

# Welding Procedure Specification (WPS)

**Code: AWS D1.1**

**Company Name:** www.WPSAmerica.com

**Address:** info@WPSAmerica.com, 1 (877) WPS-WELD

**Identification #:**

GMAW-DEMO

**WPS Prequalified:**

Yes

**Supporting PQR No.(s):**

N/A

**Welding Process:**

GMAW

**Process Type:**

Semi-Automatic

**Position(s):**

Flat

**Base Metal Part I (Material Spec., type or grade):**

Steels in Group I and II of Table 3.1-AWS D1.1

**Base Metal Part II (Material Spec., type or grade):**

Steels in Group I and II of Table 3.1-AWS D1.1

**Qualified Thickness and Diameter Range:**

Groove (Fillet): mm (in)

$T \geq 6 \text{ mm (1/4 in)}$

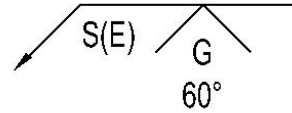
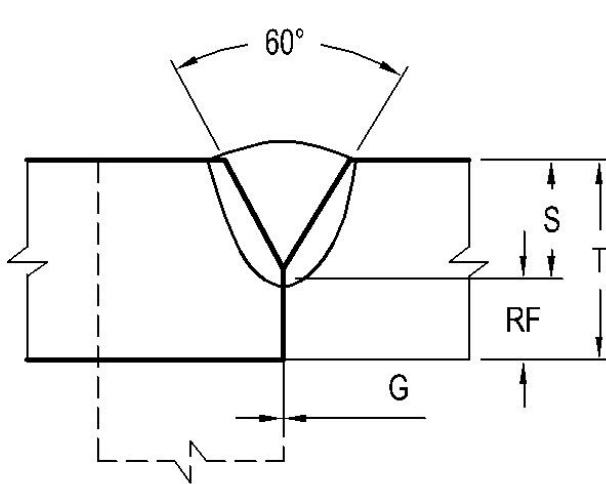
**Filler Metals:**

**AWS Classification/AWS Specification:**

E70C-6M H4

A5.18

**Joint Details/Sketch:**



$RF \geq 3 \text{ mm (1/8 in)}$

$G = 0$

$E = S$

$T \geq 6 \text{ mm (1/4 in)}$

Table 3.4 of AWS D1.1

T	S	E min
in	in	in
$T = \frac{1}{4}$	As specified in the drawing	$\frac{1}{8}$
$T \leq \frac{1}{2}$		$\frac{3}{16}$
$T \leq \frac{3}{4}$		$\frac{1}{4}$
$T \leq 1 - \frac{1}{2}$		$\frac{5}{16}$
$T \leq 2 - \frac{1}{4}$		$\frac{3}{8}$

**BC-P2-GF**

**Joint Design Used: mm (in)**

**Root Opening G:** 0

**Root Face RF:**  $\geq 3 \text{ mm (1/8 in.)}$

**Groove Angle:** 60°

**Radius (J-U):** N/A

**Weld Type:**

Partial Joint Penetration Groove Weld

**Joint Type:**

Butt Joint    Corner Joint

**Backing Option:**

Welded without backing

**Backing Material:**

N/A

**Back Gouging Method:**

N/A

**Electrical Characteristics:**

**Current Type/Polarity:** DCEP  
**Transfer Mode (GMAW):** Spray  
**Tungsten Electrode (GTAW):**

Type: N/A

Size: mm (in) N/A

**Shielding:**

**Gas Composition (Flux for SAW):** Ar + 5 to 15% CO2  
**Gas Flow Rate:** lt/min. (CFH) 40 to 50 CFH  
**Gas Cup Size:** 5/8 in.

**Welding Procedure**

Weld Layers	Pass No.	Process	Filler Metal Classification	Filler Metal Diameter mm (in)	Current Amps	Current Type & Polarity	Wire Feed Speed (in/min)	Volts	Travel Speed (in/min)	Remarks [Heat Input] J/mm (J/in)
1	1	GMAW	E491C-6M-H4	1.4 mm (0.052)	200-250	DCEP	200-250	25-27	10-14	Root Pass
1 to 2	2 to 3	GMAW	E491C-6M-H4	1.4 mm (0.052)	200-250	DCEP	200-250	25-27	10-14	Fill Pass
2 to n	3 to n	GMAW	E491C-6M-H4	1.4 mm (0.052)	270-300	DCEP	270-320	26-28	12-18	Weld Size > = 10 mm (3/8 in.)

**Technique:**

Stringer or Weave Bead: *Stringer Bead*

Contact Tube to Work Distance: *1 to 1-1/8 in.*

Initial/Interpass Cleaning: *Wire Brush, Grind*

Peening: *N/A*

Number of Electrodes: *Single*

Electrodes Spacing: *Longitudinal: N/A*

*Lateral: N/A*

*Angle: N/A*

**Heat Treatment:**

Preheat Temp. Min °C (°F): *0 to 10 °C-Table 3.2 AWS D1.1*

Interpass Temp. Min/Max °C (°F): *0 to 10 °C-Table 3.2 AWS D1.1*

Postweld Heat Treatment: Temp. °C (°F): *N/A*

Time: *N/A*

**Additional Notes:**

The end of contact tube recommended to be recessed in the cup nozzle at least 6 mm (1/4 in.)

**Manufacturer/ Contractor  
 Welding Engineer:**

**Authorized by:**

**Name:** *Jim Clark*

**Name:** *John Smith*

**Title:** *Welding Engineer*

**Title:** *QA Manager*

**Date:** *12/12/2005*

**Date:** *12/12/2005*

## Heat Treatment (AWS Code's Guideline):

### PREHEAT TABLE:

Preheat and interpass temperature shall be sufficient to prevent cold cracking. The need for and the temperature of preheat are dependent upon a number of factors such as chemical analysis, degree of restraint of the parts being joined, elevated temperature mechanical properties, and material thicknesses.

**AWS D1.1, Table 3.2 Prequalified Minimum Preheat and Interpass Temperature °F (°C):**

Preheat and Interpass temperature is provided for each material and thickness and process type on this material group.

**Guideline on Alternative Methods for Determining Preheat/Interpass: See Annex XI of AWS D1.1**  
Preheat requirements shall be based on Welding Procedure Specification (WPS).

### POSTWELD HEAT TREATMENT:

PWHT requirements shall be based on Welding Procedure Specification (WPS).

**AWS D1.1, 5.8 Stress-Relief Heat Treatment:** Where required by the contract drawings or specifications, welded assemblies shall be stress relieved by heat treating.

(See AWS D1.1, 5.8.1, Requirements for stress-relief treatment;

Table 5.2, Minimum Holding Time; Table 5.3, Alternate Stress-Relief Heat Treatment)

See AWS D1.1, 5.8.3, Steels Not Recommended for PWHT

## WPS Qualified Range (AWS Code's Guideline):

**Qualified Position (s):** For Prequalified WPS, only Position (s) allowed for prequalified joint details shown in WPS based on Figures 3.3 or 3.4 of AWS D1.1

**Qualified Thicknesses:** For Prequalified WPS, only thickness ranges allowed for prequalified joint details shown in WPS based on Figures 3.3 or 3.4 of AWS D1.1

**Qualified Diameters:** For Prequalified WPS, pipe diameters [over or less than 24 in. (600 mm OD)] allowed for prequalified joint details shown in WPS based on Figures 3.3 or 3.4 of AWS D1.1

**Prequalified WPS Base Metal Group Allowed:** Only Base Metal Group-Filler Metal Combinations for Matching Strength as shown in Table 3.1 of AWS D1.1

**Filler Metal Allowed in Prequalified WPS:** Only Filler Metal-Base Metal Group Combinations for Matching Strength as shown in Table 3.1 of AWS D1.1 (Size and other limit on electrode for prequalification of each process, as per Table 3.7 of AWS D1.1)