

WELDING PROCEDURE SPECIFICATION (WPS)

 WPS No:
DNVGL-PIPE-03-03
(CS GTAW-SMAW)
 Revision No:
1

General information ☐ pWPS

Manufacturer: **Seaspan Vancouver Shipyards Co. Ltd.**

Manufacturer address: **50 Pemberton Ave., North Vancouver, B.C. V7P 2R2**

Welding procedure qualification test records: **PQR DNVGL-Pipe-03-01 (CS SMAW), DNVGL-PIPE-03-02 (CS GTAW)**

Welding process (ISO 4063):	141-GTAW 111-SMAW Manual	Number of electrodes:	1	Tungsten electrode designation and Ø:	2 % Thoriated 3.2 mm
Welding position(s) (ISO/ASME): All ex. 3G down		Joint type:	Pipe and Plate Butt, T, K, Y CJP, PJP Groove, Fillet weld	Stringer/weave, max. bead width:	Stringer N/A mm
Welding layer:	Multi-layer One/ Two side	Backing: Gas flow rate:	Without or With	Method of preparation:	Plasma / Oxy fuel cut
Min. preheating temperature:	Ambient (15°C)	Max. interpass temperature:	144 °C	PWHT details:	None

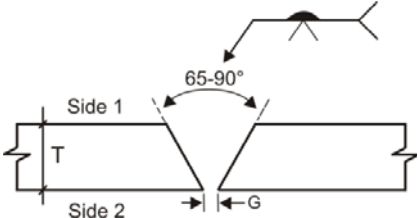
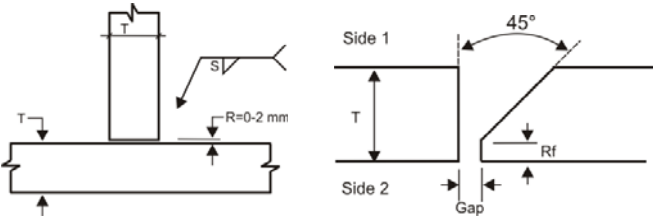
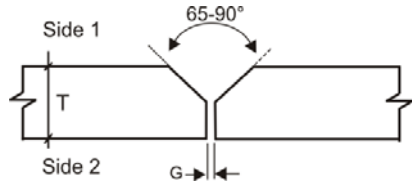
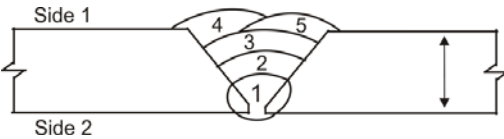
Material specification

Base material 1 group:	ASTM A106 Gr. B and all P-No 1, Group No. 1 materials	Base material 2 group:	ASTM A106 Gr. B and all P-No 1, Group No. 1 materials
Delivery condition(s):	AR Hot Rolled Seamless pipe	Delivery condition(s):	AR Hot Rolled Seamless pipe
Max. C _{eq} :	N/A	Max. C _{eq} :	N/A
Thickness range		Thickness range	
Butt:	3 – 19 mm	Butt:	3 – 19 mm
Fillet		Fillet	
Throat:	3 – 19 mm	Throat:	3 – 19 mm
Leg size:	4.2 – 26.8 mm	Leg size:	4.2 – 26.8 mm
Outside diameter range:	> 63 mm	Outside diameter range:	> 63 mm

Welding consumables

No.	Filler metal and flux				Shielding gas		Nozzle diameter (mm)	DNV GL grade(s)
	Type	Manufacturer	Brand Name/ Designation	ISO or AWS classification	Type	Purity		
1	Rod	HARRIS	ER70S-2 (GTAW) TIG	AWS A5.18 ER70S-2	Argon	100%	8	-
2	Rod	Lincoln	Lincoln Excalibur E7018-MR	AWS A5.1 E7018-1	N/A	N/A	N/A	3YH5

Joint preparation (sketch) and welding details

Joint design	Welding sequences
State rolling direction, if applicable	For multiple welding process qualification, the deposited weld metal thickness shall be recorded for each filler metal and process used.
 <p>Thickness T = 3 - 19 mm Groove angle = 65 - 90° Root face Rf = 0 - 2 mm Butt Root gap G = 1 - 5 mm Fillet Root gap G = 0 - 2 mm</p> <p>All position except 3G down Single or Double Vee groove, Butt, T, K, Y Complete/ Partial Joint Penetration</p>   <p>Note:</p> <ul style="list-style-type: none"> * Pipes rolling direction transverse to the weld. * Branch connections shall be qualified separately * This procedure is applicable for welding from one side with/ without backing (gas purging) and both side with/ without gouging * Grind weld joint preparation edges and adjacent surfaces to bright metal prior to welding to remove all traces of paint, primer, scale, rust, moisture and any other contaminants. Wire brush, grinding to be used for interpass cleaning. * This procedure is also applicable for other double side and single side welded preparation. Also this procedure covers single bevel joint design. * Any change in wire brand name/designation is permitted as long as AWS/ISO consumable classification remains the same as PQR. 	 <p>Multi Runs/ Multi layers</p> <p>For Thickness T = 9.5 mm Typically 5-6 runs & 4-5 layers</p>

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Run ⁽¹⁾	Process ⁽²⁾	C ⁽³⁾	Ø ⁽⁴⁾ (mm)	Gas flow (l/min)	Current (A)	Voltage (V)	C&P ⁽⁵⁾	V ⁽⁶⁾ (cm/min)	S ⁽⁷⁾ (mm/s)	F/B ⁽⁸⁾	HI ⁽⁹⁾ (kJ/cm)
Root & Hot	141-GTAW	1	2.4	8 - 15	93 - 136	11.9 - 17.5	DC-	3.7 - 5.1	N/A	B	15.6 - 26
Fill & Cap	111-SMAW	2	3.2	N/A	86 - 127	20.4 - 30.0	DC+	13.7 - 18.6	N/A	B	6.9 - 11.5

(1) Root, fill or cap. (2) Ref. ISO4063. (3) Welding consumable, see previous table. (4) Filler metal diameter. (5) Current and polarity, /P for pulse welding. Details to be specified below. (6) Travel speed. (7) Wire feed speed. (8) Forehand "F" or backhand "B" progression. (9) Heat input not compensated for process efficiency (arc energy).

Note:

- * The values for the Current (A) and Voltage (V) are -15%, +25% and ±15% for Travel speed (V) based on the PQRs DNVGL-Pipe-03-02 (CS GTAW) and DNVGL-Pipe-03-01 (CS SMAW).
- * Range of the Heat Inputs are ± 25% based on the actual values in the PQRs DNVGL-Pipe-03-02 (CS GTAW) and DNVGL-Pipe-03-01 (CS SMAW).
- * Selection of Current (A), Voltage (V) and Travel speed (V) shall be in compliance with approved range of heat input provided above.

Further information

Shop primer for fillet weld		
Manufacturer:	N/A	Max. dry film thickness: N/A µm

Place: **Vancouver, BC, Canada**
Date : **July 2019**

Prepared by: **Mathew Smith P.Eng.**



Place: **Vancouver, BC, Canada**
Date : **July 2019**

Rev.1 2019-08-23 for DNV GL



Surveyor - DNV GL Maritime Vancouver

