Brown & Root, Inc. HOUSTON, TEXAS

CODE
ASME SEC. IX

Welding Procedure Specification No. 0112BB101 Date 4/28/77
Revisions 4 6/29/79

WELDING PROCESS(ES) 1. Shielded Metal Arc TYPE Manual
2. N/A TYPE N/A

BASE METALS (QW-403)
P No. 1 Gr. No. 1 to P No. * Gr. No. *
Thickness Range .187 thru 2.00 IN.
Pipe Dia. Range Unlimited
*ASTM A588 Grade B

FILLER METALS (QW-404)
F No. 1. 4 2. N/A
A No. 1. 1 2. N/A
SFA Spec. No. 1. 5.1 2. N/A
AWS Class. No. 1. E7018 2. N/A
Size of Electrode 1. 3/32-5/32 2. N/A IN
Size of Filler 1. N/A 2. N/A IN.
Electrode - Flux Class N/A
Consumable insert N/A

POSITION (QW-405)
Welding Position 1G
Welding Progression N/A

PREHEAT (QW-406)
Preheat Temp. 70 °F (Min.)
Interpass - Temp. Range 70-500 °F
Preheat Maint. 70 °F

JOINT DESIGN (QW-402)
Groove Design Double V
Joint Type OB Yes CI N/A BS N/A
Backing Matl Type N/A

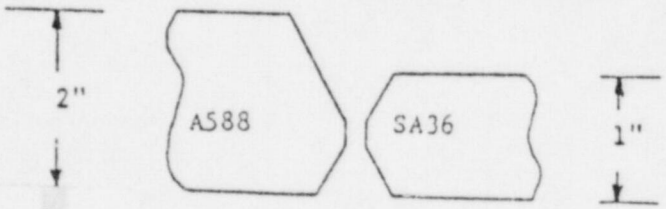
POSTWELD HEAT TREATMENT (QW-407)
Type N/A
Temperature N/A °F
Time Range N/A

GAS (QW-408)
Shielding Gas 1. N/A
Percent Comp. N/A
Shielding Gas Flow Rate N/A CFH
Purge Gas N/A Flow Rate N/A CFH
Trailing Shielding Gas Composition N/A

ELECTRICAL CHARACTERISTICS (QW-409)
Current 1. DCRP 2. N/A
Amps Range 1. 100-200 2. N/A
Volts Range 1. 18-28 2. N/A
Tungsten Elec. Size/Type N/A

TECHNIQUE (QW-410)
Stringer or Weave Bead 1. Stringer 2 N/A
Bead Width 1 5/8 2. N/A IN. (Max.)
Orifice or Gas Cup Size 1. N/A 2. N/A IN
Initial and Interpass cleaning: Welding surfaces shall be wire brushed or ground as required to remove slag, scale or other contaminants.
Method of back gouging Air Carbon Arc and/or grinding
Oscillation 1. N/A 2. N/A IN.
Contact Tube to work distance N/A IN.
Multiple or Single Layer 1. Multiple
(Per Side) 2. N/A
Multiple or single electrodes Single
Travel Speed (Range) 1. 2-7 2. N/A IPM
Peening Not allowed

Sketch/Comments



Bevel: 37 1/2° ± 2 1/2° Land: 3/32" + 0 - 1/32" Gap: 1/8" + 0 - 1/32"

Prepared by Josef Bruschi 6/29/79
WELDING ENGINEERING DATE

Approved by R. P. Culbertson 6/29/79
MATERIALS ENGINEERING DATE

Brown & Root, Inc. HOUSTON, TEXAS

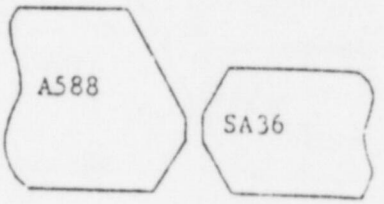
PROCEDURE QUALIFICATION RECORD

PQR No. 0112BB101 Rev. 4
WPS No. 0112BB101 4

WELDING PROCESS (ES) 1. Shielded Metal Arc TYPE Manual
2. N/A TYPE N/A

BASE METALS (QW-403)
Matl. Spec. SA- 36 To ASTM A588
Type or Grade N/A B
P No. 1 Gr. No. 1 To P No. N/A Gr No. N/A
Coupon OD N/A Thickness 1.06 2.0 IN. Plate
O. D. Range Qualified Unlimited
Deposited Weld Metal Thk. 1. 1.00 2. N/A IN.
Total Thk. Range Qualified .187 thru 2.00 IN.

JOINTS (QW-402)
Groove
Angle: 75°
Land: 1/16"
Root
Opening: N/A
B. S.
Matl.: N/A



(Joint Design Used)

FILLER METALS (QW-404)
F. No. 1. 4 2. N/A
A No. 1. 1 2. N/A
SFA Spec. No. 1. 5.1 2. N/A
AWS Class. No. 1. E7018 2. N/A
Size of Electrode 1. 3/32-5/32 2. N/A IN.
Size of Filler 1. N/A 2. N/A IN.
Electrode - Flux Class. N/A
Consumable Insert 1. N/A
Trade Name N/A

GAS (QW-408)
Shielding Gas N/A
Flow Rate N/A CFH
Purge Gas N/A
Flow Rate N/A CFH

ELECTRICAL CHARACTERISTICS (QW-409)
Current 1. DCRP 2. N/A
Amps Range 1. 105-190 2. N/A
Volts Range 1. 21-27 2. N/A
Tungsten Elect. Size/Type N/A

POSITION (QW-405)
Welding Position 1G
Welding Progression N/A

PREHEAT (QW-406)
Preheat Temp. 70 °F
Interpass Temp. 70-500 °F

POSTWELD HEAT TREATMENT (QW-407)
Type N/A
Temperature N/A °F
Time Range N/A

TECHNIQUE (QW-410)
Stringer or Weave Bead 1. Stringer 2. Stringer
Bead Width 1. 5/8 max. 2. N/A IN
Orifice or Gas Cup Size 1. N/A 2. N/A IN.
Oscillation N/A IN.
Multi or Single Layer 1. Multiple
(Per Side) 2. N/A
Multiple or Single Electrodes Single
Travel Speed Range 1. 3-5.5 2. N/A IPM
Peening Not used
Backgouging method Gouging and grinding

TENSILE TEST

Specimen No.	Specimen Fig. No.	Dimensions (IN.) Width	Dimensions (IN.) Thickness	Area (IN.^{2})	Ultimate Total Load l.b.	Ultimate Unit Stress psi	Character of Failure And Location
1	QW-462.1(a)	.990	.956	.9464	67,800	71,639	Base Metal
2	QW-462.1(a)	.991	.947	.9385	67,100	71,497	Base Metal

GUIDED BEND TESTS

Specimen No	Specimen Fig. No.	Specimen Type	Result	Specimen No.	Specimen Fig. No.	Specimen Type	Result
1	QW-462.2(a)	SB	Satisfactory	3	QW-462.2(a)	SB	Satisfactory
2	QW-462.2(a)	SB	Satisfactory	4	QW-462.2(a)	SB	Satisfactory

Welder's Name Don Riza S.S. No. 450-04-7704

Test Conducted by B&R Materials Engineering Lab. Laboratory Test No. 77-96
per J.M. Hale Address: 3100 Clinton Drive, Houston, Texas
Date April 28, 1977

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

Signed BROWN & ROOT, INC.
(Manufacturer)

Date 6-29-79 By R P Culbertson

Brown & Root, Inc.	HOUSTON, TEXAS	PG. .o. 0112BB101	Rev. 4
SUPPLEMENTAL TEST RESULTS	Project	Job No.	

This Supplemental Test coupon was welded in the 3G position, progression upward, using the amperage and voltage parameters delineated in the original Procedure Qualification Test using a minimum travel speed of 2.6 IPM.

CHARPY "V" NOTCH TESTS (PER ASTM A370)
SPECIMEN SIZE: 10mm x 10mm
TEST TEMPERATURE AND MEDIUM: +32 F; dry ice and alcohol
THERMOMETER NO.044

SPECIMEN NO.	ENERGY (FT. LBS.)	LATERAL EXPANSION (IN MILS)	PERCENT SHEAR
Weld Metal			
W-1	106	60	70
W-2	103	57	70
W-3	110	58	80
Base Metal Grade 60			
BM-1	44	40	90
BM-2	25.5	42	90
BM-3	60	48	90
Heat Affected Zone-Grade 60			
HAZ-1	115	70	90
HAZ-2	118	78	90
HAZ-3	121	71	90
Base Metal Grade B			
BM-1	135	55	80
BM-2	116	55	90
BM-3	145	62	90
Heat Affected Zone-Grade B			
HAZ-1	101.5	62	70
HAZ-2	90	56	40
HAZ-3	35	28	30

Test conducted by B&R Materials Engineering Lab. Lab No. 82-30
Address: 3100 Clinton Drive, Houston, Texas
per Josef Bronicki Date 5-14-82

We certify that the statements in this record are correct and that the test welds were prepared, welded and tested in accordance with the above listed PQR and per requirements of the listed code/standard(s).

Signed Brown & Root, Inc.

Date 5/19/82 By A. Wainwright

Brown & Root, Inc.	HOUSTON, TEXAS		WPS/PQR NO. 0112BB101

CHANGE NOTICE
PROCEDURE QUALIFICATION RECORD
QUALIFYING WELDING PROCEDURE SPECIFICATION

ESSENTIAL VARIABLES CANNOT BE CHANGED. CURRENT REVISIONS ARE INDICATED BY CHANGE BARS.

WPS/PQR	REV.	DATE	ORIGINATOR	APPROVAL*
PQR	1	5-10-77	E. Hotko	
PQR	2	6-8-77	E. Hotko	
PQR	3	4-3-79	J. Bronicki	
WPS & PQR	4	6-29-79	J. Bronicki	

WPS/PQR.	REVISION NO.	DESCRIBE THE CHANGE
PQR	1	Corrected typographical error on tensile #2 ultimate stress from 74,497 to 71,497.
PQR	2	Corrected travel speed from 10-18 IPM to 2.5-5.5 IPM.
PQR	3	Retyped on new form. Added the following information: WPS number, joint sketch & dimensions, O.D. range qualified, thickness range qualified per process, electrode size, electrode-flux class., consumable insert, welding progression, PWHT type & time range, purge flow rate, bead width, orifice or gas cup size. Changed "passes/side" to "multi or single layer", "number of arcs" to "multiple or single electrode". Deleted reference to "atmosphere trade name", "backing", and "who by virtue of these tests meets welder performance requirements". Changed filler trade name to "N/A". Information previously indicated under "oscillation" is entered under "bead width" and added "N/A" under oscillation.
WPS	4	Deleted reference to supporting PQR and added peening and preheat maintenance. Added material specifications to joint detail.
PQR	4	Changed "thickness range qualified" to "deposited weld metal thickness". Added joint dimension information, tungsten size and type, peening and backgouging. Added material specifications to joint detail.

* REVISIONS MUST BE APPROVED BY THE MANAGER OF MATERIALS ENGINEERING OR HIS DESIGNEE