

WELDING PROCEDURE SPECIFICATION (WPS) YES (X)
 PREQUALIFIED _____ QUALIFIED BY TESTING X
 or PROCEDURE QUALIFICATION RECORD (PQR) YES ()

Company Name ARC Ent. Inc.
 Welding Process(es) SAW
 Supporting PQR No.(s) ARC PQR # 45

Identification # ARC WPS 45a
 Revision 3 Date 9/12/2014 By SVH
 Authorized by STEVE HOWARD Date 6/8/2012
 Type - Manual Semi - Automatic
 Machine Automatic

DART Welder

JOINT DESIGN USED Type <u>FILLET</u> Single <input checked="" type="checkbox"/> Double Weld <input type="checkbox"/> Backing <input type="checkbox"/> <input type="checkbox"/> NC <input type="checkbox"/> Backing Material _____ Root Opening <u>0</u> Root Face Dimension _____ Groove Angle <u>NA</u> Radius (J-U) _____ Back Gouging _____ Method _____	POSITION Position of Groove _____ Fillet <u>1F 2F</u> Vertical Progression <input type="checkbox"/>
BASE METALS Material Spec <u>A709</u> Type or Grade <u>50 50W HPS50W</u> Thickness _____ Groove _____ Fillet <u>U</u> Diameter (Pipe) _____	ELECTRICAL CHARACTERISTICS Transfer Mode (FCAW) _____ Short Circuiting <input type="checkbox"/> Globular <input type="checkbox"/> Spray <input checked="" type="checkbox"/> Current : AC <input type="checkbox"/> DCEP _____ DCEN <input checked="" type="checkbox"/> Pulsed <input type="checkbox"/> OTHER : _____
FILLER METALS AWS Specification <u>A5.23 Lincoln LA-75</u> AWS Classification <u>ENi1K-Ni1-H6</u>	TECHNIQUE Stringer or Weave Bead <u>STRINGER</u> Multi-pass or Single Pass (per side) <u>SINGLE</u> Number of Electrodes _____ Electrode Spacing _____ Longitudinal _____ Lateral _____ Angle _____
SHIELDING Flux <u>960</u> Gas _____ Electrode - Flux (Class) _____ Composition _____ F8A2-ENi1K-Ni1 _____ Flow Rate _____ Gas Cup Size _____	Contact Tube to Work Distance <u>1 1/4" Stickout +/- 1/4"</u> Peening _____ Interpass Cleaning : _____
Preheat up to 3/4" = 50 degrees 3/4" - 1 1/2" = 70 degrees 1 1/2" - 2 1/2" = 150 degrees Over 2 1/2" = 225 degrees F.	POSTWELD HEAT TREATMENT Temp _____ Time _____

WELDING PROCEDURE

Pass or Weld Layer(s)	S	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Amps or Wire Feed Speed			
1	SAW	ENi1K	3/32"	DCEN	360-440	28-32	12-16.2 ipm	
1	1/4"							
1	5/16"							
1	3/8"							

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 BY _____ DATE 1/30/15

WELDING PROCEDURE SPECIFICATION (WPS) YES (X)
PREQUALIFIED _____ QUALIFIED BY TESTING (X) _____
or PROCEDURE QUALIFICATION RECORD (PQR) YES (x)

Company Name A.R.C. Ent. Inc.
 Welding Process(es) SAW
 Supporting PQR No.(s) ARC - PQR - 42

Identification # ARC WPS #42
 Revision 4 Date 2/3/2015 By SVH
 Authorized by STEVE HOWARD Date 12/10/2012
 Type - Manual Semi - Automatic
 Machine Automatic

<p>JOINT DESIGN USED</p> Type <u>FILLET</u> Single <input checked="" type="checkbox"/> Double Weld <input type="checkbox"/> Backing <input type="checkbox"/> NO <input checked="" type="checkbox"/> Backing Material _____ Root Opening _____ Root Face Dimension _____ Groove Angle _____ Radius (J-U) _____ Back Gouging _____ Method _____	<p>POSITION</p> Position of Groove _____ Fillet <input type="checkbox"/> 1F 2F Vertical Progression <input type="checkbox"/>
<p>BASE METALS</p> Material Spec <u>A709</u> Type or Grade <u>36 50 50W HPS50W</u> Thickness <u>Groove</u> Fillet <u>UNLIMITED</u> Diameter (Pipe) _____	<p>ELECTRICAL CHARACTERISTICS</p> Transfer Mode (FCAW) _____ Short Circuiting <input type="checkbox"/> Globular <input type="checkbox"/> Spray <input checked="" type="checkbox"/> Current : AC <input type="checkbox"/> DCEP _____ DCEN <input checked="" type="checkbox"/> Pulsed <input type="checkbox"/> OTHER : _____
<p>FILLER METALS</p> Lincoln I-61 AWS Specification <u>A 5.23 A 5.17</u> AWS Classification <u>EM12K</u>	<p>TECHNIQUE</p> Stringer or Weave Bead <u>STRINGER</u> Multi-pass or Single Pass (per side) <u>SINGLE</u> Number of Electrodes <u>-1</u> Electrode Spacing _____ Longitudinal _____ Lateral _____ Angle _____
<p>SHIELDING</p> Flux <u>LINCOLN 960</u> Gas _____ Composition _____ Electrode - Flux (Class) _____ Flow Rate _____ <u>F7A2-EM12K</u> Gas Cup Size _____	<p>Contact Tube to Work Distance <u>1 1/4 STICKOUT +/- 1/4"</u> Peening _____ Interpass Cleaning : <u>hand and power tools</u></p>
<p>Preheat < 3/4" = 50 degrees 3/4" - 1 1/2" = 70 degrees 1 1/2" - 2 1/2" = 150 degrees Over 2 1/2" = 225 degrees F</p>	<p>POSTWELD HEAT TREATMENT</p> Temp _____ Time _____

** Preheat to HPS70W = 3/4" - 1 1/2" = 125 1 1/2" - 2 1/2" = 175 degrees F. Table 4.3

WELDING PROCEDURE

Pass or Weld Layer(s)	S	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Amps or Wire Feed Speed			
	5/16"	EM12K	5/32	DCEN	540-620	29.8 - 32	21 - 23.8	
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WELDING PROCEDURE SPECIFICATION (WPS) YES (X)
PREQUALIFIED _____ QUALIFIED BY TESTING (X) _____
or PROCEDURE QUALIFICATION RECORD (PQR) YES (x)

Company Name ARC ENT. INC.
 Welding Process(es) GMAW
 Supporting PQR No.(s) ARC PQR 5M3-2

Identification # ARC WPS 5M3-2
 Revision 3 Date 2/3/2015 By SVH
 Authorized by STEVE HOWARD Date 5/14/2012
 Type - Manual Semi - Automatic (X)
 Machine () Automatic ()

<p>JOINT DESIGN USED</p> Type <u>FILLET</u> Single (X) Double Weld () Backing () NO Backing Material _____ Root Opening <u>0</u> Root Face Dimension _____ Groove Angle _____ Radius (J-U) _____ Back Gouging _____ Method _____	<p>POSITION</p> Position of Groove _____ Fillet <u>1F 2F</u> Vertical Progression ()
<p>BASE METALS</p> Material Spec <u>A709</u> Type or Grade <u>36 50 50W HPS50W</u> Thickness _____ Groove _____ Fillet <u>UNLIMITED</u> Diameter (Pipe) _____	<p>ELECTRICAL CHARACTERISTICS</p> Transfer Mode (FCAW) _____ Globular () Spray (X) Current : AC () DCEP (X) DCEN () Pulsed () OTHER : _____
<p>FILLER METALS</p> LINCOLN L-56 AWS Specification <u>A5.18</u> AWS Classification <u>ER70S-6</u>	<p>TECHNIQUE</p> Stringer or Weave Bead <u>STRINGER</u> Multi-pass or Single Pass (per side) <u>SINGLE/MULTI</u> Number of Electrodes <u>ONE</u> Electrode Spacing _____ Longitudinal _____ Lateral _____ Angle _____
<p>SHIELDING</p> Flux _____ Gas <u>98/2</u> Composition <u>98Argon 2 oxygen</u> Electrode - Flux (Class) _____ Flow Rate <u>36-52 cfh</u> Gas Cup Size <u>5/8"</u>	Contact Tube to Work Distance <u>5/8" - 3/4"</u> Peening _____ Interpass Cleaning : <u>HAND AND POWER TOOLS</u>
Preheat up to 3/4" - 50 degrees F 3/4"-1 1/2" - 70 degrees F 1 1/2" - 2 1/2" - 150 degrees over 2 1/2" - 225 degrees F	<p>POSTWELD HEAT TREATMENT</p> Temp _____ Time _____

** Preheat to HPS70W = 3/4"-1 1/2" = 125 1 1/2"-2 1/2" = 175 degrees F. Table 4.3

WELDING PROCEDURE

Pass or Weld Layer(s)	S	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Amps or Wire Feed Speed			
1	3/16"		.035"	DCEP	209-255	24.9-28.5	8.1-9.9 ipm	
1	1/4"		.035"	DCEP	209-255	24.9-28.5	8.1-9.9 ipm	
1	5/16"		"	"	"	"	8.1-9.9 ipm	
2	3/8"		"	"	"	"	8.1-9.9 ipm	
3	7/16"		"	"	"	"	8.1-9 ipm	
3	1/2"		"	"	"	"	8.1-9 ipm	

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No welds over 5/16" with this wire for 50W!

FEB 03 2015

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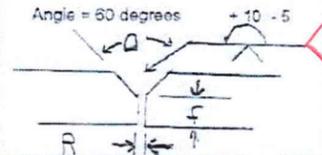
Welding Procedure Specification (wps) Yes (X)
 PREQUALIFIED ___ QUALIFIED BY TESTING X
 or PROCEDURE QUALIFICATION RECORD (PQR) YES ()

Company Name A.R.C. Enterprises, Inc.
 Welding Process(es) SAW
 Supporting PQR No.(s) ARC PQR # 45

Identification # ARC WPS #45
 Revision 7 Date 5/1/2013 By SVH
 Authorized by STEVE HOWARD Date 5/1/2013
 Type - Manual () Semi - Automatic ()
 Machine () Automatic x

JOINT DESIGN USED Type <u>B-L2c-S</u> Single Backing () Double Weld (X) Backing Material () NO (X) Root Opening <u>0"</u> Root Face Dimension <u>1/4" min</u> Groove Angle <u>60 degrees</u> Radius (J-U) Back Gouging (YES) Method <u>open</u>		POSITION Position of Groove <u>1G</u> Fillet () Vertical Progression ()	
BASE METALS Material Spec <u>A709</u> Type or Grade <u>50W HPS50W</u> Thickness <u>Groove U</u> Fillet Diameter (Pipe)		ELECTRICAL CHARACTERISTICS Transfer Mode (FCAW) Short Circuiting () Globular () Spray (X) Current : AC () DCEP (X) DCEN () Pulsed () OTHER :	
FILLER METALS AWS Specification <u>A5.23</u> AWS Classification <u>ENi1K-Ni1-H8</u>		TECHNIQUE Stringer or Weave Bead <u>STRINGER</u> Multi-pass or Single Pass (per side) <u>MULTI</u> Number of Electrodes <u>ONE</u> Electrode Spacing Longitudinal Lateral Angle	
SHIELDING Flux <u>980 Lincoln</u> Gas Composition Electrode - Flux (Glass) Flow Rate <u>F8A2-ENi1K-Ni1-H8</u> Gas Cup Size		Contact Tube to Work Distance <u>1 1/4" stickout +/- 1/4"</u> Peening <u>none</u> Interpass Cleaning : <u>Hand or Power tools</u>	
Preheat <u>3/4" = 60 degrees 3/4" - 1 1/2" = 70 degrees.</u> <u>1 1/2" - 2 1/2" = 150 degrees Over 2 1/2" = 225 degrees F.</u>		POSTWELD HEAT TREATMENT Temp	

WELDING PROCEDURE Min. heat input=37.3 Kj/in. Max heat input= 70.4 Kj/in.

Pass or Weld Layer(s)	S	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Amps or Wire Feed Speed			
	SAW	ENi1K	3/32"	DCEP	360-440	28-32	14-16.2 ipm	B-L2c-S Tolerance Root = 0" + 1/16" Face = > 1/2" - 1" = 1/4" > 1" - 1 1/2" = 3/8" + 1/4" > 1 1/2" - 2" = 1/2" - 1/4" Angle = 60 degrees +10 -5 

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Heat Cambering and Straightening Procedure

Purpose: This procedure describes the method for heat cambering and straightening.

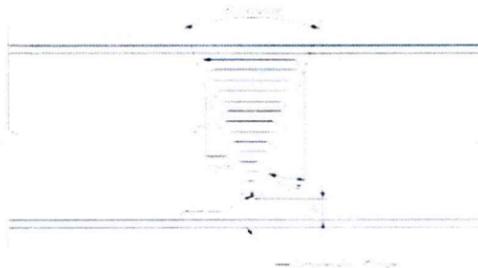
Responsibility: Production Manager

Procedure:

- Method of heating: #12 heating tip. Both sides shall be heated simultaneously.
Gas / Oxygen: 18 – 31 psi – oxygen. 8 – 15 psi – gas.
Heat range is 1,100 minimum to 1,125 maximum degrees Fahrenheit. Appropriate temp sticks shall be used to verify the above temperature requirements are met. The surface temperature of the heated areas shall be tested with the appropriate temp stick approximately ten (10) seconds after removal of the heat source. Temperatures exceeding 1,200 degrees Fahrenheit may be cause for rejection.
- Members to be heat cambered shall be supported at each end with the compression flange down.
- Heating patterns shall be equally spaced along the length of the girder. Heating shall begin at the midpoint of the girder and shall alternate either side of the girder midpoint working toward the ends of the girder.
- Web heating progression shall be according to the "half lap" technique. Once started, each heat pattern shall be carried on to completion without interruption. Each heat pattern shall be heated only once. Two (2) torches are to be used – one on each side of the girder web.

Flange heating procedure:

- Upon completing the web portion, heating of the flange areas shall commence without pause, also using the "half lap" technique. The flanges shall be concurrently heated top and bottom on each side of the flange centerline, heating from the web centerline toward the outside edge of the flange. Each flame heat shall alternate starting point from one side of the web centerline to the other side, reducing the possibility of sweep induction.
- After heat cambering, the heat patterns shall be allowed to cool in still air to 600 degrees Fahrenheit. If necessary, compressed air may be used to cool the beam below 600 degrees Fahrenheit.
- If the required camber has not been achieved, additional heat points shall be located evenly throughout the length of the girder at locations which have not been previously heated.
- All heating shall be carried out in the presence of the QA Inspector.



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Heat Straightening Procedure

Purpose:

This procedure describes the method for heat straightening beams.

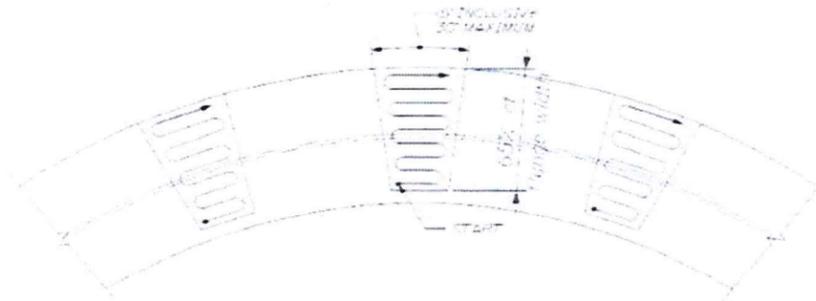
Responsibility: Production Manager

Procedure:

- Method of heating: #12 heating tip. Both sides shall be heated simultaneously. Gas / Oxygen: 18 – 31 psi (oxygen). 8 – 15 psi (gas). Heat range is 1,100 minimum to 1,125 maximum degrees Fahrenheit. Appropriate temp sticks shall be used to verify the temperature requirements are met. The surface temperature of the heated areas shall be tested with the appropriate temp stick approximately ten (10) seconds after removal of the heat source. Temperatures exceeding 1,200 degrees Fahrenheit may be cause for rejection.
- Members to be heat straightened shall be supported at each end (with sweep up) and shall be blocked to prevent excess movement.
- Heat patterns shall be placed from midpoint working toward both ends of the girder.

Flange heating procedure:

- Two (2) torches shall be used, concurrently heating both sides of the flange, starting at the inside of the sweep and working across the flange using the "half lap" technique.
- After heat straightening, the heat patterns shall be allowed to cool in still air to 600 degrees Fahrenheit. If necessary, compressed air may be used to cool the steel below 600 degrees Fahrenheit.
- If the required straightness has not been achieved, additional heat points shall be located evenly throughout the length of the girder at locations which have not been previously heated.
- All heat straightening shall be carried out in the presence of the QA Inspector.



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