

# Welding Procedure Specification (WPS)

(QW-482 Format in QW-200.1, Section IX, ASME Boiler and Pressure Vessel Code)

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WPS NO :   
Supporting PQR NO : FDCIPL/PQR/013

Revision : 0

PROCESS : GTAW , TYPE: MANUAL

Date : 05.09.2014

## JOINTS (QW-402)

Joint Design: As per approved drawings

Root Spacing : 2.0 mm to 4.0 mm

Backing Material (type) : Yes

- Metal                      ○ Nonfusing Metal
- Nonmetallic              • Other(Weld metal)

Others : Retainers not allowed

## BASE METAL (QW-403)

P no. 1    Group no. 2            To    P no. 1    Group no. 2

OR

Specification and type grade : SA 516 GR 70                      To                      Specification and type grade : SA 516 GR 70

OR

Chem. Comp. and Mech. Prop.: - - -                      To                      Chem. Comp. and Mech. Prop.: - - -

Thickness Range:

Base Metal:                      Groove: 1.5 to 20 mm                      Fillet: All Sizes

Maximum pass Thickness ≤ 13 mm : Yes

Other: QW 403.5 & 6 – Not applicable

## FILLER METALS (QW-404)                      Process: 1

GTAW

Spec. No. (SFA)	5.18
AWS No. (Class)	ER70S2
F-No.	6
A-No.	1
Size of Filler Metal (mm)	Ø1.6, 2.0, 2.5 & 3.15
+ / - Filler	With filler only
Consumable Insert	Not Applicable
Filler Metal Product Form	Solid
Supplemental Filler Metal	Not Applicable
Weld Metal Thickness Range:	
Groove (mm)	20 mm max.
Fillet (mm)	All Size
Electrode-Flux (Class)	Not Applicable
Flux Type	Not Applicable
Flux Trade Name	Not Applicable
Other	Not Applicable

PREPARED BY:

APPROVED BY:

REVIEWED BY:

WEDING E. FER

HEAD QUALITY / WELDING



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**POSITION (QW-405)** **POST WELD HEAT TREATMENT (QW-407)**

Position(s) of Groove	All		Temperature Range	Not Applicable
Welding Progression	Up: Vertical	Down: - - -	Time Range	Not Applicable
Position(s) of Fillet	All		Other	QW-407.4 - Not Applicable
Other	Not Applicable			

**PREHEAT (QW-406)** **GAS (QW-408)** % Composition

Preheat Temperature Minimum(°C)	20°C	Shielding	Gas(es)	Argon	(Mixture)	Flow Rate
Interpass Temperature Maximum (°C)	150°C	Trailing	-	-	Single	10-20 LPM
Post Heating Temp.	Not Applicable	Backing	-	-	-	-
Preheat Maintenance	Not Applicable					

**ELECTRICAL CHARACTERISTIC (QW-409)**

Current / polarity	Refer below table	Heat Input (Max.)	Not Applicable
Tungsten Electrode Size and Type	Ø2.4 to 3.0 mm, (EW-2% Thoriated)		
Mode of Metal Transfer for GTAW	Not applicable		
Other	Not applicable		

Weld Pass(es)	Process	Filler Metal		Current Type and Polarity	Amps (Range)	Volts (Range)	Travel Speed (mm/minute)
		Classification	Diameter (mm)				
1st	GTAW	ER70S2	1.6 / 2.0 / 2.4	DCEN	90 to 120	14 to 20	40 to 100
2nd	GTAW	ER70S2	1.6 / 2.0 / 2.4	DCEN	90 to 140	14 to 20	50 to 120
Sub-sequent	GTAW	ER70S2	2.0 / 2.4 / 3.15	DCEN	100 to 150	14 to 20	40 to 120

**TECHNIQUE (QW-410)** Process:1 GTAW

String or Weave Bead	String / Weave (String)
Orifice, Nozzle or Gas Cup Size	8 to 20 mm
Initial and Interpass Cleaning	SS Brushing and Grinding
Method of Back Gouging	Grinding
Oscillation	Not Applicable
Contact Tube to Work Distance	Not applicable
Multiple or Single Pass (Per Side)	Multiple
Multiple or Single Electrodes	Single
Electrode Spacing	Not Applicable
Peening	Not Allowed
Use of Thermal Process	Not Applicable
Other	QW-410.11 – Not Applicable

REV.NO.	DATE	CHANGE DESCRIPTION	PREPARED BY: WELDING ENGINEER	APPROVED BY: HEAD QUALITY / WELDING
-	-	-	-	-

PREPARED BY:  WEDI	APPROVED BY:  HEAD QUALITY / WELDING	REVIEWED BY:  
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# Procedure Qualification Record(PQR)

(See QW-200.2, Section IX, ASME Boiler and Pressure Vessel Code)  
Record Actual Variables Used to Weld Test Coupons

PQR NO : \_\_\_\_\_

WPS NO : \_\_\_\_\_

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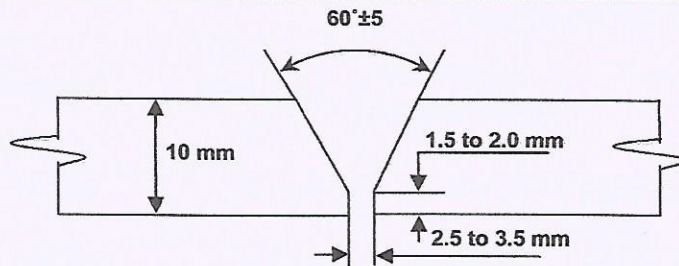
Date : 05.09.2014

**PROCESS : GTAW , TYPE: MANUAL**

**JOINTS (QW-402)**

Joint Design

Others : Retainers not allowed



**BASE METAL (QW-403)**

Material spec: SA 516

Type/Grade, or UNS Number : Grade 70

P-No. 1 Group No. 2 to P-No.1 Group No. 2

Thickness of Test Coupon: 10 mm

Diameter of Test Coupon: Not applicable

Maximum Pass Thickness: 4 mm maximum

Other (QW-403.5 & 6) : Not applicable

**FILLER METALS (QW-404) GTAW**

SFA Specification No. 5.18

AWS Classification ER70S2

Filler Metal F-No. 6

Weld Metal Analysis A. No. 1

Size of Electrode/Filler Ø3.15 mm

Filler Metal Product Form Solid

Supplemental Filler Metal Not applicable

Electrode Flux Classification Not applicable

Flux Type Not applicable

Flux Trade Name Not applicable

Weld Metal Thickness 10 mm

Other Not applicable

**POSITION (QW-405)**

Position of Groove 1G

Weld Progression NA

Other NA

**PREHEAT (QW-406)**

Preheat Temperature 28°C minimum

Interpass Temperature 150°C maximum

Post Heating NA

Preheat Maintenance NA

Other -

**POST WELD HEAT TREATMENT (QW-407)**

Temperature: Not applicable

Time : Not applicable

Other: Not applicable

**GAS (QW-408)**

	Gas(es)	Mixture or % Composition	Flow Rate
Shielding	Argon	Single	12-15 LPM
Trailing	NA	NA	NA
Backing	NA	NA	NA
Other	NA	NA	NA

**ELECTRICAL CHARACTERISTICS (QW-409)**

Current	DC
Polarity	DCEN
Amps	Refer Annexure
Volts	Refer Annexure
Mode of Metal Transfer For GTAW	Not applicable
Other	Not applicable

**TECHNIQUE (QW-410) GTAW**

Travel Speed	Refer Annexure
String or Weave Bead	String / Weave (String)
Oscillation	Not applicable
Multi pass or Single pass (Per Side)	Multiple
Single or Multiple Electrode	Single
Closed to out Chamber	Not applicable
Electrode Spacing	Not applicable
Peening	Not done
Tube Work Distance	Not applicable
Nozzle or Gas cup size	10 mm
Method of cleaning	Brushing and Grinding
Back Gouge	Grinding
Other	QW-410.11-Not Applicable



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**Tensile Test (QW-150)**

Test Report No: 107-TE/2014

Specimen No.	Width (mm)	Thickness (mm)	Area (mm <sup>2</sup> )	Ultimate Total Load (N)	Ultimate Unit Stress, (Mpa)	Type of Failure and Location
107 TE	20.00	9.65	193.00	101310	524.9	Parent metal – Fracture ductile
108 TE	19.70	9.90	195.00	97050	497.5	Parent metal – Fracture ductile

**Guided-Bend Tests (QW-160)**

Test Report No: 107-TE/2014

Specimen No.	Bend Angle	Mandril dia (mm)	Type and Figure No	Result
109 TE	180 <sup>0</sup>	38.00	Root Bend Test QW – 462.3(b)	Passed Satisfactorily
110 TE	180 <sup>0</sup>	38.00		Passed Satisfactorily
111 TE	180 <sup>0</sup>	38.00	Face Bend Test QW – 462.3(b)	Passed Satisfactorily
112 TE	180 <sup>0</sup>	38.00		Passed Satisfactorily

**Toughness Tests (QW-170)-Not applicable**

Specimen No	Notch Location	Specimen Size (mm)	Test Temperature	Impact Values (J)			
				Sample 1	Sample 2	Sample 3	Average
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

**Comments**

**Fillet-Weld Test (QW-180) – Not Applicable**

Result : Not Applicable Penetration into Parent Metal: Not Applicable  
Macro results: Not Applicable

**Other Tests**

**Type of Test: Visual Examination – Satisfactory**

**Deposit Analysis : Not Applicable**

**Other : Not Applicable**

Welder's Name: Mr. . . . . . Welder No./Stamp No.:1 . . . . .

Test conducted by : . . . . . Laboratory test No.: . . . . .

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 Boiler and Pressure Vessel Code, Edition 2010, Add 2011.

Manufacturer or Contractor:

Date:05.09.2014

Certified by:



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## ANNEXURE

PASS / LAYER NO.	PROCESS	CONSUMABLE		POLARITY	CURRENT (amps)	VOLTAGE (volts)	TRAVEL SPEED (mm/minute)	Gas Flow-Rate (LPM)
		Classification	Diameter (mm)					
1	GTAW	ER70S2	3.15	DCEN	85 to 95	16 to 18	60	12 to 15
2	GTAW	ER70S2	3.15	DCEN	85 to 100	16 to 18	75	12 to 15
3	GTAW	ER70S2	3.15	DCEN	85 to 100	16 to 18	75	12 to 15
4	GTAW	ER70S2	3.15	DCEN	85 to 100	16 to 18	70	12 to 15
5	GTAW	ER70S2	3.15	DCEN	85 to 100	16 to 18	85	12 to 15
6	GTAW	ER70S2	3.15	DCEN	85 to 100	16 to 18	85	12 to 15
<b>BACK CHIPPED TO SOUND METAL, THEN DP TEST CARRIED OUT &amp; FOUND SATISFACTORY.</b>								
1	GTAW	ER70S2	3.15	DCEN	85 to 100	16 to 18	80	12 to 14
2	GTAW	ER70S2	3.15	DCEN	85 to 100	16 to 18	85	12 to 14

Manufacturer or Contractor:

Date:05.09.2014

Certified by: