Small amount of scattered slag and porosity.	
						2	2525 est.	1/2" L	8 1/2" U	Imp I	7"		
						3	2525 est.	1/4" X	9 1/2" D	Imp I	7"		
						4	2525 est.	1/4" L	4 1/2" U	Imp II	3 1/2"		
						5	2525 est.	1/2" R	1" D	Imp I	28 1/2"		
							37mm HE M-54 Projectile						28.

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING PROCEDURE	HEAT	BALLISTIC RESULTS				REMARKS ON CRACKING
						H	V/S	LOC.	CRACKING	
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE BEGR. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BRN E. PROCESS F. HEAT TREATMENT G. TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROWN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST					
A. AD-738 B. 7/9/43 C. V-7647-L D. Jones & Laughlin Steel Corp. E. Combustion Eng. Co. Inc. F. Combustion Eng. Co. Inc.	A. 1/2" B. R-III (.150Mn, .20Si, .32Mo) C. .25 D. Face 352 Back 363 E. B.O.H. F. 1600 F. 1/2 hr. Water 850 F. 1/2 hr. Air Cool	A. F (.09C, 1.60 Mn, .46Si, .29Mo)* (.11C, 1.87 Mn, .47Si, .40Mo)* B. 1212 C. --- D. DC REV	A. 120° DV B. 3/8" C. Flame Cutting Grinding	A. Copper B. 1. II 3/16" 2a 210 - 26 2. & Two layers 1/4" 2a 300 - 30 C. 58 mins. 95 - 150° F. D. Weld reinforcement not removed.	A. None B. None	1	2564	14" R 8 1/2" U	Imp I 4 1/2" II 14 1/2" V 14 1/2" 3-1/4" X Imp I 15 1/2"	Passed radiograph 3-1/2" opening
A. AD-778 B. 8/5/43 C. NR63B5B D. Great Lakes Steel Corp. E. Combustion Eng. Co. Inc. F. Combustion Eng. Co. Inc.	A. 1/2" B. R-IV (.88Mn, .79Si, .17Mo, .08Zr) C. .27 D. Face 368 E. B.O.H. F. 1600 F. 1/2 hr. Spray 900 F. 1/2 hr. Air cool	A. F (1.65Mn, .31Si, .45Mo)* (1.55Mn, .36Si, .46Mo)* B. 1231 C. Stainless Lime D. DC REV	A. 40° SV B. 3/8" C. Flame Cutting Grinding	A. Carbon steel B. 1. I 3/16" 1a 210 - 26 2. I 1/4" 3a 300 - 30 3. III 3/16" 2b 210 - 26 1/4" 1b 300 - 30 3/16" 28B 210 - 26 1/4" 18B 300 - 30 C. 1:45 hrs. 90 - 150 F. D. Flame gouged groove. Chipping and grinding time 2 hours, to remove weld reinforcement.	A. None B. None	1	2518	2 1/2" L 6 1/2" U	Imp I 4" III 4"	Passed radiograph Small amount of porosity.
						2	2534	4 1/4" R	Imp I 4"	
						3	2537	X 5"	Imp I 4"	
						4	2615	2 1/2" R	Imp I 10 1/2" II 2" III 1 1/2" 14 1/2"	
						5	2614	1/2" R	Imp I 10 1/2" II 2" III 1 1/2" 14 1/2"	
						6	2650 est.	1" L	Imp I 10 1/2" II 2" III 1 1/2" 14 1/2"	
						7	2696	4" L	Imp I 10 1/2" II 2" III 1 1/2" 14 1/2"	
							37	HE M-54	Projectile	

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING PROCEDURE	HEAT	BALLISTIC RESULTS				REMARKS ON CRACKING
						VEL.	LOC.	CRACKING	RADIOGRAPHIC RESULTS, ETC.	
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFG. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BHR E. PROCESS F. HEAT TREATMENT G. TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROW TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	F/S	L.L. R.L. C.B. LOC. TYPE AMT			
A. AD-786 B. 6/12/43 C. NRG5E5A D. Great Lakes Steel Corp. E. Combustion Eng. Co. Inc. F. Combustion Eng. Co. Inc.	A. 1/2" B. R-IV C. .88Mn, .79Si, .68Cr, .17Mo, .08Zr D. 27 E. Face 340 F. E.O.H. G. 1600 F. 1/2 hr. Spray H. 900 F. 1.2 hr. Air Cool	A. F (1.55Mn, .36Si, .46Mo)* B. 1231 C. Stainless D. DC REV	A. 40° SV B. 3/8" C. Flame Cutting Grinding	A. Carbon steel B. 1. I 1/4" 1a 300 - 30 2. I 1/4" 2a 300 - 30 3. I 1/4" 1a 300 - 30 1/4" 1SB 300 - 30 C. 1.09 hrs. 90° - 150°F. D. Flame gouged groove. Weld reinforcement removed, time 2 hours chipping and grinding.	A. None B. None	2528 2538	1/2" R U 5 1/2" D III III 15 1/2"	Imp Imp II III	Passed radiograph Small amount of porosity and slag throughout the welds	
A. AD-786 B. 6/12/43 C. NRG5E5A D. Carnegie Illinois Steel Corp. E. Combustion Eng. Co. Inc. F. Combustion Eng. Co. Inc.	A. 1/2" B. R- C. Face 349 D. --- E. --- F. ---	A. F (1.55Mn, .36Mn, .46Mo)* B. 1231 C. Stainless D. DC REV	A. 40° SV B. 3/8" C. Flame Cutting Grinding	A. Carbon steel B. 1. I 1/4" 1a 300 - 30 2. I 1/4" 2a 300 - 30 3. I 1/4" 1a 300 - 30 1/4" 1SB 300 - 30 C. 1.10 hrs. 90° - 150°F. D. Flame gouged groove. Weld reinforcement removed, time 2 hours-chipping and grinding.	A. None B. None	2524 2525 2608 2898 2700 2200	1 1/4" R U 5" D X 5" U 5" U 3" L U	5 1/2" U 5" D 9 1/2" D 5" U 5" U 1 1/2" U	Passed radiograph Small amount of slag	
		*Weld Metal				37mm HE M-54 Projectile				

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING	PROCEDURE	HEAT		BALLISTIC RESULTS				REMARKS ON CRACKING	
						A. PRE	B. POST	H	VEL. F/S	LOC.	CRACKING		RADIOGRAPHIC RESULTS, ETC
A. Firing Record No. B. Date of Test C. Plate No. D. Armor Manufacturer E. Electrode Mfg. F. Armor Fabricator	A. Plate Thickness B. Type C. Carbon Content D. BHN E. Process F. Heat Treatment Temp. Time Quench	A. Type B. Trade Name C. Coating D. Current & Polarity	A. Groove, Included B. Angle, Root Face C. Plate Preparation	A. Backing B. Deposition Size El. No. Type App. V. 1. Root Type 2. Body Type 3. Groove Type C. Total Welding Time & Inter Pass Temperature D. Remarks	A. Pre B. Post	H	VEL. F/S	LOC.	CRACKING	RADIOGRAPHIC RESULTS, ETC			
A. AD-796 B. 8/12/43 C. NR655B D. Carnegie-Illinois Steel Corp. E. Combustion Eng. Co. Inc. F. Combustion Eng. Co. Inc.	A. 1/2" B. R C. --- D. Face 348 E. --- F. ---	A. F (1.55MM, .96SI, .46 MO)* B. 1231 C. Stainless Lime D. DC REV	A. 40°SV B. 3/8" C. Flame Cutting Grinding	A. Carbon steel B. 1. I 1/4" 1a 300 - 30 2. I 1/4" 2a 300 - 30 3. I 1/4" 1a 300 - 30 1/4" 1B 300 - 30 C. 1:13 mins. 90° - 150°F. D. Flame gouged groove. Weld reinforcement removed, time 2 hours.	A. None B. None	1	2530	2" R	9" U	0	III	2"	Passed radiograph
						2	2533	1" L	7" D				
						3	2521	1" R	4 1/2" D				
						4	2586	4" L	9 1/2" U				
						5	2613	1/2" L	4" U	Imp	III	1/2"	
						6	2702	4 1/2" L	3" D				
							37mm HE	M-54	Projectile				

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING	PROCEDURE	HEAT		BALLISTIC RESULTS					REMARKS ON CRACKING		
						A. PRE	B. POST	H	VEL.	F/S	L.L.	R.L.		C.B.	LOC.
A. TING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFG. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BHN E. PROCESS F. HEAT TREATMENT TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE (AF, V, PASSES) 1. ROOT TYPE 2. BODY TYPE 3. GROUN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	H	VEL.	F/S	L.L.	R.L.	C.B. <td>LOC.</td> <td>CRACKING</td> <td>RADIOGRAPHIC RESULTS, ETC.</td>	LOC.	CRACKING	RADIOGRAPHIC RESULTS, ETC.	
A. AD-788 B. 8/16/43 C. 99 D. Jones & Laughlin Steel Corp. E. Harnischfeger Corp. F. Fisher Tank Division	A. 1/2" B. R-III (1.66Mn, .28Si, .39Mo) C. .28 D. Face 311 Back 321 E. 1600°F. 1/2 hr. Water 875°F. 1-1/2 hrs. Air	A. F (.13C, 1.54 Mn, .12Si, .60)* B. AW-2-C C. Lime D. DC	A. 45°SV B. 3/8" C. Flame Cutting Grinding	A. Mild steel B. 1. I 3/16" 1a 225 - 20 2. I 1/4" 3a 325 - 30 3. III 3/16" 3b 225 - 20 3. III 3/16" 3B 225 - 20 C. 1:45 hrs. 140° - 185°F. D. 3 mins. chipping after each pass. 1 hr. grinding to remove steel back up after flame gouging. Reinforcement ground off.	A. None B. None	1 2	2577 2587		1/2" 1/4"	R R	2 1/2" 3/4" D	Imp Imp III V 18"	III I II III V	Passed radiograph Moderate amount of slag and porosity throughout the welds	
A. AD-788 B. 8/16/43 C. 99 D. Jones & Laughlin Steel Corp. E. Harnischfeger Corp. F. Fisher Tank Division	A. 1/2" B. R-III (1.66Mn, .28Si, .39Mo) C. .28 D. Face 311 Back 321 E. 1600°F. 1/2 hr. Water 875°F. 1-1/2 hrs. Air	A. F (.13C, 1.54 Mn, .12Si, .60)* B. AW-2-C C. Lime D. DC REV	A. 45°DV B. 3/16" C. Flame Cutting Grinding	A. None B. 1. I 5/32" 1a 125 - 18 2. I 5/32" 1a 165 - 22 5/32" 2a 175 - 22 3. III 5/32" 4b 175 - 22 3/16" 2b 225 - 22 C. 1:57 hrs. 130° - 200°F. D. Reinforcement ground off.	A. None B. None	1 2	2525 est. 2518		X 3/4"	X R U	5 1/2" D 5" U	Imp D U	III III III	Passed radiograph Moderate amount of slag and porosity throughout the welds	
A. AD-788 B. 8/16/43 C. 100 D. Jones & Laughlin Steel Corp. E. Harnischfeger Corp. F. Fisher Tank Division	A. 1/2" B. R-III (1.40Mn, .25Si, .62Mo) C. .27 D. Face 363 Back 363 E. 1600°F. 1/2 hr. Water 875°F. 1-1/2 hrs. Air	A. F (.13C, 1.54 Mn, .12Si, .60Mo)* B. AW-2-C C. Lime D. ---	A. 45°SV B. 3/8" C. ---	A. Mild steel B. 1. I 3/16" 1a 200 - 21 2. I 1/4" 2a 325 - 21 3. I 1/4" 1a 325 - 21 C. 1:15 hrs. 140° - 200°F. D. 3 mins. chipping after each pass. 45 mins. of grinding after mild steel back-up was flame gouged out. Pass NO. 1 was replaced by NO. 5 - 1/4" - 325 - 21. Reinforcement ground off.	A. None B. None	1 2	2517 2558		X 1/4"	X R U	7 1/2" D 6 1/2" U	Imp U	III III	Passed radiograph Moderate amount of slag and porosity in all the welds	
		*Weld Metal													

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING		HEAT	BALLISTIC RESULTS				REMARKS ON CRACKING			
				A. BACKING	B. DEPOSITION SIZE EL. NO. TYPE AMP. V.		A. PRE	B. POST	H	F/S		VEL.	LOCATION OF B	CRACKING
A. FIRING RECORD NO.	A. PLATE THICKNESS	A. TYPE	A. GROOVE, INCLUDED	A. BACKING	A. MILD STEEL	A. NONE	A. PRE							
B. DATE OF TEST	B. TYPE	B. TRADE NAME	B. ANGLE, ROOT FACE	B. DEPOSITION SIZE EL. NO. TYPE AMP. V.	B. REMARKS	B. NONE	B. POST							
C. PLATE NO.	C. CARBON CONTENT	C. COATING	C. ROOT GAP	1. ROOT TYPE	1. 3/16" 1a 200 - 21									
D. ARMOR MANUFACTURER	D. BRN	D. AW-2-C	C. PLATE PREPARATION	2. BODY TYPE	2. I 1/4" 2a 325 - 21									
E. ELECTRODE MFG.	E. PROCESS	C. Lime		3. CROWN TYPE	3. III 5/32" 2b 165 - 21									
F. ARMOR FABRICATOR	F. HEAT TREATMENT	D. DC		C. TOTAL WELDING TIME & INTER PASS TEMPERATURE	1/4" 1b 325 - 21									
	F. TEMP. TIME QUENCH				5/32" 2SB 165 - 21									
					1/4" 1SB 325 - 21									
					C. 1:28 hrs. 140 - 200°F.									
					D. 45 mins. to grind out									
					pass No. 1 after back-up									
					strip was removed. 2 mins.									
					of chipping after each pass.									
					Reinforcement ground off.									
A. AD-788	A. 1/2"	A. F	A. SV 45°	A. Mild steel	A. 1:28 hrs. 140 - 200°F.	A. None	A. None	1	2515	1"	4 1/2"	Imp II	8"	Passed radiograph
B. 8/16/43	B. R-III	(.13C, 1.54 Mn, .12Si, .60Mo)*	B. Flame	B. 1. I 3/16"	1a 200 - 21	B. None	B. None	2	2821	1"	4 1/2"	Imp III	11 1/2"	Small amount of slag and porosity throughout the welds
C. 101	C. .27	B. AW-2-C	C. Grinding	2. II 1/4"	2a 325 - 21						5"	Imp III	19 1/2"	
D. Jones & Laughlin Steel Corp.	D. Face 363	C. Lime		3. III 5/32"	2b 165 - 21						L	D		
E. Harnischfeger Corp.	D. Back 363	D. DC		1/4"	1b 325 - 21									
F. Fisher Tank Division	E. 1600°F. 1/2 hr. Water			5/32"	2SB 165 - 21									
	F. 875°F. 1-1/2 hrs. Air			1/4"	1SB 325 - 21									
					C. 1:28 hrs. 140 - 200°F.									
					D. 45 mins. to grind out									
					pass No. 1 after back-up									
					strip was removed. 2 mins.									
					of chipping after each pass.									
					Reinforcement ground off.									
A. AD-796	A. 1/2"	A. F	A. 45° SV	A. Mild steel	A. 1:41 hrs. 150 - 300°F.	A. None	A. None	1	2516	1"	6 1/2"	Imp III	8 1/2"	Passed radiograph
B. 8/17/43	B. R-III	(.13C, 1.54 Mn, .12Si, .60Mo)*	B. 3/8"	B. 1. I 3/16"	1a 225 - 21	B. None	B. None	2	2513	1"	6 1/2"	Imp III	14"	Small amount of slag and porosity throughout the welds.
C. 106	C. .28	B. AW-2-C	C. Grinding	2. III 3/16"	2b 225 - 21						8"	Imp II	9 1/2"	
D. Jones & Laughlin Steel Corp.	D. Face 311	C. Lime		3. III 3/16"	2b 225 - 21						L	D		
E. Harnischfeger Corp.	D. Back 321	D. DC REV		1/4"	1b 300 - 21									
F. Fisher Tank Division	E. 1600°F. 1/2 hr. Water			3/16"	2SB 225 - 21									
	F. 875°F. 1-1/2 hrs. Air			1/4"	1SB 300 - 21									
					C. 1:41 hrs. 150 - 300°F.									
					D. 3 mins. of chipping after									
					each pass. 39 mins. grinding									
					after back-up strip was re-									
					moved. Weld reinforcements									
					ground off.									
A. AD-798	A. 1/2"	A. F	A. 45° SV	A. Mild Steel	A. 2:29 hrs. 120 - 160°F.	A. None	A. None	1	2513	1"	4 1/2"	Imp I	1"	Failed radiograph
B. 8/17/43	B. R-III	(.13C, 1.54 Mn, .12Si, .60Mo)*	B. 3/8"	B. 1. II 5/32"	2b 165 - 21	B. None	B. None	2	2513	1"	4 1/2"	Imp II	3"	Due to excessive porosity and slag
C. 107	C. .28	B. AW-2-C	C. Grinding	2. II 5/32"	4b 165 - 21						R	D	4"	3/8" crack in crossbar
D. Jones & Laughlin Steel Corp.	D. Face 311	C. Lime		3. II 5/32"	2b 165 - 21						6 1/2"	U		
E. Harnischfeger Corp.	D. Back 321	D. DC REV		5/32"	3SB 165 - 021									
F. Fisher Tank Corp.	E. 1600°F. 1/2 hr. Water			C. 2:29 hrs. 120 - 160°F.	each pass. 42 mins. grinding									
	F. 875°F. 1-1/2 hrs. Air			D. 3 mins. of chipping after	after back-up strip									
					was removed. Weld reinforce-									
					ments ground off.									

IDENTIFICATION	ANOR DATA			ELECTRODE DATA		JOINT DESIGN		WELDING		PROCEDURE		HEAT		BALLISTIC RESULTS			REMARKS ON CRACKING	
	A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFG. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BHN E. HEAT TREATMENT F. TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. CROWN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	H	VEL. F/S	LOC. OF H. CRACKING L.L. R.L. C.B. LOC. TYPE AMT	CRACKING	REMARKS ON CRACKING	RADIOGRAPHIC RESULTS, ETC.						
A. AD-796 B. 8/17/43 C. 108 D. Jones & Laughlin Steel Corp. E. Harnischfeger Corp. F. Fisher Tank Division	A. 1/2" B. R-III (1.68Mn, .26S1, .39Mo) C. .28 D. Face 311 Back 321 E. 1600°F. 1/2 hr. Water 875°F. 1-1/2 hrs. Air	A. F (.13C, 1.54 Mn, .12S1, .60Mo)* B. AW-2-C C. Lime D. DC REV	A. SV 45° B. 3/8" C. Flame Cutting Grinding	A. Mild steel B. 1. II 5/32" 2b 165 - 21 2. III 5/32" 4b 165 - 21 3. II 5/32" 3b 165 - 21 5/32" 3SB 165 - 21 C. 2:22 mins. 140° - 300°F. D. 3 mins. chipping after each pass. 45 mins. grinding after removal of back-up strip. Weld reinforcements ground off.	A. None B. None	1 2	2519 2518	1/2" L 7 1/2" L 1 1/2" L 2 1/2" L 9 1/2" L	5 1/2" U 7 1/2" Imp I 6 1/2" Imp II 9 1/2" Imp III	Failed radiograph 1/4" crack in crossbar Small amount of slag and porosity throughout the welds								
A. AD-800 B. 8/25/43 C. 102 D. Jones & Laughlin Steel Corp. E. Harnischfeger Corp. F. Fisher Tank Division	A. 1/2" B. R-III (1.40Mn, .25S1, .52Mo) C. .27 D. Face 363 Back 363 E. 1600°F. 1/2 hr. Water 875°F. 1-1/2 hrs. Air	A. F (.13C, 1.54 Mn, .12S1, .60Mo)* B. AW-2-C C. Lime D. DC	A. SV 45° B. 3/8" C. Flame Cutting Grinding	A. Mild steel B. 1. I 3/16" 1a 225 - 21 2. I 1/4" 2a 325 - 21 3. III 5/32" 2b 165 - 21 1/4" 1b 300 - 21 5/32" 2SB 165 - 21 1/4" 1SB 300 - 21 C. 1:25 hrs. 140° - 180°F. D. 4 mins. of chipping after each pass. 32 mins. of grinding after back-up strip was removed. Weld reinforcement ground off.	A. None B. None	1 2 3 4 5 6	2521 2521 2528 2526 2514 2532	2" L 2" R 1 1/2" L 2 1/2" R 1 1/2" L 7" U HE M-54 Projectile	4" D 3 1/2" U 7 1/2" Imp III 5" D 12" D 7" Imp III 4" U 4 1/2" U	Passed radiograph Moderate amount of slag and porosity throughout the welds								
A. AD-800 B. 8/25/43 C. 103 D. Jones & Laughlin Steel Corp. E. Harnischfeger Corp. F. Fisher Tank Division	A. 1/2" B. R-III (1.68Mn, .26S1, .39Mo) C. .28 D. Face 311 Back 321 E. 1600°F. 1/2 hr. Water 875°F. 1-1/2 hrs. Air	A. F (.13C, 1.54 Mn, .12S1, .60Mo)* B. AW-2-C C. Lime D. DC	A. 45° SV B. 3/8" C. Flame Cutting Grinding	A. Mild steel B. 1. I 3/16" 1a 225 - 21 2. III 1/4" 1a 325 - 21 3. III 3/16" 2b 225 - 21 1/4" 1b 300 - 21 3/16" 2SB 225 - 21 1/4" 1SB 300 - 21 C. 1:33 hrs. 160° - 180°F. D. 4 mins. chipping after each pass. 32 mins. grinding to clean after removal of back-up. Weld reinforcement ground off.	A. None B. None	1 2 3	2509 2533 2528	1" L 1/2" R 1/2" L HE M-54 Projectile	3 1/2" Imp III 8 1/2" Imp I 7" Imp II 2 1/2" Imp III U3-5/8" X 3-1/2" opening 14 1/2"	Failed radiograph Excessive imperfect fusion and porosity								

IDENTIFICATION	ABSOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING	PROCEDURE	HEAT	BALLISTIC RESULTS				REMARKS ON CRACKING	
							VEL.	LOC. OF B.	CRACKING	RADIOGRAPHIC RESULTS, ETC.		
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFR. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BSW E. PROCESS F. HEAT TREATMENT TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. CURRENT & POLARITY D. DC	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NG. TYPE ANP. V. 1. ROOT TYPE 2. BODY TYPE 3. CROWN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	H	VEL. F/S	LOC. OF B. L.L. R.L. C. B.	CRACKING LOC. TYPE AMT	RADIOGRAPHIC RESULTS, ETC.		
A. AD-800 B. 8/25/43 C. 104 D. Jones & Laughlin Steel Corp. E. Farnischfeger Corp. F. Fisher Tank Division	A. 1/2" B. R-III (1.66Mn, .26Si, .39Mo) C. .28 D. Face 311 Back 321 E. 1600 F. 1/2 hr. Water 875 F. 1-1/2 hrs. Air	A. F (.13C, 1.54 Mn, .12Si, .60Mo)* B. AW-2-C C. Lime D. DC	A. 45° SV B. 3/8" C. Flame Cutting Grinding	A. Mild steel B. 1. I 3/16" 1a 225 - 21 2. I 1/4" 2a 325 - 21 3. I 1/4" 1a 300 - 21 C. 1:09 hrs. 140° - 180° F. D. 3 mins. chipping after each one. Weld reinforcement ground off.	A. None B. None	1	2555	X	6 1/2" U Imp II	1/2"	Passed radiograph Moderate amount of scattered slag and porosity in all the welds	
A. AD-800 B. 8/25/43 C. .05 D. Jones & Laughlin Steel Corp. E. Farnischfeger Corp. F. Fisher Tank Division	A. 1/2" B. R-III (1.66Mn, .26Si, .39Mo) C. .28 D. Face 311 Back 321 E. 1600 F. 1/2 hr. Water 875 F. 1-1/2 hrs. Air	A. F (.13C, 1.54 Mn, .12Si, .60Mo)* B. AW-2-C C. Lime D. DC REV	A. 45° SV B. 3/8" C. Flame Cutting Grinding	A. Mild steel B. 1. I 3/16" 1a 225 - 21 2. I 1/4" 2a 325 - 21 3. I 1/4" 1a 300 - 21 C. 1:08 hrs. 140° - 300° F. D. 3 mins. chipping after each pass. 45 mins. grinding after mild steel back-up was removed. Weld reinforcement ground off.	A. None B. None	1	2521	3" L	12 1/2" U 4 1/2" D	12 1/2" 5" 1 1/2" 19 1/2"	Passed radiograph Small amount of slag and porosity	
A. AD-866 B. 9/5/43 C. 111 D. Jones & Laughlin Steel Corp. E. Farnischfeger Corp. F. Fisher Tank Division	A. 1/2" B. R-III (1.65Mn, .25Si, .25Mo) C. .25 D. Face 311 Back 321 E. 1600 F. 1/2 Fr. Water 875 F. 1-1/2 hrs. Air	A. F (.13C, 1.54 Mn, .12Si, .60Mo)* B. AW-2-C C. Lime D. DC	A. 45° SV B. 3/8" C. Flame Cutting Grinding	A. 1/4 x 1" Mild steel B. 1. I 3/16" 1a 225 - 21 2. I 1/4" 2a 225 - 21 3. I 1/4" 1a 225 - 21 C. 1:12 hrs. 120° - 300° F. D. 3 mins. chipping after each pass. 30 mins. grinding after back-up strip was removed. Weld reinforcements ground off.	A. None B. None	1	2525	3 1/2" L	3 1/2" U 6" D	3 1/2" 6" 2 1/2" D 2 1/2" U	Failed radiograph Excessive cracking and imperfect fusion in the welds Moderate amount of slag and porosity throughout the welds	
		*Weld Metal					37mm	HE M-54	Projectile			

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING PROCEDURE	HEAT	BALLISTIC RESULTS				REMARKS ON CRACKING
						VEL.	LOC.	CRACKING	RADIOGRAPHIC RESULTS, ETC.	
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFG. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BHN E. PROCESS F. HEAT TREATMENT TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. GAWN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	F/S	R.L. C.B. LOC.	TYPE	AMT	
A. AD-866 B. 9/3/43 C. 112 D. Great Lakes Steel Corp. E. Farnischfeger Corp. F. Fisher Tank Division	A. 1/2" B. R-V (1.46Mn, .25S1, .33Cr, .15Mo) C. .23 D. Face 321 Back 321 E. — F. 1650°F. 1/2 hr. Water 930°F. 1/2 hr. Air	A. F (.13C, 1.54 Mn, .12S1, .013Cr, .60Mo)* B. AW-2-C C. Lime D. DC	A. 45°SV B. 3/8" C. Flame Cutting Grinding	A. 1/4 x 1" Mild steel B. 1. II 5/32" 2b 165 - 21 2. II 5/32" 4b 165 - 21 3. II 5/32" 3b 165 - 21 5/32" 3SB. 165 - 21 C. 2:11 hrs. chipping after each pass. 30 mins. grinding after back-up bar was removed. Weld reinforcements ground off. D. 3 mins. chipping after each pass. 30 mins. grinding after back-up bar was removed. Weld reinforcements ground off.	A. None B. None	2527	2 1/8" U	Imp V	9 1/2"	Passed radiograph Moderate amount of slag and porosity throughout the welds
A. AD-866 B. 9/3/43 C. 113 D. Great Lakes Steel Corp. E. Farnischfeger Corp. F. Fisher Tank Division	A. 1/2" B. R-V (1.46Mn, .25S1, .33Cr, .15Mo) C. .23 D. Face 321 Back 311 E. — F. 1650°F. 1/2 hr. Water 930°F. 1/2 hr. Air	A. F (.08C, 1.54 Mn, .12S1, .013Cr, .60Mo)* B. AW-2-C C. Lime D. DC	A. 45°SV B. 3/8" C. Flame Cutting Grinding	A. 1/4 x 1" Mild steel B. 1. I 3/16" 1a 225 - 21 2. I 1/4" 2a 325 - 21 3. I 1/4" 1a 325 - 21 1/4" 1SB 300 - 21 C. 1:08 hrs. chipping after each pass. 30 mins. grinding after back-up strip was removed. Weld reinforcements ground off. D. 3 mins. chipping after grinding after back-up strip was removed. Weld reinforcements ground off.	A. None B. None	2517 2509	1" 6" R U 4 1/2" D	Imp II Imp II Imp III	1" 8 1/4"	Failed radiograph 3/16" crack in crossbar Excessive amount of imperfect fusion, slag and porosity
A. AD-866 B. 9/3/43 C. 114 D. Great Lakes Steel Corp. E. Farnischfeger Corp. F. Fisher Tank Division	A. 1/2" B. R-V (1.46Mn, .25S1, .33Cr, .15Mo) C. .23 D. Face 321 Back 311 E. — F. 1650°F. 1/2 hr. Water 930°F. 1/2 hr. Air	A. F (.13C, 1.54 Mn, .12S1, .013Cr, .60Mo)* B. AW-2-C C. Lime D. DC	A. 45°SV B. 3/8" C. —	A. 1/4 x 1" Mild steel B. 1. I 3/16" 1a 225 - 21 2. I 1/4" 2a 325 - 21 3. I 1/4" 1a 325 - 21 1/4" 1SB 300 - 21 C. 1:09 hrs. chipping after each pass. 30 mins. grinding after removal of back-up strip. Weld reinforcements ground off. D. 3 mins. chipping after grinding after removal of back-up strip. Weld reinforcements ground off.	A. None B. None	2513 2516 2565	1 1/2" 9" R U 7 1/2" D 6" U	Imp III Imp III Imp III	1 1/2" 8" 8"	Failed radiograph Excessive imperfect fusion, slag and porosity
		*Weld Metal				2564	7 1/2" 5" L U	Imp III	8" 9 1/2"	
						37mm HE M-54	HE M-54 Projectile	Projectile		

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING	PROCEDURE	HEAT	BALLISTIC RESULTS					REMARKS ON CRACKING	
							VEL.	LOC.	CRACKING	RADIOGRAPHIC RESULTS, ETC.	F/S		L.L.
A. AD-872 B. 9/7/43 C. P-115 D. Jones & Laughlin Steel Corp. E. Farnischfeger Corp. F. Fisher Tank Division	A. 1/2" B. R-III (1.53Mn, .18Si, .35Mo) C. .25 D. Face 341 Back 352 E. 1625°F, 1/2 hr. Water 880°F, 1/2 hr. Air	A. F (.13C, 1.54 Mn, .12Si, .60Mo)* B. AW-2-C C. Lime D. DC REV	A. 45° SV B. 3/8" C. Flame Cutting Grinding	A. Mild steel B. 1. I 3/16" 1a 250 - 21 2. III 1/4" 1a 200 - 21 2b 350 - 21 3. III 5/32" 2b 200 - 21 1/4" 1b 350 - 21 5/32" 2SB 200 - 21 1/4" 1SB 350 - 21 C. 1:33 mins. chipping after each pass. 19 mins. grinding after back-up strip was removed. Reinforcement off.	A. None B. None	1 2513 1/2" R 6 1/2" U 2 2518 1 1/2" R 9 1/2" D 3 2518 1 1/2" R 5 1/2" U 4 2592 1 1/2" R 5 1/2" D	HE M-54 Projectile	Imp I II III V	2 1/2" 3" 4 1/2"	Failed radiograph 3/8" transverse crack in upper right leg weld. Small amount of slag at both junctions			
A. AD-878 B. 9/11/43 C. P-116 D. Great Lakes Steel Corp. E. Farnischfeger Corp. F. Fisher Tank Division	A. 1/2" B. R-V (1.46Mn, .25Si, .33Cr, .18Mo) C. .23 D. Face 352 Back 352 E. 1650°F, 1/2 hr. Water 930°F, 1/2 hr. Air	A. F (.13C, 1.54 Mn, .12Si, .60Mo)* B. AW-2-C C. Lime D. DC REV	A. 45° SV B. 3/8" C. Flame Cutting Grinding	A. Mild steel B. 1. I 3/16" 1a 250 - 21 2. III 1/4" 1a 200 - 21 2b 350 - 21 3. III 5/32" 2b 200 - 21 1/4" 1b 350 - 21 5/32" 2SB 200 - 21 1/4" 1SB 350 - 21 C. 1:31 hrs. 120° - 360°F. each pass. 20 mins. grinding after back-up was removed. Reinforcement ground off.	A. None B. None	1 2511 3/4" R 3 1/2" U 2 2534 2 1/2" R 8 1/2" D 3 2534 2" L 7 1/2" Imp III 4 2537 X 5 1/2" D 0 III 0 V 0 V	HE M-54 PROJECTILE	Imp I II III V	2 1/2" 3" 4 1/2" 4" 4 1/2" 16 1/2"	Passed radiograph. Small amount of slag throughout			
A. AD-886 B. 9/16/43 C. P-117 D. Jones & Laughlin Steel Corp. E. Farnischfeger Corp. F. Fisher Tank Division	A. 1/2" B. R-III (1.53Mn, .18Si, .35Mo) C. .25 D. Face 341 Back 352 E. 1625°F, 1/2 hr. Water 880°F, 1-1/2 hrs. Air	A. F (.13C, 1.54 Mn, .12Si, .60Mo)* B. AW-2-C C. Lime D. AC	A. 45° SV B. 3/8" C. Flame Cutting Grinding	A. Mild steel B. 1. I 3/16" 1a 250 - 21 2. III 1/4" 1a 200 - 21 2b 350 - 21 3. III 5/32" 2b 200 - 21 1/4" 1b 350 - 21 5/32" 2SB 200 - 21 1/4" 1SB 350 - 21 C. 1:54 hrs. 160° - 400°F. Reinforcement ground off.	A. None B. None	1 2495 7/8" R 4" D 2 2515 X 4 1/2" Imp III 3 2524 2 1/2" R 5 1/2" U 0 III 4 2522 1" L 7 1/2" Imp III 6 1/2" III 2 1/2" III	HE M-54 PROJECTILE	Imp III III III III III III	7 1/2" 7 1/2" 6 1/2" 2 1/2" 16 1/2"	Passed radiograph. Moderate amount of porosity throughout			
		*Weld Metal											

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING PROCEDURE	BEAT	BALLISTIC RESULTS				REMARKS ON CRACKING		
						VEL.	LOCATION OF H	CRACKING	RADIOGRAPHIC RESULTS, ETC.			
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFG. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BHN E. PROCESS F. HEAT TREATMENT G. TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROW TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	H	F/S	L.L. R.L. C.B. LOC.	TYPE	AMT		
A. A 10912 B. 11/9/43 C. 122 D. Jones & Laughlin E. Harnischfeger F. Fisher Tank Division.	A. 1/2" B. R III 1.52Mn .09Si .014S .027P .59Mo C. .28C D. Face 302 Back 302 E. 1625°F ½ hr water 880 F ½ hr air	A. F .17C 1.98Mn .19Si .010S .022P .59Mo B. AW-2C C. Lime D. DC-REV	A. 45° SV B. 1/8" C. Flame cutting. Grinding.	A. Copper B. 1. I 5/32" 1a 150 22 2. I 5/32" 1a 150 22 3. I 1/4" 1a 325 26 Seal bead - 3/16" 1a 225 26 C. 1 hr. 18 minutes 130 F - 300°F D. Grinding time 37 minutes.	A. None B. None	1 2	2509 2523	1 5 1/8" 16 L 7 1/2" R IMP U IMP D	I I	8" 19 5/8" 27 5/8"	P Small amount of porosity and slag.	
A. A 10912 B. 11/9/43 C. 123 D. Jones & Laughlin E. Metal & Thermit Mfg. F. Fisher Tank Division	A. 1/2" B. R III 1.52Mn .09Si .014S .027P .59Mo C. .28C D. Face 302 Back 302 E. 1625°F ½ hr water 880 F ½ hr air	A. F .20C 1.74Mn .39Si .011S .017P .80Mo B. Murex C. DC-REV	A. 45° SV B. 1/8" C. Flame cutting. Grinding.	A. Copper B. 1. I 5/32" 1a 150 21 2. I 5/32" 1a 175 21 3. I 1/4" 1a 325 26 Seal bead - 3/16" 1a 220 26 C. 1 hour 36 minutes 140°F - 260°F D. Grinding time 37 minutes.	A. None B. None	1 2 3 4 5	37mm HE M54 2523 2525 2525 2522 2516	2 1/2" HE M54 Projectile L U R D 4 1/2" IMP L U 3" 6 1/2" IMP 8 L 7 1/2" D L D	I I I I I	7" 6" - 15 16 14 1/2" - 16 1/8"	P Small amount of porosity.	
A. A 10921 B. 11/11/43 C. 124 D. Jones & Laughlin E. McKey F. Fisher Tank Division	A. 1/2" B. R III 1.52Mn .09Si .014S .027P .59Mo C. .28C D. Face 321 Back 302 E. 1625°F ½ hr water 880 F 1 ½ hr air	A. F .14C 1.98Mn .20Si .009S .020P .73Mo B. Pluralloy C. Lime D. DC-REV	A. 45° SV B. 1/8" C. Flame cutting. Grinding.	A. Copper B. 1. I 5/32" 1a 150 22 2. I 3/16" 1a 225 26 3. I 1/4" 1a 325 26 Seal bead - 3/16" 1a 225 26 C. 1 hour 4 minutes 110 F - 280 F D. Grinding time 32 minutes.	A. None B. None	1 2 3	2525 2525 2513	X 4 1/8" U 1" IMP L D 1/2" IMP R U	I I I	11 1/2" 13 1/2" 17 7/8" 42 5/8"	P Moderate amount of slag and porosity.	
							37mm HE M54	HE M54 Projectile				99.

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING PROCEDURE	BEAT	BALLISTIC RESULTS			REMARKS ON CRACKING
						VEL.	LOC.	CRACKING	
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFG. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BHN E. PROCESS F. HEAT TREATMENT G. TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROWN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	F/S	L.L. R.L. C.B. LOC. TYPE ART	CRACKING	RADIOGRAPHIC RESULTS, ETC.
A. A 10924 B. 11/16/43 C. H 119 D. Jones & Laughlin E. McKay Company F. Fisher Tank Division	A. 1/2" B. R III C. .52Mn .09S1 .014S .027P .59Mn .28C D. Face 321 Back 302 E. 1625° F 1/2 hr water 880° F 1 1/2 hr air	A. F .14C 1. 96Mn .20S1 .009S .020P .73Mo B. Pluralloy C. Lime D. DC-REV	A. 45° SV B. 5/16" C. Flame cutting. Grinding.	A. Copper B. 1. I 5/32" 1a 185 21 2. I 3/16" 2a 250 22 3. I 1/4" 1a 320 22 C. 1 hour 15 minutes. 110° F - 220° F D. Grinding time 42 minutes.	A. None B. None	2535	2 1/2" 6 1/2" R U 7" IMP I 14" IMP V 1 1/2" IMP I 12" IMP V 3 1/2" IMP V 31"	-	P Moderate amount of slag and porosity.
A. A 10998 B. 11/30/43 C. H 128 D. Great Lakes Steel E. Harnischfeger F. Fisher Tank Division.	A. 1/2" B. R IV C. .53Mn .19S1 .023S .029P .59Cr .14Mo C. 25C D. Face 341 Back 352 E. 1650° F 1/2 hr water 775° F 1 1/2 hr water	A. F .17C 1. 24Mn .34S1 .014S .027P .45Mo B. AW-2C C. Lime D. DC-REV	A. 90° SV 3/32" B. - - C. Flame cutting. Grinding.	A. Copper B. 1. I 5/32" 1a 175 22 2. I 3/16" 1a 225 22 3. I 3/16" 1a 225 22 Seal bead 1/4" 18 325 22 C. 54 minutes. 110° F - 240° F D. Grinding time 37 minutes. 90" root opening.	A. None B. None	2567 2506 2507 2506	2 1/2" 4 1/2" R D 3" IMP I 4 1/2" U IMP IV 19 1/2" 1 1/2" IMP I 5 1/2" IMP I 8 1/2" U 4 8" 1 1/2" U	-	P
						37mm HE M54	HE M54 Projectile	Projectile	

IDENTIFICATION	BEAD DATA	ELECTRODE DATA	JOINT DESIGN	WELDING PROCEDURE	BEAT	BALLISTIC RESULTS			REMARKS ON CRACKING RADIOGRAPHIC RESULTS, ETC.
						VEL. F/2	LOC. OF H. CRACKING	CRACKING LOC. TYPE AWT	
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. AREA MANUFACTURER E. ELECTRODE MFR. F. BEAD FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BEH E. PROCESS F. HEAT TREATMENT TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION: SIZE EL. NO. TYPE AMP. V. 1. ROY TYPE 2. HODY TYPE 3. GAGE TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	F/2	L.L. R.L. C.B. LOC.	CRACKING TYPE AWT	
A. A 10946 B. 11/23/43 C. H 121 D. Jones & Laughlin E. Harnischfeger F. Fisher Tank Division.	A. 1/2" B. R III 1.52Mn .08S1 .014S .027P .59Mo C. Face 302 D. Back 302 E. 1625°F 1/2 hr F. water 880 F 1/2 hr air -	A. F .17C 1.98Mn .19S1 .010S .022P .59Mo B. AW-2C C. Lime D. DC-REV	A. 45° SV B. 1/8" C. Flame cutting-grinding Grinding	A. Copper B. 1. I 5/32" 1a 145 22 2. I 3/16" 1a 225 28 3. I 1/4" 1a 320 28 Seal bead - 3/16" 1a 225 28 C. 55-1/2 minutes. 120°F ~ 260°F D. Grinding time 35 minutes.	A. None B. None	2446 2544 2556	2" R 1" L 3" U 1" U 1" U IMP IV 12"	- I 18" I 34"	P
A. A 10946 B. 11/23/43 C. H 127 D. Great Lakes Steel E. Harnischfeger F. Fisher Tank Division.	A. 1/2" B. R IV 1.32Mn .19S1 .025S .028P .14Mn .25C C. Face 341 D. Back 352 E. B.O.H. F. 1650 F 1/2 hr water 775 F 1/2 hr water	A. F .17C 1.66Mn .32S1 .014S .027P .35Mo B. AW-2C C. Lime D. DC-REV	A. 90° SV 3/32" B. - - - C. Flame Cutting-grinding Grinding	A. Copper B. 1. I 5/32" 1a 175 22 2. I 3/16" 1a 225 22 3. I 1/4" 1a 325 22 Seal bead - 3/16" 1a 225 22 C. 57.5 minutes. 110°F ~ 280° D. Grinding time 37 min.	A. None B. None	2523 2529 2516	2" R 1/2" L 1" R IMP V IMP V IMP V	- I 12" V 7 1/2 I 18 1/2	P
						37mm HE	HE ME4	Projectile	

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING PROCEDURE	BEAT	BALLISTIC RESULTS				REMARKS ON CRACKING
						H	VEL.	LOCATION OF B.	CRACKING	
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFR. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BHN E. PROCESS F. HEAT TREATMENT TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. CROWN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	F/S	L.L. R.L. C.B.	LOC. TYPE AMT		
A. A 11247 B. 12/7/43 C. H 125 D. Great Lakes Steel Corp. E. Harnischfeger F. Fisher Tank Division.	A. 1/2" B. R IV 1.83Mn .19S1 .023S .028P .14Mn C. .25C D. Face 341 Back 362 E. 1650°F 1/2 hr water 775 F 1 1/2 hr water	A. F .16C 1.83Mn .29S1 .014S .032P .40Mn B. AW2C C. Lime D. DC-REV	A. 45° DV B. 5/16" C. Flame cutting. Grinding.	A. Mild Steel B. 1. I 5/32" 1a 165 22 2. III 3/16" 2a 225 22 3. III 3/16" 4b 225 22 3. III 1/4" 4b 325 22 Seal bead - C. 1 hr. 56 minutes. 100°F - 320°F D. Hot Rolled Steel Back-up used-Flame Gouge and seal bead used. Grinding time 40 minutes.	A. None B. None	13 2528 14 2532 15 2525	5 1/2" R 7 1/2" U 6 1/2" D 1 1/2" R	IMP I U IMP I - - 1 1/2"	F Small amount of slag & porosity.	
A. A11247 B. 12/7/43 C. H 130 D. Carnegie-Ill. Steel Company E. Harnischfeger F. Fisher Tank Division.	A. 1/2" B. R I 1.20Mn .015 S .014P .67Cr .65Mn .24Mn C. .27C D. Face 321 Back 341 E. Unknown	A. F .16C 1.83Mn .016S .022P .16Cr .33Mn B. AW2C C. Lime D. DC-REV	A. 45° DV B. 0 to 1/16" C. Flame cutting. Grinding.	A. Mild Steel B. 1. I 5/32" 1a 175 22 2. III 3/16" 2a 225 22 3. III 3/16" 4b 225 22 3. III 1/4" 4b 325 22 Seal bead - C. 1 hour 25 1/2 minutes. 140°F - 320°F D. Hot rolled steel back-up used-Flame gouge-seal bead used. Grinding time 40 minutes.	A. None B. None	11 2507 12 2501	0" R 7" U 7" D 1" R	IMP I V IMP I I - 85"	F Linear porosity. Small amount of slag.	
						37mm	HE M54	Projectile		

IDENTIFICATION	ARBOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING PROCEDURE	HEAT	BALLISTIC RESULTS				REMARKS ON CRACKING RADIOGRAPHIC RESULTS, ETC			
						VEL.	LOC.	CRACKING					
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARBOR MANUFACTURER E. ELECTRODE MFG. F. ARBOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. SHN E. PROCESS F. HEAT TREATMENT TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROWN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	F/S	L.L.	R.L.	C B.	LOC.	TYPE	AMT	
A. A 11266 B. 12/9/43 C. H 131 D. Carnegie-III. Steel Co. E. Harnischfeger Fisher Tank Division.	A. 1/2" B. R I 1. 20Mn .015S .014P .87Cr .65Ni .24Mo C. .27C D. Face 321 Back 341 E. Unknown F. Unknown	A. F .19 C 1. 79Mn .016S .022P .18Cr .35Mo B. AW-2C C. Lime D. DC-REV	A. 90° SV B. 0 to 1/16" C. Flame cutting. Grinding.	A. Mild Steel B. 1. I 5/32" 1a 175 22 2. III 3/16" 1a 225 22 3/16" 2b 225 22 3. III 1/4" 2b 325 22 Seal bead - 1/4" 1a 325 22 C. 1 hour 19.5 minutes. 120°F - 300°F D. Grinding time 40 minutes. Hot rolled steel used - Flame gouge-seal bead used.	A. None B. None	2525	7 3/8	4"	U	-	-	-	P
A. A 11266 B. 12/9/43 C. H 132 D. Carnegie-III. Steel Co. E. Harnischfeger Fisher Tank Division.	A. 1/2" B. R I 1. 22Mn .020S .010P .88Cr .73Ni .17Mo C. .28C D. Face 321 Back 331 E. Unknown F. Unknown	A. F .18C 1. 85Mn .011S .013P .21Cr .36Mo B. AW-2C C. Lime D. DC-REV	A. 90° SV B. 0 to 1/16" C. Flame cutting. Grinding.	A. Mild Steel B. 1. I 5/32" 1a 150 22 2. I 3/16" 1a 225 22 3. III 3/16" 2b 225 22 Seal bead - 1/4" 1a 325 22 C. 1 hour 17 1/2 minutes. 140°F - 300°F D. Grinding time 40 minutes. Hot rolled steel used - Flame gouge-seal bead used.	A. None B. None	2525	1-7/16"	4"	U	-	-	-	P
						2519	5 1/8	8 1/2"	U	-	-	-	Small amount of slag & porosity. 3/16" incomplete fusion and slag.
						2514	1/2"	R 1/2"	D	IMP	I	9 1/2	
						2527	X	7"	U	IMP	I	10	
						37mm	HE M54	Projectile				19 1/2"	

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING		BEAT	BALLISTIC RESULTS			REMARKS ON CRACKING
				A. BACKING	PROCEDURE		H	VEL.	LOCATION OF H	
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFG. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BHN E. PROCESS F. HEAT TREATMENT TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. CROWN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	F/S	L.L. R.L. C.B. LOC. TYPE AMT	CRACKING	RADIOGRAPHIC RESULTS, ETC	
A. 11596 B. 1/6/44 C. H 147 D. Great Lakes Steel Co. E. Farnischfeger F. Fisher Tank Division	A. 1/2" B. R IV C. .99Mn .64S1 D. .004S .016P E. .61Cr .22Mo F. Face 363 Back 341 E. Unknown	A. F B. .22C C. 1.74Mn D. .41S1 E. .004S F. .012P G. .33Mo H. AW-2C I. Lime J. DC-REV	A. 45° DV B. 1/16" C. Flame cutting. Grinding.	A. Mild Steel B. 1. I 5/32" 1a 175 22 2. I 3/16" 2a 225 22 3. I 1/4" 2a 325 22 Hot Rolled Steel back-up gouged out. Seal bead used. C. 62-32 minutes. 140° F - 260° F D. Grinding time 37 minutes.	A. None B. None	1 2524 2 2524 28 3 2517 4 1/4" 4 2511 2 1/4" 5 2519 2 1/4"	1 1/4" R 9" U 6" D 7 1/4" U 3 1/2" IMP IMP V 23 3/8"	I 0 - - I V	P Small amount of slag.	
A. 12303 B. 2/1/44 C. H 133 D. Jones & Laughlin E. Farnischfeger F. Fisher Tank Division	A. 1/2" B. R III C. .49Mn .20S1 D. .012S .014P E. .29Mo F. Face 352 Back 352 E. 1650° F 1/2 hr water 800° F 1 1/2 hr water	A. F B. .20C C. 1.59Mn D. .19S1 E. .014S F. .020P G. .36Mo H. AW-2C I. Lime J. DC-REV	A. 60° SV B. 1/8" C. Flame cutting. Grinding.	A. Mild Steel B. 1. I 5/32" 1a 175 22 2. I 3/16" 1a 225 22 3. I 1/4" 1a 225 22 Seal beads - C. 65 minutes. 100° F 170° F D. 70" root opening. Hot rolled steel-ground out-two seal beads used. Grinding time 3 hrs. 42 mins.	A. None B. None	11 2530 1 1/4" 12 2528	11 1/4" - L 7 7/8" D 8 7/8" U	- - -	P	
A. 12303 B. 2/1/44 C. F 134 D. Jones & Laughlin E. Farnischfeger F. Fisher Tank Division	A. 1/2" B. R III C. .49Mn .20S1 D. .012S .014P E. .29Mo F. Face 352 Back 352 E. 1650° F 1/2 hr water 800° F 1 1/2 hr water	A. F B. .20C C. 1.59Mn D. .19S1 E. .014S F. .020P G. .36Mo H. AW-2C I. Lime J. DC-REV	A. 60° SV B. 1/8" C. Flame cutting. Grinding.	A. Mild Steel B. 1. I 5/32" 1a 175 22 2. I 3/16" 1a 225 22 3. I 1/4" 1a 275 22 Seal beads C. 69 minutes. 100° F - 170° F D. 70" root opening. Hot rolled steel back-up Ground out-two seal beads used. Grinding time 3 hrs. 12 min.	A. None B. None	1 2537 7 2530 8R 8 2524	4" R 3 3/8" R 8 1/2" IMP D 1 1/2" L 8 1/2" D	- - I 0 I	P 3/16" incomplete fusion and slag.	
						37mm HE M54 Projectile	37mm HE M54 Projectile	Projectille	45.	

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING PROCEDURE	HEAT		BALLISTIC RESULTS				REMARKS ON CRACKING RADIOGRAPHIC RESULTS, ETC.					
					A. PRE	B. POST	H	VEL.	F/S	LOCATION OF H		CRACKING	TYPE	AMT		
A. FIRING RECORD NO.	A. PLATE THICKNESS	A. TYPE	A. GROOVE, INCLUDED	A. BACKING	A. PRE	B. POST	H	VEL.	F/S	L.L.	R.L.	C.B.	LOC.	TYPE	AMT	
A. 12303 B. 2/1/44 C. H 149 D. Jones & Laughlin E. Harnischfeger F. Fisher Tank Division.	1/2" R III 1.49Mn .20S1 .012S .014P .29Mo .28C Face 352 Back 352 E. 1650°F 1/2 hr water 800°F 1 1/2 hr water	A. F 1.59Mn .20C .19S1 .014S .020P .36Mo AW-2C Lime DC-REV	A. 60° SV 1/8" B. -- C. Flame cutting. Grinding.	A. Mild steel. B. 1. I 5/32" 1a 175 22 2. I 3/16" 1a 225 22 3. I 1/4" 1a 275 22 Two seal beads- 3/16" 1a 225 22 1/4" 1a 275 22 C. 67 minutes. 100°F - 170°F D. Grinding time 2 hrs. 57 min. "0" root opening.	A. None B. None	A. None	13 14	2530 2528	L	12" D 7" S 8 1/2" U	I I I				3 14 1/2 23 1/2	P
A. 12303 B. 2/1/44 C. H 160 D. Jones & Laughlin E. Harnischfeger F. Fisher Tank Division.	1/2" R III 1.49Mn .20S1 .012S .014P .29Mo .28C Face 352 Back 352 E. 1650°F 1/2 hr water 800°F 1 1/2 hr water	A. F .20C 1.59Mn .19S1 .014S .020P .36Mo AW-2C Lime DC-REV	A. 60° SV 1/8" B. -- C. Flame cutting. Grinding.	A. Mild Steel B. 1. I 5/32" 1a 175 22 2. I 3/16" 1a 225 22 3. I 1/4" 1a 275 22 Two seal beads- 3/16" 2a 225 22 3/16" 2a 225 22 C. 67 minutes. 100°F - 170°F D. Grinding time 3 hrs. 12 min. "0" root opening.	A. None B. None	A. None	9 10	2524 2524 1/2	R 1 1/2" R	12" DMP 8" O U	I I I				7 10 1/2 11 1/2	P
										37mm HE M54	Projectile					
										37mm HE M54	Projectile					

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING PROCEDURE	HEAT	BALLISTIC RESULTS				REMARKS ON CRACKING	
						H	VEL. F/S	LOC. OF H. CRACKING	RADIOPHOTOGRAPHIC RESULTS, ETC.		
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFG. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BHN E. PROCESS F. HEAT TREATMENT G. TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROWN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	1+ R	6" U	Imp II	3"		
A. AD-881 B. 8/31/43 C. 1783-4 D. Jones & Laughlin Steel Corp. E. Linde Air Products Co. F. American Car & Foundry	A. 1/2" B. R-III (1.65Mn, .21S1, .37Mo) C. 28 D. Face 331 Back 328 E. --- F. ---	A. F B. Oxweld #36 C. #80-20XD D. AC	A. 45° SV B. 1/8" C. Flame Cutting Grinding	A. Copper B. Unionmelt 540-560 30-32 3/16" 1SB 540-560 30-32 C. 20 mins. 80 - 135 F D.	A. None B. None	1 2 3	2525 est. 2505 1" 2512	7" D Imp II V 4 1/2" R D Imp II	3" 3" 8" 1 1/2" 2 1/2" 18"	Failed radiograph 1/4" crack at left junction. Some slag	
							37mm HE M-54 Projectile				

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING	PROCEDURE	HEAT	BALLISTIC RESULTS				REMARKS ON CRACKING
							V.L.	LOC.	CRACKING	RADIOGRAPHIC RESULTS, ETC.	
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFR. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BHN E. PROCESS F. HEAT TREATMENT G. TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE ASP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROWN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	F/S	V.L. LOC.	CRACKING	RADIOGRAPHIC RESULTS, ETC.		
A. AD-789 B. 8/17/43 C. U-45 D. Jones & Laughlin Steel Corp. E. Linde Air Products Co. F. Fisher Tank Division	A. 1/2" B. R-III (1.66Mn, .26Si, .39Mo) C. .28 D. Face 311 Back 321 E. 1600°F. 1/2 hr. Water 875°F. 1-1/2 hrs. Air	A. F (.17C, .92 Mn, .65Si, .42Mo)* B. Oxweld #36 C. --- D. ---	A. 45°SV B. 1/32" C. Flame Cutting Grinding	A. Yes B. Special Unionmelt 3/16" 3a 650 - 30 5/16" 3a 500 - 42 C. 18.61 mins. D. Weld reinforcement ground off.	A. None B. None	2513	1 1/2" R 2 1/2" U		Passed Radiograph Moderate amount of slag and porosity		
A. AD-789 B. 8/17/43 C. U-44 D. Jones & Laughlin Steel Corp. E. Linde Air Products Co. F. Fisher Tank Division	A. 1/2" B. R-III (1.66Mn, .26Si, .39Mo) C. .28 D. Face 311 Back 321 E. 1600°F. 1/2 hr. Water 875°F. 1-1/2 hrs. Air	A. F (.17C, .92 Mn, .65Si, .42Mo)* B. Oxweld #36 C. --- D. ---	A. 45°SV B. 1/32" C. Flame Cutting Grinding	A. Yes B. Special Unionmelt 3/16" 3a 650 - 30 5/16" 3a 300 - 38 C. 19.89 mins. D. Weld reinforcement ground off.	A. None B. None	2515	1" R 2 1/2" U		Passed radiograph Borderline amount of slag and porosity at left junction of X-bar		
A. AD-789 B. 8/17/43 C. U-45 D. Jones & Laughlin Steel Corp. E. Linde Air Products Co. F. Fisher Tank Division	A. 1/2" B. R-III (1.40Mn, .25Si, .52Mo) C. .27 D. Face 383 Back 383 E. 1600°F. 1/2 hr. Water 875°F. 1-1/2 hrs. Air	A. F (.17C, .92 Mn, .65Si, .42Mo)* B. Oxweld #36 C. --- D. ---	A. 45°SV B. 1/32" C. Flame Cutting Grinding	A. Yes B. Special Unionmelt 3/16" 3a 550 - 30 5/16" 3a 600 - 38 C. 20.3 mins. D. Weld reinforcement ground off.	A. None B. None	2520 est. 2513	1 1/2" R 2 1/2" U 7 1/2" D 5 1/2" U		Passed radiograph		
		*Weld Metal				37mm	HE M-54 Projectile				

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING	PROCEDURE	HEAT	BALLISTIC RESULTS			REMARKS ON CRACKING
							VEL. F/S	LOC. OF H. C. B.	CRACKING LOC. TYPE AMT	
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFG. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BRN E. PROCESS F. HEAT TREATMENT TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROWN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	VEL. F/S	LOC. OF H. C. B.	CRACKING LOC. TYPE AMT	REMARKS ON CRACKING	
A. AD-330 B. 3/19/43 C. Y-1 D. Great Lakes Steel Corp. E. Linde Air Products Co. F. General Motors Truck & Coach Division	A. 1/2" B. R-IV (.68Mn, .66Si, .66Cr, .23Mo, .09Zr) C. .28 D. Face 363 Back 375 E. B.O.H. F. 1600° F. 1/2 hr. Water 880° F. 1-1/2 hrs. Air	A. F B. Oxweld #36 C. #20 (12 x 200) D. ---	A. 45° SV B. 1/32" C. Flame Cutting	A. Copper B. Unionmelt 3/16" 630 - 30 3/16" 610 - 38-18B C. 5 hrs. 100° F. D. Plates were tacked at 8" intervals with Fleetweld #7 before Unionmelt welding.	A. None B. None	2800	2" R 9 1/2" U 7 1/2" D 3 1/2" U	II Imp III V	1 1/2" 5" 6 1/2" star-shaped crater crack	
A. AD-330 B. 3/19/43 C. Y-2 D. Great Lakes Steel Corp. E. Linde Air Products Co. F. General Motors Truck & Coach Division	A. 1/2" B. R-IV (.68Mn, .66Si, .66Cr, .23Mo, .09Zr) C. .28 D. Face 363 Back 375 E. B.O.H. F. 1600° F. 1/2 hr. Water 880° F. 1-1/2 hrs. Air	A. F B. Oxweld #36 C. #20 (12 x 200) D. AC STR REV	A. 45° SV B. 1/32" C. Flame Cutting	A. Copper B. Unionmelt 3/16" 630 - 30 3/16" 610 - 38-18B C. 5 hrs. 100° F. D. Plates were tacked at 8" intervals with Fleetweld #7 before Unionmelt welding.	A. None B. None	2800	1 1/2" R 3" R 10" D 5 1/2" L	9" U 3" D 10" D L	Passed radiograph	
A. AD-865 B. 9/3/43 C. 54 D. Jones & Laughlin Steel Corp. E. Union Carbide Company F. General Motors Truck & Coach Division	A. 1/2" B. R-III (1.63Mn, .25Si, .41Mo) C. .27 D. Face 363 Back 363 E. B.O.H. F. 1600° F. 2 hrs. Water 850° F. 2-1/2 hrs. Draw	A. F B. Oxweld #36 C. #20 (12 x 200) C.	A. 45° SV B. 1/32" C. Flame Cutting	A. Copper B. Unionmelt 3/16" 10M 680 - 28 3/16" 155 575 --42 C. 8 hrs. 100° F. D.	A. None B. None	2519	3 1/2" R 3" D 2" R 4 1/2" D 1 1/2" R 2" R	6 1/2" U 3" D 4 1/2" D 8" U 1 1/2" Imp 2" R	Passed radiograph	

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING	PROCEDURE	HEAT		BALLISTIC RESULTS				REMARKS ON CRACKING		
						A. PRE	B. POST	H	VEL.	LOCATION OF H			CRACKING	RADIOGRAPHIC RESULTS, ETC.
A. FIRING RECORD NO.	A. PLATE THICKNESS	A. TYPE	A. GROOVE, INCLUDED	A. BACKING	PASSES	A. PRE	H	F/S	L.L.	R.L.	C.B.	LOC.	TYPE	AMT.
B. DATE OF TEST	B. TYPE	B. TRADE NAME	B. ANGLE, ROOT FACE	B. DEPOSITION SIZE EL. NO. TYPE AMP. V. <td></td> <td>B. POST</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		B. POST								
C. PLATE NO.	C. CARBON CONTENT	C. COATING	B. ROOT GAP	1. ROOT TYPE										
D. ARMOR MANUFACTURER	D. BHN	D. CURRENT & POLARITY	C. PLATE PREPARATION	2. BODY TYPE										
E. ELECTRODE MFG.	E. PROCESS			3. GROWN TYPE										
F. ARMOR FABRICATOR	F. HEAT TREATMENT			C. TOTAL WELDING TIME & INTER PASS TEMPERATURE										
	F. TEMP. TIME QUENCH			D. REMARKS										
A. AD-865	A. 1/2"	A. F	A. 45° SV	A. Copper		A. None	1	2517	7 1/2"	Imp	I		15"	Passed radiograph
B. 9/2/43	B. R-III	B. Oxweld	B. 1/32"	B. Unionmelt		B. None			R	U	II		3"	
C. 56	(1.63Mn, .25Si, .41Mo)	C. #36	C. Flame	3/16" 1UM 680 - 28							III		3"	
D. Jones & Laughlin Steel Corp.	C. .27	D. DC STR	C. Cutting	3/16" 1SB 575 - 42							IV		2"	
E. Union Carbide Company	D. Face 363 Back 363			C. 8 hrs.							V		5"	
F. General Motors Truck & Coach Division	E. B.O.H.			D.									28"	
	F. 1600 F. 2 hrs. Water 850 F. 2-1/2 hrs. Draw													
A. AD-865	A. 1/2"	A. F	A. 45° SV	A. Copper		A. None	1	2516	1 1/2"	Imp	I		17 1/2"	Passed radiograph
B. 9/2/43	B. R-III	B. Oxweld	B. 1/32"	B. Unionmelt		B. None			L	U	V		13 1/2"	
C. 56	(1.63Mn, .21Si, .47Mo)	C. #36	C. Flame	3/16" 1UM 680 - 28									31"	
D. Youngstown Sheet & Tube Company	C. .24	D. DC STR	C. Grinding	3/16" 1SB 575 - 42										
E. Union Carbide Company	D. Face 363 Back 363			C. 8 hrs.										
F. General Motors Truck & Coach Division	E. B.O.H.			D.										
	F. 1600 F. 1/2 hr. Water 880 F. 1-1/2 hrs. Draw													
A. AD-865	A. 1/2"	A. F	A. 45° SV	A. Copper		A. None	1	2525	1 1/2"	Imp	I		16"	Passed radiograph
B. 9/2/43	B. R-III	B. Oxweld	B. 1/32"	B. Unionmelt		B. None			R	U	II		2 1/2"	
C. 57	(1.3Mn, .18Si, .47Mo)	C. #36	C. Flame	3/16" 1UM 680 - 28							III		2 1/2"	
D. Youngstown Sheet & Tube Company	C. .24	D. AC DC STR	C. Grinding	3/16" 1SB 575 - 42							IV		11"	
E. Union Carbide Company	D. 1600 F. 1/2 hr. Water 880 F. 1-1/2 hrs. Draw			C. 8 hrs.										
F. General Motors Truck & Coach Division				D.										

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING		PROCEDURE	BEAT		BALLISTIC RESULTS						REMARKS ON CRACKING
				A. BACKING	B. DEPOSITION SIZE EL. NO. TYPE AMP. V.		A. PRE	B. POST	VEL.	LOC.	CRACKING	RADIOGRAPHIC RESULTS, ETC.			
A. FIRING RECORD NO.	A. PLATE THICKNESS	A. TYPE	A. GROOVE, INCLUDED ANGLE, ROOT FACE	A. BACKING	B. DEPOSITION SIZE EL. NO. TYPE AMP. V.	A. PRE	A. PRE	F/S	L.L.	R.L.	C.B.	LOC.	TYPE	AMT	
B. DATE OF TEST	B. TYPE	B. TRADE NAME	B. ROOT CAP	B. DEPOSITION SIZE EL. NO. TYPE AMP. V.	1. ROOT TYPE	B. POST	B. POST								
C. PLATE NO.	C. CARBON CONTENT	C. COATING	C. PLATE PREPARATION	C. CURRENT & POLARITY	2. BODY TYPE										
D. ARMOR MANUFACTURER	D. BHN	D. CURRENT & POLARITY			3. GROWN TYPE										
E. ELECTRODE WFG.	E. PROCESS				C. TOTAL WELDING TIME & INTER PASS TEMP. TIME QUENCH										
F. ARMOR FABRICATOR	F. HEAT TREATMENT														
	F. TIME QUENCH														
A. AD-395	A. 1/2"	A. F	A. 34° SV	A. Copper	A. None	1	A. None	2600	X	X	Imp	III	1 1/2"	Passed radiograph	
B. 4/23/43	B. R-I	B. #40	B. Machining	B. Special Unionmelt	B. None	2	B. None	2600	3/16"	3/16"	0	II	2 1/2"		
C. D5-45-21	C. (.80Mn., .31Si, .93Cr., .65Ni, .25Mo)	C. AC STR	C. Grinding	C. ---		3		2600	1"	1"	0	II	3"		
D. Dominion Fdry. and Steel Company	D. .25			D. ---		4		2600	4"	4"	0	II	1"		
E. Union Carbide Company	E. B. El8c. 1650 F. 4 hrs. of Air								X	X	Imp	I	6"		
F. International Harvester Co.	F. 1650 F. 1 hr. Water										Imp	V	16 1/2"		
	1000 F. 1 hr. Water										Projectile		33 1/2"		
A. AD-395	A. 1/2"	A. F	A. 34° SV	A. Copper	A. None	1	A. None	2600	1 1/2"	1 1/2"	5"	D	5"	Passed radiograph	
B. 4/23/43	B. R-I	B. #40	B. Machining	B. Special Unionmelt	B. None	2	B. None	2600	2 1/2"	2 1/2"	3 1/2"	U	3 1/2"	Some scattered porosity and moderate incomplete fusion	
C. D5-45-22	C. (.80Mn., .31Si, .93Cr., .65Ni, .25Mo)	C. DC REV	C. Grinding	C. ---		3		2600	7 1/2"	7 1/2"	4 1/2"	U	4 1/2"		
D. Dominion Fdry. and Steel Company	D. .25			D. ---		4		2600	1"	1"	5"	D	5"		
E. Union Carbide Company	E. B. El8c. 1650 F. 4 hrs. of Air					5		2600	1 1/2"	1 1/2"	1 1/2"	U	1 1/2"		
F. International Harvester Co.	F. 1650 F. 1 hr. Water					6		2600	7 1/2"	7 1/2"	1 1/2"	Imp	1 1/2"		
	1000 F. 1 hr. Water										Projectile		33 1/2"		
A. AD-395	A. 1/2"	A. F	A. 34° SV	A. Copper	A. None	1	A. None	2600	1"	1"	4 1/2"	Imp	4 1/2"	Failed radiograph	
B. 4/23/43	B. R-I	B. #40	B. Machining	B. Special Unionmelt	B. None	2	B. None	2600	4"	4"	10 1/2"	D	10 1/2"	Moderate linear porosity and slag	
C. D5-45-23	C. (.80Mn., .31Si, .93Cr., .65Ni, .25Mo)	C. DC REV	C. Grinding	C. ---		3		2600	4"	4"	X	Imp	7 1/2"	1-1/8" deep seated crack at right junction	
D. Dominion Fdry. and Steel Company	D. .25			D. ---		4		2600	4 1/2"	4 1/2"	12"	D	14 1/2"		
E. Union Carbide Company	E. B. El8c. 1650 F. 4 hrs. of Air										Projectile		25 1/2"		
F. International Harvester Co.	F. 1650 F. 1 hr. Water										Projectile				
	1000 F. 1 hr. Water										Projectile				

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING PROCEDURE	HEAT	BALLISTIC RESULTS				REMARKS ON CRACKING RADIOGRAPHIC RESULTS, ETC.	
						H	VEL. F/S	LOC. OF H	CRACKING		
A. AD-748 B. 7/17/43 C. NR-35A D. Great Lakes Steel Corp. E. Linde Air Products Co. F. Union Carbide & Carbon Res. Labs., Inc.	A. 1/2" B. R-IV C. (.90Mn, .83Si, .68Cr, .14Mo, .08Zr) D. Face 363 Back 375 E. O.F. 1/3 hr. Water F. 1600 F. 1/3 hr. Air	A. F (.16C, .70 Mn, .95Si, .45Cr, .12Mo)* B. Oxweld #38 C. None D. AC	A. 45° SV B. 1/32" Flame cutting C. Grinding	A. Copper B. Unionmelt 3/16" 1UM 650 - 30 3/16" 1SB 690 - 380 F. C. 16 mins. 200 - 400 F. D.	A. None B. None	1	2517	2 1/2" R U 8" D 6 1/2" L D	I 7" II 5" I 10" II 16 1/2" V 2" 40 1/2"	Passed radiograph Small crater crack and gas pocket at right junction	
A. AD-748 B. 7/17/43 C. NR-35B D. Great Lakes Steel Corp. E. Linde Air Products Co. F. Union Carbide & Carbon Res. Labs., Inc.	A. 1/2" B. R-IV C. (.90Mn, .83Si, .66Cr, .14Mo, .08Zr) D. Face 363 Back 375 E. O.F. 1/3 hr. Water F. 1600 F. 1-1/2 hrs. Air	A. F (.16C, .70 Mn, .95Si, .45Cr, .12Mo, .03Zr)* B. Oxweld #38 C. None D. AC	A. 45° SV B. 1/32" Flame cutting C. Grinding	A. Copper B. Unionmelt 3/16" 1UM 650 - 30 3/16" 1SB 690 - 380 F. C. 16 mins. 200 - 400 F. D. Four hours required to remove weld reinforcement from 168 inches of weld.	A. None B. None	1	2519	2 1/2" R U 8 1/2" L D 6" U 1" L D	5 20 1/2"	Passed radiograph Small gas pockets in the 2 right legs and X-bar	
A. AD-749 B. 7/17/43 C. NR-55C D. Great Lakes Steel Corp. E. Linde Air Products Co. F. Union Carbide & Carbon Res. Labs., Inc.	A. 1/2" B. R-IV C. (.90Mn, .83Si, .40Cr, .12 Mo, .03Zr)* D. Face 363 Back 375 E. O.F. 1/3 hr. Water F. 1600 F. 1-1/2 hrs. Air	A. F (.19C, 1.20 Mn, .60Si, .40Cr, .12 Mo, .03Zr)* B. Oxweld #38 C. None D. AC	A. 45° SV B. 1/32" Flame Cutting C. Grinding	A. Copper B. Unionmelt 3/16" 1UM 650 - 30 3/16" 1SB 690 - 380 F. C. 16 mins. 200 - 400 F. D. Four hours required to remove weld reinforcement from 168 inches of weld.	A. None B. None	1	2577	1 1/2" L D 1 1/2" R U 2 1/2" D	Imp I 3 1/2" III 10 1/2" Imp III 13 1/2" 0 III 1 1/2"	Passed radiograph 1/4" cracks in right and left junctions Some slag and porosity	
		*Weld Metal					37mm HE M-54 Projectile				54.

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING	PROCEDURE	BEAT	BALLISTIC RESULTS				REMARKS ON CRACKING
							H	F/S	VEL.	LOCATION OF B	
A. FILING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFG. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BRN E. PROCESS F. HEAT TREATMENT TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROW TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	1	2	3	4	5	6
A. AD-748 B. 7/17/43 C. NR-35D D. Great Lakes Steel Corp. E. Linde Air Products Co. F. Union Carbide & Carbon Res. Labs., Inc.	A. 1/2" B. R-IV C. .90Mn, .83Si, .36Cr, .14Mo, .08Zr D. .28 E. Face 363 Back 375 F. O.H. 1/3 1600°F. 1/3 hr. Water 880°F. 1-1/2 hrs. Draw	A. F (.18C, 1.20 Mn, .60Si, .40Cr, .30 Mo, .02Zr)* B. Oxweld #40 C. None D. AC STR REV	A. 45° SV B. 1/32" C. Flame Cutting Grinding	A. Copper B. Unionmelt 3/16" 1UM 650 - 30 3/16" 1SB 600 - 380 F. C. 16 mins. 200 - 400 F. D. Four hours required to remove weld reinforcement from 168 inches of weld.	A. None B. None	1 2521 2 2517 3 2514 4 2510	3" L 1" L 1" R 1/2" R	4 1/2" U 4 1/2" D 9 1/2" D 7" U	Imp I III 11" 0 II 15 1/2"	Passed radiograph Small amount of slag and porosity	
A. AD-879 B. 9/11/43 C. NR-35E D. Great Lakes Steel Corp. E. Linde Air Products Co. F. Union Carbide & Carbon Res. Labs., Inc.	A. 1/2" B. R-IV C. .90Mn, .83Si, .45Cr, .14Mo, .08Zr D. .28 E. Face 363 Back 375 F. O.H. 1/3 1600°F. 1/3 hr. Water 880°F. 1/2 hr. Air	A. (.16C, .70 Mn, .95Si, .45Cr, .25 Mo, .03Zr)* B. Oxweld #40 C. None D. AC	A. 45° SV B. 1/32" C. Flame Cutting Grinding	A. Copper B. Unionmelt 3/16" 1UM 650 - 30 3/16" 1SB 600 - 380 F. C. 16 mins. 200 F. D. Four hours required to remove weld reinforcement from 168 inches of weld.	A. None B. None	1 2544 2 2531	1 1/2" L 1" L	5 1/2" U 5 1/2" D	Imp V 18 1/2" III 1 1/2" Imp I 7 1/2" III 12" 39 1/2"	Failed radiograph 1/4" crack in cross-bar Moderate amount of slag throughout welds	
		*Weld Metal					37mm HE M-54 Projectile				

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING	PROCEDURE	HEAT		BALLISTIC RESULTS					REMARKS ON CRACKING
						A. PRE	B. POST	H	VEL. F/S	L.L.	R.L.	C.B.	
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFG. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BHN E. PROCESS F. HEAT TREATMENT TEMP. TIME QUENCH	A. TYPE E. TRADE NAME C. COATING D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROWN TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	H	VEL. F/S	L.L.	R.L.	C.B. <td>LOC.</td> <td>CRACKING TYPE</td> <td>RADIOGRAPHIC RESULTS, ETC.</td>	LOC.	CRACKING TYPE	RADIOGRAPHIC RESULTS, ETC.
A. A 12567 B. 2/18/44 C. F 51 D. Republic Steel Corp. E. Harnischfeger F. Buick Motor Division	A. 3/8" B. R I 1.03Mn .24Si .022S .014P .46Cr .42Ni .13Mo .33C C. Face 388 Back 388 E. O.H. F. 1650 F 2 hrs. water spray. 725 F 3 hrs. water spray	A. F .18C 1.75Mn .24Si .018S .027P .39Mo B. AW-2C C. Lime D. DC-REV	A. 60° SV B. 1/8" C. Flame cutting. Grinding.	A. Mild steel B. 1. I 5/32" 1a 175 22 2. & 3. I 3/16" 1a 225 22 Seal bead 3/16" 1a 225 22 C. 46 minutes. 160°F - 200°F D. Grinding time 2 hrs. 49 minutes. Hot rolled steel backup used, ground out, seal bead.	A. None B. None	7 8 9 10	1981 2028 2020 2019	5" 8" 9" 7" 8" 9" 9" 8" L L L L L L L L	IMP - IMP IMP	I - I I	107 - 13 228	P	
							37mm PE M54 Projectile						

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	WELDING PROCEDURE	BEAT	BALLISTIC RESULTS						REMARKS ON CRACKING			
						ARMOR DATA		WELDING PROCEDURE		BEAT			BALLISTIC RESULTS		RADIOGRAPHIC RESULTS, ETC.
						A. PLATE THICKNESS	B. TYPE	A. TYPE	B. TRADE NAME	A. GROOVE, INCLUDED ANGLE, ROOT FACE	A. BACKING		A. PRE	H	
A. FIRING RECORD NO. B. DATE OF TEST C. PLATE NO. D. ARMOR MANUFACTURER E. ELECTRODE MFGN. F. ARMOR FABRICATOR	A. PLATE THICKNESS B. TYPE C. CARBON CONTENT D. BHN E. PROCESS F. HEAT TREATMENT TEMP. TIME QUENCH	A. TYPE B. TRADE NAME C. CURRENT & POLARITY D. POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE B. ROOT GAP C. PLATE PREPARATION	A. BACKING B. DEPOSITION SIZE EL. NO. TYPE AMP. V. 1. ROOT TYPE 2. BODY TYPE 3. GROW TYPE C. TOTAL WELDING TIME & INTER PASS TEMPERATURE D. REMARKS	A. PRE B. POST	F/S	L.L.	R.L.	C.F.	LOC.	TYPE	AMT			
A. A 11596 B. 1/6/44 C. P 145 D. Jones & Laughlin E. Harnischfeger F. Fisher Tank Division	A. 1/4" B. R III 1.63Mn .02Si .017S .016P .36Mo C. .25C D. Face 285 " Back 285 E. F. Unknown	A. F .25C 1.79Mn .30Si .010S .018P .36Mo B. AW-2C C. Lime D. DC-REV	A. 1/16" B. Flame cutting & grinding.	A. None B. 1 Bead 3/16" 1a 225 22 Grind and deposit seal bead 3/16" 1a 225 22 C. 30 minutes. 140°F-185°F D. Grinding time 6 minutes.	A. None B. None	1583	1/4"	L	9"	IMP	I	10 1/8"			
						1586 1/2"			8 1/2"						
						1592	X		8 1/2"	IMP	I	9 1/2"			
										IMP	IV	19 1/2"			
												48 5/8"			
						37mm HE MS4 Projectile									

IDENTIFICATION	ARMOR DATA	ELECTRODE DATA	JOINT DESIGN	PROCEDURE	BEAT	BALLISTIC RESULTS				REMARKS ON CRACKING	
						VEL.	LOCATION OF H	CRACKING	RADIOGRAPHIC RESULTS, ETC.		
A. FIRING RECORD NO.	A. PLATE THICKNESS	A. TYPE	A. GROOVE, INCLUDED	A. BACKING	A. PRE	H	L.L.	C.B.	LOC.	TYPE	AMT
B. DATE OF TEST	B. TYPE	B. TRADE NAME	B. ANGLE, ROOT FACE	B. DEPOSITION SIZE EL. NO. TYPE AMP. V.	B. POST	F/S	R.L.	C.B.			
C. PLATE NO.	C. CARBON CONTENT	C. COATING	C. ROOT GAP	1. ROOT TYPE							
D. ARMOR MANUFACTURER	D. BRN	D. CURRENT & POLARITY	C. PLATE PREPARATION	2. BODY TYPE							
E. ELECTRODE MFG.	E. PROCESS			3. GROWN TYPE							
F. ARMOR FABRICATOR	F. HEAT TREATMENT TEMP. TIME QUENCH			C. TOTAL WELDING TIME & INTER PASS TEMPERATURE							
				D. REMARKS							
A. AD 874 B. 9/9/43 C. NR-81-B2 D. Jones & Laughlin. E. Harnischfeger Corp. F. International Harvester Co.	A. 1-1/2" B. R III C. 1.64Mn .22S1 D. .018S .020P E. .027Cr .024Ni F. .46Mo .048Cu C. .28C D. Face 293 Back 290 E. B.O.H. F. 1625 F 1/2 hr water 1075 F 2 hrs air	A. F B. .11-.13C C. 1.65- 1.75Mn D. .25-.30S1 E. .35-.40Mo F. AW 2C C. Lime D. DC-REV	A. 60° DV B. 5/32" C. Flame cutting. Grinding.	A. None B. 160-240 2a 285 2b 285 C. 280-285 4b 180 2b 285 D. 200 F-300 F Weld reinforcement ground off.	A. 200° B. None	1 1198 2 1201 3 1301	1-3/8" L 2 1/4" R 6" U IMP I IMP I IMP V 4-5/8"				P Small amount of slag.
A. AD 874 B. 9/9/43 C. NR-81-B3 D. Jones & Laughlin E. Harnischfeger Corp. F. International Harvester Co.	A. 1-1/2" B. R III C. 1.64Mn .22S1 D. .018S .020P E. .027Cr .024Ni F. .46Mo .048Cu C. .28C D. Face 295 Back 295 E. B.O.H. F. 1625 F 1/2 hr water 1075 F 2 hrs air	A. F B. .11-.13C C. 1.65- 1.75Mn D. .25-.30S1 E. .35-.40Mo F. AW 2C C. Lime D. DC-REV	A. 60° DV B. 5/32" C. Flame cutting. Grinding.	A. None B. 160-225 2a 285 2b 285 C. 280-285 4b 185 2b 285 D. 200 F-300 F Weld reinforcement ground off.	A. 200° B. None	1 1191 2 1313 3 1328 4 1409	1 1/2" L 2 1/4" R 3 1/2" U 4 1/2" D IMP V 16 2-5/8"				P Small amount of slag.
A. AD 874 B. 9/9/43 C. NR-81-B4 D. Jones & Laughlin E. Harnischfeger Corp. F. International Harvester Co.	A. 1-1/2" B. R III C. 1.64Mn .22S1 D. .018S .02P E. .027Cr .024Ni F. .46Mo .048Cu C. .28C D. Face 260 Back 260 E. B.O.H. F. 1625 F 1/2 hr water 1075 F 2 hrs air	A. F B. .11-.13C C. 1.65- 1.75Mn D. .25-.30S1 E. .35-.40Mo F. AW 2C C. Lime D. DC-REV	A. 60° DV B. 5/32" C. Flame cutting. Grinding.	A. None B. 160-230 2a 285 2b 285 C. 280-285 4b 185 2b 285 D. 200 F-300 F Weld reinforcement ground off.	A. 200° B. None	1 1102 2 1191 3 1087 4 1191	1 1/2" R 2 1/4" R 1 1/4" 7" D L 3/8" R 3/8" U				P

IDENTIFICATION		ARMOR DATA		ELECTRODE DATA		JOINT DESIGN		WELDING PROCEDURE		HEAT		BALLISTIC RESULTS				REMARKS ON CRACKING														
A. FIRING RECORD NO.	B. DATE OF TEST	C. PLATE NO.	D. ARMOR MANUFACTURER	E. ELECTRODE MFG.	F. ARMOR FABRICATOR	A. TYPE	B. TRADE NAME	C. COATING	D. CURRENT & POLARITY	A. GROOVE, INCLUDED ANGLE, ROOT FACE	B. ROOT GAP	C. PLATE PREPARATION	A. BACKING	B. DEPOSITION SIZE EL. NO. TYPE AMP. V.	1. ROOT TYPE	2. BODY TYPE	3. CROWN TYPE	C. TOTAL WELDING TIME & INTER PASS TEMPERATURE	D. REMARKS	A. PRE	B. POST	H	VEL. F/S	LOC. L.L.	LOC. C.B.	LOC. TYPE	CRACKING	RADIOGRAPHIC RESULTS, ETC.		
A. AD 874	9/9/43	NR-65B-5C	Great Lakes	Detroit Steel	Combustion Engineering Company	A. F	1.55-1.65 Mn	.31-.36Si	.019-.022P	.43-.46Mo	B. No. 1231	C. Stainless- lime	D. DC-REV	A. Carbon steel	1. 1/4" 1a 300 30	2. 1/4" 2a 300 30	3. 1/4" 1a 300 30	7 Seal beads- 1/4" 3b 300 30 3/16" 4b 210 26	A. None B. None	A. None B. None	1	2536	X	5 1/2" D	IMP IV	42-5/8" P		Moderate amount of porosity.		
A. AD 874	9/9/43	NR-64B-5B	Jones & Laughlin	Combustion Engineering Company	Combustion Engineering Company	A. F	.11C	1.65-	1.97Mn	.31-.47Si	.022P	.40-.43Mo	B. Nos. 1231 1212	C. Stainless- lime	D. DC-REV	A. Carbon steel	1. 1/4" 1a 300 30	2. 1/4" 1a 300 30	3. 1/4" 1a 300 30	6 Seal beads - 3/16" 4b 210 26 1/4" 2b 300 30	A. None B. None	A. None B. None	1	2553	1 1/2" L	6 1/2" D	-	-	P	Small amount of slag and porosity.
A. AD 874	9/9/43	NR-65B-5A	Carnegie-Illinois	Combustion Engineering Co.	Combustion Engineering Company	A. F	1.55-1.65 Mn	.31-.36Si	.019-.022P	.43-.46Mo	B. No. 1231	C. Stainless- lime	D. DC-REV	A. Carbon steel	1. 1/4" 1a 300 30	2. 1/4" 2a 300 30	3. 1/4" 1a 300 30	6 Seal beads- 3/16" 4b 210 26 1/4" 2b 500 30	A. None B. None	A. None B. None	1	2516	1 1/2" R	5 1/2" D	-	-	P			