VRTEX® ENGAGE™

WELDING PROCEDURE SPECIFICATIONS

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LINCOLN® ELECTRIC

VRTEX® Engage™

WELDING PROCEDURE SPECIFICATIONS

S21400-47 Revision A.04
Use MC15-120 for ordering replacement

VRTEX® Engage™ - 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	GMAW - S	.035" (.89 mm) ER70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	Flat	1/4" (6.4 mm)	250 (+ 5) (6.3 m/min)	18	DC+
2	GMAW - S	.035" (.89 mm) ER70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	2F	10 GA.(3.2 mm)	250 (+ 5) (6.3 m/min)	18	DC+
3	GMAW-S	.035" (.89 mm) ER70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	2F	1/4" (6.4 mm)	375 (+ 5) (9.5 m/min)	20	DC+
4	GMAW - S	.035" (.89 mm) ER70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	1G	3/8" (9.6 mm)	350 (+ 5) (8.9 m/min)	20	DC+
5	GMAW - S	.035" (.89 mm) ER70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	2G	3/8" (9.6 mm)	320 (+ 5) (8.0 m/min)	19.5	DC+
6	GMAW - Spray	.045" (1.1 mm) ER70S-6	SuperArc L-56	90/10	25-40 (12-18 l/min)	Flat	1/4" (6.4 mm)	400 (+ 5) (10.0 m/min)	27	DC+
7	GMAW - Spray	.045" (1.1 mm) ER70S-6	SuperArc L-56	90/10	25-40 (12-18 l/min)	2F	3/8" (9.6 mm)	375 (+ 5) (9.5 m/min)	26.5	DC+
8	GMAW - Spray	.045" (1.1 mm) ER70S-6	SuperArc L-56	90/10	25-40 (12-18 l/min)	1G	3/8" (9.6 mm)	370 (+ 5) (9.4 m/min)	26.5	DC+
9	GMAW - Pulse	.045" (1.1 mm) ER70S-6	SuperArc L-56	90/10	25-40 (12-18 l/min)	2G	3/8" (9.6 mm)	130 (+ 5) (3.3 m/min)	.95(trim)	DC+
10	FCAW - S	5/64" (2.0 mm) E71T-8	NR- 232/233	NA	NA	Flat	1/4" (6.4 mm)	140 (+ 5) (3.5 m/min)	20	DC-
11	FCAW - S	5/64" (2.0 mm) E71T-8	NR- 232/233	NA	NA	2F	3/8" (9.6 mm)	155 (+ 5) (4.0 m/min)	21	DC-
12	FCAW - S	5/64" (2.0 mm) E71T-8	NR- 232/233	NA	NA	1G	3/8" (9.6 mm)	130 (+ 5) (3.3 m/min)	21	DC-
13	FCAW - S	5/64" (2.0 mm) E71T-8	NR- 232/233	NA	NA	2G	3/8" (9.6 mm)	130 (+ 5) (3.3 m/min)	21	DC-
14	GMAW-S	.035" (.89 mm) ER70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	Flat Pad	1/4" (6.4 mm)	250 (+ 5) (6.3 m/min)	18	DC+
15	GMAW - Spray	.045" (1.1 mm) ER70S-6	SuperArc L-56	90/10	25-40 (12-18 l/min)	Flat Pad	1/4" (6.4 mm)	400 (+ 5) (10.0 m/min)	27	DC+
16	FCAW - S	5/64" (2.0 mm) E71T-8	NR- 232/233	NA	NA	Flat Pad	1/4" (6.4 mm)	140 (+ 5) (3.5 m/min)	20	DC-
17	GMAW - S	.035" (.89 mm) ER70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	3F up	1/4" (6.4 mm)	275 (±5) (7.0 m/min)	18	DC+
18	GMAW -S	.035" (.89 MM) ER70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	3F down	10 GA. (3.2 mm)	250 (+ 5) (6.3 m/min)	18	DC+
19	FCAW - S	5/64" (2.0 mm) E71T-8	NR- 232/233	NA	NA	3F up	3/8" (9.6 mm)	155 (+ 5) (4.0 m/min)	21	DC-
20	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	Flat	1/4" (6.4 mm)	100 (±5)	NA	AC
21	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	2F	10 GA. (3.2 mm)	100 (± 5)	NA	AC
22	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	3F down	10 GA. (3.2 mm)	125 (±5)	NA	AC
23	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	1G	3/8" (9.6 mm)	110 (±5)	NA	AC
24	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	2G	3/8" (9.6 mm)	110 (±5)	NA	AC
25	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	Flat Pad	1/4" (6.4 mm)	100 (±5)	NA	AC
26	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	Flat	1/4" (6.4 mm)	125 (±5)	NA	DC+
27	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	2F	3/8" (9.6 mm)	125 (±5)	NA	DC+
28	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	3F up	3/8" (9.6 mm)	125 (±5)	NA	DC+
29	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	1G	3/8" (9.6 mm)	125 (±5)	NA	DC+
30	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	2G	3/8" (9.6 mm)	125 (±5)	NA	DC+
31	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	Flat Pad	1/4" (6.4 mm)	125 (±5)	NA	DC+

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name: VRTEX® VRAW™

Welding Process: **GMAW**

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

Identification #: VRTEX® GMAW # 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: *A5.18*

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: 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 / Trim	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.035" (.89 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 # 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: ***10 GA. (3.2 mm)***

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: ***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 ☑

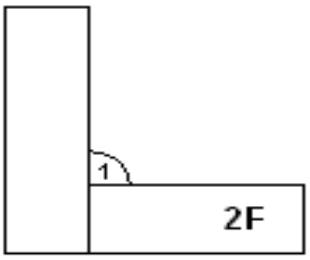
Cleaning Method: None

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 / Trim	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.035" (.89 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 # 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: ***1/4" (6.4 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 ☑

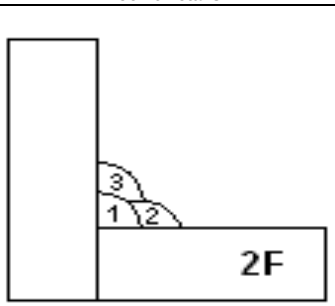
Cleaning Method: None

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 / Trim	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.035" (.89 mm)	DC+	375 (9.5 m/min)	20	12.5 ipm (.32 m/min)	
2	Stringer	E70S-6	.035" (.89 mm)	DC+	375 (9.5 m/min)	20	15 ipm (.38 m/min)	
3	Stringer	E70S-6	.035" (.89 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 # 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" (9.6 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: *75/25*
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

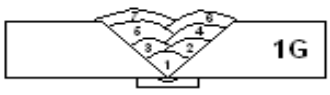
TECHNIQUE

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 / Trim	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.035" (.89 mm)	DC+	350 (8.9 m/min)	20	10.9 ipm (.28 m/min)	
2	Stringer	E70S-6	.035" (.89 mm)	DC+	350 (8.9 m/min)	20	12.8 ipm (.33 m/min)	
3	Stringer	E70S-6	.035" (.89 mm)	DC+	350 (8.9 m/min)	20	12.6 ipm (.32 m/min)	
4	Stringer	E70S-6	.035" (.89 mm)	DC+	350 (8.9 m/min)	20	15 ipm (.38 m/min)	
5	Stringer	E70S-6	.035" (.89 mm)	DC+	350 (8.9 m/min)	20	16 ipm (.41 m/min)	
6	Stringer	E70S-6	.035" (.89 mm)	DC+	350 (8.9 m/min)	20	12.6 ipm (.32 m/min)	
7	Stringer	E70S-6	.035" (.89 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 # 5
Revision: ____ Date: ____ by: ____
Authorized by: ____ Date: ____

Supporting PQR No.(s): PQR VRTEX® 5

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" (9.6 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

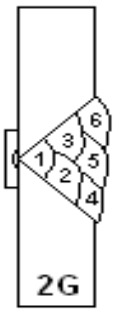
TECHNIQUE

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 / Trim	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.035" (.89 mm)	DC+	320 (8.0 m/min)	19.5	9.8 ipm (.25 m/min)	
2	Stringer	E70S-6	.035" (.89 mm)	DC+	320 (8.0 m/min)	19.5	13.4 ipm (.34 m/min)	
3	Stringer	E70S-6	.035" (.89 mm)	DC+	320 (8.0 m/min)	19.5	14.2 ipm (.36 m/min)	
4	Stringer	E70S-6	.035" (.89 mm)	DC+	320 (8.0 m/min)	19.5	11.6 ipm (.29 m/min)	
5	Stringer	E70S-6	.035" (.89 mm)	DC+	320 (8.0 m/min)	19.5	10.6 ipm (.27 m/min)	
6	Stringer	E70S-6	.035" (.89 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 # 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: 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 Gas: Argon/Co2

Composition: *90/10*

Flux: N/A

Flow Rate: *25-40cfh (12-18 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 / Trim	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.045" (1.1 mm)	DC+	400 (10.0 m/min)	27	20 ipm (.51 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 # 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: ***3/8" (9.6 mm)***

FILLER METALS

AWS Specification: *A5.18*

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

SHIELDING

Electrode Flux (Class): N/A Gas: Argon/Co2
Composition: *90/10*
Flux: N/A
Flow Rate: *25-40cfh (12-18 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

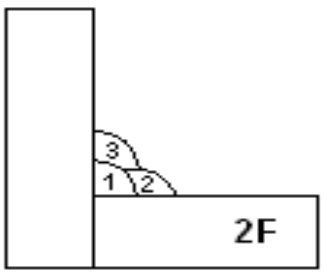
Stringer, Weave Bead, Other: *Stringer*
Multi-pass or Single Pass (per side): *Multi-pass*
Number of Electrodes: Single
Contact Tip to Work Distance: *1/2"*
Peening: Yes ☐ NO ☑
Interpass Cleaning: YES ☐ NO ☑
Cleaning Method: None

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 / Trim	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.045" (1.1 mm)	DC+	375 (9.5 m/min)	26.5	20 ipm (.51 m/min)	
2	Stringer	E70S-6	.045" (1.1 mm)	DC+	375 (9.5 m/min)	26.5	24 ipm (.61 m/min)	
3	Stringer	E70S-6	.045" (1.1 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 # 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: *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" (9.6 mm)*** Fillet: N/A

FILLER METALS

AWS Specification: *A5.18*

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

SHIELDING

Electrode Flux (Class): N/A Gas: Argon/Co2
Composition: *90/10*

Flux: N/A

Flow Rate: *25-40cfh (12-18 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

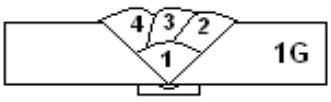
Stringer, Weave Bead, Other: *Stringer*
Multi-pass or Single Pass (per side): *Multi-pass*
Number of Electrodes: Single
Contact Tip to Work Distance: *1/2"*
Peening: Yes ☐ NO ☑
Interpass Cleaning: YES ☐ NO ☑
Cleaning Method: None

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 / Trim	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.045" (1.1 mm)	DC+	370 (9.4 m/min)	26.5	18.4 ipm (.47 m/min)	
2	Stringer	E70S-6	.045" (1.1 mm)	DC+	370 (9.4 m/min)	26.5	21.8 ipm (.55 m/min)	
3	Stringer	E70S-6	.045" (1.1 mm)	DC+	370 (9.4 m/min)	26.5	20 ipm (.51 m/min)	
4	Stringer	E70S-6	.045" (1.1 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 # 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: *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" (9.6 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 (12-18 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

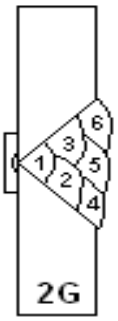
TECHNIQUE

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 / Trim	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	11.5 ipm (.29 m/min)	
2	Stringer	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	7.7 ipm (.20 m/min)	
3	Stringer	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	10 ipm (.25 m/min)	
4	Stringer	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	8.3 ipm (.21 m/min)	
5	Stringer	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	12 ipm (.30 m/min)	
6	Stringer	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	16.6 ipm (.42 m/min)	

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WELDING PROCEDURE SPECIFICATION (WPS)

Company Name: VRTEX® VRAW™

Welding Process: **FCAW-S**

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

Identification #: VRTEX® FCAW # 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: 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)	

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WELDING PROCEDURE SPECIFICATION (WPS)

Company Name: VRTEX® VRAW™

Welding Process: **FCAW-S**

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

Identification #: VRTEX® FCAW # 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: 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" (9.6 mm)***

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: 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

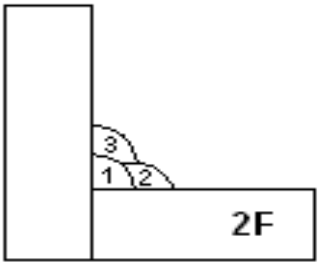
Stringer, Weave Bead, Other: *Stringer*
Multi-pass or Single Pass (per side): *Multi-pass*
Number of Electrodes: Single
Contact Tip to Work Distance: *1" (25 mm)*
Peening: Yes ☐ NO ☑
Interpass Cleaning: YES ☑ NO ☐
Cleaning Method: Chipping Hammer and Wire Brush

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)	



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WELDING PROCEDURE SPECIFICATION (WPS)

Company Name: VRTEX® VRAW™

Welding Process: **FCAW-S**

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

Identification #: VRTEX® FCAW # 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" (9.6 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: ***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

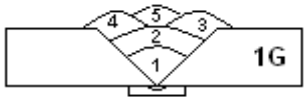
Stringer, Weave Bead, Other: *Stringer*
Multi-pass or Single Pass (per side): *Multi-pass*
Number of Electrodes: Single
Contact Tip to Work Distance: *1" (25 mm)*
Peening: Yes ☐ NO ☑
Interpass Cleaning: YES ☑ NO ☐
Cleaning Method: Chipping Hammer and Wire Brush

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)	



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WELDING PROCEDURE SPECIFICATION (WPS)

Company Name: VRTEX® VRAW™

Welding Process: **FCAW-S**

Type: Manual ☐ Semi-Automatic ☑

Machine ☐ Automatic ☐

Identification #: VRTEX® FCAW # 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: *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" (9.6 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: ***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 ☐

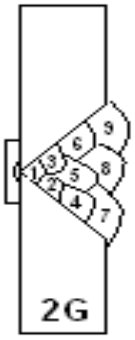
Cleaning Method: Chipping Hammer and Wire Brush

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		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	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)	

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WELDING PROCEDURE SPECIFICATION (WPS)

Company Name: VRTEX® VRAW™

Welding Process: **GMAW**

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

Identification #: VRTEX® GMAW # 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: 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: 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

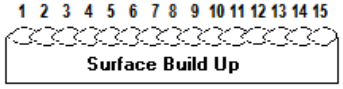
Stringer, Weave Bead, Other: *Stringer*
Multi-pass or Single Pass (per side): *Multi Pass*
Number of Electrodes: Single
Contact Tip to Work Distance: *3/8" (10 mm)*
Peening: Yes ☐ NO ☑
Interpass Cleaning: YES ☐ NO ☑
Cleaning Method: None

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: Class	Filler Metals: Diameter	Current: Type & Polarity	Current: Wire Feed Speed	Volts / Trim	Travel Speed	Joint Details
1	Stringer	E70S-6	.035" (.89 mm)	DC+	250 (6.3 m/min)	18	16 ipm (.41 m/min)	
2	Stringer	E70S-6	.035" (.89 mm)	DC+	250 (6.3 m/min)	18	16 ipm (.41 m/min)	
3	Stringer	E70S-6	.035" (.89 mm)	DC+	250 (6.3 m/min)	18	16 ipm (.41 m/min)	
4	Stringer	E70S-6	.035" (.89 mm)	DC+	250 (6.3 m/min)	18	16 ipm (.41 m/min)	
5	Stringer	E70S-6	.035" (.89 mm)	DC+	250 (6.3 m/min)	18	16 ipm (.41 m/min)	
6	Stringer	E70S-6	.035" (.89 mm)	DC+	250 (6.3 m/min)	18	16 ipm (.41 m/min)	
7	Stringer	E70S-6	.035" (.89 mm)	DC+	250 (6.3 m/min)	18	16 ipm (.41 m/min)	
8	Stringer	E70S-6	.035" (.89 mm)	DC+	250 (6.3 m/min)	18	16 ipm (.41 m/min)	
9	Stringer	E70S-6	.035" (.89 mm)	DC+	250 (6.3 m/min)	18	16 ipm (.41 m/min)	
10	Stringer	E70S-6	.035" (.89 mm)	DC+	250 (6.3 m/min)	18	16 ipm (.41 m/min)	
11	Stringer	E70S-6	.035" (.89 mm)	DC+	250 (6.3 m/min)	18	16 ipm (.41 m/min)	
12	Stringer	E70S-6	.035" (.89 mm)	DC+	250 (6.3 m/min)	18	16 ipm (.41 m/min)	
13	Stringer	E70S-6	.035" (.89 mm)	DC+	250 (6.3 m/min)	18	16 ipm (.41 m/min)	
14	Stringer	E70S-6	.035" (.89 mm)	DC+	250 (6.3 m/min)	18	16 ipm (.41 m/min)	
15	Stringer	E70S-6	.035" (.89 mm)	DC+	250 (6.3 m/min)	18	16 ipm (.41 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 # 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: N/A

FILLER METALS

AWS Specification: *A5.18*

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

SHIELDING

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

Composition: *90/10*

Flux: N/A

Flow Rate: *25-40cfh (12-18 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): *Multi Pass*

Number of Electrodes: Single

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

Peening: Yes ☐ NO ☑

Interpass Cleaning: YES ☐ NO ☑

Cleaning Method: None

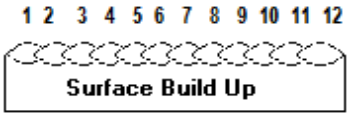
PREHEAT

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: Class	Filler Metals: Diameter	Current: Type & Polarity	Current: Wire Feed Speed	Volts / Trim	Travel Speed	Joint Details
1	Stringer	E70S-6	.045" (1.1 mm)	DC+	400 (10.0 m/min)	27	24 ipm (.61 m/min)	
2	Stringer	E70S-6	.045" (1.1 mm)	DC+	400 (10.0 m/min)	27	24 ipm (.61 m/min)	
3	Stringer	E70S-6	.045" (1.1 mm)	DC+	400 (10.0 m/min)	27	24 ipm (.61 m/min)	
4	Stringer	E70S-6	.045" (1.1 mm)	DC+	400 (10.0 m/min)	27	24 ipm (.61 m/min)	
5	Stringer	E70S-6	.045" (1.1 mm)	DC+	400 (10.0 m/min)	27	24 ipm (.61 m/min)	
6	Stringer	E70S-6	.045" (1.1 mm)	DC+	400 (10.0 m/min)	27	24 ipm (.61 m/min)	
7	Stringer	E70S-6	.045" (1.1 mm)	DC+	400 (10.0 m/min)	27	24 ipm (.61 m/min)	
8	Stringer	E70S-6	.045" (1.1 mm)	DC+	400 (10.0 m/min)	27	24 ipm (.61 m/min)	
9	Stringer	E70S-6	.045" (1.1 mm)	DC+	400 (10.0 m/min)	27	24 ipm (.61 m/min)	
10	Stringer	E70S-6	.045" (1.1 mm)	DC+	400 (10.0 m/min)	27	24 ipm (.61 m/min)	
11	Stringer	E70S-6	.045" (1.1 mm)	DC+	400 (10.0 m/min)	27	24 ipm (.61 m/min)	
12	Stringer	E70S-6	.045" (1.1 mm)	DC+	400 (10.0 m/min)	27	24 ipm (.61 m/min)	



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WELDING PROCEDURE SPECIFICATION (WPS)

Company Name: VRTEX® VRAW™

Welding Process: **FCAW-S**

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

Identification #: VRTEX® FCAW # 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: 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

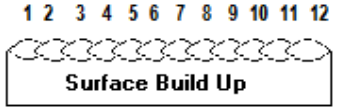
Stringer, Weave Bead, Other: *Stringer*
Multi-pass or Single Pass (per side): *Multi Pass*
Number of Electrodes: Single
Contact Tip to Work Distance: *1" (25 mm)*
Peening: Yes ☐ NO ☑
Interpass Cleaning: YES ☑ NO ☐
Cleaning Method: Chipping Hammer and Wire Brush

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-	140 (3.5 m/min)	20	13.5 ipm (.34 m/min)	
2	Stringer	E71T-8	5/64" (2.0 mm)	DC-	140 (3.5 m/min)	20	13.5 ipm (.34 m/min)	
3	Stringer	E71T-8	5/64" (2.0 mm)	DC-	140 (3.5 m/min)	20	13.5 ipm (.34 m/min)	
4	Stringer	E71T-8	5/64" (2.0 mm)	DC-	140 (3.5 m/min)	20	13.5 ipm (.34 m/min)	
5	Stringer	E71T-8	5/64" (2.0 mm)	DC-	140 (3.5 m/min)	20	13.5 ipm (.34 m/min)	
6	Stringer	E71T-8	5/64" (2.0 mm)	DC-	140 (3.5 m/min)	20	13.5 ipm (.34 m/min)	
7	Stringer	E71T-8	5/64" (2.0 mm)	DC-	140 (3.5 m/min)	20	13.5 ipm (.34 m/min)	
8	Stringer	E71T-8	5/64" (2.0 mm)	DC-	140 (3.5 m/min)	20	13.5 ipm (.34 m/min)	
9	Stringer	E71T-8	5/64" (2.0 mm)	DC-	140 (3.5 m/min)	20	13.5 ipm (.34 m/min)	
10	Stringer	E71T-8	5/64" (2.0 mm)	DC-	140 (3.5 m/min)	20	13.5 ipm (.34 m/min)	
11	Stringer	E71T-8	5/64" (2.0 mm)	DC-	140 (3.5 m/min)	20	13.5 ipm (.34 m/min)	
12	Stringer	E71T-9	5/64" (2.0 mm)	DC-	140 (3.5 m/min)	20	13.5 ipm (.34 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 # 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: 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" (6.4 mm)***

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: ***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 ☑

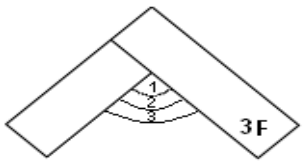
Cleaning Method: None

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 / Trim	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.035" (.89 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 # 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: 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. (3.2 mm)***

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: ***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 ☑

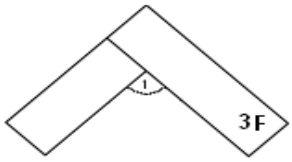
Cleaning Method: None

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 / Trim	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.035" (.89 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: **FCAW-S**

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

Identification #: VRTEX® FCAW # 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 ***3/8" (9.6 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

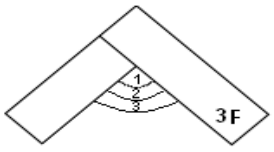
Stringer, Weave Bead, Other: *Stringer/ Weave*
Multi-pass or Single Pass (per side): *Multi-pass*
Number of Electrodes: Single
Contact Tip to Work Distance: *1" (25 mm)*
Peening: Yes ☐ NO ☑
Interpass Cleaning: YES ☑ NO ☐
Cleaning Method: Chipping Hammer and Wire Brush

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)	21	12.8 ipm (.33 m/min)	
2	Weave	E71T-8	5/64" (2.0 mm)	DC-	155 (4.0 m/min)	21	5.3 ipm (.13 m/min)	
3	Weave	E71T-8	5/64" (2.0 mm)	DC-	155 (4.0 m/min)	21	4.3 ipm (.11 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 # 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 *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	Type & Polarity	AMPS		
1	Stringer	E6013	1/8" (3.2 mm)	AC	100 ± 5	9 ipm ± 10% (.23 m/min)	

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **SMAW**

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

Identification # VRTEX® SMAW # 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 ____ Fillet ***10 GA (3.2 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

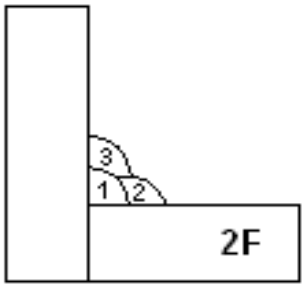
TECHNIQUE

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	9.2 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 # 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 ____ Fillet ***10 GA (3.2 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 ☑

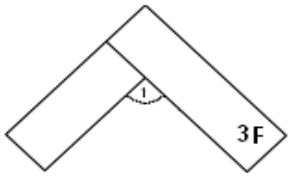
Cleaning Method: Chipping Hammer and Wire Brush

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	16.2 ipm ± 10% (.41 m/min)	

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **SMAW**

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

Identification # VRTEX® SMAW # 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 1/4" 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" (9.6 mm)*** Fillet ____

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: ***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

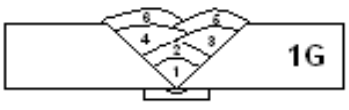
TECHNIQUE

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	E6013	1/8" (3.2 mm)	AC	110± 5	4.5 ipm ± 10% (.11 m/min)	
2	Straight Weave	E6013	1/8" (3.2 mm)	AC	110± 5	4.6 ipm ± 10% (.12 m/min)	
3	Stringer	E6013	1/8" (3.2 mm)	AC	110± 5	5.8 ipm ± 10% (.15 m/min)	
4	Stringer	E6013	1/8" (3.2 mm)	AC	110± 5	6.4 ipm ± 10% (.17 m/min)	
5	Stringer	E6013	1/8" (3.2 mm)	AC	110± 5	4.3 ipm ± 10% (.11 m/min)	
6	Stringer	E6013	1/8" (3.2 mm)	AC	110± 5	3.7 ipm ± 10% (.09 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 # 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" 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" (9.6 mm)*** Fillet ____

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: ***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	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	6.3 ipm ± 10% (.16 m/min)	
3	Stringer	E6013	1/8" (3.2 mm)	AC	110± 5	8.2 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	5.3 ipm ± 10% (.14 m/min)	
6	Stringer	E6013	1/8" (3.2 mm)	AC	110± 5	6.1 ipm ± 10% (.16 m.min)	
7	Stringer	E6013	1/8" (3.2 mm)	AC	110± 5	7.6 ipm ± 10% (.19 m/min)	
8	Stringer	E6013	1/8" (3.2 mm)	AC	110± 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 # 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 N/A Root Face Dimension N/A

Groove Angle: N/A

Back Gouging: Yes ☐ NO ☑ Method 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

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove *N/A* Fillet *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

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

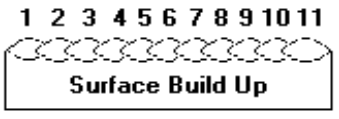
Gas Cup Size N/A

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" (3.2mm)	AC	100 ± 5	9 ipm ± 10% (.23 m/min)	
3	Stringer	E6013	1/8" (3.2 mm)	AC	100 ± 5	9 ipm ± 10% (.23 m/min)	
4	Stringer	E6013	1/8" (3.2mm)	AC	100 ± 5	9 ipm ± 10% (.23 m/min)	
5	Stringer	E6013	1/8" (3.2 mm)	AC	100 ± 5	9 ipm ± 10% (.23 m/min)	
6	Stringer	E6013	1/8" (3.2mm)	AC	100 ± 5	9 ipm ± 10% (.23 m/min)	
7	Stringer	E6013	1/8" (3.2 mm)	AC	100 ± 5	9 ipm ± 10% (.23 m/min)	
8	Stringer	E6013	1/8" (3.2mm)	AC	100 ± 5	9 ipm ± 10% (.23 m/min)	
9	Stringer	E6013	1/8" (3.2 mm)	AC	100 ± 5	9 ipm ± 10% (.23 m/min)	
10	Stringer	E6013	1/8" (3.2mm)	AC	100 ± 5	9 ipm ± 10% (.23 m/min)	
11	Stringer	E6013	1/8" (3.2 mm)	AC	100 ± 5	9 ipm ± 10% (.23 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 # 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 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
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	Type & Polarity	AMPS		
1	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	9.6 ipm ± 10% (.24 m/min)	

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **SMAW**

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

Identification # VRTEX® SMAW # 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 ____ Fillet ***3/8" (9.6 mm)***

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: *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

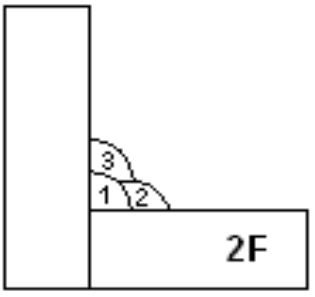
Stringer, Weave Bead, Other: Stringer
Multi-pass or Single Pass (per side) *Multi-pass*
Number of Electrodes Single
Contact Tip to Work Distance *N/A*
Peening Yes ☐ NO ☑
Interpass Cleaning YES ☑ NO ☐
Cleaning Method: Chipping Hammer and Wire Brush

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	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)	



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WELDING PROCEDURE SPECIFICATION (WPS)

Company Name VRTEX® VRAW™

Welding Process **SMAW**

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

Identification # VRTEX® SMAW # 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 ____ Fillet ***3/8" (9.6 mm)***

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: *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

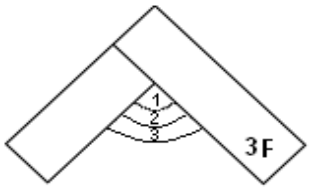
TECHNIQUE

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	Type & Polarity	AMPS		
1	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	3.9 ipm ± 10% (.10 m/min)	
2	Straight Weave	E7018	1/8" (3.2 mm)	DC+	125 ± 5	3.4 ipm ± 10% (.09 m/min)	
3	Straight Weave	E7018	1/8" (3.2 mm)	DC+	125 ± 5	2.3 ipm ± 10% (.6 m/min)	

WELDING PROCEDURE SPECIFICATION (WPS)

Company Name: VRTEX® VRAW™

Welding Process: **SMAW**

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

Identification #: VRTEX® SMAW # 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" 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" (9.6 mm)*** Fillet: ____

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

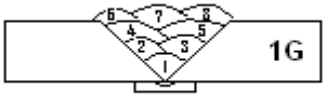
TECHNIQUE

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% (.17 m/min)	
4	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	7 ipm + 10% (.17 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 # 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" 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" (9.6 mm)*** Fillet ____

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: ***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	7.5 ipm ± 10% (.15 m/min)	
3	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	6.9 ipm ± 10% (.23 m/min)	
4	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	7.8 ipm ± 10% (.19 m/min)	
5	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	7.8 ipm ± 10% (.18 m/min)	
6	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	9.1 ipm ± 10% (.20 m/min)	
7	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	9.1 ipm + 10% (.20 m/min)	
8	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 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 # 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 N/A Root Face Dimension N/A

Groove Angle: N/A

Back Gouging: Yes ☐ NO ☑ Method 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

BASE MATERIAL

Material Spec. ASTM A36

Type or Grade *N/A*

Thickness: Groove *N/A* Fillet *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

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

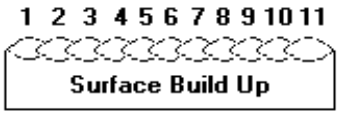
Gas Cup Size N/A

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	9.6 ipm ± 10% (.24 m/min)	
2	Stringer	E7018	1/8" (3.2mm)	DC+	125 ± 5	9.6 ipm + 10% (.24 m/min)	
3	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	9.6 ipm ± 10% (.24 m/min)	
4	Stringer	E7018	1/8" (3.2mm)	DC+	125 ± 5	9.6 ipm + 10% (.24 m/min)	
5	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	9.6 ipm ± 10% (.24 m/min)	
6	Stringer	E7018	1/8" (3.2mm)	DC+	125 ± 5	9.6 ipm + 10% (.24 m/min)	
7	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	9.6 ipm ± 10% (.24 m/min)	
8	Stringer	E7018	1/8" (3.2mm)	DC+	125 ± 5	9.6 ipm + 10% (.24 m/min)	
9	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	9.6 ipm ± 10% (.24 m/min)	
10	Stringer	E7018	1/8" (3.2mm)	DC+	125 ± 5	9.6 ipm + 10% (.24 m/min)	
11	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 _____

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			

This document is intended for training purposes only

The Lincoln Electric Company
22801 St. Clair Avenue · Cleveland, OH · 44117-1199 · U.S.A.
www.lincolnelectric.com

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