CBI

WELDING PROCEDURE SPECIFICATION

IDENTIFICATION: WPS - E309/83670

PRODUCT / CUSTOMER	DOWNCOMER BRACING - NUCLEAR POWER PLANT COMMONWEALTH EDISON	PAGE NO. 1 OF 3 REV. NO. 0 BY JEB	DATE 5-5-78

WORK THIS DOCUMENT WITH GEN. WELD PROCEDURE SPEC. GWPS-- SMAW

REFERENCE PROCEDURE QUALIFICATION RECORD			SPECIFIC CONTRACT	
NO.	POSITION	THICKNESS RANGE	POSITION	THICKNESS RANGE
3068	V	3/16" to 2"	V,H,O,D	3/16" to 5/8"

SPECIFIC CONTRACT WPS REQUIREMENTS

BASE METAL-

ASME SA 240 Type 304 (P-8, GP-1) welded to A588 Grade A (Sim, ASME P-1, GP-2).

FILLER METAL-

ASME SPECIFICATION NO.:	SFA 5.4
ASME CLASSIFICATION:	E309
ASME ANALYSIS NO.:	A-8
ASME GROUP NO.:	F-5

ELECTRICAL CHARACTERISTICS-

CURRENT:	DC
POLARITY:	Electrode Positive
OTHER:	(Reverse Polarity)

BACKING MATERIAL-

None Required

FLUX-

None Required

	GAS-SHIELDING	BACKUP
COMPOSITION MIN. FLOW RATE	None Required	None Required

This welding procedure specification complies with the ASME Code Section III Summer 1977.

This procedure is to be used for any welding with E309 electrode on the base material listed.

LIMITATIONS:

The interpass temperature of joints in the base material listed shall not exceed 350°F maximum.

No postweld heat treatment is required.

No preheat is required except as an aid for removing moisture or unless the ambient temperature falls below 50°F. When the ambient temperature falls below 50°F, the plate shall be preheated warm to the hand within 3" of the point of welding.

CBI
CONTRACT 83670
DATE 8-14-78
INITIALS dlv
RELEASED BY
CNQA SERVICES

CUSTOMER APPROVAL- Letter dated 7-6-78 LCS #1627, Burke to Stelman

REVIEWED	OB ENGR	DIST ENGR	WELDING SERVICES-HOUSTON	CORP QA	RLG CONST QA	REG MFG QA				BY	DATE
	TJA		CMR		LRS GDM	RTF			PREPARED CHECKED AUTHORIZED	JEB TJL RES	5-5-78 5-15-78 6-13-78

CBI

WELDING PROCEDURE SPECIFICATION

IDENTIFICATION

WPS – E309/83670

PRODUCT	DOWNCOMER BRACING - NUCLEAR POWER PLANT	PAGE NO. 2 OF 3
CUSTOMER	COMMONWEALTH EDISON	REV. NO. 0
		BY JEB DATE 5-5-78

SPECIFIC REQUIREMENTS (CONT)

Use only stainless brushes on the stainless steel material.

Vertical passes may be deposited uphill or downhill.

SPECIFIC REQUIREMENTS (CONT)

IDENTIFICATION

WPS- E309/83670

TITLE WELDING PROCEDURE SPECIFICATION

PAGE NO. 3 OF 3

PRODUCT DOWNCOMER BRACING - NUCLEAR POWER PLANT

REV. NO. 0

CUSTOMER COMMONWEALTH EDISON

BY JEB DATE 5-5-78

GENERAL WELDING TECHNIQUE

Operation Description	Beads Layer	Weld Proc.	Electrode Size	Electrode Type	Current (amps)	Voltage (Volts)	Travel (IPM)	B.O.R. Sec/12"
Stringer Beads*	As Req'd	SMA	3/32"Ø	E309-15	60-100	23-26	---	54-32
			1/8"Ø		60-100	23-26	---	90-55
			5/32"Ø		100-145	23-26	---	100-60
			3/16"Ø		130-230	24-27	---	90-47
			3/32"Ø	E309-16	60-100	19-22	----	80-49
			1/8"Ø		70-110	23-26	---	108-55
			5/32"Ø		110-170	24-26	---	105-57
			3/16"Ø		160-240	24-27	---	92-50

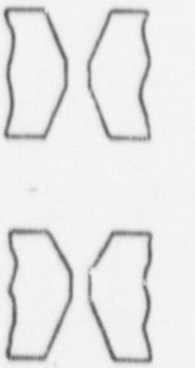
*Vertical Uphill welds and overhead welds may be deposited using a weave technique.

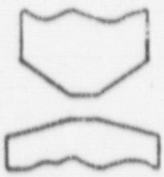
JOINT DETAIL – See contract drawings for applicable joint details and dimensions.

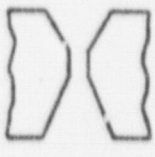
VERTICAL

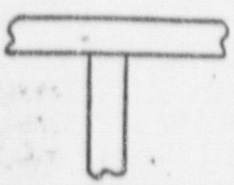
HORIZONTAL

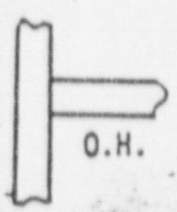
OVERHEAD & DOWN

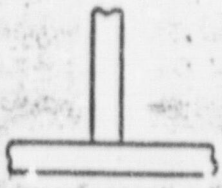












WL 186

WL 20 D REV 6-73

RECORD OF WELDING PROCEDURE QUALIFICATION
TO A.S.M.E. SECTION IX

PART II ESSENTIAL VARIABLES

Qualification No. 2743

Date 3-9-76

Process SMA

Manual or Machine Manual

Material specification SA 516-60 To SA 537-B

ASME p. no 1 Gr. 1 To ASME p. no. 1 Gr. 3

Thickness (if pipe, dia and wall thick) 1"

Thickness range this test qualifies 3/16" - 2"

Filler metal group no. F. F5*

Weld metal analysis no. A. A8*

ASME specification no. SFA 5.4

AWS specification no. A 5.4

FLUX OR ATMOSPHERE

Flux trade name N/A

Inert gas composition N/A

Flow rate N/A

Is backing strip used? No

Preheat temperature range 70-100 F

Postheat treatment None

Interpass temp. 350 F

WELDING PROCEDURE

Single or multiple pass Multiple

Single or multiple arc Single

Position of groove Horizontal

Electrode E309-15

Filler wire diameter 1/8, 5/32 & 3/16"

Type of backing None

Welding current Direct Current Electrode Positiv (DCRP)

Consult PART III WELDING VARIABLES for joint dimensions and welding current settings.

TEST RESULTS

Reduced Section Tensile Results

Specimen No.	Dimensions Width	Dimensions Thickness	Area Sq. In.	Ultimate Total Load Lb	Ultimate Unit Stress PSI	Character of Failure and Location
41 I-1	.500"ϕ		.1963	14,200	72,338	PL
-2	.501"ϕ		.1971	14,300	72,552	PL

Guided Bend Test

Type	Result	Type	Result
4 Side Bends	OK		

Welder's name Herb Reynolds

Social Security no. 227-10-9228

Welder's Symbol HR

Who by virtue of these tests meets welder performance requirements.

We certify that the statements in this record are correct and that the test weld was prepared, welded and tested in accordance with the requirements of Section IX of the ASME code.

Signed CHICAGO BRIDGE & IRON COMPANY (MANUFACTURERS) Date 3-9-76

Laboratory test no. 41 I

By Dennis Niemeyer (signature)

Dennis Niemeyer

Remarks:

* ASME Sec. IX 1974 No Addendum.

1 of 7

Line No. 3

Folder 1

RECORD OF WELDING PROCEDURE QUALIFICATION
TO A.S.M.E. SECTION IX

PART II ESSENTIAL VARIABLES

Qualification No. 2743 Date 3-9-76

Process SMA Manual or Machine Manual

Material specification SA516-60 To SA537-B

ASME p. no. 1 Gr. 1 To ASME p. no. 1 Gr. 3

Thickness (if pipe, dia and wall thick) 1"

Thickness range this test qualifies 3/16 - 2"

Filler metal group no. F. F5*

Weld metal analysis no. A. A8*

ASME specification no. SFA 5.4

AWS specification no. A 5.4

FLUX OR ATMOSPHERE

Flux trade name N/A

Inert gas composition N/A

Flow rate N/A

Is backing strip used? No

Pr heat temperature range 70-100F

Postheat treatment None

Interpass temp. 350F

WELDING PROCEDURE

Single or multiple pass Multiple Single or multiple arc Single Position of groove Vertical

Electrode E309-15 Filler wire diameter 1/8, 5/32

Type of backing None Welding current Direct Current Electrode Positi (DCRP)

Consult PART III WELDING VARIABLES for joint dimensions and welding current settings.

TEST RESULTS

Reduced Section Tensile Results

Specimen No.	Dimensions		Area	Ultimate Total Load Lb	Ultimate Unit Stress PSI	Character of Failure and Location
	Width	Thickness	Sq. In.			
40I-1	.505"ϕ		.2002	14,350	71,678	516-60 PL
-2	.505"ϕ		.2010	14,450	71,890	516-60 PL

Guided Bend Test

Type	Result	Type	Result
4 Side Bends	OK		

Welder's name Carl Westfall Social Security no. 356-16-6278 Welder's Symbol CW

Who by virtue of these tests meets welder performance requirements.

We certify that the statements in this record are correct and that the test weld was prepared, welded and tested in accordance with the requirements of Section IX of the ASME code.

Signed CHICAGO BRIDGE & IRON COMPANY (MANUFACTURERS) Date 3-9-76

Laboratory test no. H 40I By Dennis Niemeyer

Dennis Niemeyer

Remarks: *ASME Section IX 1974 No Addendum.

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Log 3

Test 1

WL 28 D REV 6-73

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Contract

RECORD OF WELDING PROCEDURE QUALIFICATION
TO A.S.M.E. SECTION IX

PART II ESSENTIAL VARIABLES

Qualification No. 2743 Date 3-9-76

Process SMA Manual or Machine Manual

Material specification SA 516-60 to SA 537-B

ASME p. no. 1 Gr. 1 To ASME p. no. 1 Gr. 3

Thickness (if pipe, dia and wall thick) 1"

Thickness range this test qualifies 3/16 - 2"

Filler metal group no. F. F-5*

Weld metal analysis no. A. F-8*

ASME specification no. SFA 5.4

AWS specification no. A 5.4

FLUX OR ATMOSPHERE

Flux trade name N/A

Inert gas composition N/A

Flow rate N/A

Is backing strip used? No

Preheat temperature range 70-100F

Postheat treatment None

Interpass temp. 350F

WELDING PROCEDURE

Single or multiple pass Multiple Single or multiple arc Single Position of groove OH & DN

Electrode E309-15 Filler wire diameter 1/8, 5/??

Type of backing None Welding current Direct Current Electrode Positi (DCRP)

Consult PART III WELDING VARIABLES for joint dimensions and welding current settings.

TEST RESULTS

Reduced Section Tensile Results

Specimen No.	Dimensions		Area	Ultimate Total Load Lb	Ultimate Unit Stress PSI	Character of Failure and Location
	Width	Thickness				
42 I-1	.503"ϕ		.1987	14,500	72,974	PL
-2	.503"ϕ		.1987	14,600	73,477	PL

Guided Bend Test

Type	Result	Type	Result
4 Side Bends	OK		

Welder's name Carl Westfall Social Security no. 356-16-6278 Welder's Symbol CW

Who by virtue of these tests meets welder performance requirements.

We certify that the statements in this record are correct and that the test weld was prepared, welded and tested in accordance with the requirements of Section IX of the ASME code.

Signed CHICAGO BRIDGE & IRON COMPANY (MANUFACTURERS) Date 3-9-76

Laboratory test no. 42 I By Dennis Niemeyer

Remarks: Dennis Niemeyer

* ASME Sec. IX 1974 No Addendum

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WELDING PROCEDURE QUALIFICATION

To A.S.M.E. Section IX

PART III WELDING VARIABLES

VERTICAL

Layer Number	Electrode	Wire Size	Amps	Volts	B.O. Rate
1	E309	1/8"	90-100	22-24	
2	E309	5/32"	100-120	24-26	
3	E309	1/8"	90-100	24-26	

HORIZONTAL

Layer Number	Electrode	Wire Size	Amps	Volts	B.O. Rate
1	E309	1/8"	100-110	22-24	
2	E309	3/16"	140-170	23-25	
3	E309	5/32"	130-145	23-25	

OVERHEAD & DOWN

Layer Number	Electrode	Wire Size	Amps	Volts	B.O. Rate
1	E309	1/8"	80-100	23-26	
2&3	E309	5/32"	100-150	23-26	

Qualification No. 2743
Date 3-3-76

Line No. 3
Folder No. 1

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CHICAGO BRIDGE & IRON COMPANY

BY Dennis Heinegar

WPQ 2743 5 of 7

41 I

E 309

IMPACT TEST DATA

TYPE OF NOTCH Vee

SPEC. NO.	SPEC. ORIENT	SPEC. SIZE	NOTCH LOCATION	TEST TEMP DEG F.	ENERGY FT LB	LATERAL EXPANSION MILS	PER CENT SHEAR
			HORIZONTAL				
A1	T	Full	516 PL	0	33	37	60
A2	T	Full	516 PL	0	42	46	80
A3	T	Full	516 PL	0	41	46	75
B1	T	Full	516 HAZ	0	17	19	20
B2	T	Full	516 HAZ	0	18	20	20
B3	T	Full	516 HAZ	0	20	22	20
C1	T	Full	537 PL	0	36	40	100
C2	T	Full	537 PL	0	37	42	100
C3	T	Full	537 PL	0	37	42	100
D1	T	Full	537 HAZ	0	40	30	95
D2	T	Full	537 HAZ	0	31	35	85
D3	T	Full	537 HAZ	0	30	33	95

REMARKS:

5 OF 7

SIGNED: Dennis Niemeyer

BY Dennis Niemeyer

Line No. 3

Folder No. 1

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IMPACT TEST DATA

WPQ 2743 6 of 7

W. O. 401

E 309

TYPE OF NOTCH Vee

SPEC. NO.	SPEC. ORIENT	SPEC. SIZE	NOTCH LOCATION	TEST TEMP DEG F.	ENERGY FT-LB	LATERAL EXPANSION MILS	PER CENT SHEAR
			VERTICAL				
A1	T	Full	516 PL	0	41	46	65
A2	T	Full	516 PL	0	30	37	60
A3	T	Full	516 PL	0	40	48	65
B1	T	Full	516-HAZ	0	40	35	65
B2	T	Full	516 HAZ	0	28	30	45
B3	T	Full	516 HA	0	27	27	30
C1	T	Full	537 PL	0	35	41	100
C2	T	Full	537 PL	0	37	43	100
C3	T	Full	537 PL	0	35	40	100
D1	T	Full	537 HAZ	0	32	35	90
D2	T	Full	537 HAZ	0	30	33	90
D3	T	Full	537 HAZ	0	32	35	90

REMARKS:

SIGNED: Dennis Niemeyer

BY Dennis Niemeyer

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1

CBI

WPQ 2743 7 of 7

42 I

E 309

IMPACT TEST DATA

TYPE OF NOTCH Vee

SPEC. NO.	SPEC. ORIENT	SPEC. SIZE	NOTCH LOCATION	TEST TEMP DEG F.	ENERGY FT-LB	LATERAL EXPANSION MILS	PER CENT SHEAR
			OH & DN				
A1	T	Full	516 PL	0	32	38	60
A2	T	Full	516 PL	0	36	43	60
A3	T	Full	516 PL	0	31	36	40
B1	T	Full	516 HAZ	0	22	24	30
B2	T	Full	516 HAZ	0	25	28	35
B3	T	Full	516 HAZ	0	27	28	35
C1	T	Full	637 PL	0	37	40	100
C2	T	Full	537 PL	0	39	41	100
C3	T	Full	537 PL	0	37	41	100
D1	T	Full	537 HAZ	0	34	36	90
D2	T	Full	537 HAZ	0	28	29	75
D3	T	Full	537 HAZ	0	33	34	95

REMARKS:

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Folder No. 1

SIGNED: Dennis Niemeyer

BY Dennis Niemeyer

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PROCEDURE QUALIFICATION RECORD
TO A.S.M.E. SECTION IX

PART II ESSENTIAL VARIABLES

Qualification No. 3668 Date May 31, 1978

Process SMA Manual or Machine Manual

Material specification A588 GR A to A240 TP 304

ASME p. no. SIMILAR 1 GP 2 To ASME p. no. 8 GP 1

Thickness (if pipe, dia and wall thick) 1.0"

Thickness range this test qualifies 3/16" to 2"

Filler metal group no. F. 5

Weld metal analysis no. A. 8

ASME specification no. SFA 5.4

AWS specification no. A 5.4

FLUX OR ATMOSPHERE

Flux trade name None Required

Inert gas composition None Required

Flow rate None Required

Is backing strip used? No

Preheat temperature range 70°-500°F IPT

Postheat treatment None Required

WELDING PROCEDURE

Single or multiple pass Multiple Single or multiple arc Single Position of groove Vertical

Electrode E309-15 Filler wire diameter 1/16", 5/32"

Type of backing None Required Welding current DC Current Electrode Positive (Reverse Polarity)

Consult PART III WELDING VARIABLES for joint dimensions and welding current settings.

TEST RESULTS

Reduced Section Tensile Results

Specimen No.	Dimensions INCHES Diameter	Area IN²	Ultimate Total Load Lb	Ultimate Unit Stress PSI	Character of Failure and Location
H539L 1	0.505	0.2002	15,750	78,671	DUCTILE-PLATE*
H539L 2	0.505	0.2002	15,700	78,421	DUCTILE-PLATE*

Guided Bend Test

Type	Result	Type	Result
4 Transverse Side	OK		

Welder's name Curtis Campbell Social Security no. 403-36-4037 Welder's Symbol CC

Who by virtue of these tests meets welder performance requirements.

We certify that the statements in this record are correct and that the test weld was prepared, welded and tested in accordance with the requirements of Section IX of the ASME code.

Signed CHICAGO BRIDGE & IRON COMPANY (MANUFACTURERS) Date May 31, 1978

By James E. Burch
James E. Burch

Laboratory test no. H 539 L

Remarks:

* A588 GR A
Edge coating A 588 GR A Plate: Carboweld 11

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Line No. 4
Folder No. 1

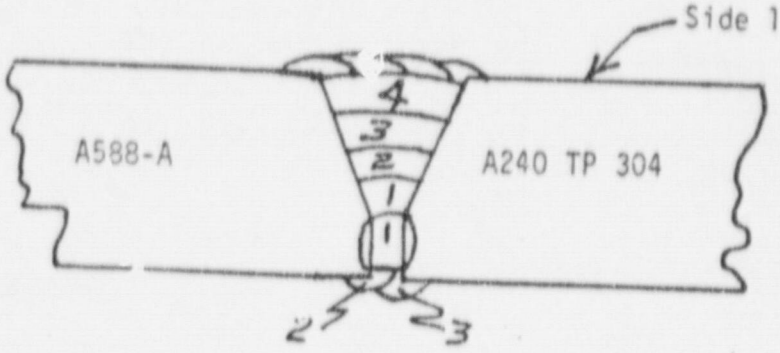
PROCEDURE QUALIFICATION RECORD

To A.S.M.E. Section IX

PART III WELDING VARIABLES

Vertical POSITION		
SIDE	BEVEL	
1	45°	
2	None	

LAND = 5/16"
GAP = 5/32"



SIDE	PASS	Electrode		Amps	Volts	Travel Speed in./min.	PASS DIR.	Remarks (Gas Flow etc)
		Type	Size					
1	1	E309-15	1/8	100	26	----	DN	
	2		5/32	120	26	----	UP	
	3-4		5/32	130	26	----	UP	
	5-8		1/8	130	26	----	DN	
2	1	E309-15	1/8	90	24	-----	UP	
	2-3		1/8	100	26	-----	DN	

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Folder No. 1

Qualification No. 3668
Date: May 31, 1978

BY James E. Burch
JAMES E. BURCH
CHICAGO BRIDGE & IRON COMPANY

CBI

IMPACT TEST DATA

TYPE OF NOTCH VEE

W.O. NO. H539L

MAY 31, 1978

REV. 0.

SPEC. NO.	SPEC. ORIENT	SPEC. SIZE	NOTCH LOCATION	TEST TEMP DEG F.	ENERGY FT-LB	LATERAL EXPANSION MILS	PER CENT SHEAR
V 539L-A1	T	10x10mm	PL	0	25	31	60
V 539L-A2	T	10x10mm	PL	0	18	21	50
V 539L-A3	T	10x10mm	PL	0	25	30	60
V 539L-B1	T	10x10mm	HAZ	0	32	40	100
V 539L-B2	T	10x10mm	HAZ	0	32	43	95
V 539L-B3	T	10x10mm	HAZ	0	34	42	85

REMARKS: IMPACT SPECIMENS TAKEN AT 1/4 t.

SIGNED: James E. Burch
James E. Burch

BY Mike Mason

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PROCEDURE QUALIFICATION RECORD
TO A.S.M.E. SECTION IX

PART II ESSENTIAL VARIABLES

PQR No. 4580 Date 4/21/80

Process SMAW Manual or Machine Manual

Material specification A583 Gr. A to A240 Tp 304

ASME p. no. Sim P1 Gp 3 To ASME p. no. P8 Gp 1

Thickness (if pipe, dia and wall thick) 1.5"

Thickness range this test qualifies 3/16" - 3"

Filler metal group no. F. 5

Weld metal analysis no. A. 8

ASME specification no. SFA 5.4

AWS specification no. A 5.4

FLUX OR ATMOSPHERE

Flux trade name None Required

Inert gas composition None Required

Flow rate None Required

Is backing strip used? No

Preheat temperature range 70°F - 350°F (IPT)

Postheat treatment None Required

WELDING PROCEDURE

Single or multiple pass Multiple Single or multiple arc Single Position of groove 1G

Electrode E309-15 Filler wire diameter 5/32"Ø, 3/16"Ø, 1/4"Ø

Type of backing None Required Welding current Direct Current - Electrode Positive (Reverse Polarity)

Consult PART III WELDING VARIABLES for joint dimensions and welding current settings.

TEST RESULTS

Reduced Section Tensile Results

Specimen No.	Dimensions		Area	Ultimate Total Load Lb	Ultimate Unit Stress PSI	Character of Failure and Location
	Width	Thickness				
H853P-1	1.395	1.006	1.403	107,000	76,265	Ductile in A588 PL
H853P-2	1.393	1.000	1.393	107,000	76,812	Ductile in A588 PL

Guided Bend Test

Type	Result	Type	Result
4 Transverse Side Bends	OK	- - - - - - -	- - -

Welder's name Carl M. Westfall Social Security no. 356-16-6278 Welder's Symbol CMW

Who by virtue of these tests meets welder performance requirements.

We certify that the statements in this record are correct and that the test weld was prepared, welded and tested in accordance with the requirements of Section IX of the ASME code.

Signed CHICAGO BRIDGE & IRON COMPANY (MANUFACTURERS) Date 4/21/80

By Tom Landon (Tom Landon)

Laboratory test no. H853P

Remarks: Plate edges coated with Carboweld 11.

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Folder No. 1

WL 20 D REV OCT 77

CBI

PROCEDURE QUALIFICATION RECORD
TO A.S.M.E. SECTION IX

PART II ESSENTIAL VARIABLES

PQR No. 4580 Date 4/21/80

Process SMAW Manual or Machine Manual

Material specification A588 Gr. A to A240 Tp 304

ASME p. no. Sim P1 Gp 3 To ASME p. no. 8 Gp 1

Thickness (if pipe, dia and wall thick) 1.5"

Thickness range this test qualifies 3/16" - 3"

Filler metal group no. F. 5

Weld metal analysis no. A. 8

ASME specification no. SFA 5.4

AWS specification no. A 5.4

FLUX OR ATMOSPHERE

Flux trade name None Required

Inert gas composition None Required

Flow rate None Required

Is backing strip used? No

Preheat temperature range 70°F - 350°F (IPT)

Postheat treatment None Required

WELDING PROCEDURE

Single or multiple pass Multiple Single or multiple arc Single Position of groove 3G

Electrode E309-15 Filler wire diameter 1/8"Ø, 5/32"Ø

Type of backing None Required Welding current Direct Current - Electrode Positive (Reverse Polarity)

Consult PART III WELDING VARIABLES for joint dimensions and welding current settings.

TEST RESULTS

Reduced Section Tensile Results

Specimen No.	Dimensions		Area	Ultimate Total Load Lb	Ultimate Unit Stress PSI	Character of Failure and Location
	Width	Thickness				
H854P-1	1.411	1.000	1.411	108,250	76,718	Ductile in A588 R.
H854P-2	1.414	1.000	1.414	108,750	76,909	Ductile in A588 R.

Guided Bend Test

Type	Result	Type	Result
4 Transverse Side Bends	OK	- - - - - - -	- - -

Welder's name Curt Campbell Social Security no. 403-36-4037 Welder's Symbol CC

Who by virtue of these tests meets welder performance requirements.

We certify that the statements in this record are correct and that the test weld was prepared, welded and tested in accordance with the requirements of Section IX of the ASME code.

Signed CHICAGO BRIDGE & IRON (MANUFACTURING) COMPANY Date 4/21/80

Laboratory test no. H854P By Tom Landon

Remarks:

Plate edges coated with Carboweld 11.

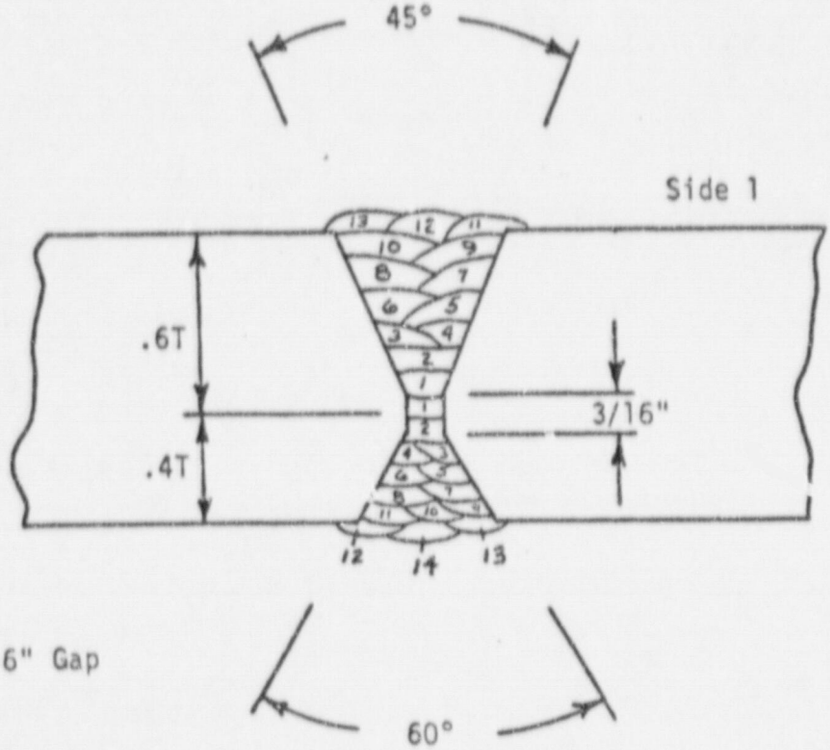
2 OF 6

Line No. 13
Folder No. 1

PROCEDURE QUALIFICATION RECORD

To A.S.M.E. Section IX

PART III WELDING VARIABLES



3/16" Gap

SIDE	PASS	Electrode Type	Electrode Size	Amps	Volts	Travel Speed in./min.	Remarks (Gas Flow etc)
1	1	E309-15	5/32"Ø	130	27	---	
1	2	E309-15	3/16"Ø	230	30	---	Stringer Bead Technique
1	3-4	E309-15	5/32"Ø	145	30	---	
1	5-6	E309-15	3/16"Ø	190	28	---	
1	7	E309-15	1/4"Ø	290	32	---	
1	8-10	E309-15	1/4"Ø	260	28	---	
1	11-13	E309-15	3/16"Ø	200	26	---	
2	1	E309-15	5/32"Ø	140	27	---	
2	2	E309-15	3/16"Ø	210	30	---	
2	3-4	E309-15	5/32"Ø	130	28	---	
2	5-6	E309-15	3/16"Ø	210	30	---	
2	7-8	E309-15	1/4"Ø	260	28	---	
2	9-14	E309-15	3/16"Ø	210	28	---	

Qualification No. 4580
Date: 4/21/80

BY Tom Landon
Tom Landon
CHICAGO BRIDGE & IRON COMPANY

WL 154 REV MAY 78

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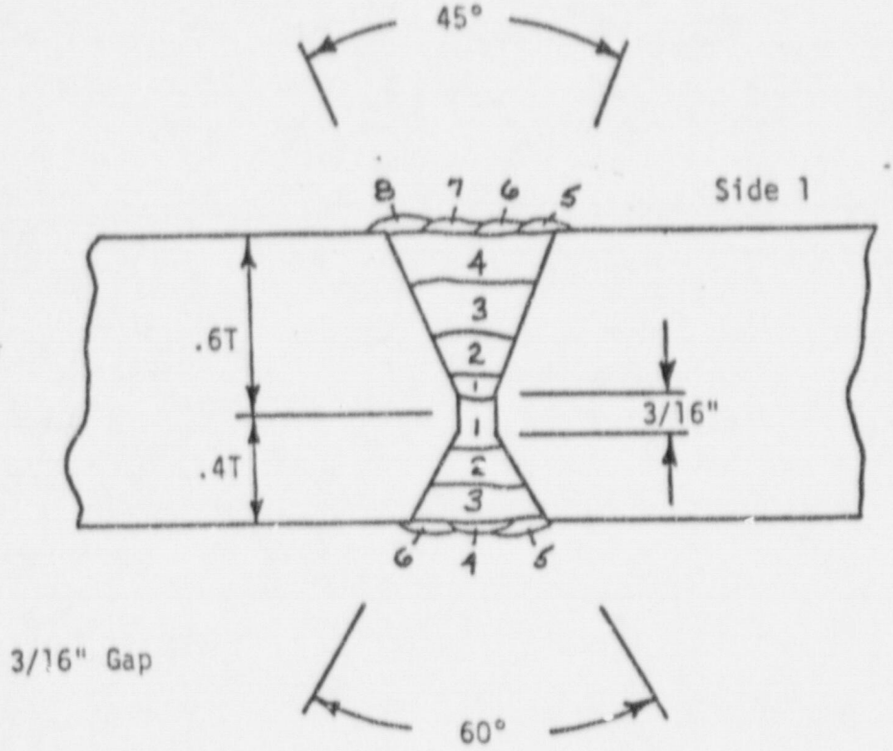
PROCEDURE QUALIFICATION RECORD

To A.S.M.E. Section IX

PART III WELDING VARIABLES



SIDE	PASS	Electrode Type	Electrode Size	Amps	Volts	PASS DIR.	Remarks (Gas Flow etc)
1	1	E309-15	1/8"Ø	110	24	DN	
1	2	E309-15	1/8"Ø	100	24	UP	Uphill Weave Technique
1	3	E309-15	5/32"Ø	130	24	UP	
1	4	E309-15	5/32"Ø	140	24	UP	
1	5-8	E309-15	5/32"Ø	160	26	DN	Max. pass thickness
2	1	E309-15	1/8"Ø	100	24	UP	is approx. 1/4"
2	2-3	E309-15	5/32"Ø	140	24	UP	
2	4-5	E309-15	5/32"Ø	160	26	DN	

Tom Landon

Qualification No. 4580
Date: 4/21/80

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BY Tom Landon
CHICAGO BRIDGE & IRON COMPANY

WL 154 REV MAY 78

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IMPACT TEST DATA

TYPE OF NOTCH VEE

Qual. No. 4580

W.O. No. H853P, H854P

4/21/80

Rev. 0

SPEC. NO.	SPEC. ORIENT	SPEC. SIZE	NOTCH LOCATION	TEST TEMP DEG F.	ENERGY FT-LB	LATERAL EXPANSION MILS	PER CENT SHEAR
DOWNFLAT							
A1	TRANS	FULL	HAZ	0°	32	33	30
A2	TRANS	FULL	HAZ	0°	36	34	30
A3	TRANS	FULL	HAZ	0°	35	35	30
B1	TRANS	FULL	PL	0°	44	46	40
B2	TRANS	FULL	PL	0°	40	42	35
B3	TRANS	FULL	PL	0°	46	45	40
VERTICAL							
A1	TRANS	FULL	HAZ	0°	50	50	60
A2	TRANS	FULL	HAZ	0°	38	33	30
A3	TRANS	FULL	HAZ	0°	39	37	35
B1	TRANS	FULL	PL	0°	42	43	40
B2	TRANS	FULL	PL	0°	46	49	40
B3	TRANS	FULL	PL	0°	44	44	35

REMARKS: All specimens taken at a depth of 1/4T from side 2.

For impacts at 0°F, the corrective temperature (ΔT) is 20°F.

Signed CHICAGO BRIDGE & IRON COMPANY

By: Tom Landon

Tom Landon

Laboratory Technician Diane Sims

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CBI

IMPACT TEST DATA

TYPE OF NOTCH VEE

Qual. No. 4580

W.O. No. H853P, H854P

4/21/80

Rev. 0

SPEC. NO.	SPEC. ORIENT	SPEC. SIZE	NOTCH LOCATION	TEST TEMP DEG F.	ENERGY FT-LB	LATERAL EXPANSION MILS	PER CENT SHEAR
DOWNFLAT							
A4	TRANS	FULL	HAZ	+20°	45	45	40
A5	TRANS	FULL	HAZ	+20°	46	45	45
A6	TRANS	FULL	HAZ	+20°	43	44	45
B4	TRANS	FULL	PL	+20°	54	52	50
B5	TRANS	FULL	PL	+20°	54	55	65
B6	TRANS	FULL	PL	+20°	47	48	45
VERTICAL							
A4	TRANS	FULL	HAZ	+20°	48	47	50
A5	TRANS	FULL	HAZ	+20°	63	57	75
A6	TRANS	FULL	HAZ	+20°	51	51	50
B4	TRANS	FULL	PL	+20°	47	49	45
B5	TRANS	FULL	PL	+20°	55	54	45
B6	TRANS	FULL	PL	+20°	60	58	55

REMARKS: All specimens taken at a depth of 1/4T from side 2.

Signed CHICAGO BRIDGE & IRON COMPANY

By: Tom Landon

Tom Landon

Laboratory Technician Diane Sims

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Log No. 13

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WL 253 REV NOV 78

CBI

PROCEDURE QUALIFICATION RECORD
TO A.S.M.E. SECTION IX

PART II ESSENTIAL VARIABLES

PQR No. 4581
Process SMAW
Material specification A588 Gr. A to A 36
ASME p. no. Sim P1 Gp 3 To ASME p. no. 1 Gp 1
Thickness (if pipe, dia and wall thick) 1.5"
Thickness range this test qualifies 3/16" - 3"
Filler metal group no. F. 5
Weld metal analysis no. A. 8
ASME specification no. SFA 5.4
AWS specification no. A 5.4

Date 4/21/80
Manual or Machine Manual

FLUX OR ATMOSPHERE
Flux trade name None Required
Inert gas composition None Required
Flow rate None Required
Is backing strip used? No
Preheat temperature range 70°F - 350°F (IPT)
Postheat treatment None Required

WELDING PROCEDURE

Single or multiple pass Multiple Single or multiple arc Single Position of groove 1G

Electrode E309-15
Type of backing None Required
Filler wire diameter 5/32"Ø, 3/16"Ø, 1/4"Ø
Welding current Direct Current - Electrode Positive (Reverse Polarity)

Consult PART III WELDING VARIABLES for joint dimensions and welding current settings.

TEST RESULTS

Reduced Section Tensile Results

Specimen No.	Dimensions		Area	Ultimate Total Load Lb	Ultimate Unit Stress PSI	Type of Failure & Location
	Width	Thickness				
H855P-1	1.395	1.002	1.397	94,500	67,644	Ductile in A36 Plate
H855P-2	1.417	1.002	1.419	97,000	68,357	Ductile in A36 Plate

Guided Bend Test

Type	Result	Type	Result
4 Transverse Side Bends	OK	- - - - - - -	- - -

Welder's name E. P. Brettel Social Security no. 519-03-2556 Welder's Symbol EPB
Who by virtue of these tests meets welder performance requirements.

We certify that the statements in this record are correct and that the test weld was prepared, welded and tested in accordance with the requirements of Section IX of the ASME code.

Laboratory test no. H855P
Signed CHICAGO BRIDGE & IRON COMPANY (MANUFACTURERS) Date 4/21/80
By Tom Landon

Remarks:

Plate edges coated with Carboweld 11.

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CBI

PROCEDURE QUALIFICATION RECORD
TO A.S.M.E. SECTION IX

PART II ESSENTIAL VARIABLES

PQR No. 4581 Date 4/21/80

Process SMAW Manual or Machine Manual

Material specification A588 Gr. A to A 36

ASME p. no. Sim Pl Gp 3 To ASME p. no. 1 Gp 1

Thickness (if pipe, dia and wall thick) 1.5"

Thickness range this test qualifies 3/16" - 3"

Filler metal group no. F. 5

Weld metal analysis no. A. 8

ASME specification no. SFA 5.4

AWS specification no. A 5.4

FLUX OR ATMOSPHERE

Flux trade name None Required

Inert gas composition None Required

Flow rate None Required

Is backing strip used? No

Preheat temperature range 70°F - 350°F (IPT)

Postheat treatment None Required

WELDING PROCEDURE

Single or multiple pass Multiple Single or multiple arc Single Position of groove 3G

Electrode E309-15 Filler wire diameter 1/8"Ø, 5/32"Ø

Type of backing None Required Welding current Direct Current - Electrode Positive (Reverse Polarity)

Consult PART III WELDING VARIABLES for joint dimensions and welding current settings.

TEST RESULTS

Reduced Section Tensile Results

Specimen No.	Dimensions		Area	Ultimate Total Load Lb	Ultimate Unit Stress PSI	Character of Failure and Location
	Width	Thickness				
H856P-1	1.441	1.010	1.455	97,600	67,079	Ductile in A36 Plate
H856P-2	1.445	1.010	1.459	97,500	66,827	Ductile in A36 Plate

Guided Bend Test

Type	Result	Type	Result
4 Transverse Side Bends	OK	- - - - - - - -	- - -

Welder's name Carl M. Westfall Social Security no. 356-16-6278 Welder's Symbol CMW

Who by virtue of these tests meets welder performance requirements.

We certify that the statements in this record are correct and that the test weld was prepared, welded and tested in accordance with the requirements of Section IX of the ASME code.

Laboratory test no. H856P Signed CHICAGO BRIDGE & IRON COMPANY (MANUFACTURERS) Date 4/21/80

By Tom Landon

Remarks: Plate edges coated with Carboweld 11.

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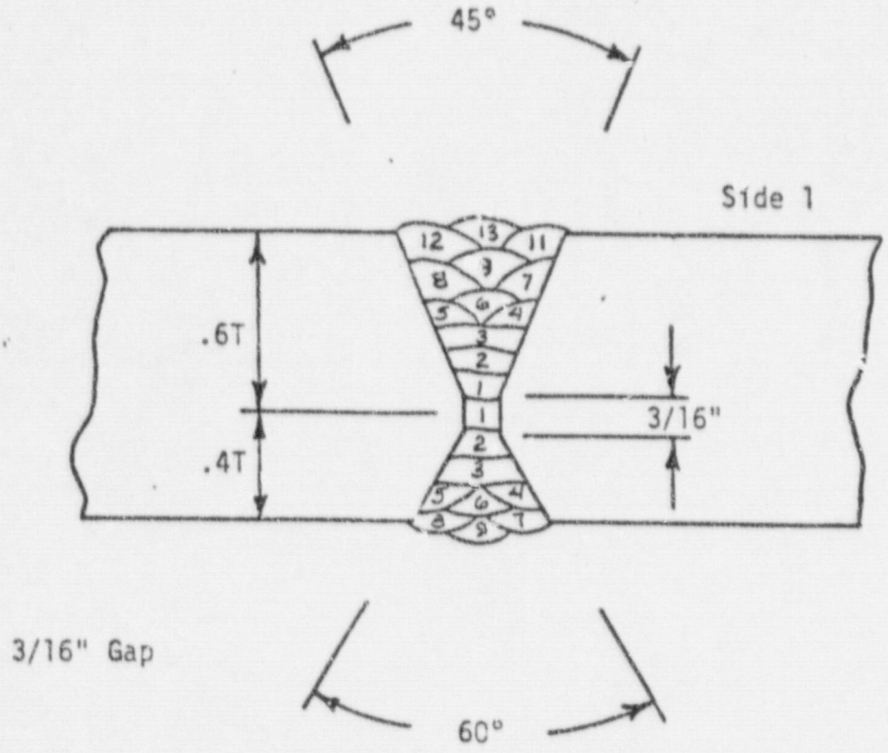
PROCEDURE QUALIFICATION RECORD

To A.S.M.E. Section IX

PART III WELDING VARIABLES



SIDE	PASS	Electrode Type	Electrode Size	Amps	Volts	Travel Speed in./min.	Remarks (Gas Flow etc)
1	1-2	F309-15	5/32"Ø	150	25	---	Stringer Bead Technique
1	3-8	E309-15	3/16"Ø	200	26	---	
1	9-12	E309-15	1/4"Ø	290	28	---	
2	1	E309-15	5/32"Ø	150	25	---	
2	2-5	E309-15	3/16"Ø	200	26	---	
2	6-9	E309-15	1/4"Ø	290	28	---	

Qualification No. 4581
Date: 4/21/80

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Tom Landon

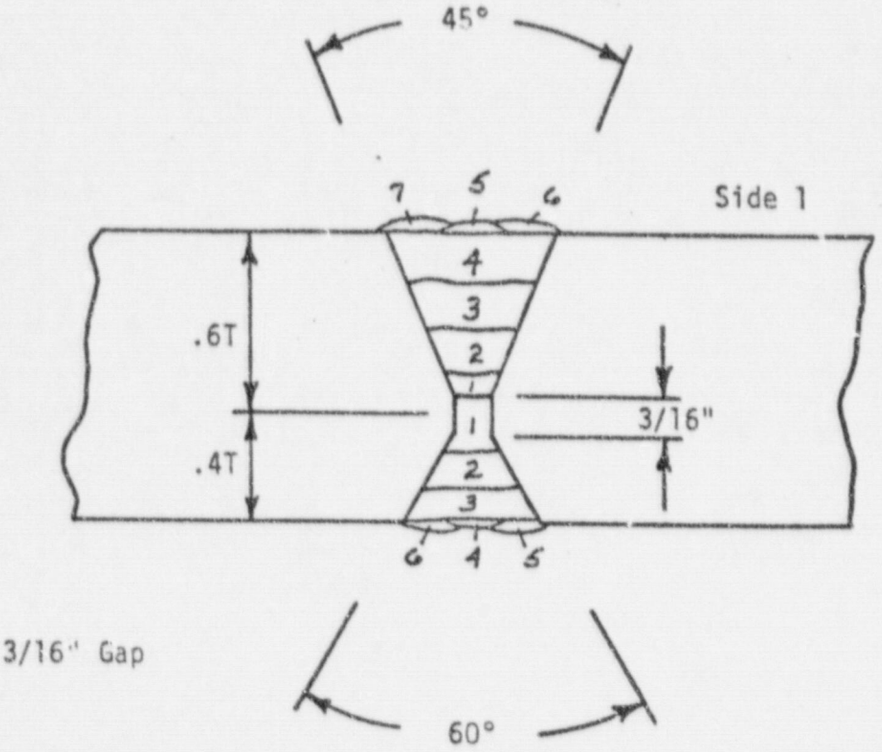
BY Tom Landon
CHICAGO BRIDGE & IRON COMPANY

WL 154 REV MAY 78

PROCEDURE QUALIFICATION RECORD

To A.S.M.E. Section IX

PART III WELDING VARIABLES



SIDE	PASS	Electrode Type	Electrode Size	Amps	Volts	PASS DIR.	Remarks (Gas Flow etc)
1	1	E309-15	1/8"Ø	100	28	DN	
	2	E309-15	1/8"Ø	90	28	UP	Uphill weave technique
1	3	E309-15	5/32"Ø	130	28	UP	
1	4	E309-15	5/32"Ø	145	28	UP	
1	5-7	E309-15	5/32"Ø	170	30	DN	Max. pass thickness
2	1	E309-15	1/8"Ø	90	28	UP	
2	2	E309-15	1/8"Ø	100	28	UP	is approx. 1/4"
2	3	E309-15	5/32"Ø	130	28	UP	
2	4-6	E309-15	5/32"Ø	170	30	DN	

Qualification No. 4581
Date: 4/21/80

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Line No. 14
Folder No. 1

Tom Landon
BY Tom Landon
CHICAGO BRIDGE & IRON COMPANY

WL 154 REV MAY 78

CBI

IMPACT TEST DATA

TYPE OF NOTCH VEE

Qual. No. 4581

W.O. No. H855P, H856P

4/21/80

Rev. 0

SPEC. NO.	SPEC. ORIENT	SPEC. SIZE	NOTCH LOCATION	TEST TEMP DEG F.	ENERGY FT-LB	LATERAL EXPANSION MILS	PER CENT SHEAR
DOWNFLAT							
A1	TRANS	FULL	HAZ*	0°	39	33	35
A2	TRANS	FULL	HAZ*	0°	31	28	30
A3	TRANS	FULL	HAZ*	0°	31	30	30
B1	TRANS	FULL	PL*	0°	55	51	60
B2	TRANS	FULL	PL*	0°	47	44	45
B3	TRANS	FULL	PL*	0°	46	44	50
C1	TRANS	FULL	HAZ**	0°	23	28	60
C2	TRANS	FULL	HAZ**	0°	24	28	60
C3	TRANS	FULL	HAZ**	0°	24	25	60
D1	TRANS	FULL	PL**	0°	32	34	40
D2	TRANS	FULL	PL**	0°	29	35	50
D3	TRANS	FULL	PL**	0°	29	34	40
VERTICAL							
A1	TRANS	FULL	HAZ*	0°	[illegible]	31	30
A2	TRANS	FULL	HAZ*	0°	[illegible]	34	35
A3	TRANS	FULL	HAZ*	0°	38	34	40
B1	TRANS	FULL	PL*	0°	50	48	40
B2	TRANS	FULL	PL*	0°	44	42	50
B3	TRANS	FULL	PL*	0°	39	39	40
C1	TRANS	FULL	HAZ**	0°	25	29	25
C2	TRANS	FULL	HAZ**	0°	18	26	35
C3	TRANS	FULL	HAZ**	0°	27	31	35
D1	TRANS	FULL	PL**	0°	28	32	40
D2	TRANS	FULL	PL**	0°	30	35	50
D3	TRANS	FULL	PL**	0°	31	40	50

REMARKS: All specimens taken at a depth of 1/4T from side 2.

*Specimens taken from A588 material.

**Specimens taken from A36 material.

For impacts at 0°F, the corrective temperature (ΔT) is 30°F.

Signed CHICAGO BRIDGE & IRON COMPANY

By: Tom Landon

Tom Landon

5 of 6

Laboratory Technician Diane Sims

Line No. 24

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WL 253 REV NOV 78

CBI

IMPACT TEST DATA

TYPE OF NOTCH VEE

Qual. No. 4581

W.O. No. H855P, H856P

4/21/80

Rev. 0

SPEC. NO.	SPEC. ORIENT	SPEC. SIZE	NOTCH LOCATION	TEST TEMP DEG F.	ENERGY FT-LB	LATERAL EXPANSION MILS	PER CENT SHEAR
DOWNFLAT							
A 4	TRANS	FULL	HAZ*	+30°	51	47	80
A 5	TRANS	FULL	HAZ*	+30°	48	46	80
A 6	TRANS	FULL	HAZ*	+30°	53	49	85
B 4	TRANS	FULL	PL*	+30°	61	51	85
B 5	TRANS	FULL	PL*	+30°	57	51	85
B 6	TRANS	FULL	PL*	+30°	62	54	87
C 4	TRANS	FULL	HAZ**	+30°	27	32	75
C 5	TRANS	FULL	HAZ**	+30°	34	38	75
C 6	TRANS	FULL	HAZ**	+30°	35	40	80
D 4	TRANS	FULL	PL**	+30°	43	54	95
D 5	TRANS	FULL	PL**	+30°	42	50	95
D 6	TRANS	FULL	PL**	+30°	41	47	95
VERTICAL							
A 4	TRANS	FULL	HAZ*	+30°	54	47	70
A 5	TRANS	FULL	HAZ*	+30°	49	42	65
A 6	TRANS	FULL	HAZ*	+30°	44	43	70
B 4	TRANS	FULL	PL*	+30°	70	56	95
B 5	TRANS	FULL	PL*	+30°	66	60	90
B 6	TRANS	FULL	PL*	+30°	60	55	80
C 4	TRANS	FULL	HAZ**	+30°	32	36	60
C 5	TRANS	FULL	HAZ**	+30°	29	36	60
C 6	TRANS	FULL	HAZ**	+30°	32	36	60
D 4	TRANS	FULL	PL**	+30°	46	53	100
D 5	TRANS	FULL	PL**	+30°	47	51	100
D 6	TRANS	FULL	PL**	+30°	41	50	95

REMARKS: All specimens taken at a depth of 1/4T from side 2.

*Specimens taken from A588 material.

**Specimens taken from A36 material.

Signed CHICAGO BRIDGE & IRON COMPANY

By: Tom Landon

Tom Landon

Line No. 14

Folder No. 1

6 OF 6

Laboratory Technician Diane Sims

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WL 253 REV NOV 78

CBI

PROCEDURE QUALIFICATION RECORD
TO A.S.M.E. SECTION IX

PART II ESSENTIAL VARIABLES

PQR No. 4643 Date 5/19/80

Process SMAW Manual or Machine Manual

Material specification A678 Gr. II to A588 Gr. A

FLUX OR ATMOSPHERE

ASME p. no. Sim. P-1 Gp 3 To ASME p. no. Sim P1 Gp 3 Flux trade name None Required

Thickness (if pipe, dia and wall thick) 8"Ø, 7/8" Wall Inert gas composition None Required

Thickness range this test qualifies 3/16" - 1 3/4" Flow rate None Required

Filler metal group no. F. 5 Is backing strip used? No

Weld metal analysis no. A. 8 Preheat temperature range 70°F - 350°F (IPT)

ASME specification no. SFA 5.4 Postheat treatment None Required

AWS specification no. A 5.4

WELDING PROCEDURE

Single or multiple pass Multiple Single or multiple arc Single Position of groove 5G

Electrode E309-15 Filler wire diameter 3/32"Ø, 1/8"Ø, 5/32"Ø

Type of backing None Required Welding current Direct Current

Consult PART II WELDING VARIABLES for joint dimensions and welding current settings. Electrode Negative - 1st pass
Electrode Positive - Remainder

TEST RESULTS

Reduced Section Tensile Results

Specimen No.	Dimensions DIAMETER	Dimensions Thickness	Area	Ultimate Total Load Lb	Ultimate Unit Stress PSI	Character of Failure and Location
H967P-1	0.504	-------	0.1995	15,750	78,947	Ductile in A588 R
H967P-2	0.505	-------	0.2002	15,800	78,921	Ductile in A588 R

Guided Bend Test

Type	Result	Type	Result
4 Transverse Side Bends	OK	- - - - - - - -	- - -

Welder's name C. Westfall Social Security no. 356-16-6278 Welder's Symbol CMW

Who by virtue of these tests meets welder performance requirements.

We certify that the statements in this record are correct and that the test weld was prepared, welded and tested in accordance with the requirements of Section IX of the ASME code.

Signed CHICAGO BRIDGE & IRON COMPANY (MANUFACTURERS) Date 5/19/80

Laboratory test no. H967P By Tom Landon
Tom Landon

Remarks: 1 OF 4

Plate edges coated with Carboweld 11.

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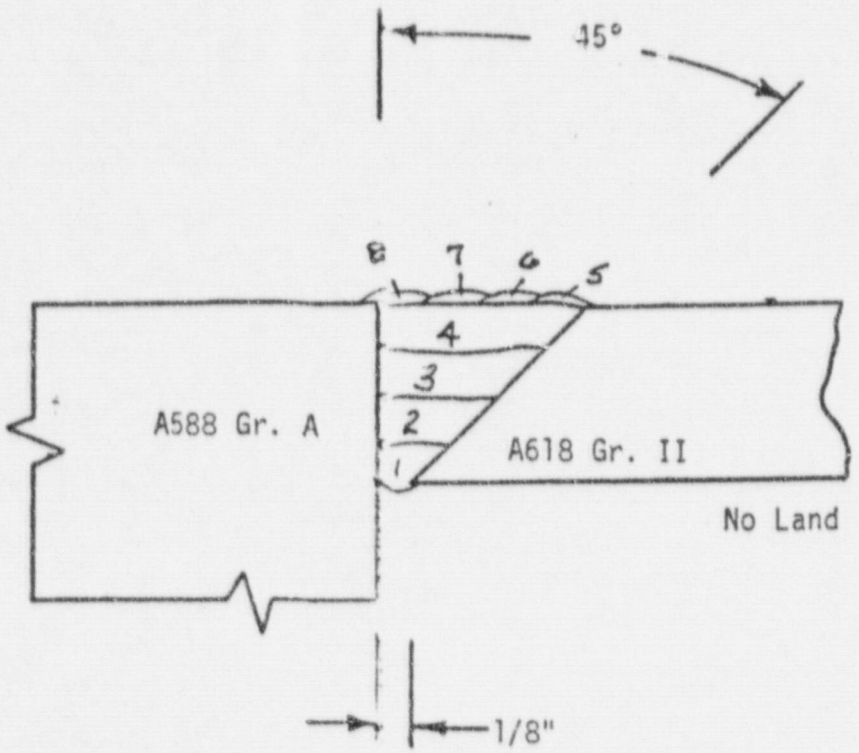
PROCEDURE QUALIFICATION RECORD

To A.S.M.E. Section IX

PART III WELDING VARIABLES



Layer	Electrode		Amps	Volts	PASS DIR.	Remarks (Gas Flow etc)
	Type	Size				
1	E309-15	3/32"Ø	80	26	UP	DC/SP First Pass
2	E309-15	1/8"Ø	90	26	UP	DC/RP Remainder
3	E309-15	1/8"Ø	100	26	UP	Uphill weave technique
4	E309-15	5/32"Ø	130	26	UP	Max. pass thickness
5-8	E309-15	5/32"Ø	160	28	DN	is approx. 1/4".

Qualification No. 4643
Date: 5/19/80

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Line No. 15
Folder No. 1

Tom Landon
BY Tom Landon
CHICAGO BRIDGE & IRON COMPANY

WL 154 REV MAY 78

CBI

IMPACT TEST DATA

TYPE OF NOTCH VEE

PQR 4643

W.O. H967P

5/19/80

Rev. 0

SPEC. NO.	SPEC. ORIENT	SPEC. SIZE	NOTCH LOCATION	TEST TEMP DEG F.	ENERGY FT-LB	LATERAL EXPANSION MILS	PER CENT SHEAR
A1	LONG	FULL	HAZ*	0	144	83	100
A2	LONG	FULL	HAZ*	0	77	54	60
A3	LONG	FULL	HAZ*	0	67	53	50
B1	LONG	FULL	PL*	0	148	81	100
B2	LONG	FULL	PL*	0	102	69	60
B3	LONG	FULL	PL*	0	142	77	100
C1	LONG	FULL	HAZ**	0	53	56	50
C2	LONG	FULL	HAZ**	0	40	39	35
C3	LONG	FULL	HAZ**	0	50	48	40
D1	LONG	FULL	PL**	0	52	47	60
D2	LONG	FULL	PL**	0	63	55	55
D3	LONG	FULL	PL**	0	40	36	45

FOR IMPACTS IN THE A588 MATERIAL AT 0°F, THE CORRECTIVE TEMPERATURE (ΔT) IS 20°F.

REMARKS: *Specimens are from A588 material.

**Specimens are from A618 material.

All specimens taken at 1/4T from side 1.

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Line No. 15

Folder No. 1

Signed CHICAGO BRIDGE & IRON COMPANY

By: Tom Landon

Tom Landon

Laboratory Technician Diane Sims

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WL 253 REV NOV 78

CBI

IMPACT TEST DATA

TYPE OF NOTCH VEE

PQR 4643

W.O. H967P

5/19/80

Rev. 0

SPEC. NO.	SPEC. ORIENT	SPEC. SIZE	NOTCH LOCATION	TEST TEMP DEG F.	ENERGY FT-LB	LATERAL EXPANSION MILS	PER CENT SHEAR
A4	LONG	FULL	HAZ*	+20	97	83	80
A5	LONG	FULL	HAZ*	+20	83	64	60
A6	LONG	FULL	HAZ*	+20	114	84	100

REMARKS: *Specimen taken from A588 material at 1/4T from side 1.

Line No. 15 4 OF 4

Folder No. 1

Signed CHICAGO BRIDGE & IRON COMPANY

By: Tom Landon

Tom Landon

Laboratory Technician Diane Sims

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