

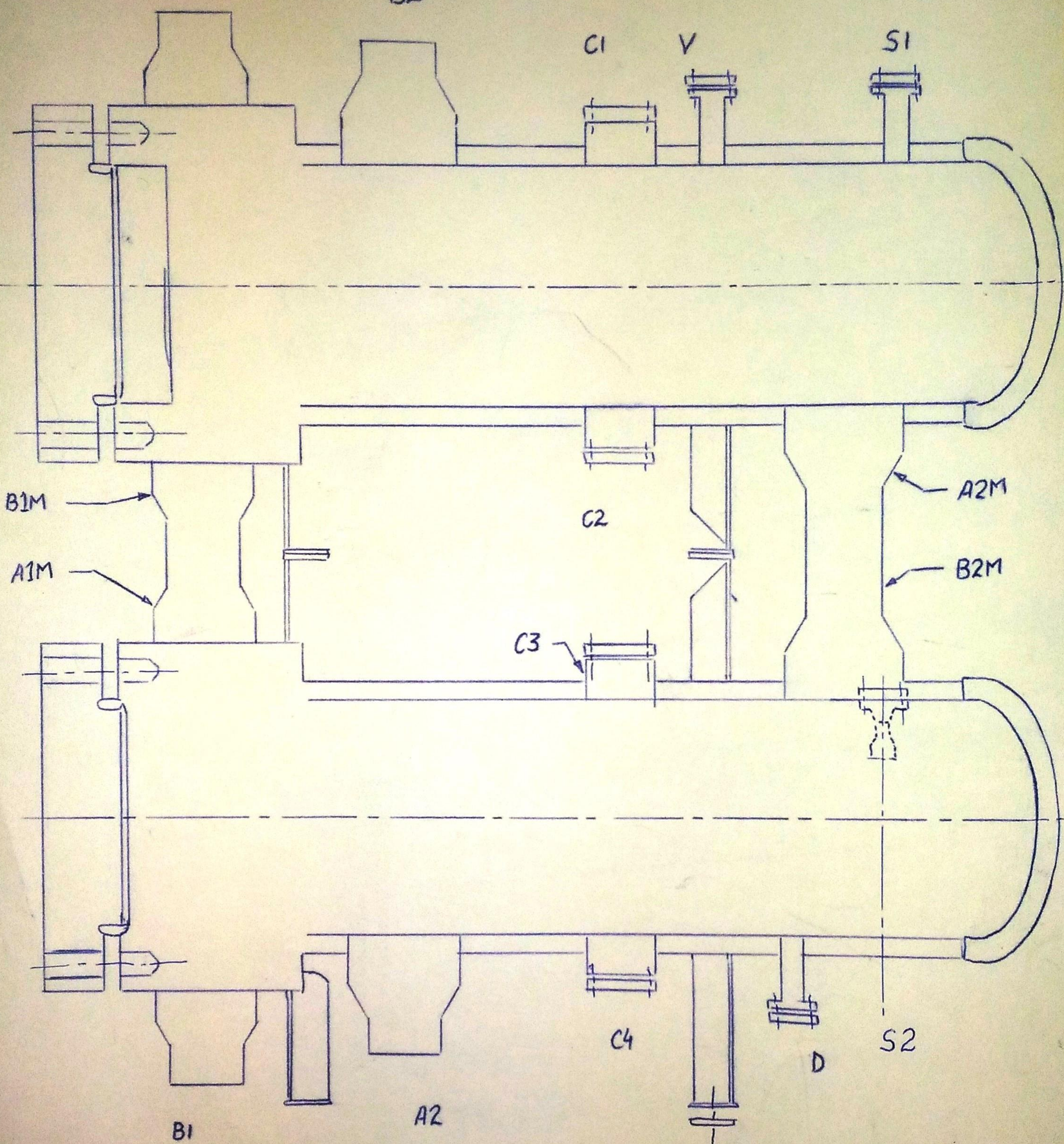
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	QW-482	WELDING PROCEDURE SPECIFICATION (Section IX, ASME Boiler and Pressure Vessel Code)	WPS No. 15AH ₂ (16-200)G ₃ 32929N ₃ Rev.0
Company Name : ISGEC Yamuna Nagar - 135 001 (Haryana)			
Welding Procedure Specification No. 15AH ₂ (16-200)G ₃ 32929N ₃		Date. 22/02/2016	
Revision No. 0		Date. 22/02/2016	
Supporting PQR No.(s) 1673			
Welding Process(es) GTAW+SMAW+SAW Type(s): Automatic /Manual/Machine/ Semi-Auto			
JOINT (Qw-402)		Details	
Joint Design As per approved production drawing		Root spacing as per drawing	
Backing (yes) SAW,SMAW (Yes/No)		GTAW	
Backing Material (Type) Base metal/Weld metal (Retainers not to be used)			
BASE METALS (QW-403)			
P.No. 1	Group No. 2	to P No. 5A	Group No. 1
OR			
Specification Type and Grade -			
to Specification Type and Grade -			
OR			
Chem. Analysis and Mech. Prop. -			
to Chem. Analysis and Mech. Prop. -			
Thickness in mm :			
Base Metal : Groove *16-200		Fillet Any	
Other Each pass thickness shall be less than 06 mm for SMAW & SAW			
*Min. Thickness shall be 5 mm in case of without impact			
FILLER METALS (QW-404)			
F. No. 6(GTAW, SAW), 4(SMAW)		Other -	
A. No. 1		Other -	
Spec. No. (SFA) (SAW & SMAW-Buttering), 5.18(GTAW), 5.1(SMAW), 5.17(SAW)			
AWS No. Class (EH10K& E7018-1-Buttering), ER 70S-2(GTAW), E7018-1(SMAW), EH10K(SAW)			
Size of Filler Metal(mm) 4&3.2/4.0(SAW&SMAW-Buttering), 2.0/2.5(GTAW), 4.0(SAW)			
3.2/4.0/5.0 for SMAW			
Deposited Weld Metal thickness range (mm):			
Groove: 6mm Each (min)-SMAW & SAW- buttering; GTAW=14 max.; SMAW=200 max.; SAW=200 max.			
Fillet: Any			
Brand Name (s) Tigfil T2 Spl or equivalent for GTA W, Union S3 of Thyssen for SAW			
Ultimate-18(spl) of Honavar or equivalent for SMAW			
Electrode - Flux (Class) F7P6-EH10K			
Flux Trade Name UV420TTR of Thyssen		Flux Type Neutral	
Recrushed Slag No		Alloy Flux No	
Consumable Insert NA			
Filler Metal Product Form Bare (Solid)-GTAW & SAW		Supplemental Filler Metal No	
Other: QW 404.7/.12-NA			

QW-482		WPS No. 15AH ₂ (16-200)G ₃ 32929N ₃ Rev.0	
POSITION (QW-405)		POST WELD HEAT TREATMENT (QW-407)	
Position (s) of Groove	Flat-buttering, Flat (SAW), Any(SMAW,GTAW)	Temperature Range	610± 10°C #690± 10°C
Fillet	Flat (SAW), Any (SMAW,GTAW)	Time Range	As per approved drg
Welding Progression Up	For Vertical Down -	Other	QW-407.4 NA
Other	-		#for Buttering on P5A
PREHEAT (QW-406)			
Thickness Range(mm)	Preheat Temp. °C min.	Thickness Range (mm)	Preheat Temp. °C min.
Up to 25	50	Over 100	150
Over 25 & up to 75	100		
Over 75 & up100	125		
Preheating 150°C min.; interpass temp. Max.= 275°C during buttering on P5A material			
Interpass Temp. Max.(°C)	300		
Preheat Maintenance	-----		
GAS (QW-408)			
Shielding Gas (es)	Argon (Welding grade 99.99%)		
Percent Composition (Mixtures)	NA	Flow Rate	7-12 LPM
Gas Backing	Nil	Flow Rate	-
Trailing Shielding Gas Composition	NA		
ELECTRICAL CHARACTERISTICS (QW-409)			
Current AC or DC	DC -No pulsing for GTAW	Polarity:	EN (Straight Polarity) for GTAW EP (Reverse Polarity) for SMAW & SAW
Amps (Range)	Refer table on page 3	Volts (Range):	Refer table on page 3
Tungsten Electrode Size and Type	2.4, EWTh-2		
Mode of Transfer GMAW	NA		
Electrode Wire Feed Speed Range	As per Amperage for SAW		
Heat Input :	Refer table on page 3		
TECHNIQUE (QW-410)			
String or Weave Bead	Stringer for SAW, Stringer /Weave (3 x core dia max.)-for SMAW, Stringer/Weave for GTAW		
Orifice or Gas Cup Size	9 mm -15mm I/D		
Initial and Interpass Cleaning (Brushing, Grinding etc.)	Brushing/ Chipping/ grinding as required		
Method of Back Gouging	Not required		
Oscillation	No		
Contact tube to Work Distance	25-35 mm for SAW		
Multiple or Single Pass (per side)	Multiple Pass		
Multiple or single Electrode	Single Electrode	Electrode Spacing	No
Travel Speed (Range)	Refer table on page 3		
Peening	No	Closed to out chamber (GTAW/PAW):	NA
Other	QW 410.64: NA		

QW-482

WPS No.: 15AH₂(16-200)G₃32929N₃ Rev.0

Weld Layer (s)	Process(es)	Filler Metal		Current		Voltage Range	Travel Speed In mm/min (min.)	Other Note 6
		AWS Class	Dia. in mm	Type & Polarity	AMP Range			
Buttering	SAW	EH 10K	4.0	DCEP	450-525	26-30	510	-
	SMAW	E7018-1	3.15	DCEP	100-130	22-26	110	150
		E7018-1	4.0	DCEP	130-170	24-28	140	175
Root+ One	GTAW	ER 70S-2	2.0	DCEN	130	09-12	50	-
		ER 70S-2	2.4/2.5	DCEN	160	09-12	60	-
Filling & Capping	SMAW	E7018-1	3.15/	DCEP	100-130	22-26	110	150
	SMAW	E7018-1	4.0/	DCEP	130-170	24-28	140	175
	SMAW	E7018-1	* 5.0	DCEP	200-240	26-30	250	280
Filling & Capping	SAW	EH 10K	4.0 /	DCEP	450-500	28-32	500	-

Max. Heat Input : 2.04 KJ/mm for SMAW for buttering
 Max. Heat Input : 1.85 KJ/mm for SAW for buttering
 Max. Heat Input: 1.92 KJ/mm For GTAW
 Max. Heat Input : 2.04 KJ/mm for SMAW
 Max. Heat Input : 1.92 KJ/mm For SAW

NOTES

- Clean the joint and 1" area on both sides thoroughly prior to welding.
- All welds shall be cleaned of foreign material (slag etc.) down to clean metal, both on completion of Each pass and when the weld is finished.
- All tack welds shall be made by qualified welders.
- Preheat zone shall be greater of 150mm or 2 x nominal wall thickness on either side of the weld preparation.
- Required Preheating temperature shall be measured by use of temperature sensitive crayons or digital pyrometer, at least 150 mm or 2 times thickness whichever is greater each side of the joints during welding (including tack welding)
- Minimum Bead length per 450mm length of electrode in mm.
- #PWHT at 690°C ±10°C on P5A material with Buttering CS Consumable
- *5.0 Dia. is allowed for flat position only

Prepared By :

Mir PNB 22/02/16
 Engineer, Welding Technology

Checked By :

[Signature]
 Engineer, Welding Technology

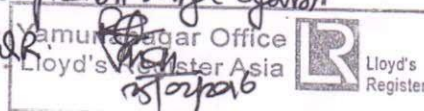
Approved By :

Mir PNB 22/02/16
 Head Welding Technology

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Sheet 3 of 3


Renowned for Qualification range against
 Supporting PQR



YAMUNAGAR

	QW-482	WELDING PROCEDURE SPECIFICATION (Section IX, ASME Boiler and Pressure Vessel Code)	WPS No. <u>11H₂(16-200)G₃62732N₃ Rev.2</u>
Company Name : ISGEC Yamuna Nagar - 135 001 (Haryana)			
Welding Procedure Specification No.	<u>11H₂(16-200)G₃62732N₃</u>	Date.	<u>30-05-2015</u>
Revision No.	<u>2</u>	Date.	<u>03-11-2015</u>
Supporting PQR No.(s)	<u>1570</u>		
Welding Process(es)	<u>GTAW+SMAW</u>	Type(s):	<u>Automatic/Manual/Machine/Semi-Auto</u>
JOINT (Qw-402)			
Joint Design	<u>As per approved production drawing</u>		Details
Backing (yes)	<u>For (SMAW)</u>	(Yes/No) For GTAW	Root spacing as per drawing
Backing Material (Type)	<u>Base metal/Weld metal</u>		Retainer not to be used
BASE METALS (QW-403)			
P.No.	<u>1</u>	Group No.	<u>1[#],2</u>
		To P No.	<u>1</u>
		Group No.	<u>1[#],2</u>
OR			
#When Impact Test not required			
Specification Type and Grade	-		
to Specification Type and Grade	-		
OR			
Chem. Analysis and Mech. Prop.	-		
to Chem. Analysis and Mech. Prop.	-		
Thickness in mm :			
Base Metal : Groove	<u>*16-200(For Normalized base metal)</u>		Fillet
Other	<u>Any</u>		
Each pass thickness shall be less than 6 mm			
*Min. thk shall be 5 mm in case of no impact (For any H/T condition of base metal)			
FILLER METALS (QW-404)			
F. No.	<u>6(GTAW), 4(SMAW)</u>		Other
A. No.	<u>1</u>		-
		Other	-
Spec. No. (SFA)	<u>5.18 (GTAW),</u>		<u>5.1 (SMAW)</u>
AWS No. Class	<u>ER70S-2 (GTAW),</u>		<u>E 7018-1 (SMAW)</u>
Size of Filler Metal(mm)	<u>2.0 mm Dia (GTAW)</u>		<u>3.2, 4.0 Dia (SMAW)</u>
Deposited Weld Metal thickness range (mm):			
Groove:	<u>GTAW= 8 mm max ,SMAW= 200 mm max</u>		
Fillet:	<u>Any</u>		
Brand Name (s)	<u>T-70S-2 for GTAW</u>		
	<u>Phoenix 7018 for SMAW</u>		
Electrode - Flux (Class)	<u>NA</u>		
Flux Trade Name	<u>NA</u>		Flux Type
Recrushed Slag	<u>NA</u>		<u>NA</u>
Consumable Insert	<u>No</u>		
Filler Metal Product Form	<u>Bare(Solid)</u>		Supplemental Filler Metal
Other:	<u>QW 404.7/12 - NA</u>		

QW-482		WPS No. 11H ₂ (16-200)G ₃ 62732N ₃ Rev.2	
POSITION (QW-405)		POST WELD HEAT TREATMENT (QW-407)	
Position (s) of Groove	Any	Temperature Range	610± 10 °C
Fillet	Any	Time Range	(Max. 912 minutes)
Welding Progression	Up	Other	407.4 : NA
Other	For Vertical Down -		
PREHEAT (QW-406)			
Thickness Range(mm)	Preheat Temp. °C min.	Thickness Range (mm)	Preheat Temp. °C min.
Up to 25	75	Over 100	150
Over 25 & up to 75	100	-	-
Over 75 & up to 100	125	-	-
Interpass Temp. Max.(°C)	250		
Preheat Maintenance	For thickness over 76 mm, During any interruption or immediately upon completion of welding, the weld joint and adjacent portion at least 50 mm on of either side of the weld shall be uniformly heated at 350 deg C for half hour minimum before cooling down to room temperature		
GAS (QW-408)			
Shielding Gas (es)	Argon (Welding Grade 99.995%)		
Percent Composition (Mixtures)	No	Flow Rate	7-12 LPM
Gas Backing	No	Flow Rate	No
Trailing-Shielding Gas Composition	No		
ELECTRICAL CHARACTERISTICS (QW-409)		DCEN(Straight Polarity) for GTAW	
Current AC or DC	DC(No pulsing current for GTAW)	Polarity :	DCEP(Reverse Polarity) for SMAW
Amps (Range)	Refer table on page 3	Volts (Range) :	Refer table on page 3
Tungsten Electrode Size and Type	2.4 mm dia, EWTh-2		
Mode of Transfer	GMAW -		
Electrode Wire Feed Speed Range	-		
TECHNIQUE (QW-410)			
String or Weave Bead	Stringer/Weave bead (3 times of core dia max) for SMAW, Stringer/Weave for GTAW		
Orifice or Gas Cup Size	9 mm I/D		
Initial and Interpass Cleaning (Brushing, Grinding etc.)	Brushing/chipping/grinding as required		
Method of Back Gouging	NA		
Oscillation	NA		
Contact tube to Work Distance	NA		
Multiple or Single Pass (per side)	Multiple pass		
Multiple or single Electrode	Single electrode	Electrode Spacing	NA
Travel Speed(Range)	Refer table on page 3		
Peening	No	Closed to out chamber (GTAW/PAW):	No
Other	QW 410.64 : NA		

 ISGEC YAMUNA NAGAR	QW : 482 WELDING PROCEDURE SPECIFICATION (Section IX, ASME Boiler and Pressure Vessel Code)	WPS No. <u>(5A)(5A) H₂(8-200)G₃61498N₃Rev.2</u>
Company Name : ISGEC, Yamuna Nagar - 135 001 (Haryana) Welding Procedure Specification No. <u>(5A)(5A) H₂(8-200)G₃61498N₃</u> Date. <u>03-08-2012</u> Revision No. <u>2</u> Date. <u>07-09-2013</u> Supporting PQR No.(s) <u>1108,1111</u> Welding Process(es) <u>GTAW+ SMAW</u> Type(s): Automatic /Manual/Machine/Semi Auto		
JOINT (Qw-402) Details Joint Design <u>As per approved production drawing</u> Root spacing as per drawing Backing (yes) <u>SMAW (Yes/No) GTAW</u> Backing Material (Type) <u>Base metal/Weld metal</u> (Retainers not to be used)		
BASE METALS (QW-403) P.No. <u>5A</u> Group No. <u>1</u> to P No. <u>5A</u> Group No. <u>1</u> OR Specification Type and Grade _____ to Specification Type and Grade _____ OR Chem. Analysis and Mech. Prop. _____ to Chem. Analysis and Mech. Prop. _____ Thickness in mm : Base Metal : Groove <u>8-200</u> Fillet <u>Any</u> Other <u>Each pass thickness shall be less than 06 mm for SMAW.</u>		
FILLER METALS (QW-404) F. No. <u>6 (GTAW), 4 (SMAW)</u> Other _____ A. No. <u>4</u> Other _____ Spec. No. (SFA) <u>5.28 (GTAW), 5.5 (SMAW)</u> AWS No. Class <u>ER 90S-G (GTAW), E 9015-B3 (SMAW)</u> Size of Filler Metal(mm) <u>2.0/2.4 dia (GTAW), 3.2/ 4.0 / 5.0 dia (SMAW)</u> Deposited Weld Metal thickness range (mm): Groove: <u>200max</u> Fillet: <u>Any</u> Brand Name (s) <u>UNION 1 CrMo2 910 for GTAW</u> <u>PHEONIX CHROMO 2KS for SMAW</u> Electrode - Flux (Class) <u>NA</u> Flux Trade Name <u>NA</u> Flux Type <u>NA</u> Recrushed Slag <u>NA</u> Alloy Flux <u>No</u> Consumable Insert <u>No</u> Filler Metal Product Form <u>Bare (Solid) for GTAW</u> Supplemental Filler Metal <u>No</u> Other: <u>QW 404.7 /12 : NA</u>		

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QW-482		WPS No. (5A)(5A) H ₂ (8-200)G ₃ 61498N ₃ Rev.2	
POSITION (QW-405)		POST WELD HEAT TREATMENT (QW-407)	
Position (s) of Groove	ALL [#]	Temperature Range	690+10 ⁰ C
Fillet	ALL [#]	Time Range	As per approved drawing
Welding Progression Up	For vertical Down -	Other	QW407.4-NA
Other	*See Note 7		
PREHEAT (QW-406)			
Thickness Range(mm)	Preheat Temp. ⁰ C min.	Thickness Range (mm)	Preheat Temp. ⁰ C min.
ALL	200	-	-
-	-	-	-
-	-	-	-
Interpass Temp. Max.(⁰ C) 250			
Preheat Maintenance During any interruption or upon completion of welding prior to cooling below preheat temperature, the weld joint and adjacent portion of the joint at least 50mm on either side of the weld shall be uniformly post heated at 350 – 400 ⁰ C, The temperature shall be maintained for 3 hours (minimum) and then wrapped with insulation blanket.			
GAS (QW-408)			
Shielding Gas (es)	Argon 99.995% for GTAW		
Percent Composition (Mixtures)	Welding grade	Flow Rate	7-12 LPM
Gas Backing	No	Flow Rate	No
Trailing Shielding Gas Composition No			
ELECTRICAL CHARACTERISTICS (QW-409)			
Current AC or DC	DC	Polarity:	DCEN (Straight Polarity) for GTAW-No Pulsing DCEP (Reverse Polarity) for SMAW
Amps (Range)	Refer table on page 3	Volts (Range):	Refer table on page 3
Tungsten Electrode Size and Type	2.4, EWTh-2		
Mode of Transfer GMAW	NA		
Electrode Wire Feed Speed Range	-		
TECHNIQUE (QW-410)			
String or Weave Bead	Stringer / Weave (3 times of core dia max)		
Orifice or Gas Cup Size	NA		
Initial and Interpass Cleaning (Brushing, Grinding etc.)	Brushing/chipping/grinding as required		
Method of Back Gouging	NA		
Oscillation	NA		
Contact tube to Work Distance	NA		
Multiple or Single Pass(per side)	Multiple Pass	QW 410.64:	NA
Multiple or single Electrode	Single Electrode	Electrode Spacing	NA
Travel Speed(Range)	Refer table on page 3		
Peening	No	Closed to out chamber (GTAW/PAW):	No
Other	-		

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QW-482		WPS No.: (5A)(5A) H ₂ (8-200)G ₃ 61498N ₃ Rev.2						
Weld Layer (s)	Process(es)	Filler Metal		Current		Voltage Range	Travel Speed in Mm/min	Other Note 6
		AWS Class	Dia. in mm	Type & Polarity	AMP Range			
Root	GTAW	ER 90S-G	2.0	DCEN	90-110	12-14	50	-
			2.4	DCEN	125-130	13-15	60	-
Filling & Capping (As reqd)	SMAW	E 9015-B3	3.2	DCEP	110-120	26-28	102	-
			4.0	DCEP	150-160	26-29	152	-
			*5.0	DCEP	210-250	26-30	254	-
Maximum Heat Input for GTAW = 1.95 KJ/mm Maximum Heat Input for SMAW = 1.97 KJ/mm								

NOTES :

- Clean the joint and 1" area on both sides thoroughly prior to welding.
- All welds shall be cleaned of foreign material (slag etc.) down to clean metal, both on completion of Each pass and when the weld is finished.
- All tack welds shall be made by qualified welders.
- Preheat zone shall be greater of 100mm or 3 x nominal wall thickness on either side of the weld preparation. Preheating temperature shall be kept uniform from the start to the end of welding.
- Preheating / Interpass temperature shall be measured by use of temperature indicative crayons or Infrared thermometer.
- Minimum bead length per 450 mm length of electrode in mm.
- *5.0 dia. is allowed for flat position only.

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Lloyd's Register Asia



WPS Revised as per Weld Plan
WP/PH/PE-2002 Rev 02
27/12/2016
Inspection Authority

Prepared By :

[Signature]
Engineer, Welding Technology

Approved By :

[Signature]
Head Welding Technology

	QW-482	14H ₂ (16-200)G ₃ 32346N ₃ Rev.0
YAMUNA NAGAR	WELDING PROCEDURE SPECIFICATION (Section IX, ASME Boiler and Pressure Vessel Code)	WPS No. _____
Company Name : ISGEC Yamuna Nagar - 135 001 (Haryana)		
Welding Procedure Specification No.	14H ₂ (16-200)G ₃ 32346N ₃	Date. 14-07-2014
Revision No.	0	Date. 14-07-2014
Supporting PQR No.(s)	1436,1449	
Welding Process(es)	GTAW+SMAW+SAW Type(s): Automatic /Manual/Machine/ Semi-Auto	
JOINT (Qw-402)		Details
Joint Design	As per approved production drawing Root spacing as per drawing (See annexure 1)	
Backing (yes) SAW,SMAW (No)	GTAW	
Backing Material (Type)	Base metal/Weld metal (Retainers not to be used)	
BASE METALS (QW-403)		
P.No. 1	Group No. 2	to P No. 4
	Group No. 1	
OR		
Specification Type and Grade	-	
to Specification Type and Grade	-	
OR		
Chem. Analysis and Mech. Prop.	-	
to Chem. Analysis and Mech. Prop.	-	
Thickness in mm :		
Base Metal : Groove	*16-200	Fillet Any
Other	Each pass thickness shall be less than 06 mm for SMAW & SAW	
	*5 mm for without impact	
FILLER METALS (QW-404)		
F. No.	6(GTAW, SAW) , 4(SMAW)	Other -
A. No.	1	Other -
Spec. No. (SFA)	5.28(GTAW), 5.5(SMAW), 5.23(SAW)	
AWS No. Class	ER 80S-B2(GTAW), E8018-B2(SMAW) , EB2R(SAW)	
Size of Filler Metal(mm)	2.0/2.5(GTAW); 3.2/4.0/5.0 for SMAW;4.0(SAW)	
Deposited Weld Metal thickness range (mm):		
Groove:	GTAW=10 max.;SMAW=200 max.; SAW=200 max.	
Fillet:	Any	
Brand Name (s)	T-80SB2 GTAW, Union S2CR MO of Thyssen for SAW	
	PHONEIX CRMO1 for SMAW	
Electrode - Flux (Class)	F8P2-EB2R	
Flux Trade Name	UV420TTR of Thyssen	Flux Type Neutral
Recrushed Slag	No	Alloy Flux No
Consumable Insert	NA	
Filler Metal Product Form	Bare (Solid)-GTAW	Supplemental Filler Metal No
Other:	QW 404.7/12-NA	

QW-482		WPS No. 14H ₂ (16-200)G ₃ 32346N ₃ Rev.0	
POSITION (QW-405)		POST WELD HEAT TREATMENT (QW-407)	
Position (s) of Groove	Flat (SAW) Any(SMAW,GTAW)	Temperature Range	690 ± 10 ⁰ C
Fillet	Flat (SAW), Any (SMAW,GTAW)	Time Range	7 HR'S MAX
Welding Progression Up	For Vertical Down -	Other	
Other	-		
PREHEAT (QW-406)			
Thickness Range(mm)	Preheat Temp. ⁰ C min.	Thickness Range (mm)	Preheat Temp. ⁰ C min.
Up to 200	150		
Interpass Temp. Max. (⁰ C) 275			
Preheat Maintenance -----			
GAS (QW-408)			
Shielding Gas (es)	Argon (Welding grade 99.99%)		
Percent Composition (Mixtures)	NA	Flow Rate	7-12 LPM
Gas Backing	Nil	Flow Rate	-
Trailing Shielding Gas Composition	NA		
ELECTRICAL CHARACTERISTICS (QW-409)			
Current AC or DC	DC- No pulsing for GTAW	Polarity:	DCEN (Straight Polarity) for GTAW DCEP (Reverse Polarity) for SMAW & SAW
Amps (Range)	Refer table on page 3	Volts (Range):	Refer table on page 3
Tungsten Electrode Size and Type	2.4, EWTh-2		
Mode of Transfer GMAW	NA		
Electrode Wire Feed Speed Range	As per Amperage for SAW		
TECHNIQUE (QW-410)			
String or Weave Bead	Stringer for SAW, Stringer /Weave (3 x core dia max.)-for SMAW, Stringer/Weave for GTAW		
Orifice or Gas Cup Size	9 mm-15mm I/D		
Initial and Interpass Cleaning (Brushing, Grinding etc.)	Brushing/ Chipping/ grinding as required		
Method of Back Gouging	Not required		
Oscillation	No		
Contact tube to Work Distance	25-35 mm for SAW		
Multiple or Single Pass (per side)	Multiple Pass		
Multiple or single Electrode	Single Electrode-GTAW& SAW	Electrode Spacing	No
Travel Speed (Range)	Refer table on page 3		
Peening	No	Closed to out chamber (GTAW/PAW):	NA
Other	QW 410.64: NA		

QW-482		WPS No.: 14H ₂ (16-200)G ₃ 32346N ₃ Rev.0						
Weld Layer (s)	Process(es)	Filler Metal		Current		Voltage Range	Travel Speed In mm/min (min.)	Other Note 6
		AWS Class	Dia. in mm	Type & Polarity	AMP Range			
Root+ One	GTAW	ER 80S-B2	2.0/2.5	DCEN	90-110	10-14	65	-
Filling & Capping	SMAW	E 8018-B2	3.15/	DCEP	100-115	22-25	125	150
	SMAW	E 8018-B2	4.0/	DCEP	130-150	24-28	130	170
	SMAW	E 8018-B2	* 5.0	DCEP	180-200	28-30	200	250
Filling & Capping	SAW	EB2R	4.0 /	DCEP	450-500	28-30	510	-
Max. Heat Input: 1.42 KJ/mm For GTAW Max. Heat Input : 1.93 KJ/mm for SMAW Max. Heat Input : 1.77 KJ/mm For SAW								

NOTES

- Clean the joint and 1" area on both sides thoroughly prior to welding.
- All welds shall be cleaned of foreign material (slag etc.) down to clean metal, both on completion of Each pass and when the weld is finished.
- All tack welds shall be made by qualified welders.
- Preheat zone shall be greater of 150mm or 2 x nominal wall thickness on either side of the weld preparation.
- Required Preheating temperature shall be measured by use of temperature sensitive crayons or digital pyrometer, at least 150 mm or 2 times thickness whichever is greater each side of the joints during welding (including tack welding)
- Minimum Bead length per 450mm length of electrode in mm.

<p><i>Reviewed for Qualification ranges as per Supporting PAR</i></p> <p>Yamunanagar Office Lloyd's Register Asia 15/07/2014</p> <p>Inspection Authority</p>	<p>Prepared By:</p> <p><i>[Signature]</i></p> <p>Engineer, Welding Technology</p>	<p>Approved By:</p> <p><i>[Signature]</i></p> <p>Head Welding Technology</p>
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