PITTSBURGH DES MOINES STEEL COMPANY

E.R.L. Wind Tunnel, Cleveland, Ohio Cont. 177-42

SPECIFICATIONS FOR WELDING

APPROVED SUBJECT TO CONTRACT PLANS AND SPECIFICATIONS. DO NOT SCALE DRAWINGS CONTRACTOR TO VERIFY ALL DIMENSIONS REC'D: CHKD: Sept. 17, RET'D:

SECTION A - PROCEDURE SPECIFICATION

A1 - Scope - All welding of the procedure qualification tests, operator qualification tests, and all welding of the skin plates, stiffening rings and test chamber shall be in accordance with this procedure specification.

A2 - Welding Process - The Direct Current Metallic Shielded Arc Welding Process shall be used for all welded joints.

A3 - Base Metal - Base material shall be "Yoloy" having a chemical composition of C .12% maximum, Mn .30% - .60%, S .05% maximum, P .04% maximum, Ni 1.30% - 2.00%, Cu .70% - 1.25% or Nickel Copper Steel with analysis of C .27% maximum, Mn .30% - .70%, S .05% maximum, P .04% maximum, Ni 1.75% - 2.25%, Cu .50% - .80%.

A4 - Filler Metal - Filler metal shall comply with the joint A.W.S.-A.S.T.M. tentative Specifications for Iron and Steel Arc-Welding Electrodes, A.S.T.M. Serial Designation A233, latest edition.

A5 - Position - Welding shall be classified as being in the flat, horizontal, vertical or overhead position depending upon the manner in which the filler metal must be deposited.

A6 - Edge Preparation - Mill edges, rolled surfaces, square sheared, square or bevel machine burned, and machined edges shall be equally satisfactory for butt, fillet and lap welds. All edges msut be brushed clean of all loose rust, dirt, and scale before welding. All moisture, grease or paint shall be removed from the surfaces on which the weld metal is to fuse except that a thin coating of lacquer on the edge of the joint will be permitted. The purpose of the lacquer, if used, is to prevent the weld splatter from sticking to the base metal and to prevent the plate edges from rusting during storage and shipment.

The most common edge preparation will be indicated on the Qualification Record.

A7 - Joint Spacing - The joint spacing or gap between the plate edges of all butt joints should represent the average gap in the length of the seam after tacking. Irregularities in the plate edges will cause the gaps to vary. The minimum permissible gap for welding in any part of the seam shall be 1/16" less than that called for. Where the gaps are smaller than the above minimum gap, or the joint be prepared or welded in some way to secure a satisfactory weld.

A8 - Tack Welds - Most welded structures are assembled by tack welds. If these tacks are sound and cleaned of all slag and dirt they may be welded over and become part of the welded joint. All cracked, porous, and poorly fused tack welds shall be chipped out before that section of the seam is continuous welded.

A9 - Treatment of Underside of Welding Groove - All butt joints shall be chipped or gas gouged on the underside of the first bead to expose sound metal before welding is begun on that side. The chipping tool, if used, shall have a round nose which will cut a U groove at least 1/32" wider than the nominal size of the electrode used to make the first pass in the chipped groove.

A10 - Cleaning - In addition to the cleaning of the base metal as specified in section A6, each pass in a multiple pass weld shall be thoroughly cleaned of all spatter, slag, and dirt before depositing the next pass.

A11 - Defects - Any cracks or blow-holes that appear on the surface of any pass of welding shall be removed by chipping, grinding, or gas gouging before depositing the next successive pass of welding.

A12 - Qualification Records - A record of the material, preparation, welding procedure and test results of each test weld shall be filled out and signed as witnessed by a qualified inspector. Copies of the Qualification Record of each joint are attached as part of this specification. The actual welding shall be performed as nearly like the qualified joints as field conditions will permit. Changes in order of welding beads, electrode sizes, welding current values, etc. may be made to suit different thicknesses, variations in field fit, positions, root openings, degree of restraint, etc.

A13 - Bead Procedure - The bead procedure shown on the sketches in the Qualification Records is only for the thickness of the test plate. The same joint in other thicknesses will require fewer or more beads. No two welding operators weld just alike so that some variation of the bead procedure shown is permissible to suit various operators. Wider gaps due to uneven edges change the bead procedure somewhat. Bead procedure for all field joints will be determined by the field foreman subject to approval by the field inspector.

A14 - Preheating - The Copper Nickel Steel base metal shall be preheated to 400 degrees F before welding is begun.

SECTION B - PROCEDURE QUALIFICATION

B1 - Test Welds - The qualification of the following test welds shall comprise the qualification of all joints in the wind tunnel:

Position	Type of Joint	Base Metal
Flat and Overhead	Double Bevel	Nickel Copper Steel
Overhead and Flat	Single Vee	"Yoloy"
Vertical	Single Vee (backed)	"Yoloy"
Horizontal	Single Bevel (backed)	"Yoloy"
Flat and Overhead	Single U	Nickel Copper Steel
Vertical	Double Vee	Nickel Copper Steel
Vertical	Single Vee	"Yoloy"
Vertical	Double Vee	Nickel Copper Steel
Flat and Overhead	Double Vee	Nickel Copper Steel
Flat and Overhead	Single Vee	"Yoloy"
Flat and Overhead	Single Bevel	"Yoloy"
Horizontal	Single Bevel	"Yoloy"
Horizontal	Double Bevel	Nickel Copper Steel
Horizontal	Single J	Nickel Copper Steel
Flat and Overhead	Single J	Nickel Copper Steel

B2 - Test Specimens - The number and type of test specimens from each test weld shall comply with the Standard Qualification Procedure of the American Welding Society.

B3 - Physical Requirements - Soundness - This shall be determined by the guided bend test as described in the Standard Qualification Procedure of the American Welding Society and the results shall meet the following requirements: Any specimen in which a crack exists before bending or results from bending, exceeding 1/8" measured in any direction shall be considered as having failed, except that cracks in the corners of the plate shall not be considered.

Tensile Strength - The reduced section tensile test specimens shall have a strength of at least 55,000 pounds per square inch.

Ductility - The ductility of the weld metal shall be determined by the free-bend test method and shall not be less than 25%.

SECTION C - OPERATOR QUALIFICATION

C1 - Shop Welders - All welding operators working on the welded joints of the wind tunnel in the shop shall be qualified in accordance with the Standard Qualification Procedure of the A.W.S., latest edition.

C2 - Field Welders - All field welding operators shall be qualified in accordance with the Standard Qualification Procedure of the A.W.S., latest edition, before being permitted to weld on any joints of the wind tunnel. Once a welder has passed the tests he need not be retested for the duration of the job providing he is continuously employed.

Test Welds:

1. 3/8" plate, single vee groove with backing strip, overhead position
2. " " " " " " " " horizontal "
3. " " " " " " " " vertical "

Test Specimens:

One root bend and one face bend from each test weld.

It is to be noted that each of the three welding positions not only qualifies the welder for that particular position but also for the flat position. An "all-position" welder must satisfactorily pass all three of the test welds.

SECTION D - WELDING PROCEDURE

D1 - Purpose - The welding procedure or sequence shall be such as to minimize welding shrinkage stresses and distortions while at the same time for practical considerations, hold the alignment of the joints and the axis of the tunnel, and avoid delays as far as possible. For practical reasons, these procedure rules must be limited to general cases. The detailed rules of procedure will be given in the various welding diagrams which shall govern the order of welding of the various joints. In general, all longitudinal seams intersecting a girth seam should be at least one-half welded before the girth seam is welded.

It is very important to use the minimum amount of weld metal consistent with stress requirement, in all joints of this structure to minimize shrinkage effects of welding to secure as smooth a surface as possible of all plates at the air passage. The reinforcement of all welds should be as small as possible without undercutting or having the welds less than flush with the plate.

CONT. 177-42 3 REV 8-8-42

17532

JOINT NO. BF017Y

PITTSBURGH-DES MOINES STEEL COMPANY
NEVILLE ISLAND PLANT

DATA SHEET (C142A,B,C) SKETCH NO.

WELDING PROCESS QUALIFICATION RECORD
A. W. S. STANDARD QUALIFICATION PROCEDURE

PROCESS SPECIFICATION

TEST PLATE NO. BF017Y
WELDING OPERATOR CARMEN TARQUINIO
POSITION FLAT AND OVERHEAD
PLATE THICKNESS 1 1/16"
EDGE PREPARATION BY BEN
METALLIC SHIELD-ARC + POLARITY REVERSED
FILLER METAL: GRADE A.S.T.M. - A.W.S. E6010
BASE METAL NICKEL COPPER STEEL
CHIPPING ROOT YES
HEAT TREATMENT NONE
CLEANING WIRE BRUSH
PEEN FOR SLAG REMOVAL ONLY

PREHEAT 400°F

TEST RESULTS - BUTT JOINTS

REDUCED SECTION TENSION - LBS. PER SQ. IN.
1. 73,760
2. 72,540

FREE BEND ELONGATION - %
1. 54.8%
2. 61.7%

ROOT BEND (MAX. CRACK - INCHES)
1. NONE REQUIRED
2.

FACE BEND (MAX. CRACK - INCHES)
1. NONE REQUIRED
2.

SIDE BEND (MAX. CRACK - INCHES)
1. 1-CRACK 3/64
2. 1-CRACK 1/16
3. NO DEFECTS
4. 1-PIN POINT GAS POCKET

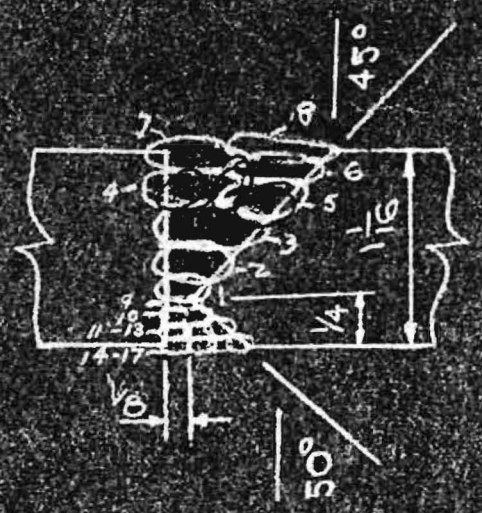
TEST RESULTS - FILLET WELDED JOINTS

TRANSVERSE SHEAR TEST - AVE. THROAT-INCHES; ULT. STR.-LBS. PER SQ. IN.
1.
2.

LONGITUDINAL SHEAR TEST
1.
2.

BREAK TESTS (SOUNDNESS)
1.
2.

FULL SCALE SKETCH - (BEVEL, SPACING, AND BEADS)



PROCEDURE

BEAD NO.	ELECTRODE SIZE	AMPERES	VOLTS	NOTES
1	3/16 ϕ	170	28	
2	7/32 ϕ	185	30	
3	7/32 ϕ	185	30	
4	7/32 ϕ	185	30	
5	7/32 ϕ	185	30	
6	7/32 ϕ	185	30	
7	7/32 ϕ	185	30	
8	7/32	185	30	
9	5/32 ϕ	130	28	
10	5/32 ϕ	130	28	
11	5/32 ϕ	130	28	
12	5/32 ϕ	130	28	
13	5/32 ϕ	130	28	
14	5/32 ϕ	130	28	
15	5/32 ϕ	130	28	
16	5/32 ϕ	130	28	
17	5/32 ϕ	130	28	

THE UNDERSIGNED CERTIFIES THAT THE ABOVE STATEMENTS MADE IN THIS REPORT ARE CORRECT, AND THAT THE TEST PLATES WERE PREPARED, WELDED AND TESTED IN ACCORDANCE WITH THE A.W.S. STANDARD QUALIFICATION PROCEDURE FOR PROCESS QUALIFICATION. THE TEST RESULTS HAVE MET AND SATISFIED THE REQUIREMENTS OF THE FOLLOWING CODES.

SIGNED: PITTSBURGH DES MOINES STEEL CO.

BY: Eric E. Hoeptner

DATE: AUG. 8, 1942 TITLE: WORKS MANAGER

CONT. 177-42 9

19532

REV. 5-5-42

JOINT NO. BOF6V

DATA SHEET (C142A,B,C) SKETCH NO.

PITTSBURGH-DES MOINES STEEL COMPANY
NEVILLE ISLAND PLANT

WELDING PROCESS QUALIFICATION RECORD
A. W. S. STANDARD QUALIFICATION PROCEDURE

PROCESS SPECIFICATION

TEST PLATE NO. BOF6V
WELDING OPERATOR LAWRENCE COLACOSSI
POSITION OVERHEAD AND FLAT
PLATE THICKNESS 3/8"
EDGE PREPARATION BY BRN
METALLIC SHIELD ARC - POLARITY REVERSED
FILLER METAL: GRADE A.S.T.M.-A.W.S. E6010
BASE METAL YOLOY
CHIPPING ROOT YES
HEAT TREATMENT NONE
CLEANING WIRE BRUSH
PEEN FOR SLAG REMOVAL ONLY

TEST RESULTS - BUTT JOINTS

REDUCED SECTION TENSION - LBS. PER SQ. IN.
#1. 69,000
#2. 70,630

FREE BEND ELONGATION - %
#1. 73%
#2. 62.2%

ROOT BEND (MAX. CRACK - INCHES)
#1. 1 CRACK 3/64
#2. NO DEFECTS

FACE BEND (MAX. CRACK - INCHES)
#1. 3 CRACKS 1/16; 1 CRACK 3/32
#2. 1 CRACK 3/64; 2 CRACKS 1/16

SIDE BEND (MAX. CRACK - INCHES)
1.
2.
3. NONE REQUIRED
4.

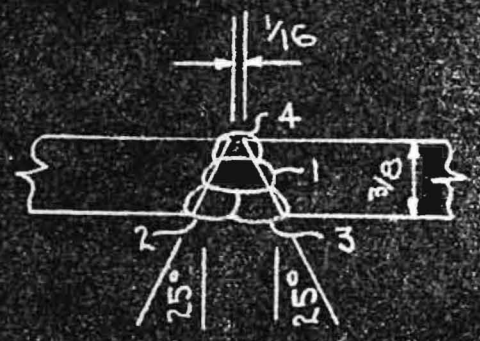
TEST RESULTS - FILLET WELDED JOINTS

TRANSVERSE SHEAR TEST - AVE. THROAT-INCHES; ULT. STR.-LBS. PER SQ. IN.
1.
2.

LONGITUDINAL SHEAR TEST
1.
2.

BREAK TESTS (SOUNDNESS)
1.
2.

FULL SCALE SKETCH - (BEVEL, SPACING, AND BEADS)



PROCEDURE

BEAD NO.	ELECTRODE SIZE	AMPERES	VOLTS	NOTES
1	5/32 ϕ	130	28	
2	5/32 ϕ	125	26	
3	5/32 ϕ	125	26	
4	7/32 ϕ	185	28	

THE UNDERSIGNED CERTIFIES THAT THE ABOVE STATEMENTS MADE IN THIS REPORT ARE CORRECT, AND THAT THE TEST PLATES WERE PREPARED, WELDED AND TESTED IN ACCORDANCE WITH THE A. W. S. STANDARD QUALIFICATION PROCEDURE FOR PROCESS QUALIFICATION. THE TEST RESULTS HAVE MET AND SATISFIED THE REQUIREMENTS OF THE FOLLOWING CODES.

SIGNED: PITTSBURGH DES MOINES STEEL CO.
BY: Earl E. Wolfston
DATE: AUG. 8-1942 TITLE: WORKS MANAGER

Conv. III-42

17542

JOINT NO. BVGV-B3

PITTSBURGH-DES MOINES STEEL COMPANY
NEVILLE ISLAND PLANT

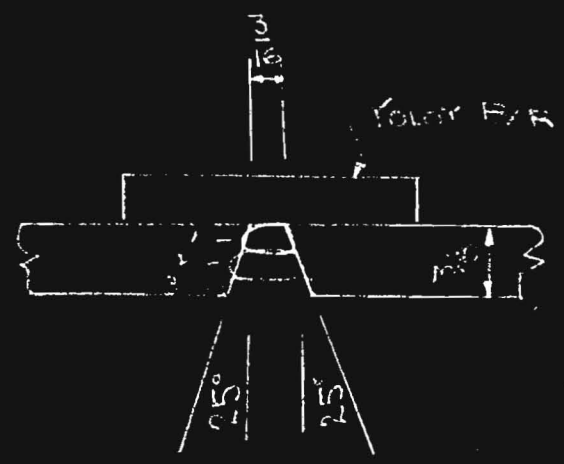
DATA SHEET (C1424,B,C) SKETCH NO.

WELDING PROCESS QUALIFICATION RECORD
A. W. S. STANDARD QUALIFICATION PROCEDURE

PROCESS SPECIFICATION

TEST PLATE NO. BVGV-B3
WELDING OPERATOR [illegible]
POSITION VERTICAL
PLATE THICKNESS 3/8"
EDGE PREPARATION BV FULL
METALLIC SHIELD ARC - POLARITY REVERSED
FILLER METAL: GRADE A.S.T.M.-A.W.S. E6010
BASE METAL YO-CY
CHIPPING ROOT No
HEAT TREATMENT NONE
CLEANING WIRE BRUSH
PEEN FOR SLAG REMOVAL ONLY

FULL SCALE SKETCH - (BEVEL, SPACING, AND BEADS)



TEST RESULTS - BUTT JOINTS

REDUCED SECTION TENSION - LBS. PER SQ. IN.
1. 64,020
2. 68,400

FREE BEND ELONGATION - %
1. 23%
2. 22%

ROOT BEND (MAX. CRACK - INCHES)
1. 4 PINPOINT GASPOCKETS
2. 6 PINPOINT GASPOCKETS

FACE BEND (MAX. CRACK - INCHES)
1. NO EFFECTS
2. 2-PINPOINT GASPOCKETS

SIDE BEND (MAX. CRACK - INCHES)
1.
2. NONE REQUIRED
3.
4.

PROCEDURE

BEAD NO.	ELECTRODE SIZE	AMPERES	VOLTS	NOTES
1	3/16"	165	25	
2	3/16"	185	28	
3	3/16"	175	30	

TEST RESULTS - FILLET WELDED JOINTS

TRANSVERSE SHEAR TEST - AVE.THROAT-INCHES; ULT.STR.-LBS.PER SQ. IN.
1.
2.

LONGITUDINAL SHEAR TEST
1.
2.

BREAK TESTS (SOUNDNESS)
1.
2.

THE UNDERSIGNED CERTIFIES THAT THE ABOVE STATMENTS MADE IN THIS REPORT ARE CORRECT, AND THAT THE TEST PLATES WERE PREPARED, WELDED AND TESTED IN ACCORDANCE WITH THE A. W. S. STANDARD QUALIFICATION PROCEDURE FOR PROCESS QUALIFICATION. THE TEST RESULTS HAVE MET AND SATISFIED THE REQUIREMENTS OF THE FOLLOWING CODES.

SIGNED: PITTSBURGH DES MOINES STEEL CO.
BY: Earl E. Wolfston.

DATE: Aug. 3 - 1942 TITLE: WORKS MANAGER

CONT. 177-42

1753

JOINT NO. BHGL-BS

PITTSBURGH-DES MOINES STEEL COMPANY
NEVILLE ISLAND PLANT

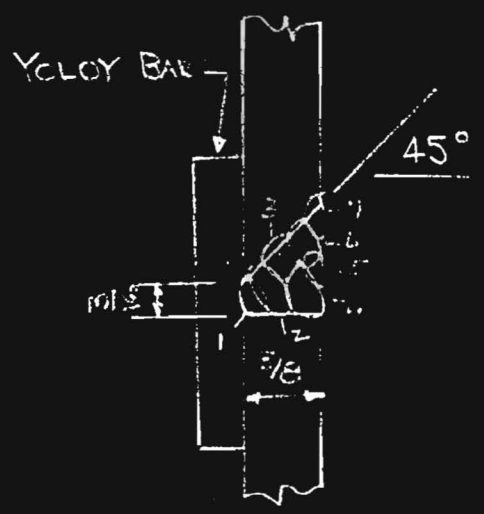
DATA SHEET (C142A,3,C) SKETCH NO.

WELDING PROCESS QUALIFICATION RECORD
A. W. S. STANDARD QUALIFICATION PROCEDURE

PROCESS SPECIFICATION

TEST PLATE NO. BHGL-BS
WELDING OPERATOR [illegible]
POSITION HORIZONTAL
PLATE THICKNESS 3/8"
EDGE PREPARATION BV BRN
METALLIC SHIELD ARC - POLARITY REVERSED
FILLER METAL: GRADE A.S.T.M.-A.W.S. E6010
BASE METAL YOLOY
CHIPPING ROOT NO
HEAT TREATMENT NONE
CLEANING WIRE BRUSH
PLEN FOR SLAG REMOVAL ONLY

FULL SCALE SKETCH - (BEVEL, SPACING, AND BEADS)



TEST RESULTS - BUTT JOINTS

REDUCED SECTION TENSION - LBS. PER SQ. IN.
1. 68,540
2. 69,200

FREE BEND ELONGATION - %
1. [illegible]
2. [illegible]

ROOT BEND (MAX. CRACK - INCHES)
1. 1-CRACK 1/8" 1 CRACK 3/32"
2. 1 CRACK 3/32" 1 CRACK 1/64"

FACE BEND (MAX. CRACK - INCHES)
1. 1 PINHOLE GASHOLE
2. 1 CRACK 1/8"

SIDE BEND (MAX. CRACK - INCHES)
1.
2. NONE REQUIRED
3.
4.

TEST RESULTS - FILLET WELDED JOINTS

TRANSVERSE SHEAR TEST - AVE. THROAT-INCHES; ULT. STR.-LBS. PER SQ. IN.
1.
2.

LONGITUDINAL SHEAR TEST
1.
2.

BREAK TESTS (SOUNDNESS)
1.
2.

PROCEDURE

BEAD NO.	ELECTRODE SIZE	AMPERES	VOLTS	NOTES
1	3/16 ø	150	26	
2	3/16 ø	150	26	
3	3/16 ø	170	26	
4	3/16 ø	160	28	
5	3/16 ø	160	28	
6	3/16 ø	170	27	
7	3/16 ø	150	27	

THE UNDERSIGNED CERTIFIES THAT THE ABOVE STATEMENTS MADE IN THIS REPORT ARE CORRECT, AND THAT THE TEST PLATES WERE PREPARED, WELDED AND TESTED IN ACCORDANCE WITH THE A. W. S. STANDARD QUALIFICATION PROCEDURE FOR PROCESS QUALIFICATION. THE TEST RESULTS HAVE MET AND SATISFIED THE REQUIREMENTS OF THE FOLLOWING CODES.

SIGNED: Carl F. Shepherd

TITLE:

CONT. 177-42 6 REV. 8-8-42

19532

JOINT NO. BF017U

DATA SHEET (C142A,B,C) SKETCH NO.

PITTSBURGH-DES MOINES STEEL COMPANY
NEVILLE ISLAND PLANT

WELDING PROCESS QUALIFICATION RECORD
A. W. S. STANDARD QUALIFICATION PROCEDURE

PROCESS SPECIFICATION

TEST PLATE NO. BF017U
WELDING OPERATOR CARMEN TARQUINIO
POSITION FLAT AND OVERHEAD
PLATE THICKNESS 11/16"
EDGE PREPARATION BY PLN
METALLIC SHIELD ARC - POLARITY REVERSED
FILLER METAL: GRADE A.S.T.M. - A.W.S. E6010
BASE METAL NICKEL COPPER STEEL
CHIPPING ROOT YES
HEAT TREATMENT NONE
CLEANING WIRE BRUSH
PEEN FOR SLAG REMOVAL ONLY

PREHEAT 400° F

TEST RESULTS - BUTT JOINTS

REDUCED SECTION TENSION - LBS. PER SQ. IN.
1. 71300
2. 72200

FREE BEND ELONGATION
1. 64.5%
2. 71.8%

ROOT BEND (MAX. CRACK - INCHES)
1. NONE REQUIRED
2.

FACE BEND (MAX. CRACK - INCHES)
1. NONE REQUIRED
2.

SIDE BEND (MAX. CRACK - INCHES)
1. NO DEFECTS
2. 1 PINPOINT GAS POCKET
3. NO DEFECTS
4. A CRACK 1/32

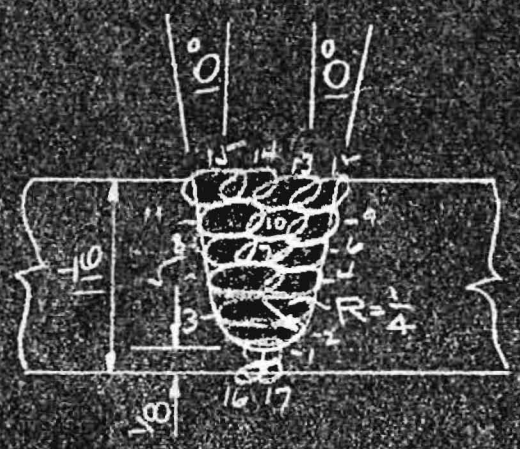
TEST RESULTS - FILLET WELDED JOINTS

TRANSVERSE SHEAR TEST - AVE. THROAT - INCHES; ULT. STR. - LBS. PER SQ. IN.
1.
2.

LONGITUDINAL SHEAR TEST
1.
2.

SHEAR TESTS (SOUNDNESS)
1.
2.

FULL SCALE SKETCH - (BEVEL, SPACING, AND BEADS)



PROCEDURE

BEAD NO.	ELECTRODE SIZE	AMPERES	VOLTS	NOTES
1	3/16	160	26	
2	7/32	160	24	
3	7/32	165	26	
4	7/32	170	28	
5	7/32	170	28	
6	7/32	170	28	
7	7/32	170	28	
8	7/32	170	28	
9	7/32	170	28	
10	7/32	170	28	
11	7/32	170	28	
12	7/32	170	28	
13	7/32	170	28	
14	7/32	170	28	
15	7/32	170	28	
16	5/32	130	30	
17	5/32	130	30	

THE UNDERSIGNED CERTIFIES THAT THE ABOVE STATEMENTS MADE IN THIS REPORT ARE CORRECT, AND THAT THE TEST PLATES WERE PREPARED, WELDED AND TESTED IN ACCORDANCE WITH THE A. W. S. STANDARD QUALIFICATION PROCEDURE FOR PROCESS QUALIFICATION. THE TEST RESULTS HAVE MET AND SATISFIED THE REQUIREMENTS OF THE FOLLOWING CODES.

SIGNED: PITTSBURGH DES MOINES STEEL CO.
BY: Earl Wrighton
DATE: AUG. 8 1942 TITLE: WORKS MANAGER

19632

CON[redacted]42 [redacted]

REV. 8-[redacted]2

JOINT NO. BV17X-A

DATA SHEET (C142A,B,C) SKETCH NO.

PITTSBURGH-DES MOINES STEEL COMPANY
NEVILLE ISLAND PLANT

WELDING PROCESS QUALIFICATION RECORD
A. W. S. STANDARD QUALIFICATION PROCEDURE

PROCESS SPECIFICATION

TEST PLATE NO. BV17X
WELDING OPERATOR CARMEN TARQUINIO
POSITION VERTICAL
PLATE THICKNESS 1 1/16"
EDGE PREPARATION BY BEN
METALLIC SHIELD ARC - POLARITY REVERSED
FILLER METAL: GRADE A.S.T.M.-A.W.S. E6010
BASE METAL NICKEL COPPER STEEL
CHIPPING ROOT YES
HEAT TREATMENT NONE
CLEANING WIRE BRUSH
PEEN FOR SLAG REMOVAL ONLY

PREHEAT 400°F

TEST RESULTS - BUTT JOINTS

REDUCED SECTION TENSION - LBS. PER SQ. IN.
1. 72,880
2. 73,280

FREE BEND ELONGATION - %
1. 52.9%
2. 54.5%

ROOT BEND (MAX. CRACK - INCHES)
1. NONE REQUIRED
2.

FACE BEND (MAX. CRACK - INCHES)
1. NONE REQUIRED
2.

SIDE BEND (MAX. CRACK - INCHES)
1. 1 PINPOINT GASPOCKET
2. 1 CRACK 1/64
3. 1 CRACK 1/64
4. NO DEFECTS

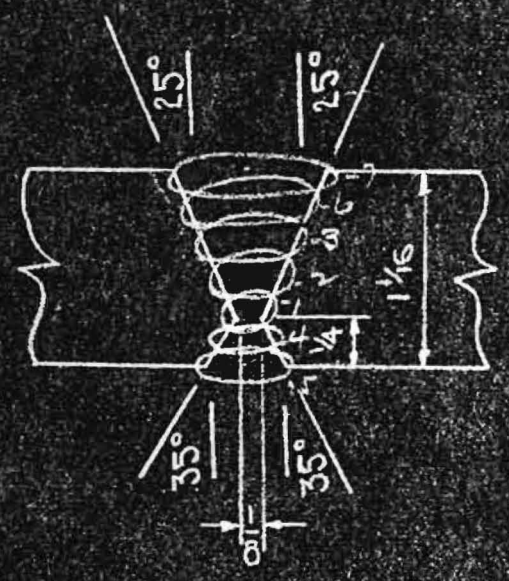
TEST RESULTS - FILLET WELDED JOINTS

TRANSVERSE SHEAR TEST - AVE. THROAT-INCHES; ULT. STR.-LBS. PER SQ. IN.
1.
2.

LONGITUDINAL SHEAR TEST
1.
2.

BREAK TESTS (SOUNDNESS)
1.
2.

FULL SCALE SKETCH - (BEVEL, SPACING, AND BEADS)



PROCEDURE

BEAD NO.	ELECTRODE SIZE	AMPERES	VOLTS	NOTES
1	5/32	120	28	
2	3/16	150	28	
3	3/16	150	28	
4	3/16	130	28	
5	3/16	130	28	
6	3/16	150	28	
7	3/16	130	28	

THE UNDERSIGNED CERTIFIES THAT THE ABOVE STATEMENTS MADE IN THIS REPORT ARE CORRECT, AND THAT THE TEST PLATES WERE PREPARED, WELDED AND TESTED IN ACCORDANCE WITH THE A. W. S. STANDARD QUALIFICATION PROCEDURE FOR PROCESS QUALIFICATION. THE TEST RESULTS HAVE MET AND SATISFIED THE REQUIREMENTS OF THE FOLLOWING CODES.

SIGNED: PITTSBURGH DES MOINES STEEL CO.
BY: Earl E. Weyston
DATE: AUG. 8, 1942 TITLE: WORKS MANAGER

17532 CONT. 177-42 15 REV. 8-8-42

JOINT NO. BV6V

PITTSBURGH-DES MOINES STEEL COMPANY
NEVILLE ISLAND PLANT

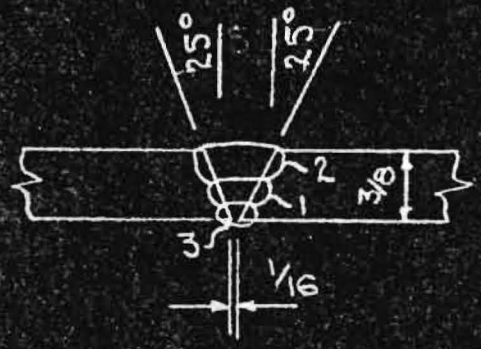
DATA SHEET (C142A,B,C) SKETCH NO.

WELDING PROCESS QUALIFICATION RECORD
A. W. S. STANDARD QUALIFICATION PROCEDURE

PROCESS SPECIFICATION

TEST PLATE NO. BV6V
WELDING OPERATOR CARMEN THEQUINIO
POSITION VERTICAL
PLATE THICKNESS 3/8"
EDGE PREPARATION BV BRN
METALLIC SHIELD ARC - POLARITY REVERSED
FILLER METAL: GRADE ASTM-AWS E6010
BASE METAL YOLOY
CHIPPING ROOT YES
HEAT TREATMENT NONE
CLEANING WIRE BRUSH
PEEN FOR SLAG REMOVAL ONLY

FULL SCALE SKETCH - (BEVEL, SPACING, AND BEADS)



TEST RESULTS - BUTT JOINTS

REDUCED SECTION TENSION - LBS. PER SQ. IN.
1. 69,550
2. 64,100

FREE BEND ELONGATION - %
1. 30.4% BEND AT FUSION LINE
2. 25% BEND AT FUSION LINE

ROOT BEND (MAX. CRACK - INCHES)
1. 2 CRACKS 1/16
2. 2 CRACKS 1/16

FACE BEND (MAX. CRACK - INCHES)
1. PINPOINT GAS POCKETS
2. PINPOINT GAS POCKETS

SIDE BEND (MAX. CRACK - INCHES)
1.
2. NONE REQUIRED
3.
4.

PROCEDURE

BEAD NO.	ELECTRODE SIZE	AMPERES	VOLTS	NOTES
1	3/16 ϕ	150	25	UP
2	3/16 ϕ	160	26	DOWN
3	3/16 ϕ	180	28	DOWN

TEST RESULTS - FILLET WELDED JOINTS

TRANSVERSE SHEAR TEST - AVE. THROAT-INCHES; ULT. STR.-LBS. PER SQ. IN.
1.
2.

LONGITUDINAL SHEAR TEST
1.
2.

BREAK TESTS (SOUNDNESS)
1.
2.

THE UNDERSIGNED CERTIFIES THAT THE ABOVE STATEMENTS MADE IN THIS REPORT ARE CORRECT, AND THAT THE TEST PLATES WERE PREPARED, WELDED AND TESTED IN ACCORDANCE WITH THE A. W. S. STANDARD QUALIFICATION PROCEDURE FOR PROCESS QUALIFICATION. THE TEST RESULTS HAVE MET AND SATISFIED THE REQUIREMENTS OF THE FOLLOWING CODES.

SIGNED: PITTSBURGH DES MOINES STEEL CO.
BY: Earl E. Hoefston
DATE: Aug. 8 - 1942 TITLE: WORKS MANAGER

BY TX

WELDING OPERATOR: GREMEN

POSITION: VERTICAL

THICKNESS: 1/16

EDGE PREPARATION: BY BRN

ASTM

NICKEL

WIRE BRUSH

NONE

NONE

NONE

17532

CONT. 177-42

REV. 8-8-42

JOINT NO. BF017X

DATA SHEET (C142A,B,C) SKETCH NO.

PITTSBURGH-DES MOINES STEEL COMPANY
NEVILLE ISLAND PLANT

WELDING PROCESS QUALIFICATION RECORD
A. W. S. STANDARD QUALIFICATION PROCEDURE

PROCESS SPECIFICATION

TEST PLATE NO. BF017X
WELDING OPERATOR EMEMEN TARQUINIO
POSITION FLAT AND OVERHEAD
PLATE THICKNESS 1 1/16"
EDGE PREPARATION BY BEN
METALLIC SHIELD ARC - POLARITY REVERSED
FILLER METAL: GRADE A.S.T.M.-A.W.S. E6010
BASE METAL NICKEL COPPER STEEL
CHIPPING ROOT YES
HEAT TREATMENT NONE
CLEANING WIRE BRUSH
PEEN FOR SLAG REMOVAL ONLY

PRECHEAT 400° F

TEST RESULTS - BUTT JOINTS

REDUCED SECTION TENSION - LBS. PER SQ. IN.
1. 71,840
2. 73,120

FREE BEND ELONGATION -
1. 55%
2. 62.7%

ROOT BEND (MAX. CRACK - INCHES)
1. NONE REQUIRED
2.

FACE BEND (MAX. CRACK - INCHES)
1. NONE REQUIRED
2.

SIDE BEND (MAX. CRACK - INCHES)
1. 1-CRACK 1/32
2. 1-CRACK 1/8
3. NO DEFECTS
4. NO DEFECTS

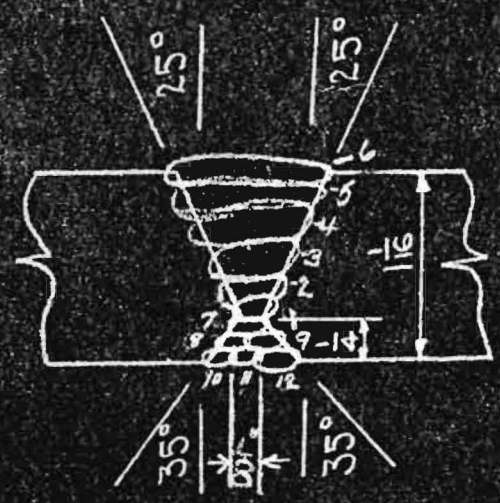
TEST RESULTS - FILLET WELDED JOINTS

TRANSVERSE SHEAR TEST - AVE. THROAT-INCHES; ULT. STR.-LBS. PER SQ. IN.
1.
2.

LONGITUDINAL SHEAR TEST
1.
2.

BREAK TESTS (SOUNDNESS)
1.
2.

FULL SCALE SKETCH - (BEVEL, SPACING, AND BEADS)



PROCEDURE

BEAD NO.	ELECTRODE SIZE	AMPERES	VOLTS	NOTES
1	3/16 Φ	175	27	
2	7/32 Φ	185	30	
3	7/32 Φ	185	30	
4	7/32 Φ	185	30	
5	7/32 Φ	185	30	
6	7/32 Φ	185	30	
7	5/32 Φ	130	28	
8	5/32 Φ	130	28	
9	5/32 Φ	130	28	
10	5/32 Φ	130	28	
11	5/32 Φ	130	28	
12	5/32 Φ	130	28	

THE UNDERSIGNED CERTIFIES THAT THE ABOVE STATMENTS MADE IN THIS REPORT ARE CORRECT, AND THAT THE TEST PLATES WERE PREPARED, WELDED AND TESTED IN ACCORDANCE WITH THE A. W. S. STANDARD QUALIFICATION PROCEDURE FOR PROCESS QUALIFICATION. THE TEST RESULTS HAVE MET AND SATISFIED THE REQUIREMENTS OF THE FOLLOWING CODES.

SIGNED: PITTSBURGH DES MOINES STEEL CO.

BY: Lane E. Walgston

DATE: AUG. 8, 1942 TITLE: WORKS MANAGER

1752

JOINT NO. BFOSV

PITTSBURGH-DES MOINES STEEL COMPANY
NEVILLE ISLAND PLANT

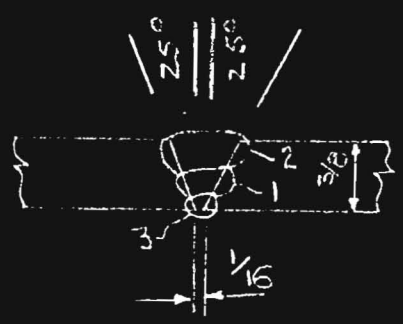
DATA SHEET (C1420A,B,C) SKETCH NO.

WELDING PROCESS QUALIFICATION RECORD
A. W. S. STANDARD QUALIFICATION PROCEDURE

PROCESS SPECIFICATION

TEST PLATE NO. BFOSV
WELDING OPERATOR [illegible]
POSITION FLAT AND OVERHEAD
PLATE THICKNESS 3/8"
EDGE PREPARATION BY BRN
METALLIC SHIELD ARC - POLARITY REVERSED
FILLER METAL: GRADE A.S.T.M. AWS E6010
BASE METAL YOLOY
CHIPPING ROOT YES
HEAT TREATMENT NONE
CLEANING WIRE BRUSH
PEEN FOR SLAG REMOVAL ONLY

FULL SCALE SKETCH - (BEVEL, SPACING, AND BEADS)



TEST RESULTS - BUTT JOINTS

REDUCED SECTION TENSION - LBS. PER SQ. IN.
1. [illegible]
2. [illegible]
FREE BEND ELONGATION - %
1. [illegible]
2. [illegible]
ROOT BEND (MAX. CRACK - INCHES)
1. [illegible]
2. [illegible]
FACE BEND (MAX. CRACK - INCHES)
1. [illegible]
2. [illegible]
SIDE BEND (MAX. CRACK - INCHES)
1.
2. NONE REQUIRED
3.
4.

PROCEDURE

BEAD NO.	ELECTRODE SIZE	AMPERES	VOLTS	NOTES
1	3/16 ϕ	165	26	
2	7/32 ϕ	180	23	
3	5/32 ϕ	125	26	

TEST RESULTS - FILLET WELDED JOINTS

TRANSVERSE SHEAR TEST - AVE. THROAT-INCHES; ULT. STR.-LBS. PER SQ. IN.
1.
2.
LONGITUDINAL SHEAR TEST
1.
2.
BREAK TESTS (SOUNDNESS)
1.
2.

THE UNDERSIGNED CERTIFIES THAT THE ABOVE STATMENTS MADE IN THIS REPORT ARE CORRECT, AND THAT THE TEST PLATES WERE PREPARED, WELDED AND TESTED IN ACCORDANCE WITH THE A. W. S. STANDARD QUALIFICATION PROCEDURE FOR PROCESS QUALIFICATION. THE TEST RESULTS HAVE MET AND SATISFIED THE REQUIREMENTS OF THE FOLLOWING CODES.

SIGNED: PITTSBURGH DES MOINES STEEL CO.
BY: [illegible]
DATE: [illegible] TITLE: WORKS MANAGER

17532

CONT. 177-42 11 REV 8-6-42

JOINT NO. BF06L

PITTSBURGH-DES MOINES STEEL COMPANY
NEVILLE ISLAND PLANT

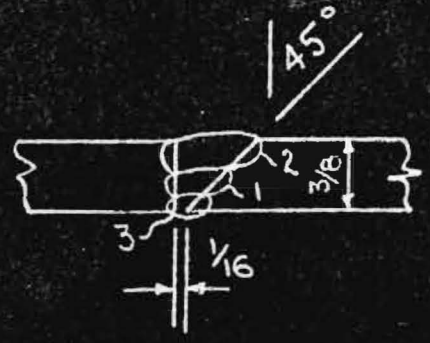
DATA SHEET (C142A,B,C) SKETCH NO.

WELDING PROCESS QUALIFICATION RECORD
A. W. S. STANDARD QUALIFICATION PROCEDURE

PROCESS SPECIFICATION

TEST PLATE NO. BF06L
WELDING OPERATOR LAWRENCE COLAROSSI
POSITION FLAT AND OVERHEAD
PLATE THICKNESS 3/8"
EDGE PREPARATION BY BRN
METALLIC SHIELD ARC - POLARITY REVERSED
FILLER METAL: GRADE A.S.T.M.-A.W.S. E6010
BASE METAL YOLOY
CHIPPING ROOT YES
HEAT TREATMENT NONE
CLEANING WIRE BRUSH
PEEN FOR SLAG REMOVAL ONLY

FULL SCALE SKETCH - (BEVEL, SPACING, AND BEADS)



TEST RESULTS - BUTT JOINTS

REDUCED SECTION TENSION - LBS. PER SQ. IN.
1. 70,720
2. 70,540

FREE BEND ELONGATION - %
1. 69.7%
2. 62.7%

ROOT BEND (MAX. CRACK - INCHES)
1. 1 CRACK 1/8
2. 1 CRACK 3/32; 2 POINT GAS POCKETS

FACE BEND (MAX. CRACK - INCHES)
1. 1 CRACK 1/16
2. NO DEFECTS

SIDE BEND (MAX. CRACK - INCHES)
1.
2. NONE REQUIRED
3.
4.

PROCEDURE

BEAD NO.	ELECTRODE SIZE	AMPERES	VOLTS	NOTES
1	3/16 ϕ	150	28	
2	7/32 ϕ	185	30	
3	5/32 ϕ	125	26	

TEST RESULTS - FILLET WELDED JOINTS

TRANSVERSE SHEAR TEST - AVE. THROAT-INCHES; ULT. STR.-LBS. PER SQ. IN.
1.
2.

LONGITUDINAL SHEAR TEST
1.
2.

BREAK TESTS (SOUNDNESS)
1.
2.

THE UNDERSIGNED CERTIFIES THAT THE ABOVE STATMENTS MADE IN THIS REPORT ARE CORRECT, AND THAT THE TEST PLATES WERE PREPARED, WELDED AND TESTED IN ACCORDANCE WITH THE A. W. S. STANDARD QUALIFICATION PROCEDURE FOR PROCESS QUALIFICATION. THE TEST RESULTS HAVE MET AND SATISFIED THE REQUIREMENTS OF THE FOLLOWING CODES.

SIGNED: PITTSBURGH DES MOINES STEEL CO.
BY: Basil E. Hoefston
DATE: August 8 - 1942 TITLE: WORKS MANAGER

Cont. 177-42 12 REV. 8-8-42

JOINT NO. BH6L

TITLE: PITTSBURGH DES MOINES STEEL COMPANY NEVILLE ISLAND PLANT

DATA SHEET (C142A,B,C) SKETCH NO.

WELDING PROCESS QUALIFICATION RECORD
A. W. S. STANDARD QUALIFICATION PROCEDURE

PROCESS SPECIFICATION

TEST PLATE NO. BH6L
WELDING OPERATOR CARMEN TARQUINIO
POSITION HORIZONTAL
PLATE THICKNESS 3/8"
EDGE PREPARATION BY BRN
METALLIC SHIELD ARC - POLARITY REVERSED
FILLER METAL: GRADE A.S.T.M. - A.W.S. E6010
BASE METAL YOLOY
CHIPPING ROOT YES
HEAT TREATMENT NONE
CLEANING WIRE BRUSH
PEEN FOR SLAG REMOVAL ONLY

TEST RESULTS - BUTT JOINTS

REDUCED SECTION TENSION - LBS. PER SQ. IN.
1. 67,940
2. 66,180

FREE BEND ELONGATION - %
1. 76.9%
2. 70.0%

ROOT BEND (MAX. CRACK - INCHES)
1. NO DEFECTS
2. 3-PINPOINT GASPOCKETS

FACE BEND (MAX. CRACK - INCHES)
1. NO DEFECTS
2. NO DEFECTS

SIDE BEND (MAX. CRACK - INCHES)
1.
2. NONE REQUIRED
3.
4.

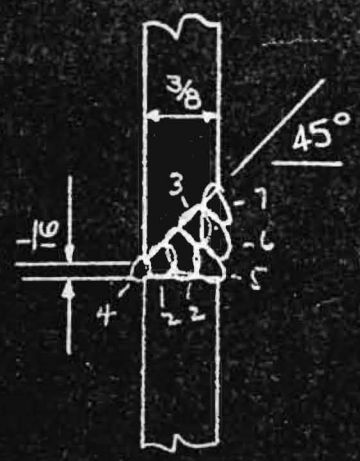
TEST RESULTS - FILLET WELDED JOINTS

TRANSVERSE SHEAR TEST - AVE. THROAT-INCHES; ULT. STR.-LBS. PER SQ. IN.
1.
2.

LONGITUDINAL SHEAR TEST
1.
2.

BREAK TESTS (SOUNDNESS)
1.
2.

FULL SCALE SKETCH - (BEVEL, SPACING, AND BEADS)



PROCEDURE

BEAD NO.	ELECTRODE SIZE	AMPERES	VOLTS	NOTES
1	3/16 ϕ	170	26	
2	3/16 ϕ	178	27	
3	3/16 ϕ	178	27	
4	3/16 ϕ	180	27	
5	3/16 ϕ	178	27	
6	3/16 ϕ	178	27	
7	3/16 ϕ	178	27	

THE UNDERSIGNED CERTIFIES THAT THE ABOVE STATEMENTS MADE IN THIS REPORT ARE CORRECT, AND THAT THE TEST PLATES WERE PREPARED, WELDED AND TESTED IN ACCORDANCE WITH THE A. W. S. STANDARD QUALIFICATION PROCEDURE FOR PROCESS QUALIFICATION. THE TEST RESULTS HAVE MET AND SATISFIED THE REQUIREMENTS OF THE FOLLOWING CODES.

SIGNED: PITTSBURGH DES MOINES STEEL CO.
BY: Earl E. Hoefston
DATE: [redacted]-9-[redacted]42 TITLE: [redacted] MANAGER

17532

CONT. 177-42

REV. 8-7-42

JOINT NO. BH17V

PITTSBURGH-DES MOINES STEEL COMPANY
NEVILLE ISLAND PLANT

DATA SHEET (C142A,B,C) SKETCH NO.

WELDING PROCESS QUALIFICATION RECORD
A. W. S. STANDARD QUALIFICATION PROCEDURE

PROCESS SPECIFICATION

TEST PLATE NO. BH17V
WELDING OPERATOR CARMEN TARQUINIO
POSITION HORIZONTAL
PLATE THICKNESS 1 1/16"
EDGE PREPARATION BY BRN
METALLIC SHIELD ARC - POLARITY REVERSED
FILLER METAL: GRADE A.S.T.M.-A.W.S. E6010
BASE METAL NICKEL COPPER STEEL
CHIPPING ROOT YES
HEAT TREATMENT NONE
CLEANING WIRE BRUSH
PEEN FOR SLAG REMOVAL ONLY

PREHEAT 400°F.

TEST RESULTS - BUTT JOINTS

REDUCED SECTION TENSION - LBS. PER SQ. IN.
1. 75560
2. 74,140

FREE BEND ELONGATION - %
1. 54.2%
2. 55.8%

ROOT BEND (MAX. CRACK - INCHES)
1. NONE REQD
2.

FACE BEND (MAX. CRACK - INCHES)
1. NONE REQD
2.

SIDE BEND (MAX. CRACK - INCHES)
1. NO DEFECTS
2. 1-PIN POINT GAS POCKET
3. 1-CRACK 1/8
4. 1-CRACK 1/8

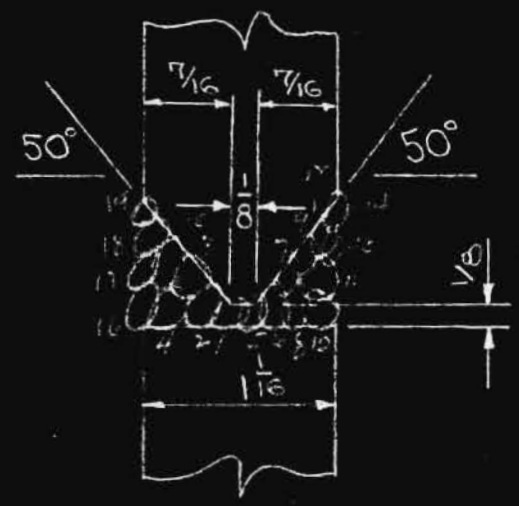
TEST RESULTS - FILLET WELDED JOINTS

TRANSVERSE SHEAR TEST - AVE. THROAT-INCHES; ULT. STR.-LBS. PER SQ. IN.
1.
2.

LONGITUDINAL SHEAR TEST
1.
2.

BREAK TESTS (SOUNDNESS)
1.
2.

FULL SCALE SKETCH - (BEVEL, SPACING, AND BEADS)



PROCEDURE

BEAD NO.	ELECTRODE SIZE	AMPERES	VOLTS	NOTES
1	3/16	185	30	
2	7/32	200	30	
3	7/32	200	30	
4	7/32	200	30	
5	5/16	200	30	
6	7/32	200	30	
7	7/32	200	30	
8	7/32	200	30	
9	7/32	200	30	
10	7/32	200	30	
11	7/32	200	30	
12	7/32	200	30	
13	7/32	200	30	
14	7/32	200	30	
15	7/32	200	30	
16	7/32	200	30	
17	7/32	200	30	
18	7/32	200	30	
19	7/32	200	30	

THE UNDERSIGNED CERTIFIES THAT THE ABOVE STATEMENTS MADE IN THIS REPORT ARE CORRECT, AND THAT THE TEST PLATES WERE PREPARED, WELDED AND TESTED IN ACCORDANCE WITH THE A. W. S. STANDARD QUALIFICATION PROCEDURE FOR PROCESS QUALIFICATION. THE TEST RESULTS HAVE MET AND SATISFIED THE REQUIREMENTS OF THE FOLLOWING CODES.

SIGNED: PITTSBURGH-DES MOINES STEEL CO.

BY: Earl E. Hoyston

DATE: AUG. 3, 1942 TITLE: WORKS MANAGER

17532

CONT. 177-42

REV. 7-7-42

JOINT NO. BH17J

DATA SHEET (C142A,B,C) SKETCH NO.

PITTSBURGH-DES MOINES STEEL COMPANY
NEVILLE ISLAND PLANT

WELDING PROCESS QUALIFICATION RECORD
A. W. S. STANDARD QUALIFICATION PROCEDURE

PROCESS SPECIFICATION

TEST PLATE NO. BH17J
WELDING OPERATOR [illegible]
POSITION HORIZONTAL
PLATE THICKNESS 1 1/16"
EDGE PREPARATION BY PLN
METALLIC SHIELD ARC - POLARITY REVERSED
FILLER METAL: GRADE ASTM - AWS E6010
BASE METAL NICKEL COPPER STEEL
CHIPPING ROOT YES
HEAT TREATMENT NONE
CLEANING WIRE BRUSH
PEEN FOR SLAG REMOVAL ONLY

PREHEAT 400°F

TEST RESULTS - BUTT JOINTS

REDUCED SECTION TENSION - LBS. PER SQ. IN.
1. 72,720
2. 75,600

FREE BEND ELONGATION - %
1. 52.6 %
2. 56.4 %

ROOT BEND (MAX. CRACK - INCHES)
1. NONE REQD.
2.

FACE BEND (MAX. CRACK - INCHES)
1. NONE REQD.
2.

SIDE BEND (MAX. CRACK - INCHES)
1. 1-CRACK 1/8
2. 1-PIN POINT GAS POCKET
3. 1-CRACK 1/8
4. NO DEFECTS

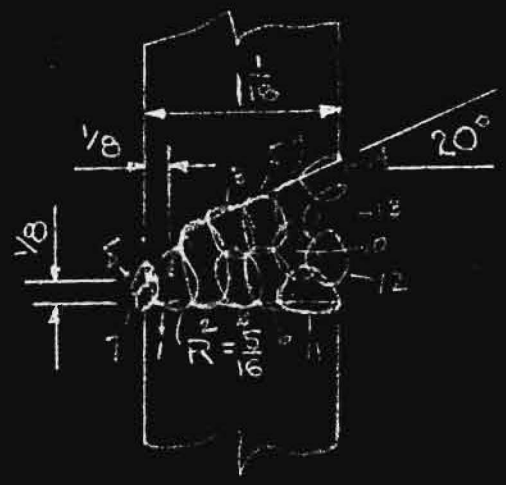
TEST RESULTS - FILLET WELDED JOINTS

TRANSVERSE SHEAR TEST - AVE. THROAT-INCHES; ULT. STR.-LBS. PER SQ. IN.
1.
2.

LONGITUDINAL SHEAR TEST
1.
2.

BREAK TESTS (SOUNDNESS)
1.
2.

FULL SCALE SKETCH - (BEVEL, SPACING, AND BEADS)



PROCEDURE

BEAD NO.	ELECTRODE SIZE	AMPERES	VOLTS	NOTES
1	3/16	160	30	
2	3/16	170	27	
3	3/16	170	27	
4	3/16	170	27	
5	1/8	185	30	
6	1/8	185		
7	1/8	185		
8	1/8	185		
9	1/8	185		
10	1/8	185		
11	1/8	185		
12	1/8	185		
13	1/8	185		
14	1/8	185	30	

THE UNDERSIGNED CERTIFIES THAT THE ABOVE STATEMENTS MADE IN THIS REPORT ARE CORRECT, AND THAT THE TEST PLATES WERE PREPARED, WELDED AND TESTED IN ACCORDANCE WITH THE A. W. S. STANDARD QUALIFICATION PROCEDURE FOR PROCESS QUALIFICATION. THE TEST RESULTS HAVE MET AND SATISFIED THE REQUIREMENTS OF THE FOLLOWING CODES.

SIGNED: PITTSBURGH-DES MOINES STEEL CO.

BY: Earl E. Wolfston

DATE: AUG. 8, 1942 TITLE: WORKS MANAGER

CONT. 111-42

17532

JOINT NO. BF017J

PITTSBURGH-DES MOINES STEEL COMPANY
NEVILLE ISLAND PLANT

DATA SHEET (C142A,B,C) SKETCH NO.

WELDING PROCESS QUALIFICATION RECORD
A. W. S. STANDARD QUALIFICATION PROCEDURE

PROCESS SPECIFICATION

TEST PLATE NO. BF017J
WELDING OPERATOR [illegible]
POSITION FLAT AND OVERHEAD
PLATE THICKNESS 1 1/16"
EDGE PREPARATION BV PLII
METALLIC SHIELD ARC - POLARITY REVERSED
FILLER METAL: GRADE ASTM - AWS E6010
BASE METAL NICKEL - COPPER STEEL
CHIPPING ROOT YES
HEAT TREATMENT NONE
CLEANING WIRE BRUSH
PEEN FOR SLAG REMOVAL ONLY

PREHEAT 400° F.

TEST RESULTS - BUTT JOINTS

REDUCED SECTION TENSION - LBS. PER SQ. IN.
1. 72,880
2. [illegible]

FREE BEND ELONGATION - %
1. 70.5%
2. 80%

ROOT BEND (MAX. CRACK - INCHES)
1. NONE REQD.
2.

FACE BEND (MAX. CRACK - INCHES)
1. NONE REQD.
2.

SIDE BEND (MAX. CRACK - INCHES)
1. NO DEFECTS
2. 2 PINHOLE GAS POCKETS
3. 2 [illegible] GAS POCKETS
4. 1 [illegible]

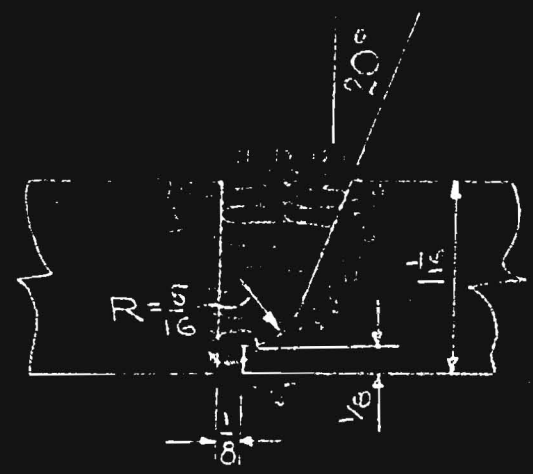
TEST RESULTS - FILLET WELDED JOINTS

TRANSVERSE SHEAR TEST - AVE. THROAT-INCHES; ULT. STR.-LBS. PER SQ. IN.
1.
2.

LONGITUDINAL SHEAR TEST
1.
2.

BREAK TESTS (SOUNDNESS)
1.
2.

FULL SCALE SKETCH - (BEVEL, SPACING, AND BEADS)



PROCEDURE

BEAD NO.	ELECTRODE SIZE	AMPERES	VOLTS	NOTES
1	[illegible]	146	[illegible]	
2	[illegible]	150	[illegible]	
3	[illegible]	170	27	
4	[illegible]	[illegible]	[illegible]	
5	[illegible]	[illegible]	[illegible]	
6	[illegible]	[illegible]	[illegible]	
7	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
9	[illegible]	[illegible]	27	
10	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	27	
12	[illegible]	[illegible]	[illegible]	
13	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
15	[illegible]	[illegible]	6	

THE UNDERSIGNED CERTIFIES THAT THE ABOVE STATMENTS MADE IN THIS REPORT ARE CORRECT, AND THAT THE TEST PLATES WERE PREPARED, WELDED AND TESTED IN ACCORDANCE WITH THE A. W. S. STANDARD QUALIFICATION PROCEDURE FOR PROCESS QUALIFICATION. THE TEST RESULTS HAVE MET AND SATISFIED THE REQUIREMENTS OF THE FOLLOWING CODES.

SIGNED: Pittsburgh-Des Moines Steel Co. CO.

BY: Earl E. Hoefston

DATE: AUG. [illegible] TITLE: WORKS MANAGER