VRTEX®

VRTEX®

WELDING PROCEDURE SPECIFICATIONS

www.vrtex360.com

LINCOLN® ELECTRIC
THE WELDING EXPERTS®

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VRTEX® Mobile

WELDING PROCEDURE SPECIFICATIONS

S28170-26 Revision A.02

VRTEX® Mobile - Default Weld Process Settings

WPS #	VR Welding Process	Consumable Type	Lincoln Brand	Gas Mixture	Gas Flow (CFH)	Position	Mat'l (in)	WFS (ipm) or amps	Voltage	Polarity
1	SMAW	1/8" E6010 (3.2 mm)	Fleetweld 5P+	NA	NA	Flat	1/4" (6 mm)	90 (±5)	NA	DC+
2,3	SMAW	1/8" E6010 (3.2 mm)	Fleetweld 5P+	NA	NA	2F, 3F up	3/8" (10 mm)	90 (±5)	NA	DC+
4,5,6	SMAW	1/8" E6010 (3.2 mm)	Fleetweld 5P+	NA	NA	1G, 2G, 3G up	3/8" (10 mm)	90 (±5)	NA	DC+
7	SMAW	1/8" E7018 (3.2 mm)	Excalibur 7018	NA	NA	Flat	1/4" (6 mm)	125 (±5)	NA	DC+
8,9	SMAW	1/8" E7018 (3.2 mm)	Excalibur 7018	NA	NA	2F, 3F up	3/8" (10 mm)	125 (±5)	NA	DC+
10,11,12	SMAW	1/8" E7018 (3.2 mm)	Excalibur 7018	NA	NA	1G, 2G, 3G up	3/8" (10 mm)	125 (±5)	NA	DC+
13	SMAW	1/8" E6013 (3.2 mm)	Fleetweld 37	NA	NA	Flat	1/4" (6 mm)	100 (± 5)	NA	AC
14	SMAW	1/8" E6013 (3.2 mm)	Fleetweld 37	NA	NA	2F	10 GA. (2.5 mm)	100 (± 5)	NA	AC
15	SMAW	1/8" E6013 (3.2 mm)	Fleetweld 37	NA	NA	3F down	10 GA. (2.5 mm)	125 (±5)	NA	AC
16,17	SMAW	1/8" E6013 (3.2 mm)	Fleetweld 37	NA	NA	1G, 2G	3/8" (10 mm)	110 (±5)	NA	AC
18	SMAW	1/8" E6013 (3.2 mm)	Fleetweld 37	NA	NA	3G	3/8" (10 mm)	90 (±5)	NA	AC
19	GMAW - S	.035" ER70S-6 (1.0 mm)	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	Flat	1/4" (6 mm)	250 (+ 5) (6.3 m/min)	18	DC+
20,21	GMAW - S	.035" ER70S-6 (1.0 mm)	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	2F, 3F down	10 GA. (2.5 mm)	250 (+ 5) (6.3 m/min)	18	DC+
22	GMAW - S	.035" ER70S-6 (1.0 mm)	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	2F	1/4" (6 mm)	375 (+ 5) (9.5 m/min)	20	DC+
23	GMAW - S	.035" ER70S-6 (1.0 mm)	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	3F up	1/4" (6 mm)	275 (+ 5) (7.0 m/min)	18	DC+
24	GMAW - S	.035" ER70S-6 (1.0 mm)	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	1G	3/8" (10 mm)	350 (+ 5) (8.9 m/min)	20	DC+
25	GMAW - S	.035" ER70S-6 (1.0 mm)	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	2G	3/8" (10 mm)	320 (+ 5) (8.0 m/min)	19.5	DC+
26	GMAW - S	.035" ER70S-6 (1.0 mm)	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	3G up	3/8" (10 mm)	250 (+ 5) (6.3 m/min)	17.9	DC+
27	GMAW - Spray	.045" ER70S-6 (1.2 mm)	SuperArc L-56	90/10	25-40 (12-19 l/min)	Flat	1/4" (6 mm)	400 (+ 5) (10.0 m/min)	27	DC+
28	GMAW - Spray	.045" ER70S-6 (1.2 mm)	SuperArc L-56	90/10	25-40 (12-19 l/min)	2F	3/8" (10 mm)	375 (+ 5) (9.5 m/min)	26.5	DC+
29	GMAW - Spray	.045" ER70S-6 (1.2 mm)	SuperArc L-56	90/10	25-40 (12-19 l/min)	1G	3/8" (10 mm)	370 (+ 5) (9.4 m/min)	26.5	DC+
30	GMAW - Pulse	.045" ER70S-6 (1.2 mm)	SuperArc L-56	90/10	25-40 (12-19 l/min)	2G	3/8" (10 mm)	130 (+ 5) (3.3 m/min)	.95(trim)	DC+
31	GMAW - Pulse	.045" ER70S-6 (1.2 mm)	SuperArc L-56	90/10	25-40 (12-19 l/min)	3G up	3/8" (10 mm)	130 (+ 5) (3.3 m/min)	.95(trim)	DC+
32	FCAW - G	.045" E71T-1 (1.2 mm)	UC 71A85	75/25	40-50 (19-23.5 l/min)	Flat	1/4" (6 mm)	275 (+ 5) (7.0 m/min)	25	DC+
33,34	FCAW - G	.045" E71T-1 (1.2 mm)	UC 71A85	75/25	40-50 (19-23.5 l/min)	2F, 3F up	3/8" (10 mm)	275 (+ 5) (7.0 m/min)	25	DC+
35,36,37	FCAW - G	.045" E71T-1 (1.2 mm)	UC 71A85	75/25	40-50 (19-23.5 l/min)	1G, 2G, 3G up	3/8" (10 mm)	275 (+ 5) (7.0 m/min)	25	DC+
38	FCAW - S	5/64" E71T-8 (2.0 mm)	NR- 232/233	NA	NA	Flat	1/4" (6 mm)	140 (+ 5) (3.5 m/min)	20	DC-
39,40	FCAW - S	5/64" E71T-8 (2.0 mm)	NR- 232/233	NA	NA	2F, 3F up	3/8" (10 mm)	155 (+ 5) (4.0 m/min)	21	DC-
41,42	FCAW - S	5/64" E71T-8 (2.0 mm)	NR- 232/233	NA	NA	1G, 2G	3/8" (10 mm)	130 (+ 5) (3.3 m/min)	21	DC-
43	FCAW - S	5/64" E71T-8 (2.0 mm)	NR- 232/233	NA	NA	3G up	3/8" (10 mm)	125 (+ 5) (3.2 m/min)	19.5	DC-

VRTEX® Mobile - SMAW Default Weld Process Settings

WPS #	VR Welding Process	Consumable Type	Lincoln Brand	Gas Mixture	Gas Flow (CFH)	Position	Mat'l (in)	WFS (ipm) or amps	Voltage	Polarity
1	SMAW	1/8" E6010 (3.2mm)	Fleetweld 5P+	NA	NA	Flat	1/4" (6 mm)	90 (±5)	NA	DC+
2	SMAW	1/8" E6010 (3.2mm)	Fleetweld 5P+	NA	NA	2F	3/8" (10 mm)	90 (±5)	NA	DC+
3	SMAW	1/8" E6010 (3.2mm)	Fleetweld 5P+	NA	NA	3F up	3/8" (10 mm)	90 (±5)	NA	DC+
4	SMAW	1/8" E6010 (3.2mm)	Fleetweld 5P+	NA	NA	1G	3/8" (10 mm)	90 (±5)	NA	DC+
5	SMAW	1/8" E6010 (3.2mm)	Fleetweld 5P+	NA	NA	2G	3/8" (10 mm)	90 (±5)	NA	DC+
6	SMAW	1/8" E6010 (3.2mm)	Fleetweld 5P+	NA	NA	3G up	3/8" (10 mm)	90 (±5)	NA	DC+
7	SMAW	1/8" E7018 (3.2mm)	Excalibur 7018	NA	NA	Flat	1/4" (6 mm)	125 (±5)	NA	DC+
8	SMAW	1/8" E7018 (3.2mm)	Excalibur 7018	NA	NA	2F	3/8" (10 mm)	125 (±5)	NA	DC+
9	SMAW	1/8" E7018 (3.2mm)	Excalibur 7018	NA	NA	3F up	3/8" (10 mm)	125 (±5)	NA	DC+
10	SMAW	1/8" E7018 (3.2mm)	Excalibur 7018	NA	NA	1G	3/8" (10 mm)	125 (±5)	NA	DC+
11	SMAW	1/8" E7018 (3.2mm)	Excalibur 7018	NA	NA	2G	3/8" (10 mm)	125 (±5)	NA	DC+
12	SMAW	1/8" E7018 (3.2mm)	Excalibur 7018	NA	NA	3G up	3/8" (10 mm)	125 (±5)	NA	DC+
13	SMAW	1/8" E6013 (3.2mm)	FLEETWELD 37	NA	NA	Flat	1/4" (6 mm)	100 (±5)	NA	AC
14	SMAW	1/8" E6013 (3.2mm)	FLEETWELD 37	NA	NA	2F	10 GA. (2.5 mm)	100 (±5)	NA	AC
15	SMAW	1/8" E6013 (3.2mm)	FLEETWELD 37	NA	NA	3F down	10 GA. (2.5 mm)	125 (±5)	NA	AC
16	SMAW	1/8" E6013 (3.2mm)	FLEETWELD 37	NA	NA	1G	3/8" (10 mm)	110 (±5)	NA	AC
17	SMAW	1/8" E6013 (3.2mm)	FLEETWELD 37	NA	NA	2G	3/8" (10 mm)	110 (±5)	NA	AC
18	SMAW	1/8" E6013 (3.2mm)	FLEETWELD 37	NA	NA	3G up	3/8" (10 mm)	90 (±5)	NA	AC

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **SMAW**

Type: Manual ☑ Semi-Automatic ☐
Machine ☐ Automatic ☐

Identification # VRTEX® SMAW # 1
Revision ____ Date ____ by ____
Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 1

JOINT DESIGN USED

Type:
Lap ☐ Tee ☐ Butt ☐
Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐
Backing: YES ☐ NO ☑
Root Opening N/A Root Face Dimension N/A
Groove Angle: N/A
Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36
Type or Grade *N/A*
Thickness: Groove N/A Fillet *N/A*

FILLER METALS

AWS Specification *A5.1*

AWS Classification ***E6010***

SHIELDING

Electrode Flux (Class) N/A Gas N/A
Composition N/A
Flux N/A
Flow Rate N/A
Gas Cup Size N/A

POSITION

Groove: N/A Fillet: N/A Flat Surfacing: ☑

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐
Pulse ☐
Other: *N/A*
Current: AC ☐ DCEP ☑ DCEN ☐
Power Source: CC ☑ CV ☐
Tungsten Electrode (GTAW)
Size: N/A
Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: Whip Stringer
Multi-pass or Single Pass (per side) *Multi-pass*
Number of Electrodes Single
Contact Tip to Work Distance *N/A*
Peening Yes ☐ NO ☑
Interpass Cleaning YES ☑ NO ☐
Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A
Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Travel Speed	Joint Details
		Class	Diameter	Polarity	AMPS		
1	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	13.9 ipm ± 10% (.13 m/min)	

This document is intended for training purposes only

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **SMAW**

Type: Manual ☑ Semi-Automatic ☐
Machine ☐ Automatic ☐

Identification # VRTEX® SMAW # 2
Revision ____ Date ____ by ____
Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 2

JOINT DESIGN USED

Type:
Lap ☐ Tee ☑ Butt ☐
Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐
Backing: YES ☐ NO ☑
Root Opening N/A Root Face Dimension N/A
Groove Angle: N/A
Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36
Type or Grade *N/A*
Thickness: Groove N/A Fillet ***3/8" (10 mm)***

FILLER METALS

AWS Specification *A5.1*

AWS Classification ***E6010***

SHIELDING

Electrode Flux (Class) N/A Gas N/A
Composition N/A
Flux N/A
Flow Rate N/A
Gas Cup Size N/A

POSITION

Groove: N/A Fillet: ***2F*** Flat Surfacing: ☐

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐
Pulse ☐
Other: *N/A*
Current: AC ☐ DCEP ☑ DCEN ☐
Power Source: CC ☑ CV ☐
Tungsten Electrode (GTAW)
Size: N/A
Type: N/A

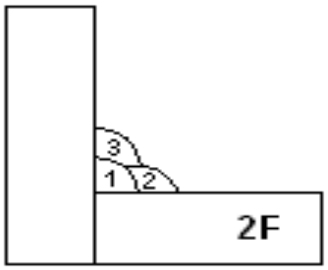
TECHNIQUE

Stringer, Weave Bead, Other: Whip Stringer
Multi-pass or Single Pass (per side) *Multi-pass*
Number of Electrodes Single
Contact Tip to Work Distance *N/A*
Peening Yes ☐ NO ☑
Interpass Cleaning YES ☑ NO ☐
Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A
Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Travel Speed	Joint Details
		Class	Diameter	Polarity	AMPS		
1	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	5 ipm ± 10% (.13 m/min)	
2	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	6.5 ipm ± 10% (.17 m/min)	
3	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	5 ipm ± 10% (.13 m/min)	

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WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **SMAW**

Type: Manual ☑ Semi-Automatic ☐
Machine ☐ Automatic ☐

Identification # VRTEX® SMAW # 3
Revision ____ Date ____ by ____
Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 3

JOINT DESIGN USED

Type:
Lap ☐ Tee ☑ Butt ☐
Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐
Backing: YES ☐ NO ☑
Root Opening N/A Root Face Dimension N/A
Groove Angle: N/A
Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36
Type or Grade *N/A*
Thickness: Groove N/A Fillet ***3/8" (10 mm)***

FILLER METALS

AWS Specification *A5.1*

AWS Classification ***E6010***

SHIELDING

Electrode Flux (Class) N/A Gas N/A
Composition N/A
Flux N/A
Flow Rate N/A
Gas Cup Size N/A

POSITION

Groove: N/A Fillet: ***3F*** Flat Surfacing: ☐

Vertical Progression: Up ☑ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐
Pulse ☐
Other: *N/A*
Current: AC ☐ DCEP ☑ DCEN ☐
Power Source: CC ☑ CV ☐
Tungsten Electrode (GTAW)
Size: N/A
Type: N/A

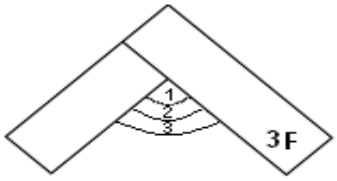
TECHNIQUE

Stringer, Weave Bead, Other: Whip Stringer/Weave
Multi-pass or Single Pass (per side) *Multi-pass*
Number of Electrodes Single
Contact Tip to Work Distance *N/A*
Peening Yes ☐ NO ☑
Interpass Cleaning YES ☑ NO ☐
Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A
Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Travel Speed	Joint Details
		Class	Diameter	Polarity	AMPS		
1	WhipStringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	2.9 ipm ± 10% (.07 m/min)	
2	Weave	E6010	1/8" (3.2 mm)	DC+	90 ± 5	2.3 ipm ± 10% (.06 m/min)	
3	Weave	E6010	1/8" (3.2 mm)	DC+	90 ± 5	1.2 ipm ± 10% (.03 m/min)	

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WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **SMAW**

Type: Manual ☑ Semi-Automatic ☐

Machine ☐ Automatic ☐

Identification # VRTEX® SMAW # 4

Revision ____ Date ____ by ____

Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 4

JOINT DESIGN USED

Type:

Lap ☐ Tee ☐ Butt ☑

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☑ NO ☐

Root Opening 1/4" (6 mm) Root Face Dimension N/A

Groove Angle: *45 Degree included*

Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove **3/8" (10 mm)** Fillet N/A

FILLER METALS

AWS Specification *A5.1*

AWS Classification ***E6010***

SHIELDING

Electrode Flux (Class) N/A

Flux N/A

Gas N/A

Composition N/A

Flow Rate N/A

Gas Cup Size N/A

POSITION

Groove: **1G** Fillet: N/A Flat Surfacing: ☐

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐

Pulse ☐

Other: *N/A*

Current: AC ☐ DCEP ☑ DCEN ☐

Power Source: CC ☑ CV ☐

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: Whip Stringer

Multi-pass or Single Pass (per side) *Multi-pass*

Number of Electrodes Single

Contact Tip to Work Distance *N/A*

Peening Yes ☐ NO ☑

Interpass Cleaning YES ☑ NO ☐

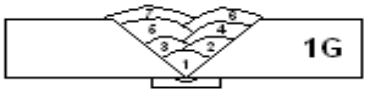
Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A

Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Polarity	AMPS			
1	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	2.8 ipm ± 10% (.07 m/min)		
2	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	5.5 ipm ± 10% (.14 m/min)		
3	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	6.5 ipm ± 10% (.17 m/min)		
4	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	5.7 ipm ± 10% (.14 m/min)		
5	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	5.8 ipm ± 10% (.15 m/min)		
6	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	7.1 ipm ± 10% (.18 m/min)		
7	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	7.5 ipm ± 10% (.19 m/min)		

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WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **SMAW**

Type: Manual ☑ Semi-Automatic ☐
Machine ☐ Automatic ☐

Identification # VRTEX® SMAW # 5
Revision ____ Date ____ by ____
Authorized by ____ Date ____

Supporting PQR No.(s) ____

JOINT DESIGN USED

Type:
Lap ☐ Tee ☐ Butt ☑
Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐
Backing: YES ☑ NO ☐
Root Opening 1/4" (6 mm) Root Face Dimension N/A
Groove Angle: *45 Degree included*
Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36
Type or Grade *N/A*
Thickness: Groove **3/8" (10 mm)** Fillet N/A

FILLER METALS

AWS Specification *A5.1*

AWS Classification ***E6010***

SHIELDING

Electrode Flux (Class) N/A Gas N/A
Composition N/A

Flux N/A

Flow Rate N/A
Gas Cup Size N/A

POSITION

Groove: **2G** Fillet: N/A Flat Surfacing: ☐

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐
Pulse ☐
Other: *N/A*
Current: AC ☐ DCEP ☑ DCEN ☐
Power Source: CC ☑ CV ☐
Tungsten Electrode (GTAW)
Size: N/A
Type: N/A

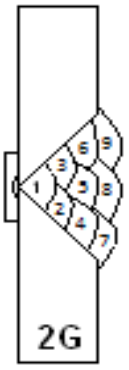
TECHNIQUE

Stringer, Weave Bead, Other: Whip Stringer
Multi-pass or Single Pass (per side) *Multi-pass*
Number of Electrodes Single
Contact Tip to Work Distance *N/A*
Peening Yes ☐ NO ☑
Interpass Cleaning YES ☑ NO ☐
Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A
Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Polarity	AMPS			
1	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	4.7 ipm ± 10% (.12 m/min)		
2	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	8.2 ipm ± 10% (.21 m/min)		
3	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	7.1 ipm ± 10% (.18 m/min)		
4	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	7.8 ipm ± 10% (.20 m/min)		
5	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	6 ipm ± 10% (.15 m/min)		
6	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	5.8 ipm ± 10% (.15 m/min)		
7	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	5.7 ipm ± 10% (.14 m/min)		
8	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	6.2 ipm ± 10% (.16 m/min)		
9	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	7.8 ipm ± 10% (.20 m/min)		

This document is intended for training purposes only

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **SMAW**

Type: Manual ☑ Semi-Automatic ☐

Machine ☐ Automatic ☐

Identification # VRTEX® SMAW # 6

Revision ____ Date ____ by ____

Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 6

JOINT DESIGN USED

Type:

Lap ☐ Tee ☐ Butt ☑

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☑ NO ☐

Root Opening 1/4" (6 mm) Root Face Dimension N/A

Groove Angle: *45 Degree included*

Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove **3/8" (10 mm)** Fillet N/A

FILLER METALS

AWS Specification *A5.1*

AWS Classification ***E6010***

SHIELDING

Electrode Flux (Class) N/A Gas N/A

Composition N/A

Flux N/A

Flow Rate N/A

Gas Cup Size N/A

POSITION

Groove: **3G** Fillet: N/A Flat Surfacing: ☐

Vertical Progression: Up ☑ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐

Pulse ☐

Other: *N/A*

Current: AC ☐ DCEP ☑ DCEN ☐

Power Source: CC ☑ CV ☐

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: Whip Stringer / Weave

Multi-pass or Single Pass (per side) *Multi-pass*

Number of Electrodes Single

Contact Tip to Work Distance *N/A*

Peening Yes ☐ NO ☑

Interpass Cleaning YES ☑ NO ☐

Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A

Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Polarity	AMPS			
1	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	3.6 ipm ± 10% (.09 m/min)		
2	Weave	E6010	1/8" (3.2 mm)	DC+	90 ± 5	4.2 ipm ± 10% (.11 m/min)		
3	Weave	E6010	1/8" (3.2 mm)	DC+	90 ± 5	3.6 ipm ± 10% (.09 m/min)		
4	Weave	E6010	1/8" (3.2 mm)	DC+	90 ± 5	3.1 ipm ± 10% (.08 m/min)		
5	Weave	E6010	1/8" (3.2 mm)	DC+	90 ± 5	2.1 ipm ± 10% (.05 m/min)		

This document is intended for training purposes only

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **SMAW**

Type: Manual ☑ Semi-Automatic ☐

Machine ☐ Automatic ☐

Identification # VRTEX® SMAW # 7

Revision ____ Date ____ by ____

Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 7

JOINT DESIGN USED

Type:

Lap ☐ Tee ☐ Butt ☐

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☐ NO ☑

Root Opening N/A Root Face Dimension N/A

Groove Angle: N/A

Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove N/A Fillet N/A

FILLER METALS

AWS Specification *A5.1*

AWS Classification ***E7018***

SHIELDING

Electrode Flux (Class) N/A Gas N/A

Composition N/A

Flux N/A

Flow Rate N/A

Gas Cup Size N/A

POSITION

Groove: N/A Fillet: N/A Flat Surfacing: ☑

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐

Pulse ☐

Other: *N/A*

Current: AC ☐ DCEP ☑ DCEN ☐

Power Source: CC ☑ CV ☐

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: Stringer

Multi-pass or Single Pass (per side) *Single Pass*

Number of Electrodes Single

Contact Tip to Work Distance *N/A*

Peening Yes ☐ NO ☑

Interpass Cleaning YES ☑ NO ☐

Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A

Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Travel Speed	Joint Details
		Class	Diameter	Polarity	AMPS		
1	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	9.6 ipm ± 10% (.24 m/min)	

This document is intended for training purposes only

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **SMAW**

Type: Manual ☑ Semi-Automatic ☐
Machine ☐ Automatic ☐

Identification # VRTEX® SMAW # 8
Revision ____ Date ____ by ____
Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 8

JOINT DESIGN USED

Type:
Lap ☐ Tee ☑ Butt ☐
Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐
Backing: YES ☐ NO ☑
Root Opening N/A Root Face Dimension N/A
Groove Angle: N/A
Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36
Type or Grade *N/A*
Thickness: Groove N/A Fillet **3/8" (10 mm)**

FILLER METALS

AWS Specification *A5.1*

AWS Classification ***E7018***

SHIELDING

Electrode Flux (Class) N/A Gas N/A
Composition N/A
Flux N/A
Flow Rate N/A
Gas Cup Size N/A

POSITION

Groove: N/A Fillet: **2F** Flat Surfacing: ☐

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐
Pulse ☐
Other: *N/A*
Current: AC ☐ DCEP ☑ DCEN ☐
Power Source: CC ☑ CV ☐
Tungsten Electrode (GTAW)
Size: N/A
Type: N/A

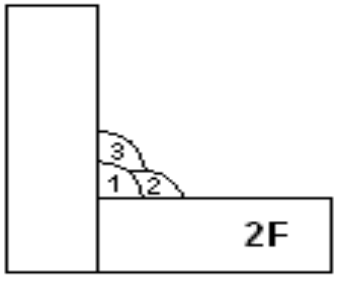
TECHNIQUE

Stringer, Weave Bead, Other: Stringer
Multi-pass or Single Pass (per side) *Multi-pass*
Number of Electrodes Single
Contact Tip to Work Distance *N/A*
Peening Yes ☐ NO ☑
Interpass Cleaning YES ☑ NO ☐
Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A
Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Travel Speed	Joint Details
		Class	Diameter	Polarity	AMPS		
1	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	6.3 ipm ± 10% (.16 m/min)	
2	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	9 ipm ± 10% (.23 m/min)	
3	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	6.3 ipm ± 10% (.16 m/min)	

This document is intended for training purposes only

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **SMAW**

Type: Manual ☑ Semi-Automatic ☐

Machine ☐ Automatic ☐

Identification # VRTEX® SMAW # 9

Revision ____ Date ____ by ____

Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 9

JOINT DESIGN USED

Type:

Lap ☐ Tee ☑ Butt ☐

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☐ NO ☑

Root Opening N/A Root Face Dimension N/A

Groove Angle: N/A

Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove N/A Fillet **3/8" (10 mm)**

FILLER METALS

AWS Specification *A5.1*

AWS Classification ***E7018***

SHIELDING

Electrode Flux (Class) N/A Gas N/A

Composition N/A

Flux N/A

Flow Rate N/A

Gas Cup Size N/A

POSITION

Groove: N/A Fillet: **3F** Flat Surfacing: ☐

Vertical Progression: Up ☑ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐

Pulse ☐

Other: *N/A*

Current: AC ☐ DCEP ☑ DCEN ☐

Power Source: CC ☑ CV ☐

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: Stringer/ Weave

Multi-pass or Single Pass (per side) *Multi-pass*

Number of Electrodes Single

Contact Tip to Work Distance *N/A*

Peening Yes ☐ NO ☑

Interpass Cleaning YES ☑ NO ☐

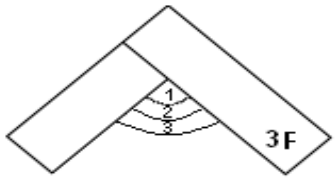
Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A

Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Travel Speed	Joint Details
		Class	Diameter	Polarity	AMPS		
1	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	3.9 ipm ± 10% (.10 m/min)	
2	Weave	E7018	1/8" (3.2 mm)	DC+	125 ± 5	3.4 ipm ± 10% (.09 m/min)	
3	Weave	E7018	1/8" (3.2 mm)	DC+	125 ± 5	2.3 ipm ± 10% (.06 m/min)	

This document is intended for training purposes only

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **SMAW**

Type: Manual ☑ Semi-Automatic ☐

Machine ☐ Automatic ☐

Identification # VRTEX® SMAW # 10

Revision ____ Date ____ by ____

Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 10

JOINT DESIGN USED

Type:

Lap ☐ Tee ☐ Butt ☑

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☑ NO ☐

Root Opening 1/4" (6 mm) Root Face Dimension N/A

Groove Angle: *45 Degree included*

Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove **3/8" (10 mm)** Fillet N/A

FILLER METALS

AWS Specification *A5.1*

AWS Classification ***E7018***

SHIELDING

Electrode Flux (Class) N/A

Flux N/A

Gas N/A

Composition N/A

Flow Rate N/A

Gas Cup Size N/A

POSITION

Groove: **1G** Fillet: N/A Flat Surfacing: ☐

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐

Pulse ☐

Other: *N/A*

Current: AC ☐ DCEP ☑ DCEN ☐

Power Source: CC ☑ CV ☐

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: Stringer

Multi-pass or Single Pass (per side) *Multi-pass*

Number of Electrodes Single

Contact Tip to Work Distance *N/A*

Peening Yes ☐ NO ☑

Interpass Cleaning YES ☑ NO ☐

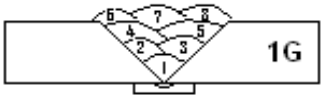
Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A

Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	AMPS		
1	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	4.5 ipm ± 10% (.11 m/min)	
2	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	3.5 ipm ± 10% (.09 m/min)	
3	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	7 ipm ± 10% (.18 m/min)	
4	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	7 ipm ± 10% (.18 m/min)	
5	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	6.5 ipm ± 10% (.17 m/min)	
6	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	7.8 ipm ± 10% (.20 m/min)	
7	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	7.8 ipm ± 10% (.20 m/min)	
8	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	7.8 ipm ± 10% (.20 m/min)	

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **SMAW**

Type: Manual ☑ Semi-Automatic ☐
Machine ☐ Automatic ☐

Identification # VRTEX® SMAW # 11
Revision ____ Date ____ by ____
Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 11

JOINT DESIGN USED

Type:
Lap ☐ Tee ☐ Butt ☑
Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐
Backing: YES ☑ NO ☐
Root Opening 1/4" (6 mm) Root Face Dimension N/A
Groove Angle: *45 Degree included*
Back Gouging: Yes ☑ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36
Type or Grade *N/A*
Thickness: Groove **3/8" (10 mm)** Fillet N/A

FILLER METALS

AWS Specification *A5.1*

AWS Classification ***E7018***

SHIELDING

Electrode Flux (Class) N/A Gas N/A
Composition N/A
Flux N/A
Flow Rate N/A
Gas Cup Size N/A

POSITION

Groove: **2G** Fillet: N/A Flat Surfacing: ☐

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐
Pulse ☐
Other: *N/A*
Current: AC ☐ DCEP ☑ DCEN ☐
Power Source: CC ☑ CV ☐
Tungsten Electrode (GTAW)
Size: N/A
Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: Stringer
Multi-pass or Single Pass (per side) *Multi-pass*
Number of Electrodes Single
Contact Tip to Work Distance *N/A*
Peening Yes ☐ NO ☑
Interpass Cleaning YES ☑ NO ☐
Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A
Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	AMPS		
1	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	5.9 ipm ± 10% (.15 m/min)	
2	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	6 ipm ± 10% (.15 m/min)	
3	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	9.1ipm ± 10% (.23 m/min)	
4	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	7.5 ipm ± 10% (.19 m/min)	
5	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	6.9 ipm ± 10% (.18 m/min)	
6	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	7.8 ipm ± 10% (.20 m/min)	
7	Stringer	E7019	1/8" (3.2 mm)	DC+	126 ± 5	7.8 ipm ± 10% (.20 m/min)	
8	Stringer	E7020	1/8" (3.2 mm)	DC+	127 ± 5	7.8 ipm ± 10% (.20 m/min)	

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name: VRTEX® VRAW™

Welding Process: **SMAW**

Type: Manual ☑ Semi-Automatic ☐
Machine ☐ Automatic ☐

Identification #: VRTEX® SMAW # 12
Revision: ____ Date: ____ by: ____
Authorized by: ____ Date: ____

Supporting PQR No.(s): PQR VRTEX® 12

JOINT DESIGN USED

Type:
Lap ☐ Tee ☐ Butt ☑
Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐
Backing: YES ☑ NO ☐
Root Opening: 1/4" (6 mm) Root Face Dimension: N/A
Groove Angle: *45 Degree included*
Back Gouging: Yes ☐ NO ☑ Method: N/A

BASE MATERIAL

Material Spec.: ASTM A36
Type or Grade: *N/A*
Thickness: Groove **3/8" (10 mm)** Fillet: N/A

FILLER METALS

AWS Specification: *A5.1*

AWS Classification: ***E7018***

SHIELDING

Electrode Flux (Class): N/A Gas: N/A
Composition: N/A
Flux: N/A
Flow Rate: N/A
Gas Cup Size: N/A

POSITION

Groove: **3G** Fillet: N/A Flat Surfacing: ☐

Vertical Progression: Up ☑ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐
Pulse ☐
Other: *N/A*
Current: AC ☐ DCEP ☑ DCEN ☐
Power Source: CC ☑ CV ☐
Tungsten Electrode (GTAW)
Size: N/A
Type: N/A

TECHNIQUE

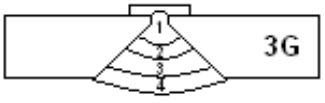
Stringer, Weave Bead, Other: Stringer/ Weave
Multi-pass or Single Pass (per side): *Multi-pass*
Number of Electrodes: Single
Contact Tip to Work Distance: *N/A*
Peening Yes ☐ NO ☑
Interpass Cleaning YES ☑ NO ☐
Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A
Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	AMPS		
1	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	4.4 ipm ± 10% (.11 m/min)	
2	Straight Weave	E7018	1/8" (3.2 mm)	DC+	125 ± 5	4.2 ipm ± 10% (.11 m/min)	
3	Straight Weave	E7018	1/8" (3.2 mm)	DC+	125 ± 5	3.5 ipm ± 10% (.09 m/min)	
4	Straight Weave	E7018	1/8" (3.2 mm)	DC+	125 ± 5	3.1 ipm ± 10% (.08 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **SMAW**

Type: Manual ☑ Semi-Automatic ☐

Machine ☐ Automatic ☐

Identification # VRTEX® SMAW # 13

Revision ____ Date ____ by ____

Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 13

JOINT DESIGN USED

Type:

Lap ☐ Tee ☐ Butt ☐

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☐ NO ☑

Root Opening N/A Root Face Dimension N/A

Groove Angle: N/A

Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove N/A Fillet N/A

FILLER METALS

AWS Specification *A5.1*

AWS Classification ***E6013***

SHIELDING

Electrode Flux (Class) N/A

Flux N/A

Gas N/A

Composition N/A

Flow Rate N/A

Gas Cup Size N/A

POSITION

Groove: N/A Fillet: N/A Flat Surfacing: ☑

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐

Pulse ☐

Other: *N/A*

Current: AC ☑ DCEP ☐ DCEN ☐

Power Source: CC ☑ CV ☐

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: Stringer

Multi-pass or Single Pass (per side) *Single Pass*

Number of Electrodes Single

Contact Tip to Work Distance *N/A*

Peening Yes ☐ NO ☑

Interpass Cleaning YES ☑ NO ☐

Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A

Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Travel Speed	Joint Details
		Class	Diameter	Polarity	AMPS		
1	Stringer	E6013	1/8" (3.2 mm)	AC	100 ± 5	9 ipm ± 10% (.23 m/min)	

This document is intended for training purposes only

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **SMAW**

Type: Manual ☑ Semi-Automatic ☐
Machine ☐ Automatic ☐

Identification # VRTEX® SMAW # 14
Revision ____ Date ____ by ____
Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 14

JOINT DESIGN USED

Type:
Lap ☐ Tee ☑ Butt ☐
Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐
Backing: YES ☐ NO ☑
Root Opening N/A Root Face Dimension N/A
Groove Angle: N/A
Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36
Type or Grade *N/A*
Thickness: Groove N/A Fillet ***10GA. (2.5 mm)***

FILLER METALS

AWS Specification *A5.1*

AWS Classification ***E6013***

SHIELDING

Electrode Flux (Class) N/A
Flux N/A
Gas N/A
Composition N/A
Flow Rate N/A
Gas Cup Size N/A

POSITION

Groove: N/A Fillet: **2F** Flat Surfacing ☐

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐
Pulse ☐
Other: *N/A*
Current: AC ☑ DCEP ☐ DCEN ☐
Power Source: CC ☑ CV ☐
Tungsten Electrode (GTAW)
Size: N/A
Type: N/A

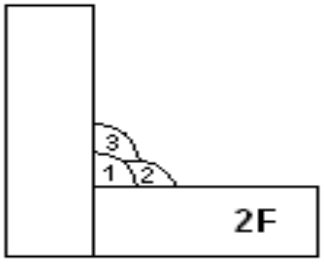
TECHNIQUE

Stringer, Weave Bead, Other: Stringer
Multi-pass or Single Pass (per side) *Multi-pass*
Number of Electrodes Single
Contact Tip to Work Distance *N/A*
Peening Yes ☐ NO ☑
Interpass Cleaning YES ☑ NO ☐
Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A
Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	AMPS		
1	Stringer	E6013	1/8" (3.2 mm)	AC	100± 5	9 ipm ± 10% (.23 m/min)	
2	Stringer	E6013	1/8" (3.2 mm)	AC	100± 5	9.4 ipm ± 10% (.24 m/min)	
3	Stringer	E6013	1/8" (3.2 mm)	AC	100± 5	9.16 ipm ± 10% (.23 m/min)	

This document is intended for training purposes only

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **SMAW**

Type: Manual ☑ Semi-Automatic ☐
Machine ☐ Automatic ☐

Identification # VRTEX® SMAW # 15
Revision ____ Date ____ by ____
Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 15

JOINT DESIGN USED

Type:
Lap ☐ Tee ☑ Butt ☐
Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐
Backing: YES ☐ NO ☑
Root Opening N/A Root Face Dimension N/A
Groove Angle: N/A
Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36
Type or Grade *N/A*
Thickness: Groove N/A Fillet ***10GA. (2.5 mm)***

FILLER METALS

AWS Specification *A5.1*

AWS Classification ***E6013***

SHIELDING

Electrode Flux (Class) N/A
Flux N/A
Gas N/A
Composition N/A
Flow Rate N/A
Gas Cup Size N/A

POSITION

Groove: N/A Fillet: **3F** Flat Surfacing ☐

Vertical Progression: Up ☐ Down ☑

ELECTRICAL CHARACTERISTICS

Transfer Mode Short Circuit ☐ Globular ☐ Spray ☐
Pulse ☐
Other: *N/A*
Current: AC ☑ DCEP ☐ DCEN ☐
Power Source: CC ☑ CV ☐
Tungsten Electrode (GTAW)
Size: N/A
Type: N/A

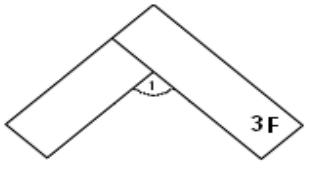
TECHNIQUE

Stringer, Weave Bead, Other: Stringer
Multi-pass or Single Pass (per side) *Single Pass*
Number of Electrodes Single
Contact Tip to Work Distance *N/A*
Peening Yes ☐ NO ☑
Interpass Cleaning YES ☑ NO ☐
Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A
Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	AMPS		
1	Stringer	E6013	1/8" (3.2 mm)	AC	125 ± 5	16.21 ipm ± 10% (.41 m/min)	

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WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **SMAW**

Type: Manual ☑ Semi-Automatic ☐

Machine ☐ Automatic ☐

Identification # VRTEX® SMAW # 16

Revision ____ Date ____ by ____

Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 16

JOINT DESIGN USED

Type:

Lap ☐ Tee ☐ Butt ☑

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☑ NO ☐

Root Opening 1/4" (6 mm) Root Face Dimension N/A

Groove Angle: *45 Degree included*

Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove **3/8" (10 mm)** Fillet N/A

FILLER METALS

AWS Specification *A5.1*

AWS Classification ***E6013***

SHIELDING

Electrode Flux (Class) N/A Gas N/A

Composition N/A

Flux N/A

Flow Rate N/A

Gas Cup Size N/A

POSITION

Groove: **1G** Fillet: N/A Flat Surfacing: ☐

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐

Pulse ☐

Other: *N/A*

Current: AC ☑ DCEP ☐ DCEN ☐

Power Source: CC ☑ CV ☐

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: Stringer

Multi-pass or Single Pass (per side) *Multi-pass*

Number of Electrodes Single

Contact Tip to Work Distance *N/A*

Peening Yes ☐ NO ☑

Interpass Cleaning YES ☑ NO ☐

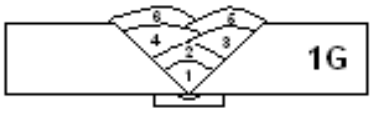
Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A

Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Travel Speed	Joint Details
		Class	Diameter	Polarity	AMPS		
1	Stringer	E6013	1/8" (3.2 mm)	AC	110± 5	4.47 ipm ± 10% (.11 m/min)	
2	Weave	E6013	1/8" (3.2 mm)	AC	110± 5	4.57 ipm ± 10% (.12 m/min)	
3	Stringer	E6013	1/8" (3.2 mm)	AC	110± 5	5.76 ipm ± 10% (.15 m/min)	
4	Stringer	E6013	1/8" (3.2 mm)	AC	110± 5	6.45 ipm ± 10% (.16 m/min)	
5	Stringer	E6013	1/8" (3.2 mm)	AC	110± 5	4.27 ipm ± 10% (.11 m/min)	
6	Stringer	E6013	1/8" (3.2 mm)	AC	110± 5	3.67 ipm ± 10% (.09 m/min)	

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WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **SMAW**

Type: Manual ☑ Semi-Automatic ☐

Machine ☐ Automatic ☐

Identification # VRTEX® SMAW # 17

Revision ____ Date ____ by ____

Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 17

JOINT DESIGN USED

Type:

Lap ☐ Tee ☐ Butt ☑

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☑ NO ☐

Root Opening 1/4" (6 mm) Root Face Dimension N/A

Groove Angle: *45 Degree included*

Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove **3/8" (10 mm)** Fillet N/A

FILLER METALS

AWS Specification *A5.1*

AWS Classification ***E6013***

SHIELDING

Electrode Flux (Class) N/A Gas N/A

Composition N/A

Flux N/A

Flow Rate N/A

Gas Cup Size N/A

POSITION

Groove: **2G** Fillet: N/A Flat Surfacing: ☐

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐

Pulse ☐

Other: *N/A*

Current: AC ☑ DCEP ☐ DCEN ☐

Power Source: CC ☑ CV ☐

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: Stringer

Multi-pass or Single Pass (per side) *Multi-pass*

Number of Electrodes Single

Contact Tip to Work Distance *N/A*

Peening Yes ☐ NO ☑

Interpass Cleaning YES ☑ NO ☐

Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A

Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Travel Speed	Joint Details
		Class	Diameter	Polarity	AMPS		
1	Stringer	E6013	1/8" (3.2 mm)	AC	110± 5	4.6 ipm ± 10% (.12 m/min)	
2	Stringer	E6013	1/8" (3.2 mm)	AC	110± 5	6.33 ipm ± 10% (.16 m/min)	
3	Stringer	E6013	1/8" (3.2 mm)	AC	110± 5	8.16 ipm ± 10% (.21 m/min)	
4	Stringer	E6013	1/8" (3.2 mm)	AC	110± 5	5.6 ipm ± 10% (.14 m/min)	
5	Stringer	E6013	1/8" (3.2 mm)	AC	110± 5	5.35 ipm ± 10% (.14 m/min)	
6	Stringer	E6013	1/8" (3.2 mm)	AC	110± 5	6.11 ipm ± 10% (.16 m/min)	
7	Stringer	E6013	1/8" (3.2 mm)	AC	110± 5	7.57 ipm ± 10% (.19 m/min)	
8	Stringer	E6013	1/8" (3.2 mm)	AC	110± 5	6.25 ipm ± 10% (.16 m/min)	

This document is intended for training purposes only

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **SMAW**

Type: Manual ☑ Semi-Automatic ☐
Machine ☐ Automatic ☐

Identification # VRTEX® SMAW # 18
Revision ____ Date ____ by ____
Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 18

JOINT DESIGN USED

Type:
Lap ☐ Tee ☐ Butt ☑
Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐
Backing: YES ☑ NO ☐
Root Opening 1/4" (6 mm) Root Face Dimension N/A
Groove Angle: *45 Degree included*
Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36
Type or Grade *N/A*
Thickness: Groove **3/8" (10 mm)** Fillet N/A

FILLER METALS

AWS Specification *A5.1*

AWS Classification ***E6013***

SHIELDING

Electrode Flux (Class) N/A
Flux N/A
Gas N/A
Composition N/A
Flow Rate N/A
Gas Cup Size N/A

POSITION

Groove: **3G** Fillet: N/A Flat Surfacing: ☐

Vertical Progression: Up ☑ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐
Pulse ☐
Other: *N/A*
Current: AC ☑ DCEP ☐ DCEN ☐
Power Source: CC ☑ CV ☐
Tungsten Electrode (GTAW)
Size: N/A
Type: N/A

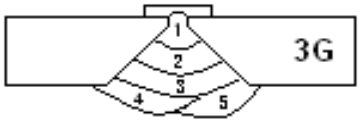
TECHNIQUE

Stringer, Weave Bead, Other: Stringer/ Weave
Multi-pass or Single Pass (per side) *Multi-pass*
Number of Electrodes Single
Contact Tip to Work Distance *N/A*
Peening Yes ☐ NO ☑
Interpass Cleaning YES ☑ NO ☐
Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A
Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Travel Speed	Joint Details
		Class	Diameter	Polarity	AMPS		
1	Stringer	E6013	1/8" (3.2 mm)	AC	90 ± 5	2.63 ipm ± 10% (.07 m/min)	
2	Weave	E6013	1/8" (3.2 mm)	AC	90 ± 5	2.36 ipm ± 10% (.06 m/min)	
3	Weave	E6013	1/8" (3.2 mm)	AC	90 ± 5	2.1 ipm ± 10% (.05 m/min)	
4	Weave	E6013	1/8" (3.2 mm)	AC	90 ± 5	2.32 ipm ± 10% (.06 m/min)	
5	Weave	E6013	1/8" (3.2 mm)	AC	90 ± 5	3.92 ipm ± 10% (.10 m/min)	

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VRTEX® Mobile - GMAW Default Weld Process Settings

WPS #	VR Welding Process	Consumable Type	Lincoln Brand	Gas Mixture Argon / Co2	Gas Flow (CFH)	Position	Mat'l (in)	WFS (ipm) or amps	Voltage	Polarity
19	GMAW - S	.035" ER70S-6 (1.0 mm)	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	Flat	1/4" (6 mm)	250 (± 5) (6.3 m/min)	18	DC+
20	GMAW - S	.035" ER70S-6 (1.0 mm)	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	2F	10 GA. (2.5 mm)	250 (± 5) (6.3 m/min)	18	DC+
21	GMAW - S	.035" ER70S-6 (1.0 mm)	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	3F down	10 GA. (2.5 mm)	250 (± 5) (6.3 m/min)	18	DC+
22	GMAW - S	.035" ER70S-6 (1.0 mm)	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	3F up	1/4" (6 mm)	375 (± 5) (9.5 m/min)	20	DC+
23	GMAW - S	.035" ER70S-6 (1.0 mm)	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	2F	1/4" (6 mm)	275 (± 5) (7.0 m/min)	18	DC+
24	GMAW - S	.035" ER70S-6 (1.0 mm)	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	1G	3/8" (10 mm)	350 (± 5) (8.9 m/min)	20	DC+
25	GMAW - S	.035" ER70S-6 (1.0 mm)	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	2G	3/8" (10 mm)	320 (± 5) (8.0 m/min)	19.5	DC+
26	GMAW - S	.035" ER70S-6 (1.0 mm)	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	3G up	3/8" (10 mm)	250 (± 5) (6.3 m/min)	17.9	DC+
27	GMAW - Spray	.045" ER70S-6 (1.2 mm)	SuperArc L-56	90/10	25-40 (12-19 l/min)	Flat	1/4" (6 mm)	400 (± 5) (10.0 m/min)	27	DC+
28	GMAW - Spray	.045" ER70S-6 (1.2 mm)	SuperArc L-56	90/10	25-40 (12-19 l/min)	2F	3/8" (10 mm)	375 (± 5) (9.5 m/min)	26.5	DC+
29	GMAW - Spray	.045" ER70S-6 (1.2 mm)	SuperArc L-56	90/10	25-40 (12-19 l/min)	1G	3/8" (10 mm)	370 (± 5) (9.4 m/min)	26.5	DC+
30	GMAW - Pulse	.045" ER70S-6 (1.2 mm)	SuperArc L-56	90/10	25-40 (12-19 l/min)	2G	3/8" (10 mm)	130 (± 5) (3.3 m/min)	.95(trim)	DC+
31	GMAW - Pulse	.045" ER70S-6 (1.2 mm)	SuperArc L-56	90/10	25-40 (12-19 l/min)	3G up	3/8" (10 mm)	130 (± 5) (3.3 m/min)	.95(trim)	DC+

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **GMAW**

Type: Manual ☐ Semi-Automatic ☑

Machine ☐ Automatic ☐

Identification # VRTEX® GMAW # 19

Revision ____ Date ____ by ____

Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 19

JOINT DESIGN USED

Type:

Lap ☐ Tee ☐ Butt ☐

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☐ NO ☑

Root Opening N/A Root Face Dimension N/A

Groove Angle: N/A

Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove N/A Fillet N/A

FILLER METALS

AWS Specification *A5.18*

AWS Classification ***E70S-6***

SHIELDING

Electrode Flux (Class) N/A

Flux N/A

Gas Argon/Co2

Composition *75/25*

Flow Rate *25-35cfh (12-16.5 l/min)*

Gas Cup Size N/A

POSITION

Groove: N/A Fillet: N/A Flat Surfacing: ☑

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☑ Globular ☐ Spray ☐

Pulse ☐

Other: *N/A*

Current: AC ☐ DCEP ☑ DCEN ☐

Power Source: CC ☐ CV ☑

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: *Stringer*

Multi-pass or Single Pass (per side) *Single Pass*

Number of Electrodes Single

Contact Tip to Work Distance *3/8" (10 mm)*

Peening Yes ☐ NO ☑

Interpass Cleaning YES ☐ NO ☑

Cleaning Method: None

PREHEAT

Preheat Temp. Min. N/A Max N/A

Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	0.035" (1.0 mm)	DC+	250 (6.3 m/min)	18	15 ipm (.38 m/min)	

This document is intended for training purposes only

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **GMAW**
Type: Manual ☐ Semi-Automatic ☑
Machine ☐ Automatic ☐

Identification # VRTEX® GMAW # 20
Revision ____ Date ____ by ____
Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 20

JOINT DESIGN USED

Type:
Lap ☐ Tee ☑ Butt ☐
Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐
Backing: YES ☐ NO ☑
Root Opening N/A Root Face Dimension N/A
Groove Angle: N/A
Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36
Type or Grade *N/A*
Thickness: Groove N/A Fillet ***10 GA. (2.5 mm)***

FILLER METALS

AWS Specification *A5.18*
AWS Classification ***E70S-6***

SHIELDING

Electrode Flux (Class) N/A Gas Argon/Co2
Composition *75/25*
Flux N/A
Flow Rate *25-35cfh (12-16.5 l/min)*
Gas Cup Size N/A

POSITION

Groove: N/A Fillet: ***2F*** Flat Surfacing: ☐
Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☑ Globular ☐ Spray ☐
Pulse ☐
Other: *N/A*
Current: AC ☐ DCEP ☑ DCEN ☐
Power Source: CC ☐ CV ☑
Tungsten Electrode (GTAW)
Size: N/A
Type: N/A

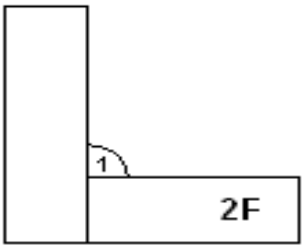
TECHNIQUE

Stringer, Weave Bead, Other: *Stringer*
Multi-pass or Single Pass (per side) *Single Pass*
Number of Electrodes Single
Contact Tip to Work Distance *3/8" (10 mm)*
Peening Yes ☐ NO ☑
Interpass Cleaning YES ☐ NO ☑
Cleaning Method: None

PREHEAT

Preheat Temp. Min. N/A Max N/A
Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	0.035" (1.0 mm)	DC+	250 (6.3 m/min)	18	15 ipm (.38 m/min)	

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WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **GMAW**
Type: Manual ☐ Semi-Automatic ☑
Machine ☐ Automatic ☐

Identification # VRTEX® GMAW # 21
Revision ____ Date ____ by ____
Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 21

JOINT DESIGN USED

Type:
Lap ☐ Tee ☑ Butt ☐
Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐
Backing: YES ☐ NO ☑
Root Opening N/A Root Face Dimension N/A
Groove Angle: N/A
Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36
Type or Grade *N/A*
Thickness: Groove N/A Fillet ***10 GA. (2.5 mm)***

FILLER METALS

AWS Specification *A5.18*

AWS Classification ***E70S-6***

SHIELDING

Electrode Flux (Class) N/A Gas Argon/Co2
Composition *75/25*

Flux N/A

Flow Rate *25-35cfh (12-16.5 l/min)*
Gas Cup Size N/A

POSITION

Groove: N/A Fillet: ***3F*** Flat Surfacing: ☐

Vertical Progression: Up ☐ Down ☑

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☑ Globular ☐ Spray ☐
Pulse ☐
Other: *N/A*
Current: AC ☐ DCEP ☑ DCEN ☐
Power Source: CC ☐ CV ☑
Tungsten Electrode (GTAW)
Size: N/A
Type: N/A

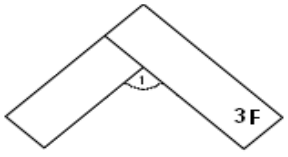
TECHNIQUE

Stringer, Weave Bead, Other: *Stringer*
Multi-pass or Single Pass (per side) *Single Pass*
Number of Electrodes Single
Contact Tip to Work Distance *3/8" (10 mm)*
Peening Yes ☐ NO ☑
Interpass Cleaning YES ☐ NO ☑
Cleaning Method: None

PREHEAT

Preheat Temp. Min. N/A Max N/A
Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.035" (1.0 mm)	DC+	250 (6.3 m/min)	18	11.6 ipm (.29 m/min)	

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WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **GMAW**
Type: Manual ☐ Semi-Automatic ☑
Machine ☐ Automatic ☐

Identification # VRTEX® GMAW # 22
Revision ____ Date ____ by ____
Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 22

JOINT DESIGN USED

Type:
Lap ☐ Tee ☑ Butt ☐
Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐
Backing: YES ☐ NO ☑
Root Opening N/A Root Face Dimension N/A
Groove Angle: N/A
Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36
Type or Grade *N/A*
Thickness: Groove N/A Fillet ***1/4" (6 mm)***

FILLER METALS

AWS Specification *A5.18*
AWS Classification ***E70S-6***

SHIELDING

Electrode Flux (Class) N/A Gas Argon/Co2
Composition *75/25*
Flux N/A
Flow Rate *25-35cfh (12-16.5 l/min)*
Gas Cup Size N/A

POSITION

Groove: N/A Fillet: ***3F*** Flat Surfacing: ☐
Vertical Progression: Up ☑ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☑ Globular ☐ Spray ☐
Pulse ☐
Other: *N/A*
Current: AC ☐ ☑DCEP ☐DCEN
Power Source: CC ☐ CV ☑
Tungsten Electrode (GTAW)
Size: N/A
Type: N/A

TECHNIQUE

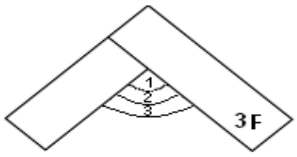
Stringer, Weave Bead, Other: *Stringer/ Weave*
Multi-pass or Single Pass (per side) *Multi-pass*
Number of Electrodes Single
Contact Tip to Work Distance *3/8" (10 mm)*
Peening Yes ☐ NO ☑
Interpass Cleaning YES ☐ NO ☑
Cleaning Method: None

PREHEAT

Preheat Temp. Min. N/A Max N/A
Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.035" (1.0 mm)	DC+	275 (7.0 m/min)	18	6.1 ipm (.15 m/min)	
2	Weave	E70S-6	.035" (1.0 mm)	DC+	275 (7.0 m/min)	18	3 ipm (.08 m/min)	
3	Weave	E70S-6	.035" (1.0 mm)	DC+	275 (7.0 m/min)	18	2.2 ipm (.06 m/min)	



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WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **GMAW**
Type: Manual ☐ Semi-Automatic ☑
Machine ☐ Automatic ☐

Identification # VRTEX® GMAW # 23
Revision ____ Date ____ by ____
Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 23

JOINT DESIGN USED

Type:
Lap ☐ Tee ☑ Butt ☐
Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐
Backing: YES ☐ NO ☑
Root Opening N/A Root Face Dimension N/A
Groove Angle: N/A
Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36
Type or Grade *N/A*
Thickness: Groove N/A Fillet ***1/4" (6 mm)***

FILLER METALS

AWS Specification *A5.18*
AWS Classification ***E70S-6***

SHIELDING

Electrode Flux (Class) N/A Gas Argon/Co2
Composition *75/25*
Flux N/A
Flow Rate *25-35cfh (12-16.5 l/min)*
Gas Cup Size N/A

POSITION

Groove: N/A Fillet: ***2F*** Flat Surfacing: ☐
Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☑ Globular ☐ Spray ☐
Pulse ☐
Other: *N/A*
Current: AC ☐ DCEP ☑ DCEN ☐
Power Source: CC ☐ CV ☑
Tungsten Electrode (GTAW)
Size: N/A
Type: N/A

TECHNIQUE

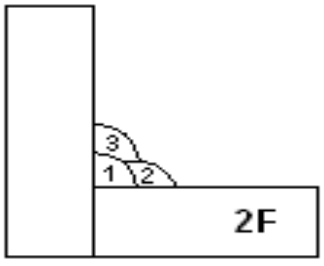
Stringer, Weave Bead, Other: *Stringer*
Multi-pass or Single Pass (per side) *Multi-pass*
Number of Electrodes Single
Contact Tip to Work Distance *3/8" (10 mm)*
Peening Yes ☐ NO ☑
Interpass Cleaning YES ☐ NO ☑
Cleaning Method: None

PREHEAT

Preheat Temp. Min. N/A Max N/A
Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	0.035" (1.0 mm)	DC+	375 (9.5 m/min)	20	12.5 ipm (.32 m/min)	
2	Stringer	E70S-6	0.035" (1.0 mm)	DC+	375 (9.5 m/min)	20	15 ipm (.38 m/min)	
3	Stringer	E70S-6	0.035" (1.0 mm)	DC+	375 (9.5 m/min)	20	12.2 ipm (.31 m/min)	



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WELDING PROCEDURE SPECIFICATION (WPS)

Company Name: VRTEX® VRAW™

Welding Process: **GMAW**

Type: Manual ☐ Semi-Automatic ☑

Machine ☐ Automatic ☐

Identification #: VRTEX® GMAW # 24

Revision: ____ Date: ____ by: ____

Authorized by: ____ Date: ____

Supporting PQR No.(s): PQR VRTEX® 24

JOINT DESIGN USED

Type:

Lap ☐ Tee ☐ Butt ☑

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☑ NO ☐

Root Opening: *1/4" (6 mm)* Root Face Dimension: N/A

Groove Angle: *45 degree included*

Back Gouging: Yes ☐ NO ☑ Method: N/A

BASE MATERIAL

Material Spec.: ASTM A36

Type or Grade: *N/A*

Thickness: Groove ***3/8" (10 mm)*** Fillet: N/A

FILLER METALS

AWS Specification: *A5.18*

AWS Classification: ***E70S-6***

SHIELDING

Electrode Flux (Class): N/A Gas: Argon/Co2

Composition: *75/25*

Flux: N/A

Flow Rate: *25-35cfh (12-16.5 l/min)*

Gas Cup Size: N/A

POSITION

Groove: ***1G*** Fillet: N/A Flat Surfacing: ☐

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☑ Globular ☐ Spray ☐

Pulse ☐

Other: *N/A*

Current: AC ☐ DCEP ☑ DCEN ☐

Power Source: CC ☐ CV ☑

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: *Stringer*

Multi-pass or Single Pass (per side): *Multi-pass*

Number of Electrodes: Single

Contact Tip to Work Distance: *3/8" (10 mm)*

Peening: Yes ☐ NO ☑

Interpass Cleaning: YES ☐ NO ☑

Cleaning Method: None

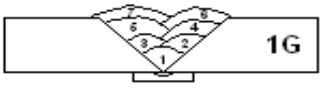
PREHEAT

Preheat Temp. Min.: N/A Max: N/A

Interpass Temp. Min.: N/A Max: N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.035" (1.0 mm)	DC+	350 (8.9 m/min)	20	10.9 ipm (.28 m/min)	
2	Stringer	E70S-6	.035" (1.0 mm)	DC+	350 (8.9 m/min)	20	21.8 ipm (.55 m/min)	
3	Stringer	E70S-6	.035" (1.0 mm)	DC+	350 (8.9 m/min)	20	12.6 ipm (.32 m/min)	
4	Stringer	E70S-6	.035" (1.0 mm)	DC+	350 (8.9 m/min)	20	15 ipm (.38 m/min)	
5	Stringer	E70S-6	.035" (1.0 mm)	DC+	350 (8.9 m/min)	20	16 ipm (.41 m/min)	
6	Stringer	E70S-6	.035" (1.0 mm)	DC+	350 (8.9 m/min)	20	12.6 ipm (.32 m/min)	
7	Stringer	E70S-6	.035" (1.0 mm)	DC+	350 (8.9 m/min)	20	15 ipm (.38 m/min)	



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WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **GMAW**

Type: Manual ☐ Semi-Automatic ☑

Machine ☐ Automatic ☐

Identification # VRTEX® GMAW # 25

Revision ____ Date ____ by ____

Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 25

JOINT DESIGN USED

Type:

Lap ☐ Tee ☐ Butt ☑

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☑ NO ☐

Root Opening *1/4" (6 mm)* Root Face Dimension N/A

Groove Angle: *45 degree included*

Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove ***3/8" (10 mm)*** Fillet N/A

FILLER METALS

AWS Specification *A5.18*

AWS Classification ***E70S-6***

SHIELDING

Electrode Flux (Class) N/A Gas Argon/Co2

Composition *75/25*

Flux N/A

Flow Rate *25-35cfh (12-16.5 l/min)*

Gas Cup Size N/A

POSITION

Groove: ***2G*** Fillet: N/A Flat Surfacing: ☐

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☑ Globular ☑ Spray ☐

Pulse ☐

Other: *N/A*

Current: AC ☐ DCEP ☑ DCEN ☐

Power Source: CC ☐ CV ☑

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: *Stringer*

Multi-pass or Single Pass (per side) *Multi-pass*

Number of Electrodes Single

Contact Tip to Work Distance *3/8" (10 mm)*

Peening Yes ☐ NO ☑

Interpass Cleaning YES ☐ NO ☑

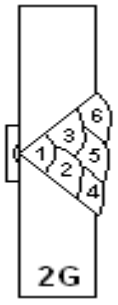
Cleaning Method: None

PREHEAT

Preheat Temp. Min. N/A Max N/A

Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.035" (1.0 mm)	DC+	320 (8.0 m/min)	19.5	9.8 ipm (.25 m/min)	
2	Stringer	E70S-6	.035" (1.0 mm)	DC+	320 (8.0 m/min)	19.5	13.4 ipm (.34 m/min)	
3	Stringer	E70S-6	.035" (1.0 mm)	DC+	320 (8.0 m/min)	19.5	14.2 ipm (.36 m/min)	
4	Stringer	E70S-6	.035" (1.0 mm)	DC+	320 (8.0 m/min)	19.5	11.6 ipm (.29 m/min)	
5	Stringer	E70S-6	.035" (1.0 mm)	DC+	320 (8.0 m/min)	19.5	10.6 ipm (.27 m/min)	
6	Stringer	E70S-6	.035" (1.0 mm)	DC+	320 (8.0 m/min)	19.5	11.6 ipm (.29 m/min)	

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WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **GMAW**
Type: Manual ☐ Semi-Automatic ☑
Machine ☐ Automatic ☐

Identification # VRTEX® GMAW # 26
Revision ____ Date ____ by ____
Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 26

JOINT DESIGN USED

Type:
Lap ☐ Tee ☐ Butt ☑
Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐
Backing: YES ☑ NO ☐
Root Opening *1/4" (6 mm)* Root Face Dimension N/A
Groove Angle: *45 degree included*
Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36
Type or Grade *N/A*
Thickness: Groove ***3/8" (10 mm)*** Fillet N/A

FILLER METALS

AWS Specification *A5.18*
AWS Classification ***E70S-6***

SHIELDING

Electrode Flux (Class) N/A Gas Argon/Co2
Composition *75/25*
Flux N/A
Flow Rate *25-35cfh (12-16.5 l/min)*
Gas Cup Size N/A

POSITION

Groove: ***3G*** Fillet: N/A Flat Surfacing: ☐
Vertical Progression: Up ☑ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☑ Globular ☐ Spray ☐
Pulse ☐
Other: *N/A*
Current: AC ☐ DCEP ☑ DCEN ☐
Power Source: CC ☐ CV ☑
Tungsten Electrode (GTAW)
Size: N/A
Type: N/A

TECHNIQUE

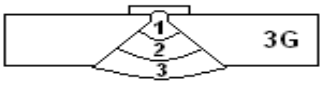
Stringer, Weave Bead, Other: *Stringer/ Weave*
Multi-pass or Single Pass (per side) *Multi-pass*
Number of Electrodes Single
Contact Tip to Work Distance *3/8" (10 mm)*
Peening Yes ☐ NO ☑
Interpass Cleaning YES ☐ NO ☑
Cleaning Method: None

PREHEAT

Preheat Temp. Min. N/A Max N/A
Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.035" (1.0 mm)	DC+	250 (6.3 m/min)	17.9	5.8 ipm (.15 m/min)	
2	Weave	E70S-6	.035" (1.0 mm)	DC+	250 (6.3 m/min)	17.9	4.8 ipm (.12 m/min)	
3	Weave	E70S-6	.035" (1.0 mm)	DC+	250 (6.3 m/min)	17.9	3.8 ipm (.10 m/min)	



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WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **GMAW**

Type: Manual ☐ Semi-Automatic ☑

Machine ☐ Automatic ☐

Identification # VRTEX® GMAW # 27

Revision ____ Date ____ by ____

Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 27

JOINT DESIGN USED

Type:

Lap ☐ Tee ☐ Butt ☐

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☐ NO ☑

Root Opening N/A Root Face Dimension N/A

Groove Angle: N/A

Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove N/A Fillet N/A

FILLER METALS

AWS Specification *A5.18*

AWS Classification ***E70S-6***

SHIELDING

Electrode Flux (Class) N/A

Flux N/A

Gas Argon/Co2

Composition *90/10*

Flow Rate *25-40cfh (12-19 l/min)*

Gas Cup Size N/A

POSITION

Groove: N/A Fillet: N/A Flat Surfacing: ☑

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☑

Pulse ☐

Other: *N/A*

Current: AC ☐ DCEP ☑ DCEN ☐

Power Source: CC ☐ CV ☑

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: *Stringer*

Multi-pass or Single Pass (per side) *Single Pass*

Number of Electrodes Single

Contact Tip to Work Distance *1/2"*

Peening Yes ☐ NO ☑

Interpass Cleaning YES ☐ NO ☑

Cleaning Method: None

PREHEAT

Preheat Temp. Min. N/A Max N/A

Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.045" (1.2 mm)	DC+	400 (10.0 m/min)	27	20 ipm (.51 m/min)	

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WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **GMAW**

Type: Manual ☐ Semi-Automatic ☑

Machine ☐ Automatic ☐

Identification # VRTEX® GMAW # 28

Revision ____ Date ____ by ____

Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 28

JOINT DESIGN USED

Type:

Lap ☐ Tee ☑ Butt ☐

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☐ NO ☑

Root Opening N/A Root Face Dimension N/A

Groove Angle: N/A

Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove N/A Fillet ***3/8" (10 mm)***

FILLER METALS

AWS Specification *A5.18*

AWS Classification ***E70S-6***

SHIELDING

Electrode Flux (Class) N/A

Flux N/A

Gas Argon/Co2

Composition *90/10*

Flow Rate *25-40cfh (12-19 l/min)*

Gas Cup Size N/A

POSITION

Groove: N/A Fillet: ***2F*** Flat Surfacing ☐

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☑

Pulse ☐

Other: *N/A*

Current: AC ☐ DCEP ☑ DCEN ☐

Power Source: CC ☐ CV ☑

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: *Stringer*

Multi-pass or Single Pass (per side) *Multi-pass*

Number of Electrodes Single

Contact Tip to Work Distance *1/2"*

Peening Yes ☐ NO ☑

Interpass Cleaning YES ☐ NO ☑

Cleaning Method: None

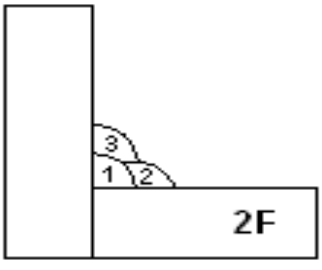
PREHEAT

Preheat Temp. Min. N/A Max N/A

Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.045" (1.2 mm)	DC+	375 (9.5 m/min)	26.5	20 ipm (.51 m/min)	
2	Stringer	E70S-6	.045" (1.2 mm)	DC+	375 (9.5 m/min)	26.5	24 ipm (.61 m/min)	
3	Stringer	E70S-6	.045" (1.2 mm)	DC+	375 (9.5 m/min)	26.5	18.4 ipm (.47 m/min)	



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WELDING PROCEDURE SPECIFICATION (WPS)

Company Name: VRTEX® VRAW™

Welding Process: **GMAW**

Type: Manual ☐ Semi-Automatic ☑
Machine ☐ Automatic ☐

Identification #: VRTEX® GMAW # 29
Revision: ____ Date: ____ by: ____
Authorized by: ____ Date: ____

Supporting PQR No.(s): PQR VRTEX® 29

JOINT DESIGN USED

Type:
Lap ☐ Tee ☐ Butt ☑
Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐
Backing: YES ☑ NO ☐
Root Opening: *1/4" (6 mm)* Root Face Dimension: N/A
Groove Angle: *45 degree included*
Back Gouging: Yes ☐ NO ☑ Method: N/A

BASE MATERIAL

Material Spec.: ASTM A36
Type or Grade: *N/A*
Thickness: Groove ***3/8" (10 mm)*** Fillet: N/A

FILLER METALS

AWS Specification: *A5.18*
AWS Classification: ***E70S-6***

SHIELDING

Electrode Flux (Class): N/A
Flux: N/A
Gas: Argon/Co2
Composition: *90/10*
Flow Rate: *25-40cfh (12-19 l/min)*
Gas Cup Size: N/A

POSITION

Groove: ***1G*** Fillet: N/A Flat Surfacing: ☐

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☑
Pulse ☐
Other: *N/A*
Current: AC ☐ DCEP ☑ DCEN ☐
Power Source: CC ☐ CV ☑
Tungsten Electrode (GTAW)
Size: N/A
Type: N/A

TECHNIQUE

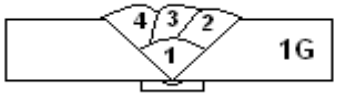
Stringer, Weave Bead, Other: *Stringer*
Multi-pass or Single Pass (per side): *Multi-pass*
Number of Electrodes: Single
Contact Tip to Work Distance: *1/2"*
Peening: Yes ☐ NO ☑
Interpass Cleaning: YES ☐ NO ☑
Cleaning Method: None

PREHEAT

Preheat Temp. Min.: N/A Max: N/A
Interpass Temp. Min.: N/A Max: N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.045" (1.2 mm)	DC+	370 (9.4 m/min)	26.5	18.4 ipm (.47 m/min)	
2	Stringer	E70S-6	.045" (1.2 mm)	DC+	370 (9.4 m/min)	26.5	21.8 ipm (.55 m/min)	
3	Stringer	E70S-6	.045" (1.2 mm)	DC+	370 (9.4 m/min)	26.5	20 ipm (.51 m/min)	
4	Stringer	E70S-6	.045" (1.2 mm)	DC+	370 (9.4 m/min)	26.5	26.6 ipm (.68 m/min)	



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WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **GMAW**

Type: Manual ☐ Semi-Automatic ☑
Machine ☐ Automatic ☐

Identification # VRTEX® GMAW # 30
Revision ____ Date ____ by ____
Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 30

JOINT DESIGN USED

Type:
Lap ☐ Tee ☐ Butt ☑
Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐
Backing: YES ☑ NO ☐
Root Opening *1/4" (6 mm)* Root Face Dimension N/A
Groove Angle: *45 degree included*
Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36
Type or Grade *N/A*
Thickness: Groove ***3/8" (10 mm)*** Fillet N/A

FILLER METALS

AWS Specification *A5.18*
AWS Classification ***E70S-6***

SHIELDING

Electrode Flux (Class) N/A
Flux N/A
Gas Argon/Co2
Composition *90/10*
Flow Rate *25-40cfh (12-19 l/min)*
Gas Cup Size N/A

POSITION

Groove: ***2G*** Fillet: N/A Flat Surfacing: ☐
Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐
Pulse ☑
Other: *N/A*
Current: AC ☐ DCEP ☑ DCEN ☐
Power Source: CC ☐ CV ☑
Tungsten Electrode (GTAW)
Size: N/A
Type: N/A

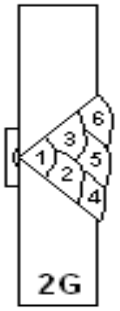
TECHNIQUE

Stringer, Weave Bead, Other: *Stringer*
Multi-pass or Single Pass (per side) *Multi-pass*
Number of Electrodes Single
Contact Tip to Work Distance *1/"2"*
Peening Yes ☐ NO ☑
Interpass Cleaning YES ☐ NO ☑
Cleaning Method: None

PREHEAT

Preheat Temp. Min. N/A Max N/A
Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.045" (1.2 mm)	DC+	130 (3.3 m/min)	0.95	11.5 ipm (.29 m/min)	
2	Stringer	E70S-6	.045" (1.2 mm)	DC+	130 (3.3 m/min)	0.95	7.7 ipm (.20 m/min)	
3	Stringer	E70S-6	.045" (1.2 mm)	DC+	130 (3.3 m/min)	0.95	10 ipm (.25 m/min)	
4	Stringer	E70S-6	.045" (1.2 mm)	DC+	130 (3.3 m/min)	0.95	8.3 ipm (.21 m/min)	
5	Stringer	E70S-6	.045" (1.2 mm)	DC+	130 (3.3 m/min)	0.95	12 ipm (.30 m/min)	
6	Stringer	E70S-6	.045" (1.2 mm)	DC+	130 (3.3 m/min)	0.95	16.6 ipm (.42 m/min)	

This document is intended for training purposes only

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **GMAW**

Type: Manual ☐ Semi-Automatic ☑

Machine ☐ Automatic ☐

Identification # VRTEX® GMAW # 31

Revision ____ Date ____ by ____

Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 31

JOINT DESIGN USED

Type:

Lap ☐ Tee ☐ Butt ☑

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☑ NO ☐

Root Opening *1/4" (6 mm)* Root Face Dimension N/A

Groove Angle: *45 degree included*

Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove ***3/8" (10 mm)*** Fillet N/A

FILLER METALS

AWS Specification *A5.18*

AWS Classification ***E70S-6***

SHIELDING

Electrode Flux (Class) N/A

Flux N/A

Gas Argon/Co2

Composition *90/10*

Flow Rate *25-40cfh (12-19 l/min)*

Gas Cup Size N/A

POSITION

Groove: ***3G*** Fillet: N/A Flat Surfacing: ☐

Vertical Progression: Up ☑ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐

Pulse ☑

Other: *N/A*

Current: AC ☐ DCEP ☑ DCEN ☐

Power Source: CC ☐ CV ☑

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: *Stringer/ Weave*

Multi-pass or Single Pass (per side) *Multi-pass*

Number of Electrodes Single

Contact Tip to Work Distance *1/"2"*

Peening Yes ☐ NO ☑

Interpass Cleaning YES ☐ NO ☑

Cleaning Method: None

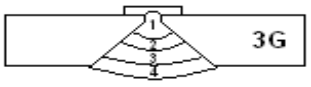
PREHEAT

Preheat Temp. Min. N/A Max N/A

Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.045" (1.2 mm)	DC+	130 (3.3 m/min)	0.95	3.9 ipm (.10 m/min)	
2	Weave	E70S-6	.045" (1.2 mm)	DC+	130 (3.3 m/min)	0.95	3.6 ipm (.10 m/min)	
3	Weave	E70S-6	.045" (1.2 mm)	DC+	130 (3.3 m/min)	0.95	2.8 ipm (.07 m/min)	
4	Weave	E70S-6	.045" (1.2 mm)	DC+	130 (3.3 m/min)	0.95	2.6 ipm (.07 m/min)	



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VRTEX® Mobile - FCAW Default Weld Process Settings

WPS #	VR Welding Process	Consumable Type	Lincoln Brand	Gas Mixture Argon / Co2	Gas Flow (CFH)	Position	Mat'l (in)	WFS (ipm) or amps	Voltage	Polarity
32	FCAW - G	.045" E71T-1 (1.2 mm)	UC 71A85	75/25	40-50 (19-23.5 l/min)	Flat	1/4" (6 mm)	275 (+ 5) (7.0 m/min)	25	DC+
33	FCAW - G	.045" E71T-1 (1.2 mm)	UC 71A85	75/25	40-50 (19-23.5 l/min)	2F	3/8" (10 mm)	275 (+ 5) (7.0 m/min)	25	DC+
34	FCAW - G	.045" E71T-1 (1.2 mm)	UC 71A85	75/25	40-50 (19-23.5 l/min)	3F up	3/8" (10 mm)	275 (+ 5) (7.0 m/min)	25	DC+
35	FCAW - G	.045" E71T-1 (1.2 mm)	UC 71A85	75/25	40-50 (19-23.5 l/min)	1G	3/8" (10 mm)	275 (+ 5) (7.0 m/min)	25	DC+
36	FCAW - G	.045" E71T-1 (1.2 mm)	UC 71A85	75/25	40-50 (19-23.5 l/min)	2G	3/8" (10 mm)	275 (+ 5) (7.0 m/min)	25	DC+
37	FCAW - G	.045" E71T-1 (1.2 mm)	UC 71A85	75/25	40-50 (19-23.5 l/min)	3G up	3/8" (10 mm)	275 (+ 5) (7.0 m/min)	25	DC+
38	FCAW - S	5/64" E71T-8 (2.0 mm)	NR- 232/233	NA	NA	Flat	1/4" (6 mm)	140 (± 5) (3.5 m/min)	20	DC-
39	FCAW - S	5/64" E71T-8 (2.0 mm)	NR- 232/233	NA	NA	2F	3/8" (10 mm)	155 (± 5) (4.0 m/min)	21	DC-
40	FCAW - S	5/64" E71T-8 (2.0 mm)	NR- 232/233	NA	NA	3F up	3/8" (10 mm)	155 (± 5) (4.0 m/min)	21	DC-
41	FCAW - S	5/64" E71T-8 (2.0 mm)	NR- 232/233	NA	NA	1G	3/8" (10 mm)	130 (± 5) (3.3 m/min)	21	DC-
42	FCAW - S	5/64" E71T-8 (2.0 mm)	NR- 232/233	NA	NA	2G	3/8" (10 mm)	130 (± 5) (3.3 m/min)	21	DC-
43	FCAW - S	5/64" E71T-8 (2.0 mm)	NR- 232/233	NA	NA	3G up	3/8" (10 mm)	125 (± 5) (3.2 m/min)	19.5	DC-

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **FCAW-G**

Type: Manual ☐ Semi-Automatic ☑

Machine ☐ Automatic ☐

Identification # VRTEX® FCAW # 32

Revision ____ Date ____ by ____

Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 32

JOINT DESIGN USED

Type:

Lap ☐ Tee ☐ Butt ☐

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☐ NO ☑

Root Opening N/A Root Face Dimension N/A

Groove Angle: N/A

Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove N/A Fillet N/A

FILLER METALS

AWS Specification *A5.20*

AWS Classification ***E71T-1***

SHIELDING

Electrode Flux (Class) N/A Gas Argon/Co2

Composition 75/25

Flux N/A

Flow Rate 40-50 CFH (19-23.5 l/min)

Gas Cup Size N/A

POSITION

Groove: N/A Fillet: N/A Flat Surfacing: ☑

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐

Pulse ☐

Other: *N/A*

Current: AC ☐ DCEP ☑ DCEN ☐

Power Source: CC ☐ CV ☑

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: *Stringer*

Multi-pass or Single Pass (per side) *Single Pass*

Number of Electrodes Single

Contact Tip to Work Distance *3/4" (19.1 mm)*

Peening Yes ☐ NO ☑

Interpass Cleaning YES ☑ NO ☐

Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A

Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.2 m/min)	25	11.4 ipm (.29 m/min)	

This document is intended for training purposes only

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **FCAW-G**

Type: Manual ☐ Semi-Automatic ☑

Machine ☐ Automatic ☐

Identification # VRTEX® FCAW # 33

Revision ____ Date ____ by ____

Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 33

JOINT DESIGN USED

Type:

Lap ☐ Tee ☑ Butt ☐

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☐ NO ☑

Root Opening N/A Root Face Dimension N/A

Groove Angle: N/A

Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove N/A Fillet ***3/8" (10 mm)***

FILLER METALS

AWS Specification *A5.20*

AWS Classification ***E71T-1***

SHIELDING

Electrode Flux (Class) N/A

Flux N/A

Gas Argon/Co2

Composition 75/25

Flow Rate 40-50 CFH (19-23.5 l/min)

Gas Cup Size N/A

POSITION

Groove: N/A Fillet: **2F** Flat Surfacing: ☐

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐

Pulse ☐

Other: *N/A*

Current: AC ☐ DCEP ☑ DCEN ☐

Power Source: CC ☐ CV ☑

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: *Stringer*

Multi-pass or Single Pass (per side) *Multi-pass*

Number of Electrodes Single

Contact Tip to Work Distance *3/4" (19.1 mm)*

Peening Yes ☐ NO ☑

Interpass Cleaning YES ☑ NO ☐

Cleaning Method: Chipping Hammer and Wire Brush

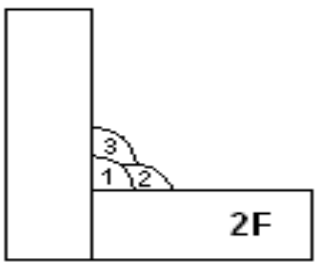
PREHEAT

Preheat Temp. Min. N/A Max N/A

Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	11.4 ipm (.29 m/min)	
2	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	15.5 ipm (.40 m/min)	
3	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	15 ipm (.38 m/min)	



This document is intended for training purposes only

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **FCAW-G**

Type: Manual ☐ Semi-Automatic ☑

Machine ☐ Automatic ☐

Identification # VRTEX® FCAW # 34

Revision ____ Date ____ by ____

Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 34

JOINT DESIGN USED

Type:

Lap ☐ Tee ☑ Butt ☐

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☐ NO ☑

Root Opening N/A Root Face Dimension N/A

Groove Angle: N/A

Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove N/A Fillet ***3/8" (10 mm)***

FILLER METALS

AWS Specification *A5.20*

AWS Classification ***E71T-1***

SHIELDING

Electrode Flux (Class) N/A Gas Argon/Co2

Composition 75/25

Flux N/A

Flow Rate 40-50 CFH (19-23.5 l/min)

Gas Cup Size N/A

POSITION

Groove: N/A Fillet: ***3F*** Flat Surfacing: ☐

Vertical Progression: Up ☑ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐

Pulse ☐

Other: *N/A*

Current: AC ☐ DCEP ☑ DCEN ☐

Power Source: CC ☐ CV ☑

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: *Stringer/ Weave*

Multi-pass or Single Pass (per side) *Multi-pass*

Number of Electrodes Single

Contact Tip to Work Distance *3/4" (19.1 mm)*

Peening Yes ☐ NO ☑

Interpass Cleaning YES ☑ NO ☐

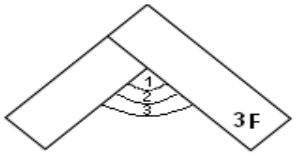
Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A

Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	6 ipm (.15 m/min)	
2	Weave	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	5.3 ipm (.13 m/min)	
3	Weave	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	4.3 ipm (.11 m/min)	

This document is intended for training purposes only

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **FCAW-G**

Type: Manual ☐ Semi-Automatic ☑

Machine ☐ Automatic ☐

Identification # VRTEX® FCAW # 35

Revision ____ Date ____ by ____

Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 35

JOINT DESIGN USED

Type:

Lap ☐ Tee ☐ Butt ☑

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☑ NO ☐

Root Opening *1/4" (6 mm)* Root Face Dimension N/A

Groove Angle: *45 degree included*

Back Gouging: Yes ☑ NO ☐ Method N/A

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove ***3/8" (10 mm)*** Fillet N/A

FILLER METALS

AWS Specification *A5.20*

AWS Classification ***E71T-1***

SHIELDING

Electrode Flux (Class) N/A

Flux N/A

Gas Argon/Co2

Composition 75/25

Flow Rate 40-50 CFH (19-23.5 l/min)

Gas Cup Size N/A

POSITION

Groove: ***1G*** Fillet: N/A Flat Surfacing ☐

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐ Pulse ☐

Other: *N/A*

Current: AC ☐ DCEP ☑ DCEN ☐

Power Source: CC ☐ CV ☑

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: *Stringer*

Multi-pass or Single Pass (per side) *Multi-pass*

Number of Electrodes Single

Contact Tip to Work Distance *3/4" (19.1 mm)*

Peening Yes ☐ NO ☑

Interpass Cleaning YES ☑ NO ☐

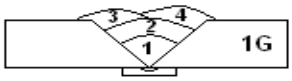
Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A

Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	8.8 ipm (.22 m/min)	
2	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	8.9 ipm (.23 m/min)	
3	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	9.8 ipm (9.8 m/min)	
4	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	9.3 ipm (9.3 m/min)	

This document is intended for training purposes only

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name: VRTEX® VRAW™

Welding Process: **FCAW-G**

Type: Manual ☐ Semi-Automatic ☑

Machine ☐ Automatic ☐

Identification #: VRTEX® FCAW # 36

Revision: ____ Date: ____ by: ____

Authorized by: ____ Date: ____

Supporting PQR No.(s): PQR VRTEX® 36

JOINT DESIGN USED

Type:

Lap ☐ Tee ☐ Butt ☑

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☑ NO ☐

Root Opening: *1/4" (6 mm)* Root Face Dimension: N/A

Groove Angle: *45 degree included*

Back Gouging: Yes ☐ NO ☑ Method: N/A

BASE MATERIAL

Material Spec.: ASTM A36

Type or Grade: *N/A*

Thickness: Groove **3/8" (10 mm)** Fillet: N/A

FILLER METALS

AWS Specification: *A5.20*

AWS Classification: ***E71T-1***

SHIELDING

Electrode Flux (Class): N/A

Flux: N/A

Gas: Argon/Co2

Composition: 75/25

Flow Rate: 40-50 CFH (19-23.5 l/min)

Gas Cup Size: N/A

POSITION

Groove: ***2G*** Fillet: N/A Flat Surfacing ☐

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐ Pulse ☐

Other: *N/A*

Current: AC ☐ DCEP ☑ DCEN ☐

Power Source: CC ☐ CV ☑

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: *Stringer*

Multi-pass or Single Pass (per side): *Multi-pass*

Number of Electrodes: Single

Contact Tip to Work Distance: *3/4" (19.1 mm)*

Peening: Yes ☐ NO ☑

Interpass Cleaning: YES ☑ NO ☐

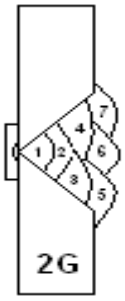
Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min.: N/A Max: N/A

Interpass Temp. Min.: N/A Max: N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	6.8 ipm (.17 m/min)	
2	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	15 ipm (.38 m/min)	
3	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	9.9 ipm (.25 m/min)	
4	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	14.1 ipm (.36 m/min)	
5	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	14.6 ipm (.37 m/min)	
6	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	14.1 ipm (.36 m/min)	
7	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	16.5 ipm (.42 m/min)	

This document is intended for training purposes only

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **FCAW-G**

Type: Manual ☐ Semi-Automatic ☑

Machine ☐ Automatic ☐

Identification # VRTEX® FCAW # 37

Revision ____ Date ____ by ____

Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 37

JOINT DESIGN USED

Type:

Lap ☐ Tee ☐ Butt ☑

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☑ NO ☐

Root Opening *1/4" (6 mm)* Root Face Dimension N/A

Groove Angle: *45 degree included*

Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove ***3/8" (10 mm)*** Fillet N/A

FILLER METALS

AWS Specification *A5.20*

AWS Classification ***E71T-1***

SHIELDING

Electrode Flux (Class) N/A

Flux N/A

Gas Argon/Co2

Composition 75/25

Flow Rate 40-50 CFH (19-23.5 l/min)

Gas Cup Size N/A

POSITION

Groove: ***3G*** Fillet: N/A Flat Surfacing ☐

Vertical Progression: Up ☑ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐ Pulse ☐

Other: *N/A*

Current: AC ☐ DCEP ☑ DCEN ☐

Power Source: CC ☐ CV ☑

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: *Stringer/ Weave*

Multi-pass or Single Pass (per side) *Multi-pass*

Number of Electrodes Single

Contact Tip to Work Distance *3/4" (19 mm)*

Peening Yes ☐ NO ☑

Interpass Cleaning YES ☑ NO ☐

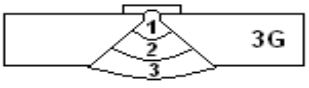
Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A

Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	8.6 ipm (.22 m/min)	
2	Weave	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	7 ipm (.18 m/min)	
3	Weave	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	11.3 ipm (.29 m/min)	

This document is intended for training purposes only

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **FCAW-S**

Type: Manual ☐ Semi-Automatic ☑

Machine ☐ Automatic ☐

Identification # VRTEX® FCAW # 38

Revision ____ Date ____ by ____

Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 38

JOINT DESIGN USED

Type:

Lap ☐ Tee ☐ Butt ☐

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☐ NO ☑

Root Opening N/A Root Face Dimension N/A

Groove Angle: N/A

Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove N/A Fillet N/A

FILLER METALS

AWS Specification *A5.20*

AWS Classification ***E71T-8***

SHIELDING

Electrode Flux (Class) N/A Gas N/A

Composition N/A

Flux N/A

Flow Rate N/A

Gas Cup Size N/A

POSITION

Groove: N/A Fillet: N/A Flat Surfacing: ☑

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐

Pulse ☐

Other: *N/A*

Current: AC ☐ DCEP ☐ DCEN ☑

Power Source: CC ☐ CV ☑

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: *Stringer*

Multi-pass or Single Pass (per side) *Single Pass*

Number of Electrodes Single

Contact Tip to Work Distance *1" (25 mm)*

Peening Yes ☐ NO ☑

Interpass Cleaning YES ☑ NO ☐

Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A

Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E71T-8	5/64" (2.0 mm)	DC-	140 (3.5 m/min)	20	13.5 ipm (.34 m/min)	

This document is intended for training purposes only

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **FCAW-S**

Type: Manual ☐ Semi-Automatic ☑

Machine ☐ Automatic ☐

Identification # VRTEX® FCAW # 39

Revision ____ Date ____ by ____

Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 39

JOINT DESIGN USED

Type:

Lap ☐ Tee ☑ Butt ☐

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☐ NO ☑

Root Opening N/A Root Face Dimension N/A

Groove Angle: N/A

Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove N/A Fillet **3/8" (10 mm)**

FILLER METALS

AWS Specification *A5.20*

AWS Classification ***E71T-8***

SHIELDING

Electrode Flux (Class) N/A Gas N/A

Composition N/A

Flux N/A

Flow Rate N/A

Gas Cup Size N/A

POSITION

Groove: N/A Fillet: ***2F*** Flat Surfacing: ☐

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐

Pulse ☐

Other: *N/A*

Current: AC ☐ DCEP ☐ DCEN ☑

Power Source: CC ☐ CV ☑

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: *Stringer*

Multi-pass or Single Pass (per side) *Multi-pass*

Number of Electrodes Single

Contact Tip to Work Distance *1" (25 mm)*

Peening Yes ☐ NO ☑

Interpass Cleaning YES ☑ NO ☐

Cleaning Method: Chipping Hammer and Wire Brush

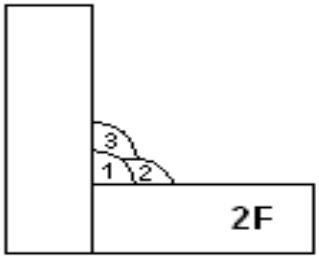
PREHEAT

Preheat Temp. Min. N/A Max N/A

Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E71T-8	5/64" (2.0 mm)	DC-	155 (4.0 m/min)	21	11.5 ipm (.29 m/min)	
2	Stringer	E71T-8	5/64" (2.0 mm)	DC-	155 (4.0 m/min)	21	13.6 ipm (.35 m/min)	
3	Stringer	E71T-8	5/64" (2.0 mm)	DC-	155 (4.0 m/min)	21	14 ipm (.36 m/min)	



This document is intended for training purposes only

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **FCAW-S**

Type: Manual ☐ Semi-Automatic ☑

Machine ☐ Automatic ☐

Identification # VRTEX® FCAW # 40

Revision ____ Date ____ by ____

Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 40

JOINT DESIGN USED

Type:

Lap ☐ Tee ☑ Butt ☐

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☐ NO ☑

Root Opening N/A Root Face Dimension N/A

Groove Angle: N/A

Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove N/A Fillet ***3/8" (10 mm)***

FILLER METALS

AWS Specification *A5.20*

AWS Classification ***E71T-8***

SHIELDING

Electrode Flux (Class) N/A Gas N/A

Composition N/A

Flux N/A

Flow Rate N/A

Gas Cup Size N/A

POSITION

Groove: N/A Fillet: ***3F*** Flat Surfacing: ☐

Vertical Progression: Up ☑ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐

Pulse ☐

Other: *N/A*

Current: AC ☐ DCEP ☐ DCEN ☑

Power Source: CC ☐ CV ☑

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: *Stringer/ Weave*

Multi-pass or Single Pass (per side) *Multi-pass*

Number of Electrodes Single

Contact Tip to Work Distance *1" (25 mm)*

Peening Yes ☐ NO ☑

Interpass Cleaning YES ☑ NO ☐

Cleaning Method: Chipping Hammer and Wire Brush

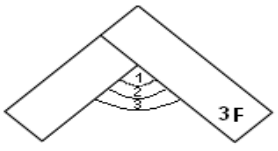
PREHEAT

Preheat Temp. Min. N/A Max N/A

Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E71T-8	5/64" (2.0 mm)	DC-	155 (4.0 m/min)	20	12.8 ipm (.33 m/min)	
2	Weave	E71T-8	5/64" (2.0 mm)	DC-	155 (4.0 m/min)	20	5.3 ipm (.13 m/min)	
3	Weave	E71T-8	5/64" (2.0 mm)	DC-	155 (4.0 m/min)	20	4.3 ipm (.11 m/min)	



This document is intended for training purposes only

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **FCAW-S**

Type: Manual ☐ Semi-Automatic ☑

Machine ☐ Automatic ☐

Identification # VRTEX® FCAW # 41

Revision ____ Date ____ by ____

Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 41

JOINT DESIGN USED

Type:

Lap ☐ Tee ☐ Butt ☑

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☑ NO ☐

Root Opening *1/4" (6 mm)* Root Face Dimension N/A

Groove Angle: *45 degree included*

Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove ***3/8" (10 mm)*** Fillet N/A

FILLER METALS

AWS Specification *A5.20*

AWS Classification ***E71T-8***

SHIELDING

Electrode Flux (Class) N/A

Flux N/A

Gas N/A

Composition N/A

Flow Rate N/A

Gas Cup Size N/A

POSITION

Groove: ***1G*** Fillet: N/A Flat Surfacing: ☐

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐

Pulse ☐

Other: *N/A*

Current: AC ☐ DCEP ☐ DCEN ☑

Power Source: CC ☐ CV ☑

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: *Stringer*

Multi-pass or Single Pass (per side) *Multi-pass*

Number of Electrodes Single

Contact Tip to Work Distance *1" (25 mm)*

Peening Yes ☐ NO ☑

Interpass Cleaning YES ☑ NO ☐

Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A

Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E71T-8	5/64" (2.0 mm)	DC-	130 (3.3 m/min)	21	6.8 ipm (.17 m/min)	
2	Stringer	E71T-8	5/64" (2.0 mm)	DC-	130 (3.3 m/min)	21	14.6 ipm (.37 m/min)	
3	Stringer	E71T-8	5/64" (2.0 mm)	DC-	130 (3.3 m/min)	21	14.2 ipm (.36 m/min)	
4	Stringer	E71T-8	5/64" (2.0 mm)	DC-	130 (3.3 m/min)	21	12.2 ipm (.31 m/min)	
5	Stringer	E71T-8	5/64" (2.0 mm)	DC-	130 (3.3 m/min)	21	9.7 ipm (.25 m/min)	

This document is intended for training purposes only

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **FCAW-S**
Type: Manual ☐ Semi-Automatic ☑
Machine ☐ Automatic ☐

Identification # VRTEX® FCAW # 42
Revision ____ Date ____ by ____
Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 42

JOINT DESIGN USED

Type:
Lap ☐ Tee ☐ Butt ☑
Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐
Backing: YES ☑ NO ☐
Root Opening *1/4" (6 mm)* Root Face Dimension N/A
Groove Angle: *45 degree included*
Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36
Type or Grade *N/A*
Thickness: Groove ***3/8" (10 mm)*** Fillet N/A

FILLER METALS

AWS Specification *A5.20*
AWS Classification ***E71T-8***

SHIELDING

Electrode Flux (Class) N/A
Flux N/A
Gas N/A
Composition N/A
Flow Rate N/A
Gas Cup Size N/A

POSITION

Groove: ***2G*** Fillet: N/A Flat Surfacing: ☐
Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐
Pulse ☐
Other: *N/A*
Current: AC ☐ DCEP ☐ DCEN ☑
Power Source: CC ☐ CV ☑
Tungsten Electrode (GTAW)
Size: N/A
Type: N/A

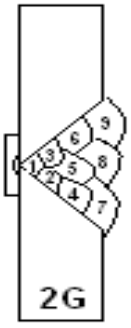
TECHNIQUE

Stringer, Weave Bead, Other: *Stringer*
Multi-pass or Single Pass (per side) *Multi-pass*
Number of Electrodes Single
Contact Tip to Work Distance *1" (25 mm)*
Peening Yes ☐ NO ☑
Interpass Cleaning YES ☑ NO ☐
Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. N/A Max N/A
Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals Class	Filler Metals Diameter	Current Type & Polarity	Current Wire Feed Speed	Volts	Travel Speed	Joint Details
1	Stringer	E71T-8	5/64" (2.0 mm)	DC-	130 (3.3 m/min)	21	12.2 ipm (.31 m/min)	
2	Stringer	E71T-8	5/64" (2.0 mm)	DC-	130 (3.3 m/min)	21	8.5 ipm (.22 m/min)	
3	Stringer	E71T-8	5/64" (2.0 mm)	DC-	130 (3.3 m/min)	21	12.1 ipm (.31 m/min)	
4	Stringer	E71T-8	5/64" (2.0 mm)	DC-	130 (3.3 m/min)	21	11.6 ipm (.30 m/min)	
5	Stringer	E71T-8	5/64" (2.0 mm)	DC-	130 (3.3 m/min)	21	9.8 ipm (.25 m/min)	
6	Stringer	E71T-8	5/64" (2.0 mm)	DC-	130 (3.3 m/min)	21	10.6 ipm (.27 m/min)	
7	Stringer	E71T-8	5/64" (2.0 mm)	DC-	130 (3.3 m/min)	21	14.2 ipm (.36 m/min)	
8	Stringer	E71T-8	5/64" (2.0 mm)	DC-	130 (3.3 m/min)	21	12.8 ipm (.33 m/min)	
9	Stringer	E71T-8	5/64" (2.0 mm)	DC-	130 (3.3 m/min)	21	12.8 ipm (.33 m/min)	

This document is intended for training purposes only

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **FCAW-S**

Type: Manual ☐ Semi-Automatic ☑

Machine ☐ Automatic ☐

Identification # VRTEX® FCAW # 43

Revision ____ Date ____ by ____

Authorized by ____ Date ____

Supporting PQR No.(s) PQR VRTEX® 43

JOINT DESIGN USED

Type:

Lap ☐ Tee ☐ Butt ☑

Corner ☐ Edge ☐

Single Weld ☑ Double Weld ☐

Backing: YES ☑ NO ☐

Root Opening *1/4" (6 mm)* Root Face Dimension N/A

Groove Angle: *45 degree included*

Back Gouging: Yes ☐ NO ☑ Method N/A

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove ***3/8" (10 mm)*** Fillet N/A

FILLER METALS

AWS Specification *A5.20*

AWS Classification ***E71T-8***

SHIELDING

Electrode Flux (Class) N/A Gas N/A

Composition N/A

Flux N/A

Flow Rate N/A

Gas Cup Size N/A

POSITION

Groove: ***3G*** Fillet: N/A Flat Surfacing: ☐

Vertical Progression: Up ☑ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐

Pulse ☐

Other: *N/A*

Current: AC ☐ DCEP ☐ DCEN ☑

Power Source: CC ☐ CV ☑

Tungsten Electrode (GTAW)

Size: N/A

Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: *Stringer/ Weave*

Multi-pass or Single Pass (per side) *Multi-pass*

Number of Electrodes Single

Contact Tip to Work Distance *1" (25 mm)*

Peening Yes ☐ NO ☑

Interpass Cleaning YES ☑ NO ☐

Cleaning Method: Chipping Hammer and Wire Brush

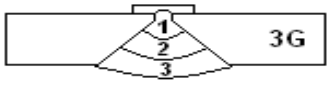
PREHEAT

Preheat Temp. Min. N/A Max N/A

Interpass Temp. Min. N/A Max N/A

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E71T-8	5/64" (2.0 mm)	DC-	125 (3.2 m/min)	19.5	5.2 ipm (.13 m/min)	
2	Weave	E71T-8	5/64" (2.0 mm)	DC-	125 (3.2 m/min)	19.5	6.4 ipm (.16 m/min)	
3	Weave	E71T-8	5/64" (2.0 mm)	DC-	125 (3.2 m/min)	19.5	6.2 ipm (.16 m/min)	



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WELDING PROCEDURE SPECIFICATION (WPS)

Company Name _____

Welding Process _____

Type: Manual ☐ Semi-Automatic ☐

Machine ☐ Automatic ☐

Identification # _____

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) _____

JOINT DESIGN USED

Type:

Lap ☐ Tee ☐ Butt ☐

Corner ☐ Edge ☐

Single Weld ☐ Double Weld ☐

Backing: YES ☐ NO ☐

Root Opening _____ Root Face Dimension _____

Groove Angle: _____

Back Gouging: Yes ☐ NO ☐ Method _____

BASE MATERIAL

Material Spec. _____

Type or Grade _____

Thickness: Groove _____ Fillet _____

FILLER METALS

AWS Specification _____

AWS Classification _____

SHIELDING

Electrode Flux (Class) _____ Gas _____

Composition _____

Flux _____

Flow Rate _____

Gas Cup Size _____

POSITION

Groove: _____ Fillet: _____ Flat Surfacing: ☐

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐

Pulse ☐

Other: _____

Current: AC ☐ DCEP ☐ DCEN ☐

Power Source: CC ☐ CV ☐

Tungsten Electrode (GTAW)

Size: _____

Type: _____

TECHNIQUE

Stringer, Weave Bead, Other: _____

Multi-pass or Single Pass (per side) _____

Number of Electrodes _____

Contact Tip to Work Distance _____

Peening Yes ☐ NO ☐

Interpass Cleaning YES ☐ NO ☐

Cleaning Method: Chipping Hammer and Wire Brush

PREHEAT

Preheat Temp. Min. _____ Max _____

Interpass Temp. Min. _____ Max _____

WELDING PROCEDURE

Pass or Weld Layer(s)	Technique	Filler Metals		Current		Travel Speed	Volt or Trim	Joint Details
		Class	Diameter	Type & Polarity	AMPS or WFS			

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