

**QW-482 suggested format for welding procedure specifications (WPS)  
(see QW-200.1, Section IX, ASME Boiler and Pressure Vessel Code)**

Company Name: <b>National Energy Equipment Inc.</b>	By: <b>SKC ENGINEERING</b> <small>WELDING • MATERIALS • MECHANICAL • INSPECTION • TESTING SKC ENGINEERING 19115 SAVA AVENUE, GAITHERSBURG, MD 20878 P (301) 902-1008 • F (301) 902-1011 • www.skcall.com</small>
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Welding Procedure Specification No.:	<b>GMAW-AL-02</b>	Revision: <b>0</b>
Supporting PQR No.(s):	<b>GMAW-AL-02</b>	Issue Date: <b>5-Feb-19</b>
Welding Process(es)	<b>GMAW</b>	WO: <b>W13939-D2</b>
Type(s):	<b>Semi-Automatic</b>	

<b>JOINTS (QW-402)</b>			
Joint design	<u>Refer Details</u>	Root Spacing*	<u>1/32 in - 1/8 in</u>
Backing	<u>With or Without</u>	Retainers (+/-)	<u>No Retainers</u>
Backing Material	<u>P no. 23</u>		
<input checked="" type="checkbox"/> Metal	<input type="checkbox"/> Nonfusing Metal		
<input type="checkbox"/> Non-metallic	<input type="checkbox"/> Other		

**Details**  
**All ASME VIII Div 1 & B31.3 Standard**  
**Groove Weld Joint Design & Fillets**

**All CJP welded from both sides with back gouge to sound metal  
or welded from one side with backing.**

\* For welds with backing use Root Spacing = 1/8 in - 3/16 in.  
Sketches, production drawings, weld symbols or written description should show the general arrangement of the parts to be welded. Where applicable, the root spacing and the details of weld groove may be specified.

<b>BASE METALS (QW-403)</b>			
P no. <b>23</b>	Group no. <b>N/A</b>	to	P no. <b>23</b>
			Group no. <b>N/A</b>

or

Specification type and grade \_\_\_\_\_  
to Specification type and grade \_\_\_\_\_

or

Chem. Analysis and Mech. Properties \_\_\_\_\_  
to Chem. Analysis and Mech. Properties \_\_\_\_\_

Thickness Range

Base Metal Groove	<u>1/16 in (1.5 mm) to 0.5 in (12.7 mm)</u>	Fillet:	<u>All thicknesses</u>
Pipe Diameter Groove	<u>All</u>	Fillet:	<u>All</u>

T Limits Impact	<u>N/A</u>
I Pass > 1/2 in (13 mm)	<u>None</u>
T Limits (S. cir. arc.)	<u>N/A</u>

<b>FILLER METALS (QW-404)</b>	
Welding Process	<b>GMAW</b>
Filler Metal F No.	<b>F22</b>
Filler Weld metal analysis A No.	<b>ER5356</b>
SFA Specification	<b>5.10</b>
Filler Metal Classification	<b>ER5356</b>
Filler Metal Size	<b>0.035 in (0.9 mm)</b>
Consumable Inserts	<b>None</b>
Filler Metal Product Form	<b>Solid wire</b>
Deposit Weld Metal thickness (t)	
Groove	<b>0.5 in (12.7 mm) max.</b>
Fillet	<b>All sizes</b>
Supplemental Filler Metal	<b>None</b>
Alloy Element	<b>None</b>
t Limits (S. cir. arc.)	<b>N/A</b>

**QW-482 (BACK)**

WPS no. **GMAW-AL-02** Rev. 0

<b>POSITIONS (QW-405)</b>		<b>POSTWELD HEAT TREATMENT (QW-407)</b>	
Position(s) of Groove	<b>All</b>	PWHT	<b>None</b>
Welding Progression:	<b>Up</b>	Temperature	<b>N/A</b> Time <b>N/A</b>
Position(s) of Fillet	<b>All</b>	T Limits	<b>N/A</b>

<b>PREHEAT (QW-406)</b>		<b>GAS (QW-408)</b>				
Preheat Temp. Min.	<b>65°F (18°C)</b>	<b>GMAW</b>	Gas(es)	Percent Composition (Mixture)	Flow rate(cfph)	
Interpass Temp. Max.	<b>180°F (82°C)</b>		<b>Argon</b>	<b>100% Argon</b>		<b>20-30</b>
Preheat Maintenance (continuous or special heating where applicable should be recorded)	<b>As Above</b> <b>N/A</b>			<b>None</b>		
		Shielding				
		Trailing				
		Backing	<b>None</b>			

<b>ELECTRICAL CHARACTERISTICS (QW-409)</b>			
Max Heat Input (KJ/in)	<b>As per welding parameters</b>		
Current AC or DC	<b>DC</b>	Polarity	<b>RP (EP)</b>
Amps (range)	<b>See below</b>	Volts (range)	<b>See below</b>
Mode of Transfer	<b>Global, Spray or Pulsed</b>		
Tungsten Electrode	<b>N/A</b>		
Other			

<b>TECHNIQUE (QW-410)</b>	
Welding Process	<b>GMAW</b>
String or weave bead	<b>Stringer / slight weave</b>
Orifice or gas cup size:	<b>9/16 in (14 mm)</b>
Method cleaning	<b>Brushing, grinding</b>
Method of back gouging	<b>Grinding, Plasma Arc or Mechanical Gouging</b>
Oscillation	<b>None</b>
Multiple to single pass (per side)	<b>Single / Multipass, as required</b>
Single to multi electrode	<b>Single</b>
Contract tube to work distance	<b>0.75 in - 1 in (19 mm - 25 mm)</b>
Electrode spacing	<b>N/A</b>
Manual or automatic	<b>Semi-Automatic</b>
Peening	<b>None</b>
Use of thermal processes	<b>None</b>
Other	

Layers /Passes	Process	Filler Metal Classification	Filler Metal Diameter in	Type Polarity	Amps	Volts	Wire Feed Speed (ipm)	ATS (ipm)
<b>Root / Hot</b>	<b>GMAW</b>	<b>ER5356</b>	<b>0.035 in</b>	<b>DC RP (EP)</b>	<b>180-240</b>	<b>21-25</b>	<b>504-632</b>	<b>12-26</b>
<b>Fill &amp; Cap</b>	<b>GMAW</b>	<b>ER5356</b>	<b>0.035 in</b>	<b>DC RP (EP)</b>	<b>180-240</b>	<b>21-25</b>	<b>504-632</b>	<b>12-26</b>

**Welding Notes:**

Base metal shall be clean, dry & without water stain. Prepare weld joints by mechanical means (cutting, sawing, shearing etc), plasma arc cutting, laser cutting or water jet cutting. It is recommended to use acetone as a cleaning agent prior to welding (before removal of the oxide layer) and between passes. Immediately prior to welding remove oxide using either a stainless steel brush or a non-resin bonded grinding disk (resin bonded disks may be used for post weld operations only). Remove smut between passes with a stainless steel wire brush. Ideally aluminum welding operations will be kept separate from welding on other materials. Do not use equipment for the welding of Aluminum that has been previously used for the welding or cleaning of other materials.

Manufacturer: **National Energy Equipment Inc.**

Certified by Manufacturer:  Zanyar Farhadi, National Quality Systems Manager

Date: 2019-02-13



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Authorized By: **Mathew Smith, P. Eng.**

