

PHOTOGRAPH THIS SHEET

AD-A953 695

DTIC ACCESSION NUMBER

LEVEL

INVENTORY

WAI 642.1/28
DOCUMENT IDENTIFICATION

This document has been approved
for public release and sale; its
distribution is unlimited.

DISTRIBUTION STATEMENT

ACCESSION FOR	
NTIS	GRA&I ☒
DTIC	TAB ☐
UNANNOUNCED	☐
JUSTIFICATION	
BY	
DISTRIBUTION /	
AVAILABILITY CODES	
DIST	AVAIL AND/OR SPECIAL
A-1	

DISTRIBUTION STAMP

UNANNOUNCED

DTIC
ELECTRONIC
OCT 18 1984
E

DATE ACCESSIONED

DATE RETURNED

84 10 12 083

DATE RECEIVED IN DTIC

REGISTERED OR CERTIFIED NO.

PHOTOGRAPH THIS SHEET AND RETURN TO DTIC-DDAC

AD-A953 695



REPORT NO. 642.1/28

BUTT & FILLET WELDS
1/4" TENSILE STRENGTH STEEL, GRADE #1
(REPUBLIC STEEL CORP.)
(SPECIMENS FURNISHED BY MR. HOWARD MILLER)

INDEXED

WATERBURY ARSENAL
WATERBURY, MASS.

U. S. GOVERNMENT PRINTING OFFICE

Approved
for issue: Hm
1-642.1/28

Doc: 642.1/28

Test. Lab.

Report No. 642.1/28

Watertown Arsenal

Butt & Fillet Welds

July 10, 1935

1/4" Double Strength Steel, Grade #1

(Republic Steel Corp.)

(Specimens Furnished by Mr. Howard Miller)

Impact Specimens

Fillet Welds

<u>Mark</u>	<u>Ft. Lbs.</u>	<u>Appearance of Fracture</u>
#2	797.2	All fractures in plate
2	875.3	above weld.
2	739.9	Approx. 1/4" fillet
#1	865.6	#1 welded with Fleetweld #5
1	664.6	#2 welded with Fleetweld #6
1	787.9	

Butt Welds

1A	264.1)	Weld	All fractures in
1A1	271.2)	reinforce-	plate except 2A1
2A	242.9)	ment off	which showed silky
2A1	264.1)		fracture and
			partial cup.
1B	209.0)	Weld	
1B1	209.0)	reinforce-	" " "
2B	195.9)	ment on	
2B1	209.0)		

D. E. Driscoll
D. E. Driscoll

June 24, 1935.

Republic Steel Corpn.

Hardness and Microstructures
on R.D.S. Grade #1 - 1/4"
Welded Plates.

Lab. #5096
Supp. #9

Company Republic Steel Corpn.

Subject Hardness and microstructures on R D S grade #1
1/4" welded plates.

Data known

1. These R D S grade #1 - 1/4" plates were section welded (1 welded) at the Lincoln Electric Co. in Cleveland, Ohio, for the Watertown Arsenal at Boston, Mass.
2. All plates were normalized before welding (1750⁰ F) but received no treatment after welding.
3. All plates were section welded (1 welded) and were divided into two groups which will be referred to as weld #1 and weld #2. Weld #1 was welded with a Lincoln flatweld #5 welding rod, and weld #2 was welded with a Lincoln #6 welding rod.

Work outline

Hardness
Microstructure

Procedure

Vickers and Rockwell B hardness readings were taken along the weld and plate of the section welds. Fig. 1 is a sketch showing the location of the Vickers and Rockwell impressions together with a tabulation of the hardness values obtained.

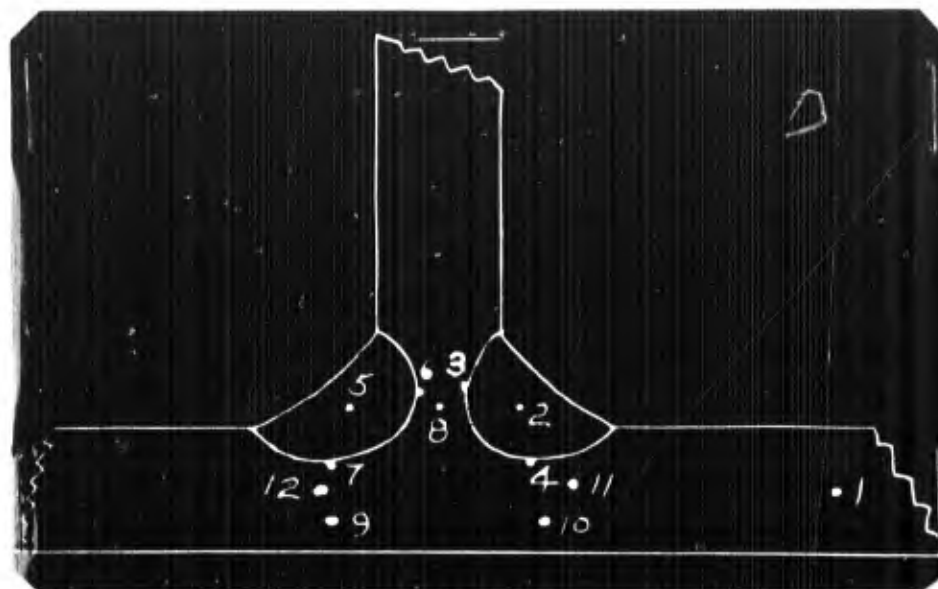


Fig. 1 Section weld

<u>Weld #1</u>			<u>Weld #2</u>	
<u>Position</u>	<u>Vickers</u>	<u>Rockwell B</u>	<u>Vickers</u>	<u>Rockwell B</u>
1	156	87	155	87
2	139	81	157	81
3	151-162	84	143-170	84
4	148-160	89	179-193	90
5	145	83	150	82
6	146-166	90	151-185	87
7	179	89	150-196	92
8	158	86	169	90
9	157	88	162	85
10	153	88	157	87
11	166	91	174	91
12	166	90	170	90

Microstructure

Figs. 2 to 15 are micrographs illustrating the structures at various positions adjacent to the hardness impressions.

Weld #1



Fig. 2 10% Nital x100
Normalized plate structure - position #1

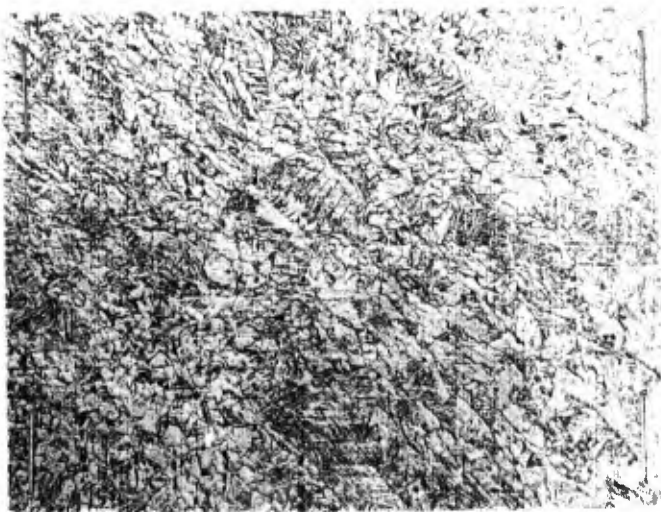


Fig. 3 10% Nital x100
Weld structure - position #5

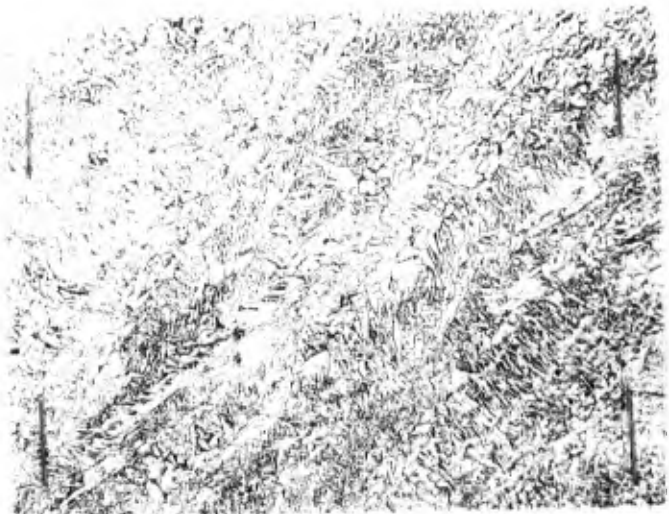


Fig. 4 10% Nital x100
Weld structure - position #2

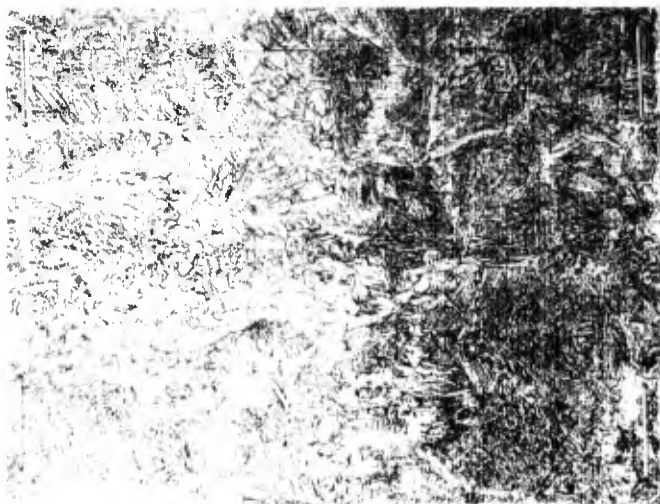


Fig. 5 10% Nital 100 Fusion
zone of weld and plate.
Position #7

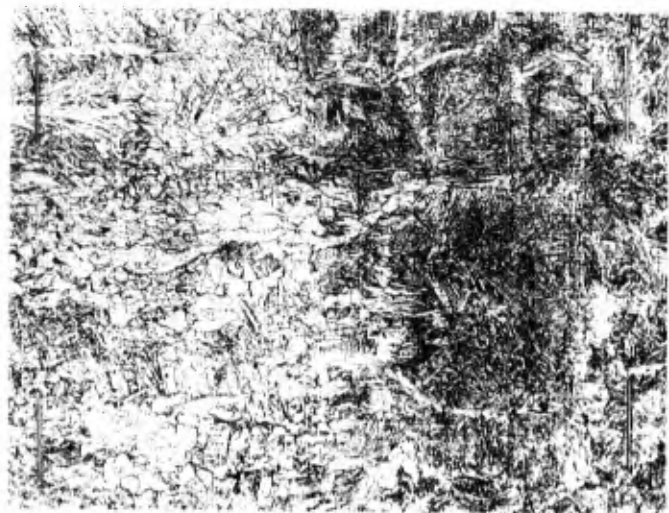


Fig. 6 10% Nital x100 Fusion
zone of weld and plate -
Position #4

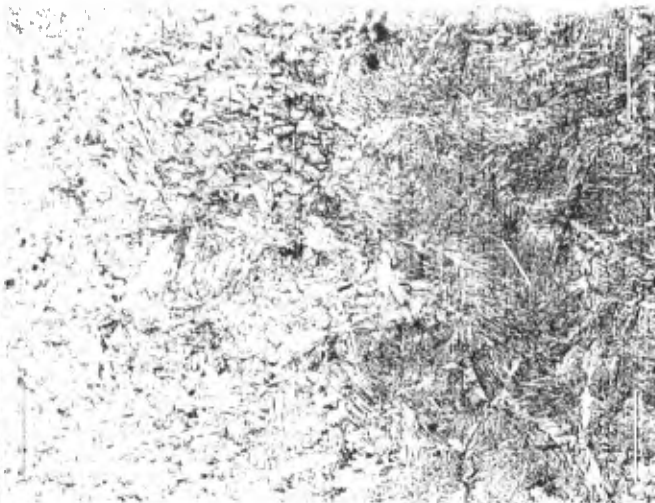


Fig. 7 10% Nital x100 Fusion zone of weld and plate. Position #6

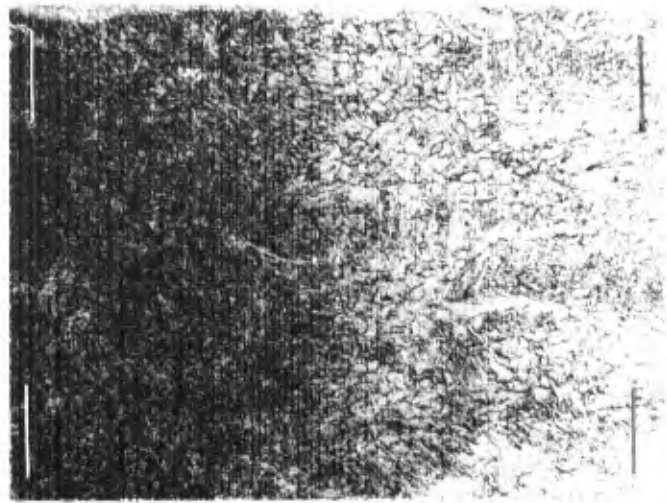


Fig. 8 10% Nital x100 Fusion zone of weld and plate. Position #3

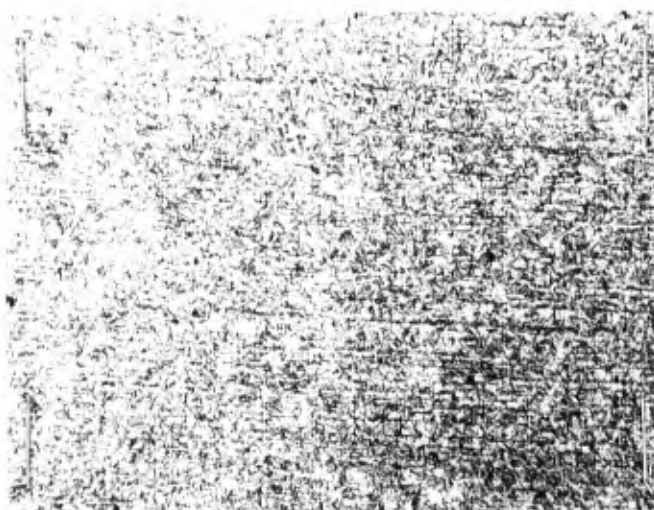


Fig. 9 10% Nital x100 Plate structure between welds. Position #8

Weld #2

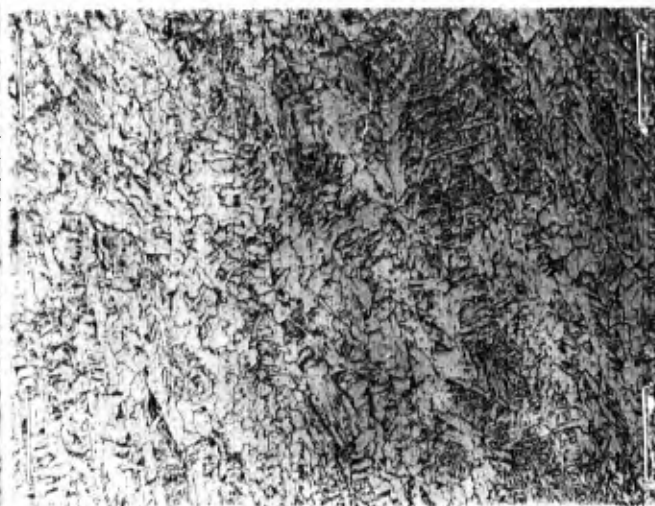


Fig. 10 10% Nital x100 Weld structure - position #5



Fig. 11 10% Nital x100 Weld structure - position #2

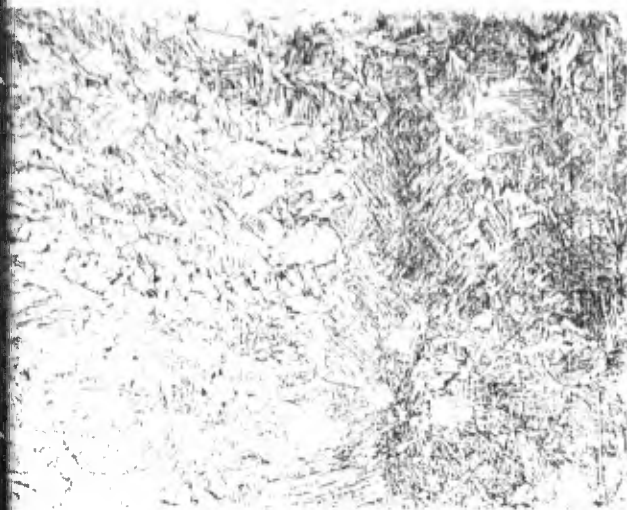


Fig. 12 10% Nital x100 Fusion zone of weld and plate. Position #7

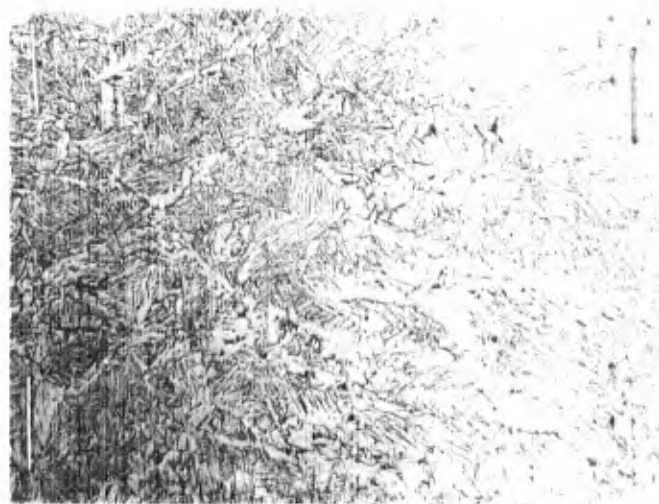


Fig. 13 10% Nital x100 Fusion zone of weld and plate. Position #4



Fig. 14 10% Nital x100 Fusion zone of weld and plate. Position #6



Fig. 15 10% Nital x100 Fusion zone of weld and plate. Position #3

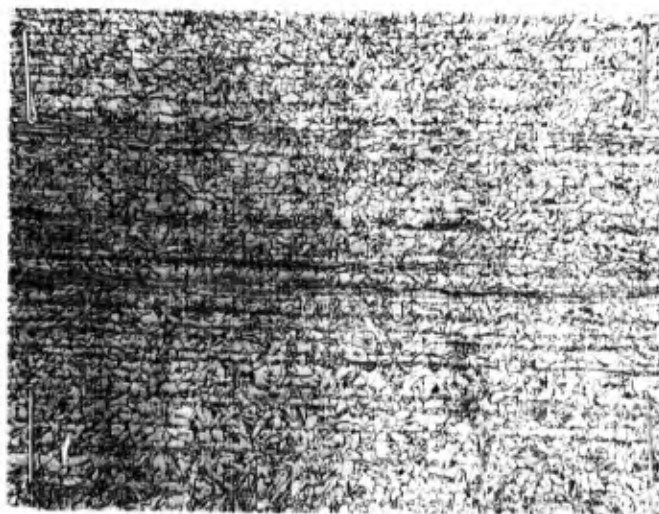


Fig. 16 10% Nital x100 Plate structure between welds. Position #8

Summary

1. Vickers and Rockwell hardness on the weld, fusion zones and normalized plate ranged from 145 to 179 Vickers and 78 to 89 Rockwell B for weld #1, and from 143 to 195 Vickers and 79 to 92 Rockwell B for weld #2.

2. Microstructures covering the welds, fusion zones and plate proper are shown in figures 2 to 16.

E. S. Lower
R. S. Sargeon

ESB
R S Sargeon
WB

ESB
L

Metallurgical Laboratory
REPUBLIC STEEL CORPORATION
Central Alloy District