Seaspan Vancouver Shipyards Co. Ltd.
Seaspan Victoria Shipyards Co. Ltd.
Seaspan Vancouver Drydock Co. Ltd.

WPS No:
**DNVGL-Pipe-03-06**
Revision No:
**1**

# WELDING PROCEDURE SPECIFICATION (WPS)

## 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-03-06 (CS SMAW)**

| | | | | | |
|---|---|---|---|---|---|
| Welding process (ISO 4063): | **111-SMAW Manual** | Number of electrodes: | **1** | Tungsten electrode designation and Ø: | **N/A** |
| 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 | **Stringer and slight weave max. bead width 15mm (as per PQR)** |
| Welding layer: | **Multi-layer One/ Two side** | Backing: Gas flow rate: | **Without or With** | Method of preparation: | **Plasma / Oxy fuel cut** |
| Min. preheating tempertaure: | **Ambient** | Max. interpass temperature: | **135 °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): | **Hot Finished Seamless pipe** | Delivery condition(s): | **Hot Finished Seamless pipe** |
| Thickness range<br>Butt:<br>Fillet<br>Throat:<br>Leg size: | <br>**3 – 22 mm**<br><br>**3 – 22 mm**<br>**4.2 – 31 mm** | Thickness range<br>Butt:<br>Fillet<br>Throat:<br>Leg size: | <br>**3 – 22 mm**<br><br>**3 – 22 mm**<br>**4.2 – 31 mm** |
| Outside diameter range: | **> 76 mm** | Outside diameter range: | **> 76 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** | **Lincoln** | **Fleetweld 5P+** | **AWS A5.1 E6010** | **N/A** | **N/A** | **N/A** | **3** |
| **2** | **Rod** | **Lincoln** | **Excalibur 7018-1 MR** | **AWS A5.1 E7018-1 H4R** | **N/A** | **N/A** | **N/A** | **3 YH5** |

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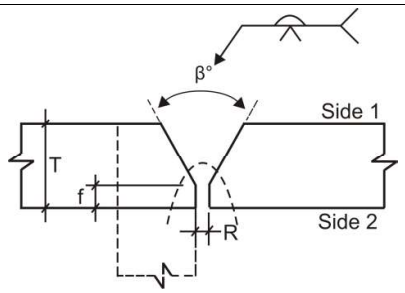
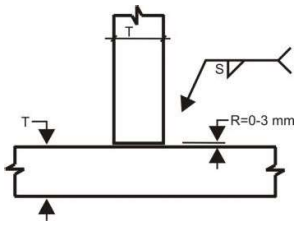
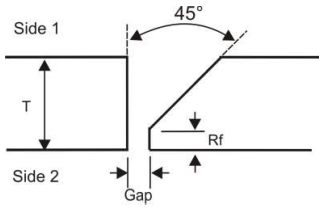
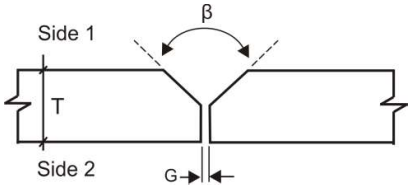
## Joint preparation (sketch) and welding details

| 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. |
|  <br>Thickness T = 3 - 22 mm<br>Groove angle (β) = 70 - 95°<br>Root face Rf= 0 - 3 mm<br>Butt Root gap G = 1.5 - 3.5 mm<br>Fillet Root gap G = 0 - 3 mm<br><br>All position except 3G down<br>Single or Double Vee groove,<br>Butt, T, K, Y Complete/ Partial Joint Penetration<br>  <br>  <br>  <br>Note:<br>* Branch connections shall be qualified separately<br>* This procedure is applicable for welding from one side with/ without backing and both side with/ without gouging<br>* 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.<br>* Any change in electrode brand name/designation is permitted as long as AWS/ISO consumable classification remains the same as PQR. | Multi Runs/ Multi layers<br><br>As required |

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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] (in/min) | s[7] (in/min) | F/B[8] | HI[9] (kJ/mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Root & Hot** | **111-SMAW** | **1** | **3.2 & 2.4** | **N/A** | **65 – 108** | **20.4 – 30** | **DC+** | **6.16 – 8.34** | **N/A** | **B** | **0.51 – 0.86** |
| **Fill & Cap** | **111-SMAW** | **2** | **4.8 and lower diameter** | **N/A** | **70 – 190** | **20– 30.6** | **DC+** | **6.81 – 9.22** | **N/A** | **B** | **0.59 – 0.98** |

(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), Voltage (V) are -15/+25% and Travel speed (V) are ±15% based on the PQR DNVGL-Pipe-03-06.
* Range of the Heat Inputs are ± 25% based on the actual values in the PQR DNVGL-Pipe-03-06.
* Selection of Current (A), Voltage (V), Wire Feed Speed (S) 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** | Brand name: | **N/A** | Max. dry film thickness: | **N/A µm** |

****Revision 1: Type of backing and welding consumable was corrected in "Joint Preparation Notes"**

Place: **Vancouver, BC, Canada**
Date : **April-25-2020**

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**Seaspan Vancouver Shipyards Co. Ltd**

Place: **Vancouver, BC, Canada**
Date : **April-25-2020**

DNV·GL

**Volodymyr Chumak**

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