

VRTEX® 360
WELDING PROCEDURE SPECIFICATIONS

VRTEX® 360 - Default Weld Process Settings (Standard Production Software Set 1)										
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" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	Flat	1/4" (6.4 mm)	90 (±5)	NA	DC+
2,3,4	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	2F, 3F up, 4F	3/8" (9.6 mm)	90 (±5)	NA	DC+
5,6,7,8	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	1G, 2G, 3G up, 4G	3/8" (9.6 mm)	90 (±5)	NA	DC+
9	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	Flat	1/4" (6.4 mm)	125 (±5)	NA	DC+
10,11,12	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	2F, 3F up, 4F	3/8" (9.6 mm)	125 (±5)	NA	DC+
13,14,15,16	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	1G, 2G, 3G up, 4G	3/8" (9.6 mm)	125 (±5)	NA	DC+
17	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	Flat	1/4" (6.4 mm)	100 (±5)	NA	AC
18	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	2F	10 GA. (3.2 mm)	100 (±5)	NA	AC
19	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	3F down	10 GA. (3.2 mm)	125 (±5)	NA	AC
20	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	4F	10 GA. (3.2 mm)	100 (±5)	NA	AC
21,22	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	1G, 2G	3/8" (9.6 mm)	110 (±5)	NA	AC
23,24	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	3G, 4G	3/8" (9.6 mm)	90 (±5)	NA	AC
25	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	2G Pipe	6" (150 mm)	Root: 80 (±5)	NA	DC+
								Hot: 100 (±5)		
								Fill/Cap: 80 (±5)		
26	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	5G Pipe up	6" (150 mm)	Root: 80 (±5)	NA	DC+
								Hot: 100 (±5)		
								Fill/Cap: 80 (±5)		
27	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	6G Pipe up	6" (150 mm)	Root: 80 (±5)	NA	DC+
								Hot: 100 (±5)		
								Fill/Cap: 80 (±5)		
28	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	2G Pipe	6" (150 mm)	Root: 90 (±5)	NA	DC+
		3/32" (2.4 mm) E7018	Excalibur 7018					Hot: 100 (±5)		
								Fill/Cap: 80 (±5)		
29	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	5G Pipe up	6" (150 mm)	Root: 90 (±5)	NA	DC+
		3/32" (2.4 mm) E7018	Excalibur 7018					Hot: 100 (±5)		
								Fill/Cap: 80 (±5)		
30	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	6G Pipe up	6" (150 mm)	Root: 90 (±5)	NA	DC+
		3/32" (2.4 mm) E7018	Excalibur 7018					Hot: 100 (±5)		
								Fill/Cap: 80 (±5)		
31	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	2G Pipe	2" (50 mm)	Root: 90 (±5)	NA	DC+
		3/32" (2.4 mm) E7018	Excalibur 7018					Hot: 100 (±5)		
								Fill/Cap: 80 (±5)		
32	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	5G Pipe up	2" (50 mm)	Root: 90 (±5)	NA	DC+
		3/32" (2.4 mm) E7018	Excalibur 7018					Hot: 100 (±5)		
								Fill/Cap: 80 (±5)		
33	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	6G Pipe up	2" (50 mm)	Root: 90 (±5)	NA	DC+
		3/32" (2.4 mm) E7018	Excalibur 7018					Hot: 100 (±5)		
								Fill/Cap: 80 (±5)		
34	SMAW	3/32" (2.4 mm) E7018	Excalibur 7018	NA	NA	2G Pipe	2" (50 mm)	GTAW Root: NA	NA	DC+
35	SMAW	3/32" (2.4 mm) E7018	Excalibur 7018	NA	NA	5G Pipe up	2" (50 mm)	Fill/Cap: 80 (±5)	NA	DC+
								GTAW Root: NA		
								Fill/Cap: 80 (±5)		
36	SMAW	3/32" (2.4 mm) E7018	Excalibur 7018	NA	NA	6G Pipe up	2" (50 mm)	GTAW Root: NA	NA	DC+
								Fill/Cap: 80 (±5)		
37	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+
38	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+
39	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+
40	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+
41	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+
42	GMAW - S	.035" (.89 mm) ER70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	4F	1/4" (6.4 mm)	325 (+5) (8.2 m/min)	19	DC+
43	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+
44	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+
45	GMAW - S	.035" (.89 mm) ER70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	3G up	3/8" (9.6 mm)	250 (+5) (6.3 m/min)	17.9	DC+
46	GMAW - S	.035" (.89 mm) ER70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	4G	3/8" (9.6 mm)	270 (+5) (6.8 m/min)	18	DC+
47	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+
48	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+
49	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+
50	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+
51	GMAW - Pulse	.045" (1.1 mm) ER70S-6	SuperArc L-56	90/10	25-40 (12-18 l/min)	3G up	3/8" (9.6 mm)	130 (+5) (3.3 m/min)	.95(trim)	DC+
52	GMAW - STT	.045" (1.1 mm) ER70S-6	SuperArc L-56	100% Co2	25-35 (12-16.5 l/min)	2G Pipe	6" (150 mm)	130 - 140 (3.3-3.8 m/min)	NA	DC+
	GMAW - Pulse	.045" (1.1 mm) ER70S-6	SuperArc L-56	90/10	25-40 (12-18 l/min)	2G Pipe		125-130 (3.2-3.3 m/min)	.95(trim)	
	GMAW - STT	.045" (1.1 mm) ER70S-6	SuperArc L-56	100% Co2	25-35 (12-16.5 l/min)	5G Pipe down		130 - 140 (3.3-3.8 m/min)	NA	
53	GMAW - Pulse	.045" (1.1 mm) ER70S-6	SuperArc L-56	90/10	25-40 (12-18 l/min)	5G Pipe up	6" (150 mm)	125-130 (3.2-3.3 m/min)	.95(trim)	DC+
	GMAW - STT	.045" (1.1 mm) ER70S-6	SuperArc L-56	100% Co2	25-35 (12-16.5 l/min)	6G Pipe down		130 - 140 (3.3-3.8 m/min)	NA	
	GMAW - Pulse	.045" (1.1 mm) ER70S-6	SuperArc L-56	90/10	25-40 (12-18 l/min)	6G Pipe up		125-130 (3.2-3.3 m/min)	.95(trim)	
54	GMAW - STT	.045" (1.1 mm) ER70S-6	SuperArc L-56	100% Co2	25-35 (12-16.5 l/min)	2G Pipe	6" (150 mm)	130 - 140 (3.3-3.8 m/min)	NA	DC+
	GMAW - Pulse	.045" (1.1 mm) ER70S-6	SuperArc L-56	90/10	25-40 (12-18 l/min)	2G Pipe		125-130 (3.2-3.3 m/min)	.95(trim)	
	GMAW - STT	.045" (1.1 mm) ER70S-6	SuperArc L-56	100% Co2	25-35 (12-16.5 l/min)	5G Pipe down		130 - 140 (3.3-3.8 m/min)	NA	
55	GMAW - G	.045" (1.2 mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)	2G Pipe	6" (150 mm)	275 (+5) (7.0 m/min)	25	DC+
	GMAW - STT	.045" (1.1 mm) ER70S-6	SuperArc L-56	100% Co2	25-35 (12-16.5 l/min)	5G Pipe down		130 - 140 (3.3-3.8 m/min)	NA	
	GMAW - G	.045" (1.2 mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)	5G Pipe up		275 (+5) (7.0 m/min)	25	
56	GMAW - STT	.045" (1.1 mm) ER70S-6	SuperArc L-56	100% Co2	25-35 (12-16.5 l/min)	6G Pipe down	6" (150 mm)	130 - 140 (3.3-3.8 m/min)	NA	DC+
	GMAW - G	.045" (1.2 mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)	6G Pipe up		275 (+5) (7.0 m/min)	25	
	GMAW - STT	.045" (1.1 mm) ER70S-6	SuperArc L-56	100% Co2	25-35 (12-16.5 l/min)	6G Pipe down		130 - 140 (3.3-3.8 m/min)	NA	
57	GMAW - G	.045" (1.1 mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)	2G Pipe	6" (150 mm)	275 (+5) (7.0 m/min)	25	DC+
	GMAW - STT	.045" (1.1 mm) ER70S-6	SuperArc L-56	100% Co2	25-35 (12-16.5 l/min)	5G Pipe down		130 - 140 (3.3-3.8 m/min)	NA	
	GMAW - G	.045" (1.2 mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)	5G Pipe up		275 (+5) (7.0 m/min)	25	
58	FCAW - G	.045" (1.1 mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)	Flat	1/4" (6.4 mm)	275 (+5) (7.0 m/min)	25	DC+
59,60,61	FCAW - G	.045" (1.1 mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)	2F, 3F up, 4F	3/8" (9.6 mm)	275 (+5) (7.0 m/min)	25	DC+
62,63,64,65	FCAW - G	.045" (1.1 mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)	1G, 2G, 3G up, 4G	3/8" (9.6 mm)	275 (+5) (7.0 m/min)	25	DC+
66	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-
67,68	FCAW - S	5/64" (2.0 mm) E71T-8	NR- 232/233	NA	NA	2F, 3F up	3/8" (9.6 mm)	155 (+5) (4.0 m/min)	21	DC-
69	FCAW - S	5/64" (2.0 mm) E71T-8	NR- 232/233	NA	NA	4F	3/8" (9.6 mm)	145 (+5) (3.7 m/min)	20	DC-
70,71	FCAW - S	5/64" (2.0 mm) E71T-8	NR- 232/233	NA	NA	1G, 2G	3/8" (9.6 mm)	130 (+5) (3.3 m/min)	21	DC-
72	FCAW - S	5/64" (2.0 mm) E71T-8	NR- 232/233	NA	NA	3G up	3/8" (9.6 mm)	125 (+5) (3.2 m/min)	19.5	DC-

VRTEX® 360 - Default Weld Process Settings (Software Upgrade 2)

WPS #	VR Welding Process	Consumable Type	Lincoln Brand	Gas Mixture	Gas Flow (CFH)	Position	Mat'l (in)	WFS (ipm) or amps	Voltage	Polarity

VRTEX® 360 - Default Weld Process Settings (Software Set 3)

WPS#	VR Welding Process	Consumable Type	Lincoln Brand	Gas Mixture	Gas Flow (CFH)	Position	Mat'l (in)	WFS (ipm) or amps	Voltage or trim	Polarity
3-1	GMAW - Spray	3/64" (1.2 mm) ER 4043	SuperGlaze 4043	100 Ar	30-40 (16-18 l/min)	2F	3/8" (9.6 mm)	385 (+ 5) (9.8 m/min)	25	DC+
3-2	GMAW - Pulse	3/64" (1.2 mm) ER 4043	SuperGlaze 4043	100 Ar	30-40 (16-18 l/min)	2G	3/8" (9.6 mm)	375 (+ 5) (9.5 m/min)	1.1(trim)	DC+
3-3	GMAW - Spray	3/64" (1.2 mm) ER 4043	SuperGlaze 4043	100 Ar	30-40 (16-18 l/min)	1G	3/8" (9.6 mm)	375 (+ 5) (9.5 m/min)	25	DC+
3-4	GMAW - Pulse	3/64" (1.2 mm) ER 4043	SuperGlaze 4043	100 Ar	30-40 (16-18 l/min)	2F	10 GA (3.2 mm)	240 (+ 5) (6.0 m/min)	1.1(trim)	DC+
3-5	GMAW - Pulse	3/64" (1.2 mm) ER 4043	SuperGlaze 4043	100 Ar	30-40 (16-18 l/min)	3F up	3/8" (9.6 mm)	240 (+ 5) (6.0 m/min)	1.05(trim)	DC+
3-6	GMAW - Pulse	3/64" (1.2 mm) ER 4043	SuperGlaze 4043	100 Ar	30-40 (16-18 l/min)	2F	3/8" (9.6 mm)	290 (+ 5) (7.4 m/min)	1.1(trim)	DC+
3-7	GMAW - Pulse	3/64" (1.2 mm) ER 4043	SuperGlaze 4043	100 Ar	30-40 (16-18 l/min)	3G up	3/8" (9.6 mm)	350 (+ 5) (8.9 m/min)	1.05(trim)	DC+

VRTEX® 360 - Default Weld Process Settings (Software Set 4)

WPS#	VR Welding Process	Consumable Type	Lincoln Brand	Gas Mixture	Gas Flow (CFH)	Position	Mat'l (in)	WFS (ipm) or amps	Voltage or trim	Polarity
4-1	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	2F	10 GA (3.2 mm)	80 (+5)	NA	DC+
4-2	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	3F down	10 GA (3.2 mm)	80 (+5)	NA	DC+
4-3	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	4F	10 GA (3.2 mm)	80 (+5)	NA	DC+
4-4	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	2F	1/4" (6.4 mm)	85 (+5)	NA	DC+
4-5	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	3F up	1/4" (6.4 mm)	85 (+5)	NA	DC+
4-6	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	4F	1/4" (6.4 mm)	85 (+5)	NA	DC+
4-7	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	2F	10 GA (3.2 mm)	100 (+5)	NA	DC+
4-8	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	3F up	10 GA (3.2 mm)	100 (+5)	NA	DC+
4-9	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	4F	10 GA (3.2 mm)	100(+5)	NA	DC+
4-10	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	2F	1/4" (6.4 mm)	115 (+5)	NA	DC+
4-11	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	3F up	1/4" (6.4 mm)	115 (+5)	NA	DC+
4-12	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	4F	1/4" (6.4 mm)	115 (+5)	NA	DC+
4-13	GMAW - Spray	.052" (1.3 mm) ER70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	2F	3/8" (9.6 mm)	350 (+ 5) (8.9 m/min)	30	DC+
4-14	GMAW - Spray	.052" (1.3 mm) ER70S-6	SuperArc L-56	90/10	40-45 (19-21 l/min)	1G	3/8" (9.6 mm)	350 (+ 5) (8.9 m/min)	31	DC+
4-15	GMAW - Spray	.052" (1.3 mm) ER70S-6	SuperArc L-56	90/10	35-45 (17-21 l/min)	2F	1/4" (6.4 mm)	300 (+ 5) (7.5 m/min)	24	DC+
4-16	GMAW - S	.052" (1.3 mm) ER70S-6	SuperArc L-56	100 Co2	25-35 (12-16.5 l/min)	2F	1/4" (6.4 mm)	200 (+ 5) (5.0 m/min)	20	DC+
4-17	GMAW - S	.052" (1.3 mm) ER70S-6	SuperArc L-56	100 Co2	25-35 (12-16.5 l/min)	3F up	3/8" (9.6 mm)	150 (+ 5) (3.8 m/min)	19	DC+
4-18	GMAW - S	.052" (1.3 mm) ER70S-6	SuperArc L-56	100 Co2	25-35 (12-16.5 l/min)	3F down	1/4" (6.4 mm)	200 (+ 5) (5.0 m/min)	17	DC+
4-19	GMAW - Pulse	.052" (1.3 mm) ER70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	2F	3/8" (9.6 mm)	375 (+ 5) (9.5 m/min)	1.1 (trim)	DC+
4-20	GMAW - Pulse	.052" (1.3 mm) ER70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	3F up	3/8" (9.6 mm)	145 (+ 5) (3.6 m/min)	1.00 (trim)	DC+
4-21	GMAW - Spray	.045" (1.1 mm) ER 308	BlueMax 308L Si	98/2	25-35 (12-16.5 l/min)	1G	3/8" (9.6 mm)	360 (+ 5) (9.2 m/min)	26	DC+
4-22	GMAW - Spray	.045" (1.1 mm) ER 308	BlueMax 308L Si	98/2	25-35 (12-16.5 l/min)	2F	3/8" (9.6 mm)	360 (+ 5) (9.2 m/min)	26	DC+
4-23	GMAW - Pulse	.045" (1.1 mm) ER 308	BlueMax 308L Si	98/2	25-35 (12-16.5 l/min)	3G up	3/8" (9.6 mm)	276 (+ 5) (7.0 m/min)	.95 (trim)	DC+
4-24	GMAW - Pulse	.045" (1.1 mm) ER 308	BlueMax 308L Si	98/2	25-35 (12-16.5 l/min)	3F down	10 GA (3.2 mm)	212 (+ 5) (5.4 m/min)	.95(trim)	DC+
4-25	GMAW - Pulse	.045" (1.1 mm) ER 308	BlueMax 308L Si	98/2	25-35 (12-16.5 l/min)	2F	10 GA (3.2 mm)	212 (+ 5) (5.4 m/min)	.95(trim)	DC+

VRTEX® 360 - Default Weld Process Settings (Software Set 5)

WPS#	VR Welding Process	Consumable Type	Lincoln Brand	Gas Mixture	Gas Flow (CFH)	Position	Mat'l (in)	WFS (ipm) or amps	Voltage or trim	Polarity
5-1	SMAW	1/8" (3.2mm) E6010	Fleetweld 5P+	N/A	N/A	2F Lap	10 GA (3.2mm)	80 (+5)	N/A	DC+
5-2	SMAW	1/8" (3.2mm) E6010	Fleetweld 5P+	N/A	N/A	3F Up Lap	10 GA (3.2mm)	80 (+5)	N/A	DC+
5-3	SMAW	1/8" (3.2mm) E6010	Fleetweld 5P+	N/A	N/A	4F Lap	10 GA (3.2mm)	80 (+5)	N/A	DC+
5-4	SMAW	1/8" (3.2mm) E6013	Fleetweld 37	N/A	N/A	2F Lap	10 GA (3.2mm)	100 (+5)	N/A	AC
5-5	SMAW	1/8" (3.2mm) E6013	Fleetweld 37	N/A	N/A	3F Down Lap	10 GA (3.2mm)	125 (+5)	N/A	AC
5-6	SMAW	1/8" (3.2mm) E7018	Excalibur 7018	N/A	N/A	2F Lap	10 GA (3.2mm)	100 (+5)	N/A	DC+
5-7	GMAW	.035" (.89mm) E70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	2F Lap	10 GA (3.2mm)	250 (+ 5)(6.3 m/min)	18	DC+
5-8	GMAW	.035" (.89mm) E70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	3F Down Lap	10 GA (3.2mm)	250 (+ 5)(6.3 m/min)	18	DC+
5-9	GMAW-Pulse	.045" (1.1mm) ER4043	SuperGlaze 4043	100 Ar	30-40 (16-18 l/min)	2F Lap	10 GA (3.2mm)	240 (+ 5)(6.0 m/min)	1.1	DC+
5-10	GMAW-Pulse	.045" (1.1mm) ER308	BlueMax 308	98/2	25-35 (12-16.5 l/min)	2F Lap	10 GA (3.2mm)	210 (+ 5)(5.4 m/min)	0.95	DC+
5-11	GMAW-Pulse	.045" (1.1mm) ER308	BlueMax 308	98/2	25-35 (12-16.5 l/min)	3F Down Lap	10 GA (3.2mm)	210 (+ 5)(5.4 m/min)	0.95	DC+
5-12	GMAW-Pulse	.035 (.89mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	2F	3/8" (9.6mm)	230 (+5) (5.8 m/min)	0.95	DC+
5-13	GMAW-Pulse	.035" (.89mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	3F Up	3/8" (9.6mm)	230 (+5) (5.8 m/min)	1	DC+
5-14	GMAW-Pulse	.035" (.89mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	4F	3/8" (9.6mm)	230 (+5) (5.8 m/min)	1	DC+
5-15	GMAW-Pulse	.035" (.89mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	1G	3/8" (9.6mm)	250 (+5) (6.3 m/min)	0.95	DC+
5-16	GMAW-Pulse	.035" (.89mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	2G	3/8" (9.6mm)	250 (+5) (6.3 m/min)	0.95	DC+
5-17	GMAW-Pulse	.035" (.89mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	3G up	3/8" (9.6mm)	230 (+5) (5.8 m/min)	0.95	DC+
5-18	GMAW-Pulse	.035" (.89mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	4G	3/8" (9.6mm)	250 (+5) (6.3 m/min)	0.95	DC+
5-19	GMAW-Pulse	.045" (1.1mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	2F	3/8" (9.6mm)	130 (+ 5)(3.3 m/min)	0.95	DC+
5-20	GMAW-Pulse	.045" (1.1mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	3F	3/8" (9.6mm)	145 (+ 5)(3.6 m/min)	1	DC+
5-21	GMAW-Pulse	.045" (1.1mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	4F	3/8" (9.6mm)	145 (+ 5)(3.6 m/min)	1	DC+
5-22	GMAW-Pulse	.045" (1.1mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	1G	3/8" (9.6mm)	130 (+ 5)(3.3 m/min)	0.95	DC+
5-23	GMAW-Pulse	.045" (1.1mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	4G	3/8" (9.6mm)	130 (+ 5)(3.3 m/min)	0.95	DC+
5-24	GMAW-Pulse	.052" (1.3mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	4F	3/8" (9.6mm)	145 (+ 5)(3.6 m/min)	1	DC+
5-25	GMAW-Pulse	.052" (1.3mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	1G	3/8" (9.6mm)	130 (+ 5)(3.3 m/min)	0.95	DC+
5-26	GMAW-Pulse	.052" (1.3mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	2G	3/8" (9.6mm)	130 (+ 5)(3.3 m/min)	0.95	DC+
5-27	GMAW-Pulse	.052" (1.3mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	3G	3/8" (9.6mm)	130 (+ 5)(3.3 m/min)	0.95	DC+
5-28	GMAW-Pulse	.052" (1.3mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	4G	3/8" (9.6mm)	130 (+ 5)(3.3 m/min)	0.95	DC+
5-29	SMAW	1/8" (3.2mm) E6010	Fleetweld 5P+	N/A	N/A	Flat Plate	1/4" (6.4mm)	90 (+ 5)	N/A	DC+
5-30	SMAW	1/8" (3.2mm) E6013	Fleetweld 37	N/A	N/A	Flat Plate	1/4" (6.4mm)	100 (+ 5)	N/A	AC
5-31	SMAW	1/8" (3.2mm) E7018	Excalibur 7018	N/A	N/A	Flat Plate	1/4" (6.4mm)	125 (+ 5)	N/A	DC+
5-32	GMAW-Short	.035" (.89mm) E70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	Flat Plate	1/4" (6.4mm)	250 (+ 5)(6.3 m/min)	18	DC+
5-33	GMAW-Spray	.045" (1.1mm) E70S-6	SuperArc L-56	90/10	25-35 (12-16.5 l/min)	Flat Plate	1/4" (6.4mm)	400 (+ 5)(10.0 m/min)	27	DC+
5-34	GMAW-Pulse	.045" (1.1mm) E70S-6	SuperArc L-56	90/10	25-40 (12-18 l/min)	Flat Plate	1/4" (6.4mm)	130 (+ 5)(3.3 m/min)	0.95	DC+
5-35	FCAW-G	.045" (1.1mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)	Flat Plate	1/4" (6.4mm)	275 (+ 5)(7.0 m/min)	25	DC+
5-36	FCAW-S	5/64" (2.0mm) E71T-8	NR 232/233	N/A	N/A	Flat Plate	1/4" (6.4mm)	140 (+ 5)(3.5 m/min)	20	DC-

VRTEX® 360 - Default Weld Process Settings (Software Set 6)

WPS#	VR Welding Process	Consumable Type	Lincoln Brand	Gas Mixture	Gas Flow	Position	Schedule 80	WFS (ipm) or Amps	Voltage or Trim	Polarity
6-1	SMAW	1/8" (3.2mm) E6010	Fleetweld 5P+	N/A	N/A	2F	1/4" (6.4mm)	85 (+5)	N/A	DC+
6-2	SMAW	1/8" (3.2mm) E6010	Fleetweld 5P+	N/A	N/A	4F	1/4" (6.4mm)	85 (+5)	N/A	DC+
6-3	SMAW	1/8" (3.2mm) E6010	Fleetweld 5P+	N/A	N/A	5F up	1/4" (6.4mm)	85 (+5)	N/A	DC+
6-4	SMAW	1/8" (3.2mm) E7018	Excalibur 7018	N/A	N/A	2F	1/4" (6.4mm)	115 (+5)	N/A	DC+
6-5	SMAW	1/8" (3.2mm) E7018	Excalibur 7018	N/A	N/A	4F	1/4" (6.4mm)	115 (+5)	N/A	DC+
6-6	SMAW	1/8" (3.2mm) E7018	Excalibur 7018	N/A	N/A	5F up	1/4" (6.4mm)	115 (+5)	N/A	DC+
6-7	SMAW	1/8" (3.2mm) E6013	Fleetweld 37	N/A	N/A	2F	1/4" (6.4mm)	100 (+5)	N/A	AC
6-8	SMAW	1/8" (3.2mm) E6013	Fleetweld 37	N/A	N/A	4F	1/4" (6.4mm)	100 (+5)	N/A	AC
6-9	SMAW	1/8" (3.2mm) E6013	Fleetweld 37	N/A	N/A	5F down	1/4" (6.4mm)	115 (+5)	N/A	AC
6-10	GMAW-S	.035 (.89mm) ER70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	2F	1/4" (6.4mm)	350 (+5) (8.9 m/min)	20	DC+
6-11	GMAW-S	.035 (.89mm) ER70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	4F	1/4" (6.4mm)	325 (+5) (8.2 m/min)	19	DC+
6-12	GMAW-S	.035 (.89mm) ER70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	5F down	1/4" (6.4mm)	275 (+5) (7.0 m/min)	19	DC+
6-13	GMAW-Pulse	.045 (1.1mm) ER70S-6	SuperArc L-56	90/10	30-40 (12-18 l/min)	2F	1/4" (6.4mm)	130 (+5) (3.3 m/min)	0.95	DC+
6-14	GMAW-Pulse	.045 (1.1mm) ER70S-6	SuperArc L-56	90/10	30-40 (12-18 l/min)	4F	1/4" (6.4mm)	130 (+5) (3.3 m/min)	0.95	DC+
6-15	GMAW-Pulse	.045 (1.1mm) ER70S-6	SuperArc L-56	90/10	30-40 (12-18 l/min)	5F up	1/4" (6.4mm)	130 (+5) (3.3 m/min)	0.95	DC+
6-16	FCAW - G	.045 (1.1mm) E71T-1	UC71A85	75/25	40-50 (19-23.5 l/min)	2F	1/4" (6.4mm)	275 (+5) (7.0 m/min)	25	DC+
6-17	FCAW - G	.045 (1.1mm) E71T-1	UC71A85	75/25	40-50 (19-23.5 l/min)	4F	1/4" (6.4mm)	275 (+5) (7.0 m/min)	25	DC+
6-18	FCAW - G	.045 (1.1mm) E71T-1	UC71A85	75/25	40-50 (19-23.5 l/min)	5F up	1/4" (6.4mm)	275 (+5) (7.0 m/min)	25	DC+
6-19	FCAW - S	5/64 (2.0mm) E71T-8	NR-232/233	N/A	N/A	2F	1/4" (6.4mm)	150 (+5) (3.5 m/min)	20	DC-
6-20	FCAW - S	5/64 (2.0mm) E71T-8	NR-232/233	N/A	N/A	4F	1/4" (6.4mm)	145 (+5) (3.5 m/min)	20	DC-
6-21	FCAW - S	5/64 (2.0mm) E71T-8	NR-232/233	N/A	N/A	5F up	1/4" (6.4mm)	150 (+5) (3.5 m/min)	20	DC-

VRTEX® 360 - SMAW Default Weld Process Settings (Standard)

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" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	Flat	1/4" (6.4 mm)	90 (±5)	NA	DC+
2	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	2F	3/8" (9.6 mm)	90 (±5)	NA	DC+
3	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	3F up	3/8" (9.6 mm)	90 (±5)	NA	DC+
4	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	4F	3/8" (9.6 mm)	90 (±5)	NA	DC+
5	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	1G	3/8" (9.6 mm)	90 (±5)	NA	DC+
6	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	2G	3/8" (9.6 mm)	90 (±5)	NA	DC+
7	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	3G up	3/8" (9.6 mm)	90 (±5)	NA	DC+
8	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	4G	3/8" (9.6 mm)	90 (±5)	NA	DC+
9	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	Flat	1/4" (6.4 mm)	125 (±5)	NA	DC+
10	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	2F	3/8" (9.6 mm)	125 (±5)	NA	DC+
11	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	3F up	3/8" (9.6 mm)	125 (±5)	NA	DC+
12	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	4F	3/8" (9.6 mm)	125 (±5)	NA	DC+
13	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	1G	3/8" (9.6 mm)	125 (±5)	NA	DC+
14	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	2G	3/8" (9.6 mm)	125 (±5)	NA	DC+
15	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	3G up	3/8" (9.6 mm)	125 (±5)	NA	DC+
16	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	4G	3/8" (9.6 mm)	125 (±5)	NA	DC+
17	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	Flat	1/4" (6.4 mm)	100 (±5)	NA	AC
18	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	2F	10 GA. (3.2 mm)	100 (± 5)	NA	AC
19	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	3F down	10 GA. (3.2 mm)	125 (±5)	NA	AC
20	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	4F	10 GA. (3.2 mm)	100 (± 5)	NA	AC
21	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	1G	3/8" (9.6 mm)	110 (±5)	NA	AC
22	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	2G	3/8" (9.6 mm)	110 (±5)	NA	AC
23	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	3G up	3/8" (9.6 mm)	90 (±5)	NA	AC
24	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	4G	3/8" (9.6 mm)	90 (±5)	NA	AC
25	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	2G Pipe	6" (150 mm)	Root: 80 (±5)	NA	DC+
								Hot:100 (± 5)		
								Fill/Cap: 80 (±5)		
26	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	5G Pipe up	6" (150 mm)	Root: 80 (±5)	NA	DC+
								Hot:100 (± 5)		
								Fill/Cap: 80 (±5)		
27	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	6G Pipe up	6" (150 mm)	Root: 80 (±5)	NA	DC+
								Hot:100 (± 5)		
								Fill/Cap: 80 (±5)		
28	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	2G Pipe	6" (150 mm)	Root: 90 (±5)	NA	DC+
		3/32" (2.4 mm) E7018	Excalibur 7018					Hot: 100 (±5)		
								Fill/Cap: 80 (± 5)		
29	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	5G Pipe up	6" (150 mm)	Root: 90 (±5)	NA	DC+
		3/32" (2.4 mm) E7018	Excalibur 7018					Hot: 100 (±5)		
								Fill/Cap: 80 (± 5)		
30	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	6G Pipe up	6" (150 mm)	Root: 90 (±5)	NA	DC+
		3/32" (2.4 mm) E7018	Excalibur 7018					Hot: 100 (±5)		
								Fill/Cap: 80 (± 5)		
31	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	2G Pipe	2" (50 mm)	Root: 90 (±5)	NA	DC+
		3/32" (2.4 mm) E7018	Excalibur 7018					Hot: 100 (±5)		
								Fill/Cap: 80 (± 5)		
32	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	5G Pipe up	2" (50 mm)	Root: 90 (±5)	NA	DC+
		3/32" (2.4 mm) E7018	Excalibur 7018					Hot: 100 (±5)		
								Fill/Cap: 80 (± 5)		
33	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	6G Pipe up	2" (50 mm)	Root: 90 (±5)	NA	DC+
		3/32" (2.4 mm) E7018	Excalibur 7018					Hot: 100 (±5)		
								Fill/Cap: 80 (± 5)		
34	SMAW	3/32" (2.4 mm) E7018	Excalibur 7018	NA	NA	2G Pipe	2" (50 mm)	GTAW Root: NA	NA	DC+
								Fill/Cap: 80 (±5)		
35	SMAW	3/32" (2.4 mm) E7018	Excalibur 7018	NA	NA	5G Pipe up	2" (50 mm)	GTAW Root: NA	NA	DC+
								Fill/Cap: 80 (±5)		
36	SMAW	3/32" (2.4 mm) E7018	Excalibur 7018	NA	NA	6G Pipe up	2" (50 mm)	GTAW Root: NA	NA	DC+
								Fill/Cap: 80 (±5)		



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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

Identification # VRTEX® SMAW # 1

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 1

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) 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	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	13.9 ipm ± 10% (.13 m/min)	 Bead on Plate



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 E6010

SHIELDING

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

Flux N/A Composition N/A

Flow Rate N/A

Gas Cup Size N/A

Identification # VRTEX® SMAW # 2

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 2

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	Type & 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)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 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

Identification # VRTEX® SMAW # 4

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 4

POSITION

Groove: N/A Fillet: 4F 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

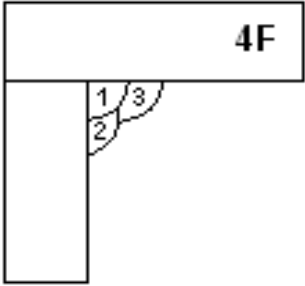
TECHNIQUE

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	Type & Polarity	AMPS		
1	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	5.3 ipm ± 10% (.13 m/min)	
2	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	7.1 ipm ± 10% (.18 m/min)	
3	Whip Stringer	E6010	1/8" 3.2 mm)	DC+	90 ± 5	7.1 ipm ± 10% (.18 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Identification # VRTEX® SMAW # 5

Welding Process SMAW

Revision _____ Date _____ by _____

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

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" Root Face Dimension N/A

Groove Angle: 45 Degree included

Back Gouging: Yes ☐ NO ☒ Method 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

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 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

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 ☐

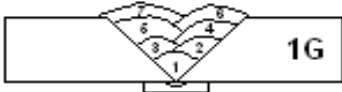
Cleaning Method: Chipping Hammer and Wire Brush

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	Type & 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)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 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

Identification # VRTEX® SMAW # 6

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 6

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		Travel Speed	Joint Details
		Class	Diameter	Type & 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)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Identification # VRTEX® SMAW # 8

Welding Process SMAW

Revision _____ Date _____ by _____

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

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" 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 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: 4G 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	Type & Polarity	AMPS		
1	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	2.1 ipm ± 10% (.05 m/min)	
2	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	4.8 ipm ± 10% (.12 m/min)	
3	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	3.8 ipm ± 10% (.10 m/min)	
4	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	3.2 ipm ± 10% (.08 m/min)	
5	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	3.6 ipm ± 10% (.09 m/min)	
6	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	3.2 ipm ± 10% (.08 m/min)	
7	Whip Stringer	E6010	1/8" (3.2 mm)	DC+	90 ± 5	4.1 ipm ± 10% (.10 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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

Identification # VRTEX® SMAW # 9

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 9

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)	 Bead on Plate



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Identification # VRTEX® SMAW # 10

Welding Process SMAW

Revision _____ Date _____ by _____

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

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

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

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 Gas N/A

Composition N/A

Flux N/A

Flow Rate N/A

Gas Cup Size 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 ☐

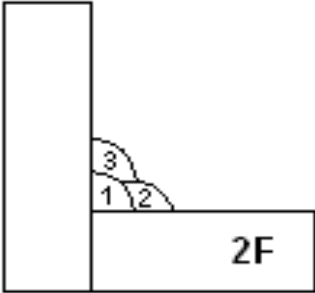
Cleaning Method: Chipping Hammer and Wire Brush

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)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 Gas N/A

Composition N/A

Flux N/A

Flow Rate N/A

Gas Cup Size N/A

Identification # VRTEX® SMAW # 11

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 11

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 ☐

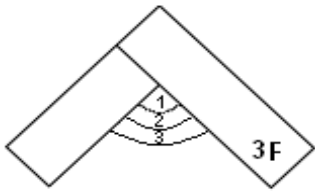
Cleaning Method: Chipping Hammer and Wire Brush

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 ☐

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 Gas N/A
Composition N/A
Flux N/A
Flow Rate N/A
Gas Cup Size N/A

Identification # VRTEX® SMAW # 12

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 12

POSITION

Groove: N/A Fillet: 4F 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

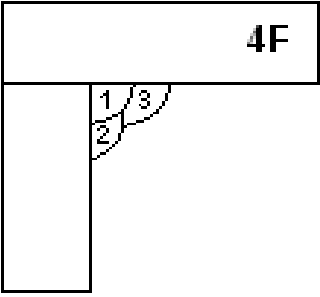
TECHNIQUE

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	6.9 ipm ± 10% (.18 m/min)	
2	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	7.5 ipm ± 10% (.19 m/min)	
3	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	10.2 ipm ± 10% (.26 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process **SMAW**

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

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 Gas N/A
Composition N/A
Flux N/A
Flow Rate N/A
Gas Cup Size N/A

Identification # VRTEX® SMAW # 13

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 13

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

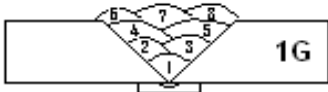
TECHNIQUE

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 ☐

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 Gas N/A
Composition N/A
Flux N/A
Flow Rate N/A
Gas Cup Size N/A

Identification # VRTEX® SMAW # 14

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 14

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)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Identification # VRTEX® SMAW # 15

Welding Process SMAW

Revision _____ Date _____ by _____

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

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 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 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	4.5 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 ☐

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 Gas N/A
Composition N/A

Flux N/A
Flow Rate N/A
Gas Cup Size N/A

Identification # VRTEX® SMAW # 16

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 16

POSITION

Groove: 4G 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

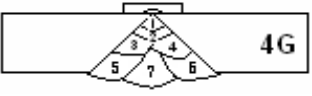
TECHNIQUE

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	5.5 ipm ± 10% (.05 m/min)	
2	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	7.0 ipm ± 10% (.12 m/min)	
3	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	7.0 ipm ± 10% (.10 m/min)	
4	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	7.0 ipm ± 10% (.08 m/min)	
5	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	7.0 ipm ± 10% (.09 m/min)	
6	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	7.0 ipm ± 10% (.08 m/min)	
7	Stringer	E7018	1/8" (3.2 mm)	DC+	125 ± 5	7.0 ipm ± 10% (.10 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 Gas N/A
Composition N/A
Flux N/A
Flow Rate N/A
Gas Cup Size N/A

Identification # VRTEX® SMAW # 17

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 17

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)	 Bead on Plate



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Identification # VRTEX® SMAW # 18

Welding Process SMAW

Revision _____ Date _____ by _____

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

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

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

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 Gas N/A

Composition N/A

Flux N/A

Flow Rate N/A

Gas Cup Size 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)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 Gas N/A
Composition N/A

Flux N/A
Flow Rate N/A
Gas Cup Size N/A

Identification # VRTEX® SMAW # 19

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 19

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™

Identification # VRTEX® SMAW # 20

Welding Process SMAW

Revision _____ Date _____ by _____

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

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

POSITION

Groove: N/A Fillet: 4F 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 _____ Fillet 10 GA (3.2 mm)

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

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 ☐

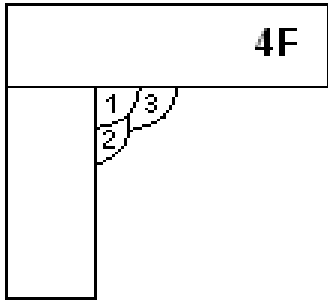
Cleaning Method: Chipping Hammer and Wire Brush

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	8.1 ipm ± 10% (.21 m/min)	
2	Stringer	E6013	1/8" (3.2 mm)	AC	100 ± 5	9.2 ipm ± 10% (.23 m/min)	
3	Stringer	E6013	1/8" (3.2 mm)	AC	100 ± 5	7.6 ipm ± 10% (.19 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 Gas N/A
Composition N/A

Flux N/A
Flow Rate N/A
Gas Cup Size N/A

Identification # VRTEX® SMAW # 21

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 21

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)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Identification # VRTEX® SMAW # 22

Welding Process SMAW

Revision _____ Date _____ by _____

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

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 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 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	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)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Identification # VRTEX® SMAW # 23

Welding Process SMAW

Revision _____ Date _____ by _____

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

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 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 ☐

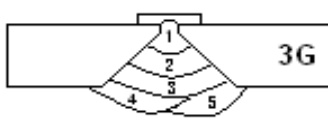
Cleaning Method: Chipping Hammer and Wire Brush

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	E6013	1/8" (3.2 mm)	AC	90 ± 5	2.6 ipm ± 10% (.07 m/min)	
2	Straight Weave	E6013	1/8" (3.2 mm)	AC	90 ± 5	2.4 ipm ± 10% (.06 m/min)	
3	Straight Weave	E6013	1/8" (3.2 mm)	AC	90 ± 5	2.1 ipm ± 10% (.05 m/min)	
4	Straight Weave	E6013	1/8" (3.2 mm)	AC	90 ± 5	2.3 ipm ± 10% (.06 m/min)	
5	Straight Weave	E6013	1/8" (3.2 mm)	AC	90 ± 5	3.9 ipm ± 10% (.10 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 Gas N/A
Composition N/A

Flux N/A
Flow Rate N/A
Gas Cup Size N/A

Identification # VRTEX® SMAW # 24

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 24

POSITION

Groove: 4G 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

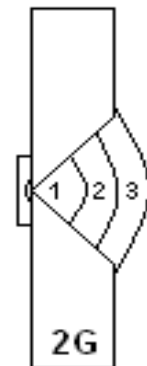
Pass or Weld Layer(s)	Technique	Filler Metals		Current		Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	AMPS		
1	Stringer	E6013	1/8" (3.2 mm)	AC	90 ± 5	3.4 ipm ± 10% (.09 m/min)	
2	Stringer	E6013	1/8" (3.2 mm)	AC	90 ± 5	5.9 ipm ± 10% (.15 m/min)	
3	Stringer	E6013	1/8" (3.2 mm)	AC	90 ± 5	7.1 ipm ± 10% (.18 m/min)	
4	Stringer	E6013	1/8" (3.2 mm)	AC	90 ± 5	6.8 ipm ± 10% (.17 m/min)	
5	Stringer	E6013	1/8" (3.2 mm)	AC	90 ± 5	9.1 ipm ± 10% (.23 m/min)	
6	Stringer	E6013	1/8" (3.2 mm)	AC	90 ± 5	7.1 ipm ± 10% (.18 m/min)	
7	Stringer	E6013	1/8" (3.2 mm)	AC	90 ± 5	5.3 ipm ± 10% (.14 m/min)	
8	Stringer	E6013	1/8" (3.2 mm)	AC	90 ± 5	5.4 ipm ± 10% (.14 m/min)	
9	Stringer	E6013	1/8" (3.2 mm)	AC	90 ± 5	7 ipm ± 10% (.18 m/min)	
10	Stringer	E6013	1/8" (3.2 mm)	AC	90 ± 5	5.6 ipm ± 10% (.14 m/min)	
11	Stringer	E6013	1/8" (3.2 mm)	AC	90 ± 5	5.2 ipm ± 10% (.13 m/min)	
12	Stringer	E6013	1/8" (3.2 mm)	AC	90 ± 5	5.9 ipm ± 10% (.15 m/min)	
13	Stringer	E6013	1/8" (3.2 mm)	AC	90 ± 5	5.2 ipm ± 10% (.13 m/min)	

PIPE - 2G		Root Land	1/16" (1.7 mm)	Preheat Temp	N/A
Diameter	6" (152 mm)	Root Gap	1/16" (1.7 mm)	Interpass Temp	N/A
Wall Thickness	3/8" (9.6 mm)	Joint Bevel Angle	30 degree	Clamp Type	N/A
Schedule	40	Backing	N/A	Cleaning	Chipping & Brush

Electrode & Gas	ROOT PASS	HOT PASS	FILL - CAP PASSES
Electrode Name	Fleetweld 5P+	Fleetweld 5P+	Fleetweld 5P+
Diameter	1/8" (3.2 mm)	1/8" (3.2 mm)	1/8" (3.2 mm)
AWS Classification	E6010	E6010	E6010
Shielding Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Backing Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Welding Position	2G	2G	2G
Direction of Welding	horizontal	horizontal	horizontal
POWER SOURCE	VRTEX360	VRTEX360	VRTEX360
Software Z #	N/A	N/A	N/A
Mode #	N/A	N/A	N/A
Wire Feeder	N/A	N/A	N/A
Electrode Polarity	DC+	DC+	DC+

PROCEDURES	ROOT PASS	HOT PASS	FILL - CAP PASSES
Process	SMAW	SMAW	SMAW
WFS (in/min)	N/A	N/A	N/A
Volts	N/A	N/A	N/A
Amps	75 - 85	95 - 105	75 - 85
Travel Speed (in/min)	6.2 (.16 m/min)	7.3 (.19 m/min)	7.5 (.19 m/min)
Arc Length	Drag	1/8" (3.2 mm)	1/8" (3.2 mm)
Synergic Mode	N/A	N/A	N/A
Trim	N/A	N/A	N/A
Arc Control	N/A	N/A	N/A
Non-Synergic Mode	N/A	N/A	N/A
Peak Amps	N/A	N/A	N/A
Background Amps	N/A	N/A	N/A
Tailout (0-10)	N/A	N/A	N/A

Comments:

Joint Details


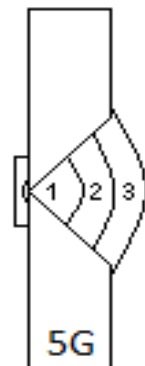
PIPE - 5G		Root Land	1/16" 1.7 mm)	Preheat Temp	N/A
Diameter	6" (152 mm)	Root Gap	1/16" (1.7 mm)	Interpass Temp	N/A
Wall Thickness	3/8" (9.6 mm)	Joint Bevel Angle	30 degree	Clamp Type	N/A
Schedule	40	Backing	N/A	Cleaning	Chipping & Brush

Electrode & Gas	ROOT PASS	HOT PASS	FILL - CAP PASSES
Electrode Name	Fleetweld 5P+	Fleetweld 5P+	Fleetweld 5P+
Diameter	1/8" (3.2 mm)	1/8" (3.2 mm)	1/8" (3.2 mm)
AWS Classification	E6010	E6010	E6010
Shielding Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Backing Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Welding Position	5G	5G	5G
Direction of Welding	UP	UP	UP
POWER SOURCE	VRTEX360	VRTEX360	VRTEX360
Software Z #	N/A	N/A	N/A
Mode #	N/A	N/A	N/A
Wire Feeder	N/A	N/A	N/A
Electrode Polarity	DC+	DC+	DC+

PROCEDURES	ROOT PASS	HOT PASS	FILL - CAP PASSES
Process	SMAW	SMAW	SMAW
WFS (in/min)	N/A	N/A	N/A
Volts	N/A	N/A	N/A
Amps	75 - 85	95 - 105	75 - 85
Travel Speed (in/min)	4.6 (.12 m/min)	4.8 (.12 m/min)	5.5 (.14 m/min)
Arc Length	Drag	1/8" (3.2 mm)	1/8" (3.2 mm)
Synergic Mode	N/A	N/A	N/A
Trim	N/A	N/A	N/A
Arc Control	N/A	N/A	N/A
Non-Synergic Mode	N/A	N/A	N/A
Peak Amps	N/A	N/A	N/A
Background Amps	N/A	N/A	N/A
Tailout (0-10)	N/A	N/A	N/A

Comments:

Joint Details



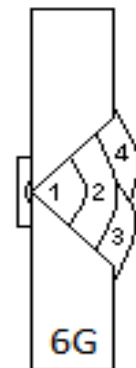
PIPE - 6G		Root Land	1/16" (1.7 mm)	Preheat Temp	N/A
Diameter	6" (152 mm)	Root Gap	1/16" (1.7 mm)	Interpass Temp	N/A
Wall Thickness	3/8" (9.6 mm)	Joint Bevel Angle	30 degree	Clamp Type	N/A
Schedule	40	Backing	N/A	Cleaning	Chipping & Brush

Electrode & Gas	ROOT PASS	HOT PASS	FILL - CAP PASSES
Electrode Name	Fleetweld 5P+	Fleetweld 5P+	Fleetweld 5P+
Diameter	1/8" (3.2 mm)	1/8" (3.2 mm)	1/8" (3.2 mm)
AWS Classification	E6010	E6010	E6010
Shielding Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Backing Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Welding Position	6G	6G	6G
Direction of Welding	UP	UP	UP
POWER SOURCE	VRTEX360	VRTEX360	VRTEX360
Software Z #	N/A	N/A	N/A
Mode #	N/A	N/A	N/A
Wire Feeder	N/A	N/A	N/A
Electrode Polarity	DC+	DC+	DC+

PROCEDURES	ROOT PASS	HOT PASS	FILL - CAP PASSES
Process	SMAW	SMAW	SMAW
WFS (in/min)	N/A	N/A	N/A
Volts	N/A	N/A	N/A
Amps	75 - 85	95 - 105	75 - 85
Travel Speed (in/min)	5.2 (.13 m/min)	5.5 (1.4 m/min)	5.2/6.0 (.13-.15 m/min)
Arc Length	Drag	1/8" (3.2 mm)	1/8" (3.2 mm)
Synergic Mode	N/A	N/A	N/A
Trim	N/A	N/A	N/A
Arc Control	N/A	N/A	N/A
Non-Synergic Mode	N/A	N/A	N/A
Peak Amps	N/A	N/A	N/A
Background Amps	N/A	N/A	N/A
Tailout (0-10)	N/A	N/A	N/A

Comments:

Joint Details



PIPE - 2G		Root Land	1/16" (1.7 mm)	Preheat Temp	N/A
Diameter	6" (152 mm)	Root Gap	1/16" (1.7 mm)	Interpass Temp	N/A
Wall Thickness	3/8" (9.6 mm)	Joint Bevel Angle	30 degree	Clamp Type	N/A
Schedule	40	Backing	N/A	Cleaning	Chipping & Brush

Electrode & Gas	ROOT PASS	HOT PASS	FILL - CAP PASSES
Electrode Name	Fleetweld 5P+	Excalibur 7018-1 MR	Excalibur 7018-1 MR
Diameter	1/8" (3.2 mm)	3/32" (2.4 mm)	3/32" (2.4 mm)
AWS Classification	E6010	E7018	E7018
Shielding Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Backing Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Welding Position	2G	2G	2G
Direction of Welding	horizontal	horizontal	horizontal
POWER SOURCE	VRTEX360	VRTEX360	VRTEX360
Software Z #	N/A	N/A	N/A
Mode #	N/A	N/A	N/A
Wire Feeder	N/A	N/A	N/A
Electrode Polarity	DC+	DC+	DC+

PROCEDURES	ROOT PASS	HOT PASS	FILL - CAP PASSES
Process	SMAW	SMAW	SMAW
WFS (in/min)	N/A	N/A	N/A
Volts	N/A	N/A	N/A
Amps	85 - 95	95 - 105	75 - 85
Travel Speed (in/min)	5.3 (.14 m/min)	5.6 (.14 m/min)	6.2/7.0 (.16-.18 m/min)
Arc Length	Drag	1/8" (3.2 mm)	1/8" (3.2 mm)
Synergic Mode	N/A	N/A	N/A
Trim	N/A	N/A	N/A
Arc Control	N/A	N/A	N/A
Non-Synergic Mode	N/A	N/A	N/A
Peak Amps	N/A	N/A	N/A
Background Amps	N/A	N/A	N/A
Tailout (0-10)	N/A	N/A	N/A

Comments:

Joint Details



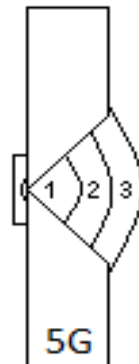
PIPE - 5G		Root Land	1/16" (1.7 mm)	Preheat Temp	N/A
Diameter	6" (152 mm)	Root Gap	1/16" (1.7 mm)	Interpass Temp	N/A
Wall Thickness	3/8" (9.6 mm)	Joint Bevel Angle	30 degree	Clamp Type	N/A
Schedule	40	Backing	N/A	Cleaning	Chipping & Brush

Electrode & Gas	ROOT PASS	HOT PASS	FILL - CAP PASSES
Electrode Name	Fleetweld 5P+	Excalibur 7018-1 MR	Excalibur 7018-1 MR
Diameter	1/8" (3.2 mm)	3/32" (2.4 mm)	3/32" (2.4 mm)
AWS Classification	E6010	E7018	E7018
Shielding Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Backing Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Welding Position	5G	5G	5G
Direction of Welding	Vertical up	Vertical up	Vertical up
POWER SOURCE	VRTEX360	VRTEX360	VRTEX360
Software Z #	N/A	N/A	N/A
Mode #	N/A	N/A	N/A
Wire Feeder	N/A	N/A	N/A
Electrode Polarity	DC+	DC+	DC+

PROCEDURES	ROOT PASS	HOT PASS	FILL - CAP PASSES
Process	SMAW	SMAW	SMAW
WFS (in/min)	N/A	N/A	N/A
Volts	N/A	N/A	N/A
Amps	85 - 95	95 - 105	75 - 85
Travel Speed (in/min)	5.5 (.14 m/min)	5.2 (.13 m/min)	5.1 (.13 m/min)
Arc Length	Drag	1/8" (3.2 mm)	1/8" (3.2 mm)
Synergic Mode	N/A	N/A	N/A
Trim	N/A	N/A	N/A
Arc Control	N/A	N/A	N/A
Non-Synergic Mode	N/A	N/A	N/A
Peak Amps	N/A	N/A	N/A
Background Amps	N/A	N/A	N/A
Tailout (0-10)	N/A	N/A	N/A

Comments:

Joint Details



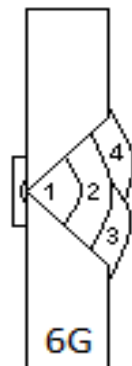
PIPE - 6G		Root Land	1/16" (1.7 mm)	Preheat Temp	N/A
Diameter	6" (152 mm)	Root Gap	1/16" (1.7 mm)	Interpass Temp	N/A
Wall Thickness	3/8" (9.6 mm)	Joint Bevel Angle	30 degree	Clamp Type	N/A
Schedule	40	Backing	N/A	Cleaning	Chipping & Brush

Electrode & Gas	ROOT PASS	HOT PASS	FILL - CAP PASSES
Electrode Name	Fleetweld 5P+	Excalibur 7018-1 MR	Excalibur 7018-1 MR
Diameter	1/8" (3.2 mm)	3/32" (2.4 mm)	3/32" (2.4 mm)
AWS Classification	E6010	E7018	E7018
Shielding Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Backing Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Welding Position	6G	6G	6G
Direction of Welding	Vertical up	Vertical up	Vertical up
POWER SOURCE	VRTEX360	VRTEX360	VRTEX360
Software Z #	N/A	N/A	N/A
Mode #	N/A	N/A	N/A
Wire Feeder	N/A	N/A	N/A
Electrode Polarity	DC+	DC+	DC+

PROCEDURES	ROOT PASS	HOT PASS	FILL - CAP PASSES
Process	SMAW	SMAW	SMAW
WFS (in/min)	N/A	N/A	N/A
Volts	N/A	N/A	N/A
Amps	85 - 95	95 - 105	75 - 85
Travel Speed (in/min)	5.2 (.13 m/min)	6.6 (.17 m/min)	6.4 (.16 m/min)
Arc Length	Drag	1/8" (3.2 mm)	1/8" (3.2 mm)
Synergic Mode	N/A	N/A	N/A
Trim	N/A	N/A	N/A
Arc Control	N/A	N/A	N/A
Non-Synergic Mode	N/A	N/A	N/A
Peak Amps	N/A	N/A	N/A
Background Amps	N/A	N/A	N/A
Tailout (0-10)	N/A	N/A	N/A

Comments:

Joint Details



PIPE - 2G		Root Land	N/A	Preheat Temp	N/A
Diameter	2" (50 mm)	Root Gap	3/32" (2.4 mm)	Interpass Temp	N/A
Wall Thickness	7/16" (11 mm)	Joint Bevel Angle	37-1/2 degree	Clamp Type	N/A
Schedule	XXS	Backing	N/A	Cleaning	Chipping & Brush

Electrode & Gas	ROOT PASS	HOT PASS	FILL - CAP PASSES
Electrode Name	Fleetweld 5P+	Excalibur 7018-1 MR	Excalibur 7018-1 MR
Diameter	1/8" (3.2 mm)	3/32" (2.4 mm)	3/32" (2.4 mm)
AWS Classification	E6010	E7018	E7018
Shielding Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Backing Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Welding Position	2G	2G	2G
Direction of Welding	horizontal	horizontal	horizontal
POWER SOURCE	VRTEX360	VRTEX360	VRTEX360
Software Z #	N/A	N/A	N/A
Mode #	N/A	N/A	N/A
Wire Feeder	N/A	N/A	N/A
Electrode Polarity	DC+	DC+	DC+

PROCEDURES	ROOT PASS	HOT PASS	FILL - CAP PASSES
Process	SMAW	SMAW	SMAW
WFS (in/min)	N/A	N/A	N/A
Volts	N/A	N/A	N/A
Amps	85-95	95-105	75-85
Travel Speed (in/min)	5.1 (.13 m/min)	6.2 (.16 m/min)	6.3 (.16 m/min)
Arc Length	Drag	1/8" (3.2 mm)	1/8" (3.2 mm)
Synergic Mode	N/A	N/A	N/A
Trim	N/A	N/A	N/A
Arc Control	N/A	N/A	N/A
Non-Synergic Mode	N/A	N/A	N/A
Peak Amps	N/A	N/A	N/A
Background Amps	N/A	N/A	N/A
Tailout (0-10)	N/A	N/A	N/A

Comments:

Joint Details


PIPE - 5G		Root Land	N/A	Preheat Temp	N/A
Diameter	2" (50 mm)	Root Gap	3/32" (2.4 mm)	Interpass Temp	N/A
Wall Thickness	7/16" (11 mm)	Joint Bevel Angle	37-1/2 degree	Clamp Type	N/A
Schedule	XXS	Backing	N/A	Cleaning	Chipping & Brush

Electrode & Gas	ROOT PASS	HOT PASS	FILL - CAP PASSES
Electrode Name	Fleetweld 5P+	Excalibur 7018-1 MR	Excalibur 7018-1 MR
Diameter	1/8" (3.2 mm)	3/32" (2.4 mm)	3/32" (2.4 mm)
AWS Classification	E6010	E7018	E7018
Shielding Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Backing Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Welding Position	5G	5G	5G
Direction of Welding	vertical up	vertical up	vertical up
POWER SOURCE	VRTEX360	VRTEX360	VRTEX360
Software Z #	N/A	N/A	N/A
Mode #	N/A	N/A	N/A
Wire Feeder	N/A	N/A	N/A
Electrode Polarity	DC+	DC+	DC+

PROCEDURES	ROOT PASS	HOT PASS	FILL - CAP PASSES
Process	SMAW	SMAW	SMAW
WFS (in/min)	N/A	N/A	N/A
Volts	N/A	N/A	N/A
Amps	85-95	95-105	75-85
Travel Speed (in/min)	5.3 .13 m/min)	5.9 (.15 m/min)	6.2/6.3 (.16 m/min)
Arc Length	Drag	1/8" (3.2 mm)	1/8" (3.2 mm)
Synergic Mode	N/A	N/A	N/A
Trim	N/A	N/A	N/A
Arc Control	N/A	N/A	N/A
Non-Synergic Mode	N/A	N/A	N/A
Peak Amps	N/A	N/A	N/A
Background Amps	N/A	N/A	N/A
Tailout (0-10)	N/A	N/A	N/A

Comments:

Joint Details


PIPE - 6G		Root Land	N/A	Preheat Temp	N/A
Diameter	2" (50 mm)	Root Gap	3/32" (2.4 mm)	Interpass Temp	N/A
Wall Thickness	7/16" (11 mm)	Joint Bevel Angle	37-1/2 degree	Clamp Type	N/A
Schedule	XXS	Backing	N/A	Cleaning	Chipping & Brush

Electrode & Gas	ROOT PASS	HOT PASS	FILL - CAP PASSES
Electrode Name	Fleetweld 5P+	Excalibur 7018-1 MR	Excalibur 7018-1 MR
Diameter	1/8" (3.2 mm)	3/32" (2.4 mm)	3/32" (2.4 mm)
AWS Classification	E6010	E7018	E7018
Shielding Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Backing Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Welding Position	6G	6G	6G
Direction of Welding	vertical up	vertical up	vertical up
POWER SOURCE	VRTEX360	VRTEX360	VRTEX360
Software Z #	N/A	N/A	N/A
Mode #	N/A	N/A	N/A
Wire Feeder	N/A	N/A	N/A
Electrode Polarity	DC+	DC+	DC+

PROCEDURES	ROOT PASS	HOT PASS	FILL - CAP PASSES
Process	SMAW	SMAW	SMAW
WFS (in/min)	N/A	N/A	N/A
Volts	N/A	N/A	N/A
Amps	85-95	95-105	75-85
Travel Speed (in/min)	4.6 (.12 m/min)	5.6 (.14 m/min)	5.8/6.2 (.15-.16 m/min)
Arc Length	Drag	1/8" (3.2 mm)	1/8" (3.2 mm)
Synergic Mode	N/A	N/A	N/A
Trim	N/A	N/A	N/A
Arc Control	N/A	N/A	N/A
Non-Synergic Mode	N/A	N/A	N/A
Peak Amps	N/A	N/A	N/A
Background Amps	N/A	N/A	N/A
Tailout (0-10)	N/A	N/A	N/A

Comments:

Joint Details


PIPE - 2G		Root Land	N/A	Preheat Temp	N/A
Diameter	2" (50 mm)	Root Gap	3/32" (2.4 mm)	Interpass Temp	N/A
Wall Thickness	7/16" (11 mm)	Joint Bevel Angle	37-1/2 degree	Clamp Type	N/A
Schedule	XXS	Backing	N/A	Cleaning	Chipping & Brush

Electrode & Gas	ROOT PASS	HOT PASS	FILL - CAP PASSES
Electrode Name	N/A	Excalibur 7018-1 MR	Excalibur 7018-1 MR
Diameter	N/A	3/32" (2.4 mm)	3/32" (2.4 mm)
AWS Classification	N/A	E7018	E7018
Shielding Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Backing Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Welding Position	N/A	2G	2G
Direction of Welding	N/A	horizontal	horizontal
POWER SOURCE	N/A	VRTEX360	VRTEX360
Software Z #	N/A	N/A	N/A
Mode #	N/A	N/A	N/A
Wire Feeder	N/A	N/A	N/A
Electrode Polarity	N/A	DC+	DC+

PROCEDURES	ROOT PASS	HOT PASS	FILL - CAP PASSES
Process	N/A	SMAW	SMAW
WFS (in/min)	N/A	N/A	N/A
Volts	N/A	N/A	N/A
Amps	N/A	75-85	75-85
Travel Speed (in/min)	N/A	6.2 (.15 m/min)	6.3 (.16 m/min)
Arc Length	N/A	1/8" (3.2 mm)	1/8" (3.2 mm)
Synergic Mode	N/A	N/A	N/A
Trim	N/A	N/A	N/A
Arc Control	N/A	N/A	N/A
Non-Synergic Mode	N/A	N/A	N/A
Peak Amps	N/A	N/A	N/A
Background Amps	N/A	N/A	N/A
Tailout (0-10)	N/A	N/A	N/A

Comments:

Joint Details


PIPE - 5G		Root Land	N/A	Preheat Temp	N/A
Diameter	2" (50 mm)	Root Gap	3/32" (2.4 mm)	Interpass Temp	N/A
Wall Thickness	7/16" (11 mm)	Joint Bevel Angle	37-1/2 degree	Clamp Type	N/A
Schedule	XXS	Backing	N/A	Cleaning	Chipping & Brush

Electrode & Gas	ROOT PASS	HOT PASS	FILL - CAP PASSES
Electrode Name	N/A	Excalibur 7018-1 MR	Excalibur 7018-1 MR
Diameter	N/A	3/32" (2.4 mm)	3/32" (2.4 mm)
AWS Classification	N/A	E7018	E7018
Shielding Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Backing Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Welding Position	N/A	5G	5G
Direction of Welding	N/A	Vertical up	Vertical up
POWER SOURCE	N/A	VRTEX360	VRTEX360
Software Z #	N/A	N/A	N/A
Mode #	N/A	N/A	N/A
Wire Feeder	N/A	N/A	N/A
Electrode Polarity	N/A	DC+	DC+

PROCEDURES	ROOT PASS	HOT PASS	FILL - CAP PASSES
Process	N/A	SMAW	SMAW
WFS (in/min)	N/A	N/A	N/A
Volts	N/A	N/A	N/A
Amps	N/A	75-85	75-85
Travel Speed (in/min)	N/A	5.9 (.15 m/min)	6.2 (.16 m/min)
Arc Length	N/A	1/8" (3.2 mm)	1/8" (3.2 mm)
Synergic Mode	N/A	N/A	N/A
Trim	N/A	N/A	N/A
Arc Control	N/A	N/A	N/A
Non-Synergic Mode	N/A	N/A	N/A
Peak Amps	N/A	N/A	N/A
Background Amps	N/A	N/A	N/A
Tailout (0-10)	N/A	N/A	N/A

Comments:

Joint Details


PIPE - 6G		Root Land	N/A	Preheat Temp	N/A
Diameter	2" (50 mm)	Root Gap	3/32" (2.4 mm)	Interpass Temp	N/A
Wall Thickness	7/16" (11 mm)	Joint Bevel Angle	37-1/2 degree	Clamp Type	N/A
Schedule	XXS	Backing	N/A	Cleaning	Chipping & Brush

Electrode & Gas	ROOT PASS	HOT PASS	FILL - CAP PASSES
Electrode Name	N/A	Excalibur 7018-1 MR	Excalibur 7018-1 MR
Diameter	N/A	3/32" (2.4 mm)	3/32" (2.4 mm)
AWS Classification	N/A	E7018	E7018
Shielding Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Backing Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Welding Position	N/A	6G	6G
Direction of Welding	N/A	Vertical up	Vertical up
POWER SOURCE	N/A	VRTEX360	VRTEX360
Software Z #	N/A	N/A	N/A
Mode #	N/A	N/A	N/A
Wire Feeder	N/A	N/A	N/A
Electrode Polarity	N/A	DC+	DC+

PROCEDURES	ROOT PASS	HOT PASS	FILL - CAP PASSES
Process	N/A	SMAW	SMAW
WFS (in/min)	N/A	N/A	N/A
Volts	N/A	N/A	N/A
Amps	N/A	75-85	75-85
Travel Speed (in/min)	N/A	5.6 (.14 m/min)	5.8/6.2 (.15-.16 m/min)
Arc Length	N/A	1/8" (3.2 mm)	1/8" (3.2 mm)
Synergic Mode	N/A	N/A	N/A
Trim	N/A	N/A	N/A
Arc Control	N/A	N/A	N/A
Non-Synergic Mode	N/A	N/A	N/A
Peak Amps	N/A	N/A	N/A
Background Amps	N/A	N/A	N/A
Tailout (0-10)	N/A	N/A	N/A

Comments:

Joint Details



VRTEX® 360 - 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 or Trim	Polarity
37	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+
38	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+
39	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+
40	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+
41	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+
42	GMAW - S	.035" (.89 mm) ER70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	4F	1/4" (6.4 mm)	325 (± 5) (8.2 m/min)	19	DC+
43	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+
44	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+
45	GMAW - S	.035" (.89 mm) ER70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	3G up	3/8" (9.6 mm)	250 (± 5) (6.3 m/min)	17.9	DC+
46	GMAW - S	.035" (.89 mm) ER70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	4G	3/8" (9.6 mm)	270 (± 5) (6.8 m/min)	18	DC+
47	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+
48	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+
49	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+
50	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+
51	GMAW - Pulse	.045" (1.1 mm) ER70S-6	SuperArc L-56	90/10	25-40 (12-18 l/min)	3G up	3/8" (9.6 mm)	130 (± 5) (3.3 m/min)	.95(trim)	DC+
52	GMAW - STT	.045" (1.1 mm) ER70S-6	SuperArc L-56	100% Co2	25-35 (12-16.5 l/min)	2G Pipe	6" (150 mm)	135 (± 5) (3.3-3.8 m/min)	NA	DC+
	GMAW - Pulse	.045" (1.1 mm) ER70S-6	SuperArc L-56	90/10	25-40 (12-18 l/min)	2G Pipe		125-130 (3.2-3.3 m/min)	.95(trim)	
53	GMAW - STT	.045" (1.1 mm) ER70S-6	SuperArc L-56	100% Co2	25-35 (12-16.5 l/min)	5G Pipe down	6" (150 mm)	135 (± 5) (3.3-3.8 m/min)	NA	DC+
	GMAW - Pulse	.045" (1.1 mm) ER70S-6	SuperArc L-56	90/10	25-40 (12-18 l/min)	5G Pipe up		125-130 (3.2-3.3 m/min)	.95(trim)	
54	GMAW - STT	.045" (1.1 mm) ER70S-6	SuperArc L-56	100% Co2	25-35 (12-16.5 l/min)	6G Pipe down	6" (150 mm)	135 (± 5) (3.3-3.8 m/min)	NA	DC+
	GMAW - Pulse	.045" (1.1 mm) ER70S-6	SuperArc L-56	90/10	25-40 (12-18 l/min)	6G Pipe up		125-130 (3.2-3.3 m/min)	.95(trim)	
55	GMAW - STT	.045" (1.1 mm) ER70S-6	SuperArc L-56	100% Co2	25-35 (12-16.5 l/min)	2G Pipe	6" (150 mm)	135 (± 5) (3.3-3.8 m/min)	NA	DC+
	FCAW - G	.045" (1.1 mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)			275 (± 5) (6.8-7.1 m/min)	25	
56	GMAW - STT	.045" (1.1 mm) ER70S-6	SuperArc L-56	100% Co2	25-35 (12-16.5 l/min)	5G Pipe down	6" (150 mm)	135 (± 5) (3.3-3.8 m/min)	NA	DC+
	FCAW - G	.045" (1.1 mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)	5G Pipe up		275 (± 5) (6.8-7.1 m/min)	25	
57	GMAW - STT	.045" (1.1 mm) ER70S-6	SuperArc L-56	100% Co2	25-35 (12-16.5 l/min)	6G Pipe down	6" (150 mm)	135 (± 5) (3.3-3.8 m/min)	NA	DC+
	FCAW - G	.045" (1.1 mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)	6G Pipe up		275 (± 5) (6.8-7.1 m/min)	25	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process GMAW

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

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

Identification # VRTEX® GMAW # 37

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 37

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)	 Bead on Plate

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 ☐

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

Identification # VRTEX® GMAW # 38

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 38

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 ☒

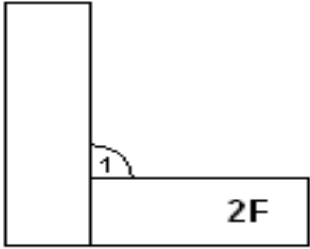
Interpass Cleaning YES ☐ NO ☒

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)	

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 ☐

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

Identification # VRTEX® GMAW # 39

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) _____ PQR VRTEX® 39

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 ☒

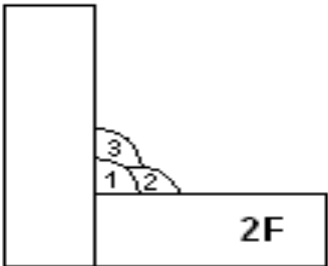
Interpass Cleaning YES ☐ NO ☒

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)	

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 ☐

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

Identification # VRTEX® GMAW # 40

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 40

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

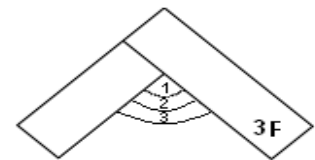
Stringer, Weave Bead, Other: Stringer/ Weave
Multi-pass or Single Pass (per side) Multi-pass
Number of Electrodes Single
Contact Tip to Work Distance 3/8" (10 mm)
Peening Yes ☐ NO ☒
Interpass Cleaning YES ☐ NO ☒
Cleaning Method: None

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)	



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 ☐

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

Identification # VRTEX® GMAW # 41

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 41

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)	

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 ☐

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

Identification # VRTEX® GMAW # 42

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) _____ PQR VRTEX® 42

POSITION

Groove: N/A Fillet: 4F 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

Number of Electrodes Single

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

Peening Yes ☐ NO ☒

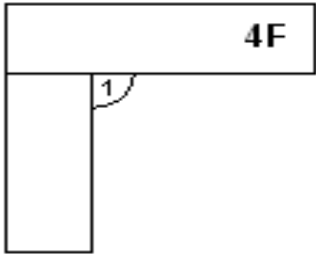
Interpass Cleaning YES ☐ NO ☒

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+	325 (8.2 m/min)	19	12.5 ipm (.32 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 ☐

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

Identification # VRTEX® GMAW # 43

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 43

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 ☐

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

Identification # VRTEX® GMAW # 44

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 44

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

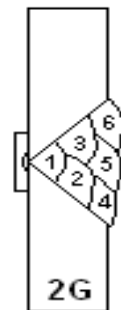
Stringer, Weave Bead, Other: Stringer
Multi-pass or Single Pass (per side) Multi-pass
Number of Electrodes Single
Contact Tip to Work Distance 3/8" (10 mm)
Peening Yes ☐ NO ☒
Interpass Cleaning YES ☐ NO ☒
Cleaning Method: None

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 ☐

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

Identification # VRTEX® GMAW # 45

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) _____ PQR VRTEX® 45

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

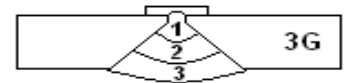
PREHEAT

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 / 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)	17.9	5.8 ipm (.15 m/min)	
2	Weave	E70S-6	.035" (.89 mm)	DC+	250 (6.3 m/min)	17.9	4.8 ipm (.12 m/min)	
3	Weave	E70S-6	.035" (.89 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 ☐

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

Identification # VRTEX® GMAW # 46

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) _____ PQR VRTEX® 46

POSITION

Groove: 4G 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+	270 (6.8 m/min)	18	6.1 ipm (.15 m/min)	
2	Stringer	E70S-6	.035" (.89 mm)	DC+	270 (6.8 m/min)	18	8.7 ipm (.22 m/min)	
3	Stringer	E70S-6	.035" (.89 mm)	DC+	270 (6.8 m/min)	18	7.2 ipm (.18 m/min)	
4	Stringer	E70S-6	.035" (.89 mm)	DC+	270 (6.8 m/min)	18	6.2 ipm (.18 m/min)	
5	Stringer	E70S-6	.035" (.89 mm)	DC+	270 (6.8 m/min)	18	9.4 ipm (.24 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 ☐

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

Identification # VRTEX® GMAW # 47

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 47

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)	 Bead on Plate

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 ☐

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

Identification # VRTEX® GMAW # 48

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 48

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

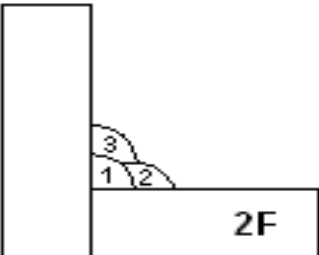
TECHNIQUE

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 ☐

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

Identification # VRTEX® GMAW # 49

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 49

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

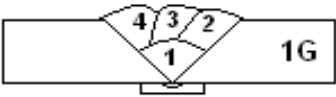
TECHNIQUE

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)	

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 ☐

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

Identification # VRTEX® GMAW # 51

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) _____ PQR VRTEX® 51

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

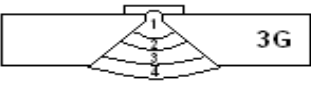
TECHNIQUE

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 / 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	3.9 ipm (.10 m/min)	
2	Weave	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	3.6 ipm (.10 m/min)	
3	Weave	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	2.8 ipm (.07 m/min)	
4	Weave	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	2.6 ipm (.07 m/min)	

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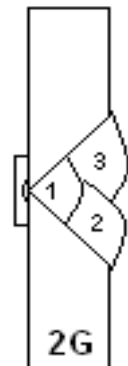
PIPE - 2G		Root Land	1/16" (1.6 mm)	Preheat Temp	N/A
Diameter	6" (152 mm)	Root Gap	1/16" (1.6 mm)	Interpass Temp	N/A
Wall Thickness	3/8" (9.6 mm)	Joint Bevel Angle	30 degree	Clamp Type	N/A
Schedule	40	Backing	N/A	Cleaning	N/A

Electrode & Gas	ROOT PASS	HOT PASS	FILL - CAP PASSES
Electrode Name	SuperArc L-56	SuperArc L-56	SuperArc L-56
Diameter	0.045 (1.1 mm)	0.045 (1.1 mm)	0.045 (1.1 mm)
AWS Classification	ER70S-6	ER70S-6	ER70S-6
Shielding Gas	100% Co2	90% Argon / 10% Co2	90% Argon / 10% Co2
Flow Rate (CFH)	25-35 (12-16.5 l/min)	25-40 (12-18 l/min)	25-40 (12-18 l/min)
Backing Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Welding Position	2G	2G	2G
Direction of Welding	Horizontal	Horizontal	Horizontal
POWER SOURCE	N/A	N/A	N/A
Software Z #	N/A	N/A	N/A
Mode #	N/A	N/A	N/A
Wire Feeder	N/A	N/A	N/A
Electrode Polarity	DC+	DC+	DC+

PROCEDURES	ROOT PASS	HOT PASS	FILL - CAP PASSES
Process	GMAW-STT	GMAW-Pulse	GMAW-Pulse
WFS (in/min)	130-150 (3.3-3.8 m/min)	125-130 (3.2-3.3 m/min)	125-130 (3.2-3.3 m/min)
Volts	N/A	N/A	N/A
Amps	130-140	N/A	N/A
Travel Speed (in/min)	7 ipm (.18 m/min)	8 ipm (.18 m/min)	9 ipm (.18 m/min)
Arc Length	0.5" (12.7 mm)	0.5" (12.7 mm)	0.5" (12.7 mm)
Synergic Mode	N/A	N/A	N/A
Trim	N/A	.95	.95
Arc Control	N/A	N/A	N/A
Non-Synergic Mode	N/A	N/A	N/A
Peak Amps	350-400	N/A	N/A
Background Amps	40-50	N/A	N/A
Tailout (0-10)	N/A	N/A	N/A

Comments:

Joint Details



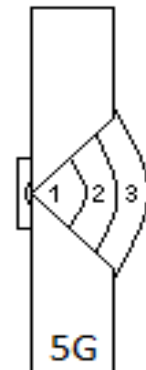
PIPE - 5G		Root Land	1/16" (1.6 mm)	Preheat Temp	N/A
Diameter	6" (152 mm)	Root Gap	1/16" (1.6 mm)	Interpass Temp	N/A
Wall Thickness	3/8" (9.6 mm)	Joint Bevel Angle	30 degree	Clamp Type	N/A
Schedule	40	Backing	N/A	Cleaning	N/A

Electrode & Gas	ROOT PASS	HOT PASS	FILL - CAP PASSES
Electrode Name	SuperArc L-56	SuperArc L-56	SuperArc L-56
Diameter	0.045 (1.1 mm)	0.045 (1.1 mm)	0.045 (1.1 mm)
AWS Classification	ER70S-6	ER70S-6	ER70S-6
Shielding Gas	100% Co2	90% Argon / 10% Co2	90% Argon / 10% Co2
Flow Rate (CFH)	25-35 (12-16.5 l/min)	25-40 (12-18 l/min)	25-40 (12-18 l/min)
Backing Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Welding Position	5G	5G	5G
Direction of Welding	down	UP	UP
POWER SOURCE	N/A	N/A	N/A
Software Z #	N/A	N/A	N/A
Mode #	N/A	N/A	N/A
Wire Feeder	N/A	N/A	N/A
Electrode Polarity	DC+	DC+	DC+

PROCEDURES	ROOT PASS	HOT PASS	FILL - CAP PASSES
Process	GMAW-STT	GMAW-Pulse	GMAW-Pulse
WFS (in/min)	130-150 (3.3-3.8 m/min)	125-130 (3.2-3.3 m/min)	125-130 (3.2-3.3 m/min)
Volts	N/A	N/A	N/A
Amps	130-140	N/A	N/A
Travel Speed (in/min)	7 ipm (.18 m/min)	8 ipm (.18 m/min)	9 ipm (.18 m/min)
Arc Length	0.5" (12.7 mm)	0.5" (12.7 mm)	0.5" (12.7 mm)
Synergic Mode	N/A	N/A	N/A
Trim	N/A	.95	.95
Arc Control	N/A	N/A	N/A
Non-Synergic Mode	N/A	N/A	N/A
Peak Amps	350-400	N/A	N/A
Background Amps	40-50	N/A	N/A
Tailout (0-10)	N/A	N/A	N/A

Comments:

Joint Details



PIPE - 6G		Root Land	1/16" (1.6 mm)	Preheat Temp	N/A
Diameter	6" (152 mm)	Root Gap	1/16" (1.6 mm)	Interpass Temp	N/A
Wall Thickness	3/8" (9.6 mm)	Joint Bevel Angle	30 degree	Clamp Type	N/A
Schedule	40	Backing	N/A	Cleaning	N/A

Electrode & Gas	ROOT PASS	HOT PASS	FILL - CAP PASSES
Electrode Name	SuperArc L-56	SuperArc L-56	SuperArc L-56
Diameter	0.045 (1.1 mm)	0.045 (1.1 mm)	0.045 (1.1 mm)
AWS Classification	ER70S-6	ER70S-6	ER70S-6
Shielding Gas	100% Co2	90% Argon / 10% Co2	90% Argon / 10% Co2
Flow Rate (CFH)	25-35 (12-16.5 l/min)	25-40 (12-18 l/min)	25-40 (12-18 l/min)
Backing Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Welding Position	5G	5G	5G
Direction of Welding	down	UP	UP
POWER SOURCE	N/A	N/A	N/A
Software Z #	N/A	N/A	N/A
Mode #	N/A	N/A	N/A
Wire Feeder	N/A	N/A	N/A
Electrode Polarity	DC+	DC+	DC+

PROCEDURES	ROOT PASS	HOT PASS	FILL - CAP PASSES
Process	GMAW-STT	GMAW-Pulse	GMAW-Pulse
WFS (in/min)	130-150 (3.3-3.8 m/min)	125-130 (3.2-3.3 m/min)	125-130 (3.2-3.3 m/min)
Volts	N/A	N/A	N/A
Amps	130-140	N/A	N/A
Travel Speed (in/min)	7 ipm (.18 m/min)	8 ipm (.18 m/min)	9 ipm (.18 m/min)
Arc Length	0.5" (12.7 mm)	0.5" (12.7 mm)	0.5" (12.7 mm)
Synergic Mode	N/A	N/A	N/A
Trim	N/A	.95	.95
Arc Control	N/A	N/A	N/A
Non-Synergic Mode	N/A	N/A	N/A
Peak Amps	350-400	N/A	N/A
Background Amps	40-50	N/A	N/A
Tailout (0-10)	N/A	N/A	N/A

Comments:

Joint Details



PIPE - 2G		Root Land	1/16" (1.6 mm)	Preheat Temp	N/A
Diameter	6" (152 mm)	Root Gap	1/16" (1.6 mm)	Interpass Temp	N/A
Wall Thickness	3/8" (9.6 mm)	Joint Bevel Angle	30 degree	Clamp Type	N/A
Schedule	40	Backing	N/A	Cleaning	Chipping & Brush

Electrode & Gas	ROOT PASS	HOT PASS	FILL - CAP PASSES
Electrode Name	SuperArc L-56	Ultra Core 71A85	Ultra Core 71A85
Diameter	0.045 (1.1 mm)	0.045 (1.1 mm)	0.045 (1.1 mm)
AWS Classification	ER70S-6	E71T-1	E71T-1
Shielding Gas	100% Co2	75% Argon / 25% Co2	75% Argon / 25% Co2
Flow Rate (CFH)	25-35 (12-16.5 l/min)	40-50 (19-23.5 m/min)	40-50 (19-23.5 m/min)
Backing Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Welding Position	2G	2G	2G
Direction of Welding	Horizontal	Horizontal	Horizontal
POWER SOURCE	N/A	N/A	N/A
Software Z #	N/A	N/A	N/A
Mode #	N/A	N/A	N/A
Wire Feeder	N/A	N/A	N/A
Electrode Polarity	DC+	DC+	DC+

PROCEDURES	ROOT PASS	HOT PASS	FILL - CAP PASSES
Process	GMAW-STT	FCAW-G	FCAW-G
WFS (in/min)	130-150 ((3.3-3.8 m/min)	270-280 (6.8-7.1 m/min)	270-280 (6.8-7.1 m/min)
Volts	130-140	24-26	24-26
Amps	N/A	N/A	N/A
Travel Speed (in/min)	6.6 (.17 m/min)	7.5 (.19 m/min)	8.3 (.21 m/min)
Arc Length	0.5 (12.7 mm)	0.75 (19.1 mm)	0.75 (19.1 mm)
Synergic Mode	N/A	N/A	N/A
Trim	N/A	N/A	N/A
Arc Control	N/A	N/A	N/A
Non-Synergic Mode	N/A	N/A	N/A
Peak Amps	350-400	N/A	N/A
Background Amps	40-50	N/A	N/A
Tailout (0-10)	N/A	N/A	N/A

Comments:

Joint Details



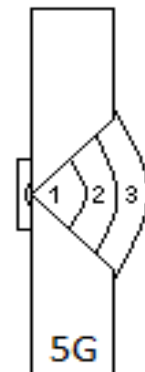
PIPE - 5G		Root Land	1/16" (1.6 mm)	Preheat Temp	N/A
Diameter	6" (152 mm)	Root Gap	1/16" (1.6 mm)	Interpass Temp	N/A
Wall Thickness	3/8" (9.6 mm)	Joint Bevel Angle	30 degree	Clamp Type	N/A
Schedule	40	Backing	N/A	Cleaning	Chipping & Brush

Electrode & Gas	ROOT PASS	HOT PASS	FILL - CAP PASSES
Electrode Name	SuperArc L-56	Ultra Core 71A85	Ultra Core 71A85
Diameter	0.045 (1.1 mm)	0.045 (1.1 mm)	0.045 (1.1 mm)
AWS Classification	ER70S-6	E71T-1	E71T-1
Shielding Gas	100% Co2	75% Argon / 25% Co2	75% Argon / 25% Co2
Flow Rate (CFH)	25-35 (12-16.5 l/min)	40-50 (19-23.5 m/min)	40-50 (19-23.5 m/min)
Backing Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Welding Position	5G	5G	5G
Direction of Welding	down	UP	UP
POWER SOURCE	N/A	N/A	N/A
Software Z #	N/A	N/A	N/A
Mode #	N/A	N/A	N/A
Wire Feeder	N/A	N/A	N/A
Electrode Polarity	DC+	DC+	DC+

PROCEDURES	ROOT PASS	HOT PASS	FILL - CAP PASSES
Process	GMAW-STT	FCAW-G	FCAW-G
WFS (in/min)	130-150 ((3.3-3.8 m/min)	270-280 (6.8-7.1 m/min)	270-280 (6.8-7.1 m/min)
Volts	130-140	24-26	24-26
Amps	N/A	N/A	N/A
Travel Speed (in/min)	7 (.18 m/min)	7.5 (5.5 m/min)	5.3 (5.3 m/min)
Arc Length	0.5 (12.7 mm)	0.75 (19.1 mm)	0.75 (19.1 mm)
Synergic Mode	N/A	N/A	N/A
Trim	N/A	N/A	N/A
Arc Control	N/A	N/A	N/A
Non-Synergic Mode	N/A	N/A	N/A
Peak Amps	350-400	N/A	N/A
Background Amps	40-50	N/A	N/A
Tailout (0-10)	N/A	N/A	N/A

Comments:

Joint Details



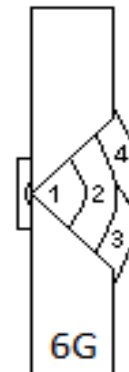
PIPE - 6G		Root Land	1/16" (1.6 mm)	Preheat Temp	N/A
Diameter	6" (152 mm)	Root Gap	1/16" (1.6 mm)	Interpass Temp	N/A
Wall Thickness	3/8" (9.6 mm)	Joint Bevel Angle	30 degree	Clamp Type	N/A
Schedule	40	Backing	N/A	Cleaning	Chipping & Brush

Electrode & Gas	ROOT PASS	HOT PASS	FILL - CAP PASSES
Electrode Name	SuperArc L-56	Ultra Core 71A85	Ultra Core 71A85
Diameter	0.045 (1.1 mm)	0.045 (1.1 mm)	0.045 (1.1 mm)
AWS Classification	ER70S-6	E71T-1	E71T-1
Shielding Gas	100% Co2	75% Argon / 25% Co2	75% Argon / 25% Co2
Flow Rate (CFH)	25-35 (12-16.5 l/min)	40-50 (19-23.5 m/min)	40-50 (19-23.5 m/min)
Backing Gas	N/A	N/A	N/A
Flow Rate (CFH)	N/A	N/A	N/A
Welding Position	6G	6G	6G
Direction of Welding	down	UP	UP
POWER SOURCE	N/A	N/A	N/A
Software Z #	N/A	N/A	N/A
Mode #	N/A	N/A	N/A
Wire Feeder	N/A	N/A	N/A
Electrode Polarity	DC+	DC+	DC+

PROCEDURES	ROOT PASS	HOT PASS	FILL - CAP PASSES
Process	GMAW-STT	FCAW-G	FCAW-G
WFS (in/min)	130-150 ((3.3-3.8 m/min)	270-280 (6.8-7.1 m/min)	270-280 (6.8-7.1 m/min)
Volts	130-140	24-26	24-26
Amps	N/A	N/A	N/A
Travel Speed (in/min)	7.1 (.18 m/min)	6.2 (.16 m/min)	5.3/5.1 (.13 m/min)
Arc Length	0.5 (12.7 mm)	0.75 (19.1 mm)	0.75 (19.1 mm)
Synergic Mode	N/A	N/A	N/A
Trim	N/A	N/A	N/A
Arc Control	N/A	N/A	N/A
Non-Synergic Mode	N/A	N/A	N/A
Peak Amps	350-400	N/A	N/A
Background Amps	40-50	N/A	N/A
Tailout (0-10)	N/A	N/A	N/A

Comments:

Joint Details



VRTEX® 360 - 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
58	FCAW - G	.045" (1.1 mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)	Flat	1/4" (6.4 mm)	275 (± 5) (7.0 m/min)	25	DC+
59	FCAW - G	.045" (1.1 mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)	2F	3/8" (9.6 mm)	275 (± 5) (7.0 m/min)	25	DC+
60	FCAW - G	.045" (1.1 mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)	3F up	3/8" (9.6 mm)	275 (± 5) (7.0 m/min)	25	DC+
61	FCAW - G	.045" (1.1 mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)	4F	3/8" (9.6 mm)	275 (± 5) (7.0 m/min)	25	DC+
62	FCAW - G	.045" (1.1 mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)	1G	3/8" (9.6 mm)	275 (± 5) (7.0 m/min)	25	DC+
63	FCAW - G	.045" (1.1 mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)	2G	3/8" (9.6 mm)	275 (± 5) (7.0 m/min)	25	DC+
64	FCAW - G	.045" (1.1 mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)	3G up	3/8" (9.6 mm)	275 (± 5) (7.0 m/min)	25	DC+
65	FCAW - G	.045" (1.1 mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)	4G	3/8" (9.6 mm)	275 (± 5) (7.0 m/min)	25	DC+
66	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-
67	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-
68	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-
69	FCAW - S	5/64" (2.0 mm) E71T-8	NR- 232/233	NA	NA	4F	3/8" (9.6 mm)	145 (± 5) (3.7 m/min)	20	DC-
70	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-
71	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-
72	FCAW - S	5/64" (2.0 mm) E71T-8	NR- 232/233	NA	NA	3G up	3/8" (9.6 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 ☐

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-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

Identification # VRTEX® FCAW # 59
Revision _____ Date _____ by _____
Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 59

POSITION

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

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

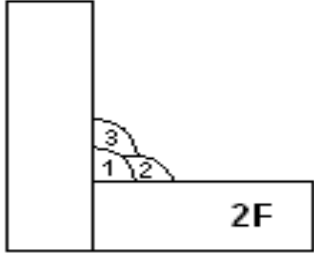
Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐
Pulse ☐
Other: N/A
Current: AC ☐ DCEP ☒ DCEN ☐
Power Source: CC ☐ CV ☒
Tungsten Electrode (GTAW)
Size: N/A
Type: N/A

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" (1.1 mm)	DC+	275 (7.0 m/min)	25	11.4 ipm (.29 m/min)	
2	Stringer	E71T-1	0.045" (1.1 mm)	DC+	275 (7.0 m/min)	25	15.5 ipm (.40 m/min)	
3	Stringer	E71T-1	0.045" (1.1 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 ☐

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-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

Identification # VRTEX® FCAW # 60

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 60

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

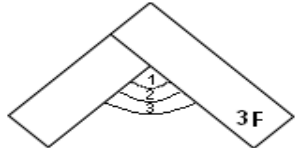
TECHNIQUE

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" (1.1 mm)	DC+	275 (7.0 m/min)	25	6 ipm (.15 m/min)	
2	Weave	E71T-1	0.045" (1.1 mm)	DC+	275 (7.0 m/min)	25	5.3 ipm (.13 m/min)	
3	Weave	E71T-1	0.045" (1.1 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 ☐

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-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

Identification # VRTEX® FCAW # 61

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 61

POSITION

Groove: N/A Fillet: 4F 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	4F 1 2 3
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E71T-1	0.045" (1.1 mm)	DC+	275 (7.0 m/min)	25	8.2 ipm (.21 m/min)	
2	Stringer	E71T-1	0.045" (1.1 mm)	DC+	275 (7.0 m/min)	25	12.5 ipm (.32 m/min)	
3	Strigner	E71T-1	0.045" (1.1 mm)	DC+	275 (7.0 m/min)	25	11.1 ipm (.28 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 ☐

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-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

Identification # VRTEX® FCAW # 63
Revision _____ Date _____ by _____
Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 63

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

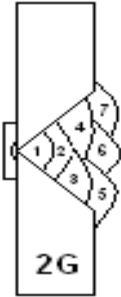
TECHNIQUE

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" (1.1 mm)	DC+	275 (7.0 m/min)	25	6.8 ipm (.17 m/min)	
2	Stringer	E71T-1	0.045" (1.1 mm)	DC+	275 (7.0 m/min)	25	15 ipm (.38 m/min)	
3	Stringer	E71T-1	0.045" (1.1 mm)	DC+	275 (7.0 m/min)	25	9.9 ipm (.25 m/min)	
4	Stringer	E71T-1	0.045" (1.1 mm)	DC+	275 (7.0 m/min)	25	14.1 ipm (.36 m/min)	
5	Stringer	E71T-1	0.045" (1.1 mm)	DC+	275 (7.0 m/min)	25	14.6 ipm (.37 m/min)	
6	Stringer	E71T-1	0.045" (1.1 mm)	DC+	275 (7.0 m/min)	25	14.1 ipm (.36 m/min)	
7	Stringer	E71T-1	0.045" (1.1 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 ☐

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-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

Identification # VRTEX® FCAW # 64

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) _____ PQR VRTEX® 64

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" (1.1 mm)	DC+	275 (7.0 m/min)	25	8.6 ipm (.22 m/min)	
2	Weave	E71T-1	0.045" (1.1 mm)	DC+	275 (7.0 m/min)	25	7 ipm (.18 m/min)	
3	Weave	E71T-1	0.045" (1.1 mm)	DC+	275 (7.0 m/min)	25	6 ipm (.29 m/min)	

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WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process FCAW-G

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

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-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

Identification # VRTEX® FCAW # 65

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 65

POSITION

Groove: 4G Fillet: N/A Flat Surfacing: ☐

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐

Pulse ☐

Other: N/A

Current: AC ☐ DCEP ☒ DCEP ☐

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 mm)

Peening Yes ☐ NO ☒

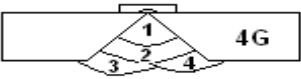
Interpass Cleaning YES ☒ NO ☐

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" (1.1 mm)	DC+	275 (7.0 m/min)	25	8.6 ipm (.22 m/min)	
2	Stringer	E71T-1	0.045" (1.1 mm)	DC+	275 (7.0 m/min)	25	7 ipm (.18 m/min)	
3	Stringer	E71T-1	0.045" (1.1 mm)	DC+	275 (7.0 m/min)	25	11.3 ipm (.29 m/min)	
4	Stringer	E71T-1	0.045" (1.1 mm)	DC+	275 (7.0 m/min)	25	12.5 ipm (32 m/min)	

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WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process **FCAW-S**

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

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

Identification # VRTEX® FCAW # 66

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 66

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)	 Bead on Plate

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 ☐

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

Identification # VRTEX® FCAW # 67

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 67

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 ☐

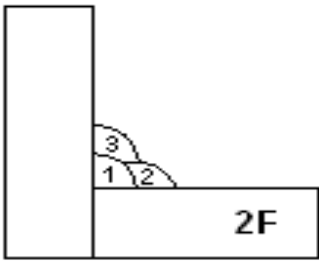
Cleaning Method: Chipping Hammer and Wire Brush

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 ☐

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

Identification # VRTEX® FCAW # 68

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 68

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 ☒

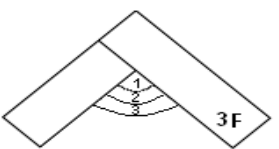
Interpass Cleaning YES ☒ NO ☐

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)	

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 ☐

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

Identification # VRTEX® FCAW # 69

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 69

POSITION

Groove: N/A Fillet: 4F 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-	145 (3.7 m/min)	20	9.5 ipm (.24 m/min)	
2	Stringer	E71T-8	5/64" (2.0 mm)	DC-	145 (3.7 m/min)	20	10 ipm (.25 m/min)	
3	Stringer	E71T-8	5/64" (2.0 mm)	DC-	145 (3.7 m/min)	20	9.2 ipm (.23 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 ☐

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

Identification # VRTEX® FCAW # 70

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 70

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

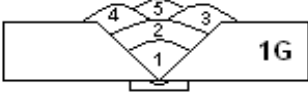
TECHNIQUE

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 ☐

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

Identification # VRTEX® FCAW # 71

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 71

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

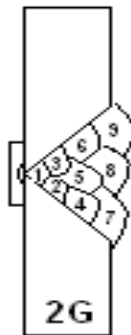
PREHEAT

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 FCAW-S

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

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

Identification # VRTEX® FCAW # 72

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) _____ PQR VRTEX® 72

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 ☐

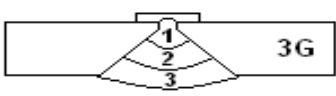
Cleaning Method: Chipping Hammer and Wire Brush

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)	
								

This document is intended for training purposes only

VRTEX® 360 - Default Weld Process Settings (Software Upgrade 2)

WPS #	VR Welding Process	Consumable Type	Lincoln Brand	Gas Mixture	Gas Flow (CFH)	Position	Mat'l (in)	WFS (ipm) or amps	Voltage	Polarity
Welds that can be bent										
5	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	1G	3/8" (9.6 mm)	90 (±5)	NA	DC+
6	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	2G	3/8" (9.6 mm)	90 (±5)	NA	DC+
7	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	3G up	3/8" (9.6 mm)	90 (±5)	NA	DC+
8	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	4G	3/8" (9.6 mm)	90 (±5)	NA	DC+
13	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	1G	3/8" (9.6 mm)	125 (±5)	NA	DC+
14	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	2G	3/8" (9.6 mm)	125 (±5)	NA	DC+
15	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	3G up	3/8" (9.6 mm)	125 (±5)	NA	DC+
16	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	4G	3/8" (9.6 mm)	125 (±5)	NA	DC+
21	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	1G	3/8" (9.6 mm)	110 (±5)	NA	AC
22	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	2G	3/8" (9.6 mm)	110 (±5)	NA	AC
23	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	3G up	3/8" (9.6 mm)	90 (±5)	NA	AC
24	SMAW	1/8" (3.2 mm) E6013	Fleetweld 37	NA	NA	4G	3/8" (9.6 mm)	90 (±5)	NA	AC
25	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	2G Pipe	6" (150 mm)	Root: 80 (±5) Hot:100 (± 5) Fill/Cap: 80 (±5)	NA	DC+
26	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	5G Pipe up	6" (150 mm)	Root: 80 (±5) Hot:100 (± 5) Fill/Cap: 80 (±5)	NA	DC+
27	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	6G Pipe up	6" (150 mm)	Root: 80 (±5) Hot:100 (± 5) Fill/Cap: 80 (±5)	NA	DC+
28	SMAW	1/8" (3.2 mm) E6010 3/32" (2.4 mm) E7018	Fleetweld 5P+ Excalibur 7018	NA	NA	2G Pipe	6" (150 mm)	Root: 90 (±5) Hot: 100 (±5) Fill/Cap: 80 (± 5)	NA	DC+
29	SMAW	1/8" (3.2 mm) E6010 3/32" (2.4 mm) E7018	Fleetweld 5P+ Excalibur 7018	NA	NA	5G Pipe up	6" (150 mm)	Root: 90 (±5) Hot: 100 (±5) Fill/Cap: 80 (± 5)	NA	DC+
30	SMAW	1/8" (3.2 mm) E6010 3/32" (2.4 mm) E7018	Fleetweld 5P+ Excalibur 7018	NA	NA	6G Pipe up	6" (150 mm)	Root: 90 (±5) Hot: 100 (±5) Fill/Cap: 80 (± 5)	NA	DC+
43	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+
44	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+
45	GMAW - S	.035" (.89 mm) ER70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	3G up	3/8" (9.6 mm)	250 (± 5) (6.3 m/min)	17.9	DC+
46	GMAW - S	.035" (.89 mm) ER70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	4G	3/8" (9.6 mm)	270 (± 5) (6.8 m/min)	18	DC+
49	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+
50	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+
51	GMAW - Pulse	.045" (1.1 mm) ER70S-6	SuperArc L-56	90/10	25-40 (12-18 l/min)	3G up	3/8" (9.6 mm)	130 (± 5) (3.3 m/min)	.95(trim)	DC+
52	GMAW - STT GMAW - Pulse	.045" (1.1 mm) ER70S-6 .045" (1.1 mm) ER70S-6	SuperArc L-56 SuperArc L-56	100% Co2 90/10	25-35 (12-16.5 l/min) 25-40 (12-18 l/min)	2G Pipe 2G Pipe	6" (150 mm)	135 (± 5) (3.3-3.8 m/min) 125-130 (3.2-3.3 m/min)	NA .95(trim)	DC+
53	GMAW - STT GMAW - Pulse	.045" (1.1 mm) ER70S-6 .045" (1.1 mm) ER70S-6	SuperArc L-56 SuperArc L-56	100% Co2 90/10	25-35 (12-16.5 l/min) 25-40 (12-18 l/min)	5G Pipe down 5G Pipe up	6" (150 mm)	135 (± 5) (3.3-3.8 m/min) 125-130 (3.2-3.3 m/min)	NA .95(trim)	DC+
54	GMAW - STT GMAW - Pulse	.045" (1.1 mm) ER70S-6 .045" (1.1 mm) ER70S-6	SuperArc L-56 SuperArc L-56	100% Co2 90/10	25-35 (12-16.5 l/min) 25-40 (12-18 l/min)	6G Pipe down 6G Pipe up	6" (150 mm)	135 (± 5) (3.3-3.8 m/min) 125-130 (3.2-3.3 m/min)	NA .95(trim)	DC+
55	GMAW - STT FCAW - G	.045" (1.1 mm) ER70S-6 .045" (1.1 mm) E71T-1	SuperArc L-56 UC 71A85	100% Co2 75/25	25-35 (12-16.5 l/min) 40-50 (19-23.5 l/min)	2G Pipe	6" (150 mm)	135 (± 5) (3.3-3.8 m/min) 275 (± 5) (6.8-7.1 m/min)	NA 25	DC+
56	GMAW - STT FCAW - G	.045" (1.1 mm) ER70S-6 .045" (1.1 mm) E71T-1	SuperArc L-56 UC 71A85	100% Co2 75/25	25-35 (12-16.5 l/min) 40-50 (19-23.5 l/min)	5G Pipe down 5G Pipe up	6" (150 mm)	135 (± 5) (3.3-3.8 m/min) 275 (± 5) (6.8-7.1 m/min)	NA 25	DC+
57	GMAW - STT FCAW - G	.045" (1.1 mm) ER70S-6 .045" (1.1 mm) E71T-1	SuperArc L-56 UC 71A85	100% Co2 75/25	25-35 (12-16.5 l/min) 40-50 (19-23.5 l/min)	6G Pipe down 6G Pipe up	6" (150 mm)	135 (± 5) (3.3-3.8 m/min) 275 (± 5) (6.8-7.1 m/min)	NA 25	DC+
62	FCAW - G	.045" (1.1 mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)	1G	3/8" (9.6 mm)	275 (± 5) (7.0 m/min)	25	DC+
63	FCAW - G	.045" (1.1 mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)	2G	3/8" (9.6 mm)	275 (± 5) (7.0 m/min)	25	DC+
64	FCAW - G	.045" (1.1 mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)	3G up	3/8" (9.6 mm)	275 (± 5) (7.0 m/min)	25	DC+

65	FCAW - G	.045" (1.1 mm) E71T-1	UC 71A85	75/25	40-50 (19-23.5 l/min)	4G	3/8" (9.6 mm)	275 (± 5) (7.0 m/min)	25	DC+
70	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-
71	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-
72	FCAW - S	5/64" (2.0 mm) E71T-8	NR- 232/233	NA	NA	3G up	3/8" (9.6 mm)	125 (± 5) (3.2 m/min)	19.5	DC-
4-15	GMAW - Spray	.052" (1.3 mm) ER70S-6	SuperArc L-56	90/10	40-50 (19-23.5 l/min)	1G	3/8" (9.6 mm)	350 (± 5) (8.9 m/min)	31	DC+
5-15	GMAW-Pulse	.035" (.89mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	1G	3/8" (9.6mm)	250 (±5) (6.3 m/min)	0.95	DC+
5-16	GMAW-Pulse	.035" (.89mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	2G	3/8" (9.6mm)	250 (±5) (6.3 m/min)	0.95	DC+
5-17	GMAW-Pulse	.035" (.89mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	3G up	3/8" (9.6mm)	230 (±5) (5.8 m/min)	0.95	DC+
5-18	GMAW-Pulse	.035" (.89mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	4G	3/8" (9.6mm)	250 (±5) (6.3 m/min)	0.95	DC+
5-22	GMAW-Pulse	.045" (1.1mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	1G	3/8" (9.6mm)	130 (±5) (3.3 mm)	0.95	DC+
5-23	GMAW-Pulse	.045" (1.1mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	4G	3/8" (9.6mm)	130 (±5) (3.3 mm)	0.95	DC+
5-25	GMAW-Pulse	.052" (1.3mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	1G	3/8" (9.6mm)	130 (±5) (3.3 mm)	0.95	DC+
5-26	GMAW-Pulse	.052" (1.3mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	2G	3/8" (9.6mm)	130 (±5) (3.3 mm)	0.95	DC+
5-27	GMAW-Pulse	.052" (1.3mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	3G up	3/8" (9.6mm)	130 (±5) (3.3 mm)	0.95	DC+
5-28	GMAW-Pulse	.052" (1.3mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	4G	3/8" (9.6mm)	130 (±5) (3.3 mm)	0.95	DC+

VRTEX® 360 - Default Weld Process Settings (Software Set 3)

WPS#	VR Welding Process	Consumable Type	Lincoln Brand	Gas Mixture	Gas Flow (CFH)	Position	Mat'l (in)	WFS (ipm) or amps	Voltage or trim	Polarity
3-1	GMAW - Spray	3/64" (1.2 mm) ER 4043	SuperGlaze 4043	100 Ar	30-40 (14-18 l/min)	2F	3/8" (9.6 mm)	385 (± 5) (9.8 m/min)	25	DC+
3-2	GMAW - Pulse	3/64" (1.2 mm) ER 4043	SuperGlaze 4043	100 Ar	30-40 (14-18 l/min)	2G	3/8" (9.6 mm)	375 (± 5) (9.5 m/min)	1.1(trim)	DC+
3-3	GMAW - Spray	3/64" (1.2 mm) ER 4043	SuperGlaze 4043	100 Ar	30-40 (14-18 l/min)	1G	3/8" (9.6 mm)	375 (± 5) (9.5 m/min)	25	DC+
3-4	GMAW - Pulse	3/64" (1.2 mm) ER 4043	SuperGlaze 4043	100 Ar	30-40 (14-18 l/min)	2F	10 GA (3.2 mm).	240 (± 5) (6.0 m/min)	1.1(trim)	DC+
3-5	GMAW - Pulse	3/64" (1.2 mm) ER 4043	SuperGlaze 4043	100 Ar	30-40 (14-18 l/min)	3F up	3/8" (9.6 mm)	240 (+ 5) (6.0 m/min)	1.05(trim)	DC+
3-6	GMAW - Pulse	3/64" (1.2 mm) ER 4043	SuperGlaze 4043	100 Ar	30-40 (14-18 l/min)	2F	3/8" (9.6 mm)	290 (± 5) (7.4 m/min)	1.1(trim)	DC+
3-7	GMAW - Pulse	3/64" (1.2 mm) ER 4043	SuperGlaze 4043	100 Ar	30-40 (14-18 l/min)	3G up	3/8" (9.6 mm)	350 (± 5) (8.9 m/min)	1.05(trim)	DC+



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process GMAW

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

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. 6061
Type or Grade N/A
Thickness: Groove N/A Fillet 3/8" (9.6 mm)

FILLER METALS

AWS Specification A5.1-93

AWS Classification ER 4043

SHIELDING

Electrode Flux (Class) N/A Gas Argon
Composition 100%
Flux N/A
Flow Rate 30-40cfh (14-18 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 3-1

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 3-1

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" (12.7 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	ER 4043	3/64" (1.2 mm)	DC+	385 (9.8 m/min)	25	25 ipm (.64 m/min)	
2	Stringer	ER 4043	3/64" (1.2 mm)	DC+	385 (9.8 m/min)	25	32 ipm (.81 m/min)	
3	Stringer	ER 4043	3/64" (1.2 mm)	DC+	385 (9.8 m/min)	25	36 ipm (.91 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 ☐

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 Included
Back Gouging: Yes ☐ NO ☒ Method N/A

BASE MATERIAL

Material Spec. 6061
Type or Grade N/A
Thickness: Groove 3/8" (9.6 mm) Fillet N/A

FILLER METALS

AWS Specification A5.1-93
AWS Classification ER 4043

SHIELDING

Electrode Flux (Class) N/A Gas Argon
Composition 100%
Flux N/A
Flow Rate 30-40cfh (14-18 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 3-3

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 3-3

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

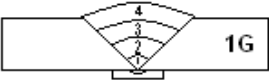
TECHNIQUE

Stringer, Weave Bead, Other: Stringer/Weave
Multi-pass or Single Pass (per side) Multi-pass
Number of Electrodes Single
Contact Tip to Work Distance 1/2" (12.7 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	ER 4043	3/64" (1.2 mm)	DC+	375 (9.5 m/min)	25	16 ipm (.41 m/min)	
2	Weave	ER 4043	3/64" (1.2 mm)	DC+	375 (9.5 m/min)	25	17 ipm (.43 m/min)	
3	Weave	ER 4043	3/64" (1.2 mm)	DC+	375 (9.5 m/min)	25	21 ipm (.53 m/min)	
4	Weave	ER 4043	3/64" (1.2 mm)	DC+	375 (9.5 m/min)	25	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 ☐

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. 6061

Type or Grade N/A

Thickness: Groove N/A Fillet 10 GA (3.2 mm)

FILLER METALS

AWS Specification A5.1-93

AWS Classification ER 4043

SHIELDING

Electrode Flux (Class) N/A Gas Argon
Composition 100%

Flux N/A
Flow Rate 30-40cfh (14-18 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 3-4

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 3-4

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 1/2" (12.7 mm)

Peening Yes ☐ NO ☒

Interpass Cleaning YES ☐ NO ☒

Cleaning Method: None

PREHEAT

Preheat Temp. Min. N/A Ma 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	ER 4043	3/64" (1.2 mm)	DC+	240 (6.0 m/min)	1.1	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 ☐

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. 6061

Type or Grade N/A

Thickness: Groove N/A Fillet 3/8" (9.6 mm)

FILLER METALS

AWS Specification A5.1-93

AWS Classification ER 4043

SHIELDING

Electrode Flux (Class) N/A Gas Argon
Composition 100%

Flux N/A
Flow Rate 30-40cfh (14-18 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 3-5

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 3-5

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 1/2" (12.7 mm)

Peening Yes ☐ NO ☒

Interpass Cleaning YES ☐ NO ☒

Cleaning Method: None

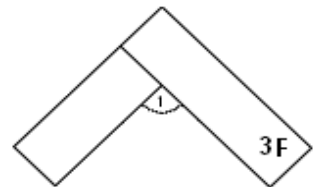
PREHEAT

Preheat Temp. Min. N/A Ma 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	ER 4043	3/64" (1.2 mm)	DC+	240 (6.0 m/min)	1.05	18 ipm (.46 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 ☐

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. 6061

Type or Grade N/A

Thickness: Groove N/A Fillet 3/8" (9.6 mm)

FILLER METALS

AWS Specification A5.1-93

AWS Classification ER 4043

SHIELDING

Electrode Flux (Class) N/A Gas Argon
Composition 100%

Flux N/A
Flow Rate 30-40cfh (14-18 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 3-6

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 3-6

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" (12.7 mm)

Peening Yes ☐ NO ☒

Interpass Cleaning YES ☐ NO ☒

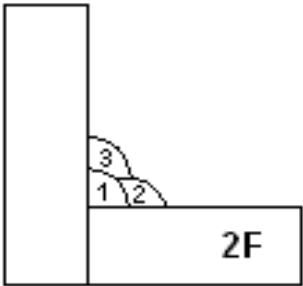
Cleaning Method: None

PREHEAT

Preheat Temp. Min. N/A Ma 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	ER 4043	3/64" (1.2 mm)	DC+	290 (7.4 m/min)	1.1	12 ipm (.30 m/min)	
2	Stringer	ER 4043	3/64" (1.2 mm)	DC+	290 (7.4 m/min)	1.1	15 ipm (.38 m/min)	
3	Stringer	ER 4043	3/64" (1.2 mm)	DC+	290 (7.4 m/min)	1.1	17 ipm (.43 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 ☐

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 included

Back Gouging: Yes ☐ NO ☒ Method N/A

BASE MATERIAL

Material Spec. 6061

Type or Grade N/A

Thickness: Groove 3/8" (9.6 mm) Fillet N/A

FILLER METALS

AWS Specification A5.1-93

AWS Classification ER 4043

SHIELDING

Electrode Flux (Class) N/A Gas Argon
Composition 100%

Flux N/A
Flow Rate 30-40cfh (14-18 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 3-7

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 3-7

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" (12.7 mm)

Peening Yes ☐ NO ☒

Interpass Cleaning YES ☐ NO ☒

Cleaning Method: None

PREHEAT

Preheat Temp. Min. N/A Ma 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	ER 4043	3/64" (1.2 mm)	DC+	350 (8.9 m/min)	1.05	15 ipm (.28 m/min)	
2	Weave	ER 4043	3/64" (1.2 mm)	DC+	350 (8.9 m/min)	1.05	13 ipm (.30 m/min)	
3	Weave	ER 4043	3/64" (1.2 mm)	DC+	350 (8.9 m/min)	1.05	12 ipm (.33 m/min)	
4	Weave	ER 4043	3/64" (1.2 mm)	DC+	350 (8.9 m/min)	1.05	11 ipm (.38 m/min)	

This document is intended for training purposes only

VRTEX® 360 - Default Weld Process Settings (Software Set 4)

WPS#	VR Welding Process	Consumable Type	Lincoln Brand	Gas Mixture	Gas Flow (CFH)	Position	Mat'l (in)	WFS (ipm) or amps	Voltage or trim	Polarity
4-1	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	2F	10 GA (3.2 mm)	80 (±5)	NA	DC+
4-2	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	3F down	10 GA (3.2 mm)	80 (±5)	NA	DC+
4-3	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	4F	10 GA (3.2 mm)	80 (±5)	NA	DC+
4-4	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	2F	1/4" (6.4 mm)	85 (±5)	NA	DC+
4-5	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	3F up	1/4" (6.4 mm)	85 (±5)	NA	DC+
4-6	SMAW	1/8" (3.2 mm) E6010	Fleetweld 5P+	NA	NA	4F	1/4" (6.4 mm)	85 (±5)	NA	DC+
4-7	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	2F	10 GA (3.2 mm)	100 (±5)	NA	DC+
4-8	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	3F up	10 GA (3.2 mm)	100 (±5)	NA	DC+
4-9	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	4F	10 GA (3.2 mm)	100(±5)	NA	DC+
4-10	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	2F	1/4" (6.4 mm)	115 (±5)	NA	DC+
4-11	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	3F up	1/4" (6.4 mm)	115 (±5)	NA	DC+
4-12	SMAW	1/8" (3.2 mm) E7018	Excalibur 7018	NA	NA	4F	1/4" (6.4 mm)	115 (±5)	NA	DC+
4-13	GMAW - Spray	.052" (1.3 mm) ER70S-6	SuperArc L-56	90/10	30-40 (16-19 l/min)	2F	3/8" (9.6 mm)	350 (± 5) (8.9 m/min)	30	DC+
4-14	GMAW - Spray	.052" (1.3 mm) ER70S-6	SuperArc L-56	90/10	40-45 (19-21 l/min)	1G	3/8" (9.6 mm)	350 (± 5) (8.9 m/min)	31	DC+
4-15	GMAW - Spray	.052" (1.3 mm) ER70S-6	SuperArc L-56	90/10	35-45 (17-21 l/min)	2F	1/4" (6.4 mm)	300 (± 5) (7.5 m/min)	24	DC+
4-16	GMAW - S	.052" (1.3 mm) ER70S-6	SuperArc L-56	100 Co2	25-35 (12-16.5 l/min)	2F	1/4" (6.4 mm)	200 (± 5) (5.0 m/min)	20	DC+
4-17	GMAW - S	.052" (1.3 mm) ER70S-6	SuperArc L-56	100 Co2	25-35 (12-16.5 l/min)	3F up	3/8" (9.6 mm)	150 (± 5) (3.8 m/min)	19	DC+
4-18	GMAW - S	.052" (1.3 mm) ER70S-6	SuperArc L-56	100 Co2	25-35 (12-16.5 l/min)	3F down	1/4" (6.4 mm)	200 (± 5) (5.0 m/min)	17	DC+
4-19	GMAW - Pulse	.052" (1.3 mm) ER70S-6	SuperArc L-56	90/10	30-40 (16-19 l/min)	2F	3/8" (9.6 mm)	375 (± 5) (9.5 m/min)	1.1 (trim)	DC+
4-20	GMAW - Pulse	.052" (1.3 mm) ER70S-6	SuperArc L-56	90/10	30-40 (16-19 l/min)	3F up	3/8" (9.6 mm)	145 (± 5) (3.6 m/min)	1.00 (trim)	DC+
4-21	GMAW - Spray	.045" (1.1 mm) ER 308	BlueMax 308L Si	98/2	25-35 (12-16.5 l/min)	1G	3/8" (9.6 mm)	360 (± 5) (9.2 m/min)	26	DC+
4-22	GMAW - Spray	.045" (1.1 mm) ER 308	BlueMax 308L Si	98/2	25-35 (12-16.5 l/min)	2F	3/8" (9.6 mm)	360 (+ 5) (9.2 m/min)	26	DC+
4-23	GMAW - Pulse	.045" (1.1 mm) ER 308	BlueMax 308L Si	98/2	25-35 (12-16.5 l/min)	3G up	3/8" (9.6 mm)	276 (± 5) (7.0 m/min)	.95 (trim)	DC+
4-24	GMAW - Pulse	.045" (1.1 mm) ER 308	BlueMax 308L Si	98/2	25-35 (12-16.5 l/min)	3F down	10 GA (3.2 mm).	212 (± 5) (5.4 m/min)	.95(trim)	DC+
4-25	GMAW - Pulse	.045" (1.1 mm) ER 308	BlueMax 308L Si	98/2	25-35 (12-16.5 l/min)	2F	10 GA (3.2 mm).	212 (± 5) (5.4 m/min)	.95(trim)	DC+



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 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

Identification # VRTEX® SMAW # 4-1

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 4-1

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

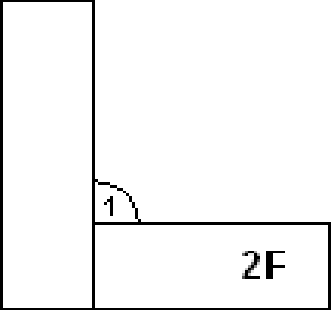
TECHNIQUE

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

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	E6010	1/8" (3.2 mm)	DC+	80 (± 5)	7.7 ipm (.19 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 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

Identification # VRTEX® SMAW # 4-2

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 4-2

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 and brushing

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	E6010	1/8" (3.2 mm)	DC+	80 (± 5)	5.2 ipm (.13 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 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

Identification # VRTEX® SMAW # 4-3

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 4-3

POSITION

Groove: N/A Fillet: 4F 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 and brushing

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	E6010	1/8" (3.2 mm)	DC+	80 (± 5)	6.3 ipm (.16 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 1/4" (6.4 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

Identification # VRTEX® SMAW # 4-4

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 4-4

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

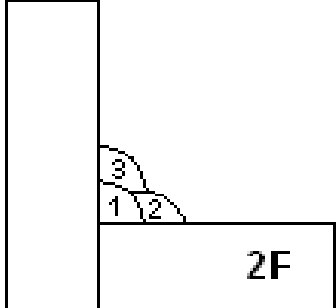
TECHNIQUE

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 and brushing

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	E6010	1/8" (3.2 mm)	DC+	85 (± 5)	6 ipm (.15 m/min)	
2	Stringer	E6010	1/8" (3.2 mm)	DC+	85 (± 5)	7 ipm (.18 m/min)	
3	Stringer	E6010	1/8" (3.2 mm)	DC+	85 (± 5)	7.4 ipm (.19 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 1/4" (6.4 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

Identification # VRTEX® SMAW # 4-5

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 4-5

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) Multi-Pass
Number of Electrodes Single
Contact Tip to Work Distance N/A
Peening Yes ☐ NO ☒
Interpass Cleaning YES ☒ NO ☐
Cleaning Method: Chipping and brushing

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	Wire Feed Speed		
1	Stringer	E6010	1/8" (3.2 mm)	DC+	85 (± 5)	6.6 ipm (.17 m/min)	
2	Stringer	E6010	1/8" (3.2 mm)	DC+	85 (± 5)	7.4 ipm (.19 m/min)	
3	Stringer	E6010	1/8" (3.2 mm)	DC+	85 (± 5)	6.9 ipm (.18 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 1/4" (6.4 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

Identification # VRTEX® SMAW # 4-6

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 4-6

POSITION

Groove: N/A Fillet: 4F 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 and brushing

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	E6010	1/8" (3.2 mm)	DC+	85 (± 5)	6 ipm (.15 m/min)	
2	Stringer	E6010	1/8" (3.2 mm)	DC+	85 (± 5)	7 ipm (.18 m/min)	
3	Stringer	E6010	1/8" (3.2 mm)	DC+	85 (± 5)	7ipm (.18 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 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

Identification # VRTEX® SMAW # 4-7

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 4-7

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 N/A
Peening Yes ☐ NO ☒
Interpass Cleaning YES ☐ NO ☒
Cleaning Method: Chipping and brushing

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+	100 (± 5)	4.9 ipm (.12 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 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

Identification # VRTEX® SMAW # 4-8

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 4-8

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 and brushing

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+	100 (± 5)	4.2 ipm (.11 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 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

Identification # VRTEX® SMAW # 4-9

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 4-9

POSITION

Groove: N/A Fillet: 4F 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 and brushing

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	Apms		
1	Stringer	E7018	1/8" (3.2 mm)	DC+	100 (± 5)	7.4 ipm (.19 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 1/4" (6.4 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

Identification # VRTEX® SMAW # 4-10

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 4-10

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 ☐

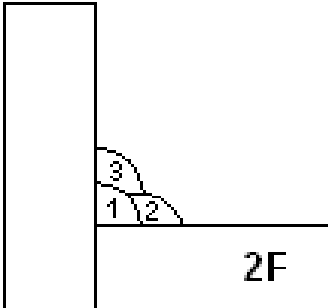
Cleaning Method: Chipping and brushing

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	Wire Feed Speed		
1	Stringer	E7018	1/8" (3.2 mm)	DC+	115 (± 5)	6 ipm (.15 m/min)	
2	Stringer	E7018	1/8" (3.2 mm)	DC+	115 (± 5)	7.3 ipm (.18 m/min)	
3	Stringer	E7018	1/8" (3.2 mm)	DC+	115 (± 5)	5.9 ipm (.15 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 1/4" (6.4 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

Identification # VRTEX® SMAW # 4-11

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 4-11

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) Multi-Pass

Number of Electrodes Single

Contact Tip to Work Distance N/A

Peening Yes ☐ NO ☒

Interpass Cleaning YES ☒ NO ☐

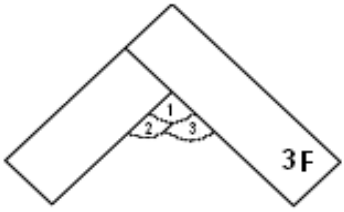
Cleaning Method: Chipping and brushing

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	Wire Feed Speed		
1	Stringer	E7018	1/8" (3.2 mm)	DC+	115 (± 5)	3.9 ipm (.09 m/min)	
2	Stringer	E7018	1/8" (3.2 mm)	DC+	115 (± 5)	6.2 ipm (.16 m/min)	
3	Stringer	E7018	1/8" (3.2 mm)	DC+	115 (± 5)	5.9 ipm (.15 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 1/4" (6.4 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

Identification # VRTEX® SMAW # 4-12

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 4-12

POSITION

Groove: N/A Fillet: 4F 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 and brushing

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	Wire Feed Speed		
1	Stringer	E7018	1/8" (3.2 mm)	DC+	115 (± 5)	6.2 ipm (.16 m/min)	4F
2	Stringer	E7018	1/8" (3.2 mm)	DC+	115 (± 5)	7.5 ipm (.19 m/min)	
3	Stringer	E7018	1/8" (3.2 mm)	DC+	115 (± 5)	7 ipm (.18 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process GMAW

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

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 30-40ft (16-18 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 4-13

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 4-13

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

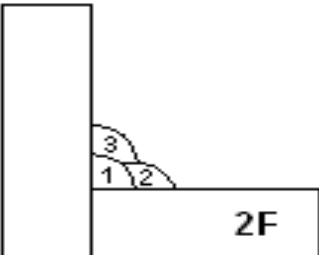
TECHNIQUE

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	.052" (1.3 mm)	DC+	350 (8.9 m/min)	30	12 ipm (.30 m/min)	
2	Stringer	E70S-6	.052" (1.3 mm)	DC+	350 (8.9 m/min)	30	12 ipm (.30 m/min)	
3	Stringer	E70S-6	.052" (1.3 mm)	DC+	350 (8.9 m/min)	30	12 ipm (.30 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 ☐

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 40-45cfh (19-21l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 4-14

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 4-14

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	.052" (1.3 mm)	DC+	350 (8.9 m/min)	31	15 ipm (.38 m/min)	
2	Stringer	E70S-6	.052" (1.3 mm)	DC+	350 (8.9 m/min)	31	16 ipm (.38 m/min)	
3	Stringer	E70S-6	.052" (1.3 mm)	DC+	350 (8.9 m/min)	31	17 ipm (.38 m/min)	
4	Stringer	E70S-6	.052" (1.3 mm)	DC+	350 (8.9 m/min)	31	18 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 ☐

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 90/10
Flux N/A
Flow Rate 35-45cfh (17-21 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 4-15

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 4-15

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
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	.052" (1.3 mm)	DC+	300 (7.5 m/min)	24	25 ipm (.64 m/min)	

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WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process GMAW

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

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 Co2
Composition 100%
Flux N/A
Flow Rate 25-35cfh (12-16.5 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 4-16

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 4-16

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
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	.052" (1.3 mm)	DC+	200 (5.0 m/min)	20	13 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 ☐

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 Co2
Composition 100%
Flux N/A
Flow Rate 25-35cfh (12-16.5 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 4-17

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 4-17

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

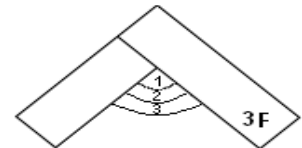
PREHEAT

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	.052" (1.3 mm)	DC+	150 (3.8 m/min)	19	4 ipm (.10 m/min)	
2	Weave	E70S-6	.052" (1.3 mm)	DC+	150 (3.8 m/min)	19	5 ipm (.13 m/min)	
3	Weave	E70S-6	.052" (1.3 mm)	DC+	150 (3.8 m/min)	19	5 ipm (.13 m/min)	



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WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process GMAW
Type: Manual ☐ Semi-Automatic ☒
Machine ☐ Automatic ☐

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 Co2
Composition 100%
Flux N/A
Flow Rate 25-35cfh (12-16.5 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 4-18
Revision _____ Date _____ by _____
Authorized by _____ Date _____
Supporting PQR No.(s) PQR VRTEX® 4-18

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

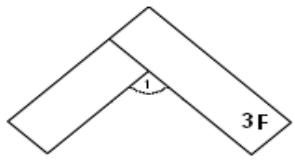
TECHNIQUE

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	.052" (1.3 mm)	DC+	200 (5.0 m/min)	20	12 ipm (.30 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 ☐

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 30-40cfh (16-18 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 4-19

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 4-19

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

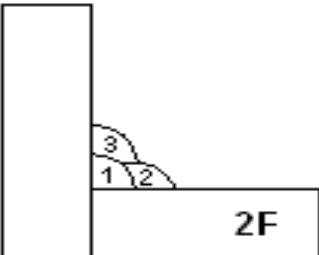
TECHNIQUE

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	.052" (1.3 mm)	DC+	375 (9.5 m/min)	1.1	10 ipm (.25 m/min)	
2	Stringer	E70S-6	.052" (1.3 mm)	DC+	375 (9.5 m/min)	1.1	10 ipm (.25 m/min)	
3	Stringer	E70S-6	.052" (1.3 mm)	DC+	375 (9.5 m/min)	1.1	11 ipm (.28 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 ☐

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 30-40cfh (16-18 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 4-20

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 4-20

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) Multi-pass

Number of Electrodes Single

Contact Tip to Work Distance 1/2"

Peening Yes ☐ NO ☒

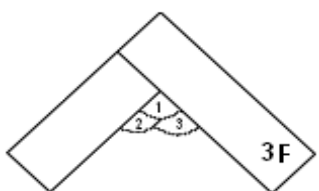
Interpass Cleaning YES ☐ NO ☒

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	.052" (1.3 mm)	DC+	145 (3.6 m/min)	1.00	12 ipm (.30 m/min)	
2	Stringer	E70S-6	.052" (1.3 mm)	DC+	145 (3.6 m/min)	1.00	10 ipm (.25 m/min)	
3	Stringer	E70S-6	.052" (1.3 mm)	DC+	145 (3.6 m/min)	1.00	9 ipm (.23 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 ☐

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 Included
Back Gouging: Yes ☐ NO ☒ Method N/A

BASE MATERIAL

Material Spec. 308
Type or Grade N/A
Thickness: Groove 3/8" (9.6 mm) Fillet N/A

FILLER METALS

AWS Specification A5.9

AWS Classification ER 308

SHIELDING

Electrode Flux (Class) N/A Gas Argon/Co2
Composition 98 / 2%
Flux N/A
Flow Rate 25-35cfh (12-16.5 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 4-21

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 4-21

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/Weave

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

Number of Electrodes Single

Contact Tip to Work Distance 1/2" (12.7 mm)

Peening Yes ☒ NO ☒

Interpass Cleaning YES ☐ NO ☒

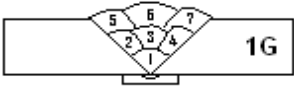
Cleaning Method: None

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	ER 308	.045" (1.1 mm)	DC+	360 (9.1 m/min)	26	6.5 ipm (.17 m/min)	
2	Stringer	ER 308	.045" (1.1 mm)	DC+	360 (9.1 m/min)	26	8.1 ipm (.21 m/min)	
3	Stringer	ER 308	.045" (1.1 mm)	DC+	360 (9.1 m/min)	26	6.4 ipm (.16 m/min)	
4	Stringer	ER 308	.045" (1.1 mm)	DC+	360 (9.1 m/min)	26	7.5 ipm (.19 m/min)	
5	Stringer	ER 308	.045" (1.1 mm)	DC+	360 (9.1 m/min)	26	9.2 ipm (.23 m/min)	
6	Stringer	ER 308	.045" (1.1 mm)	DC+	360 (9.1 m/min)	26	7.7 ipm (.20 m/min)	
7	Stringer	ER 308	.045" (1.1 mm)	DC+	360 (9.1 m/min)	26	8.6 ipm (.22 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 ☐

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. 308

Type or Grade N/A

Thickness: Groove N/A Fillet 3/8" (9.6 mm)

FILLER METALS

AWS Specification A5.9

AWS Classification ER 308

SHIELDING

Electrode Flux (Class) N/A Gas Argon/Co2
Composition 98 / 2%

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

Identification # VRTEX® GMAW # 4-22

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 4-22

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" (12.7 mm)

Peening Yes ☐ NO ☒

Interpass Cleaning YES ☐ NO ☒

Cleaning Method: None

PREHEAT

Preheat Temp. Min. N/A Ma 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	ER 308	.045" (1.1 mm)	DC+	360 (9.1 m/min)	26	6.9 ipm (.18 m/min)	
2	Stringer	ER 308	.045" (1.1 mm)	DC+	360 (9.1 m/min)	26	9.5 ipm (.24 m/min)	
3	Stringer	ER 308	.045" (1.1 mm)	DC+	360 (9.1 m/min)	26	9.4 ipm (.24 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 ☐

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 included
Back Gouging: Yes ☐ NO ☒ Method N/A

BASE MATERIAL

Material Spec. 308
Type or Grade N/A
Thickness: Groove 3/8" (9.6 mm) Fillet N/A

FILLER METALS

AWS Specification A5.9
AWS Classification ER 308

SHIELDING

Electrode Flux (Class) N/A Gas Argon/Co2
Composition 98 / 2%
Flux N/A
Flow Rate 25-35cfh (12-16.5 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 4-23

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 4-23

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" (12.7 mm)
Peening Yes ☐ NO ☒
Interpass Cleaning YES ☐ NO ☒
Cleaning Method: None

PREHEAT

Preheat Temp. Min. N/A Ma 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	ER 308	.045" (1.1 mm)	DC+	276 (7.0 m/min)	0.95	3.8 ipm (.10 m/min)	
2	Weave	ER 308	.045" (1.1 mm)	DC+	276 (7.0 m/min)	0.95	2.9 ipm (.07 m/min)	
3	Weave	ER 308	.045" (1.1 mm)	DC+	276 (7.0 m/min)	0.95	2.4 ipm (.06 m/min)	
4	Weave	ER 308	.045" (1.1 mm)	DC+	276 (7.0 m/min)	0.95	1.6 ipm (.04 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 ☐

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. 308

Type or Grade N/A

Thickness: Groove N/A Fillet 10 GA (3.4mm)

FILLER METALS

AWS Specification A5.9

AWS Classification ER 308

SHIELDING

Electrode Flux (Class) N/A Gas Argon/Co2
Composition 98 / 2%

Flux N/A

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

Gas Cup Size N/A

Identification # VRTEX® GMAW # 4-24

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 4-24

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 1/2" (12.7 mm)

Peening Yes ☐ NO ☒

Interpass Cleaning YES ☐ NO ☒

Cleaning Method: None

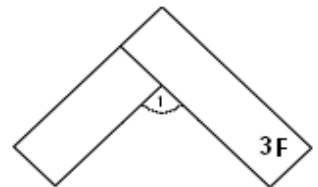
PREHEAT

Preheat Temp. Min. N/A Ma 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	ER 308	.045" (1.1 mm)	DC+	212 (5.4 m/min)	0.95	9 ipm (.23 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 ☐

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. 308

Type or Grade N/A

Thickness: Groove N/A Fillet 10 GA (3.4mm)

FILLER METALS

AWS Specification A5.9

AWS Classification ER 308

SHIELDING

Electrode Flux (Class) N/A Gas Argon/Co2
Composition 98%2%

Flux N/A

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

Gas Cup Size N/A

Identification # VRTEX® GMAW # 4-25

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 4-25

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" (12.7 mm)

Peening Yes ☐ NO ☒

Interpass Cleaning YES ☐ NO ☒

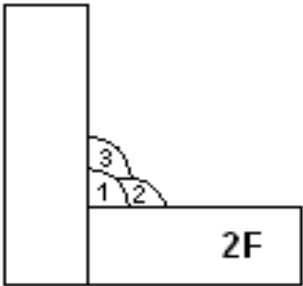
Cleaning Method: None

PREHEAT

Preheat Temp. Min. N/A Ma 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	ER 308	.045" (1.1 mm)	DC+	212 (5.4 m/min)	0.95	7.3 ipm (.19 m/min)	
2	Stringer	ER 308	.045" (1.1 mm)	DC+	212 (5.4 m/min)	0.95	8.3 ipm (.21 m/min)	
3	Stringer	ER 308	.045" (1.1 mm)	DC+	212 (5.4 m/min)	0.95	6.1 ipm (.16 m/min)	
								

This document is intended for training purposes only

VRTEX® 360 - Default Weld Process Settings (Software Set 5)

WPS#	VR Welding Process	Consumable Type	Lincoln Brand	Gas Mixture	Gas Flow (CFH)	Position	Mat'l (in)	WFS (ipm) or amps	Voltage or trim	Polarity
5-1	SMAW	1/8" (3.2mm) E6010	Fleetweld 5P+	N/A	N/A	2F Lap	10 GA (3.2mm)	80 (±5)	N/A	DC+
5-2	SMAW	1/8" (3.2mm) E6010	Fleetweld 5P+	N/A	N/A	3F Up Lap	10 GA (3.2mm)	80 (±5)	N/A	DC+
5-3	SMAW	1/8" (3.2mm) E6010	Fleetweld 5P+	N/A	N/A	4F Lap	10 GA (3.2mm)	80 (±5)	N/A	DC+
5-4	SMAW	1/8" (3.2mm) E6013	Fleetweld 37	N/A	N/A	2F Lap	10 GA (3.2mm)	100 (±5)	N/A	AC
5-5	SMAW	1/8" (3.2mm) E6013	Fleetweld 37	N/A	N/A	3F Down Lap	10 GA (3.2mm)	125 (±5)	N/A	AC
5-6	SMAW	1/8" (3.2mm) E7018	Excalibur 7018	N/A	N/A	2F Lap	10 GA (3.2mm)	100 (±5)	N/A	DC+
5-7	GMAW	.035 (.89mm) E70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	2F Lap	10 GA (3.2mm)	250 (±5) (6.3 mm)	18	DC+
5-8	GMAW	.035" (.89mm) E70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	3F Down Lap	10 GA (3.2mm)	250 (±5) (6.3 mm)	18	DC+
5-9	GMAW-Pulse	.045" (1.1mm) ER4043	SuperGlaze 4043	100 Ar	30-40 (16-19 l/min)	2F Lap	10 GA (3.2mm)	240 (±5) (6.0 mm)	1.1	DC+
5-10	GMAW-Pulse	.045" (1.1mm) ER308	BlueMax 308	98/2	25-35 (12-16.5 l/min)	2F Lap	10 GA (3.2mm)	210 (±5) (5.4 mm)	0.95	DC+
5-11	GMAW-Pulse	.045" (1.1mm) ER308	BlueMax 308	98/2	25-35 (12-16.5 l/min)	3F Down Lap	10 GA (3.2mm)	210 (±5) (5.4 mm)	0.95	DC+
5-12	GMAW-Pulse	.035 (.89mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	2F	3/8" (9.6mm)	230 (±5) (5.8 m/min)	0.95	DC+
5-13	GMAW-Pulse	.035" (.89mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	3F Up	3/8" (9.6mm)	230 (±5) (5.8 m/min)	1.00	DC+
5-14	GMAW-Pulse	.035" (.89mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	4F	3/8" (9.6mm)	230 (±5) (5.8 m/min)	1.00	DC+
5-15	GMAW-Pulse	.035" (.89mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	1G	3/8" (9.6mm)	250 (±5) (6.3 m/min)	0.95	DC+
5-16	GMAW-Pulse	.035" (.89mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	2G	3/8" (9.6mm)	250 (±5) (6.3 m/min)	0.95	DC+
5-17	GMAW-Pulse	.035" (.89mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	3G up	3/8" (9.6mm)	230 (±5) (5.8 m/min)	0.95	DC+
5-18	GMAW-Pulse	.035" (.89mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	4G	3/8" (9.6mm)	250 (±5) (6.3 m/min)	0.95	DC+
5-19	GMAW-Pulse	.045" (1.1mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	2F	3/8" (9.6mm)	130 (±5) (3.3 mm)	0.95	DC+
5-20	GMAW-Pulse	.045" (1.1mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	3F up	3/8" (9.6mm)	145 (±5) (3.6 mm)	1.00	DC+
5-21	GMAW-Pulse	.045" (1.1mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	4F	3/8" (9.6mm)	145 (±5) (3.6 mm)	1.00	DC+
5-22	GMAW-Pulse	.045" (1.1mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	1G	3/8" (9.6mm)	130 (±5) (3.3 mm)	0.95	DC+
5-23	GMAW-Pulse	.045" (1.1mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	4G	3/8" (9.6mm)	130 (±5) (3.3 mm)	0.95	DC+
5-24	GMAW-Pulse	.052" (1.3mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	4F	3/8" (9.6mm)	145 (±5) (3.6 mm)	1.00	DC+
5-25	GMAW-Pulse	.052" (1.3mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	1G	3/8" (9.6mm)	130 (±5) (3.3 mm)	0.95	DC+
5-26	GMAW-Pulse	.052" (1.3mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	2G	3/8" (9.6mm)	130 (±5) (3.3 mm)	0.95	DC+
5-27	GMAW-Pulse	.052" (1.3mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	3G up	3/8" (9.6mm)	130 (±5) (3.3 mm)	0.95	DC+
5-28	GMAW-Pulse	.052" (1.3mm) E70S-6	SuperArc L-56	90/10	30-40 (16-18 l/min)	4G	3/8" (9.6mm)	130 (±5) (3.3 mm)	0.95	DC+
5-29	SMAW	1/8" (3.2mm) E6010	Fleetweld 5P+	N/A	N/A	Flat Plate	1/4" (6.4mm)	90 (±5)	N/A	DC+
5-30	SMAW	1/8" (3.2mm) E6013	Fleetweld 37	N/A	N/A	Flat Plate	1/4" (6.4mm)	100 (±5)	N/A	AC
5-31	SMAW	1/8" (3.2mm) E7018	Excalibur 7018	N/A	N/A	Flat Plate	1/4" (6.4mm)	125 (±5)	N/A	DC+
5-32	GMAW-Short	.035" (.89mm) E70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	Flat Plate	1/4" (6.4mm)	250 (±5) (6.3 mm)	18.00	DC+
5-33	GMAW-Spray	.045" (1.1mm) E70S-6	SuperArc L-56	90/10	25-35 (12-16.5 l/min)	Flat Plate	1/4" (6.4mm)	400 (±5) (10.0 mm)	27.00	DC+
5-34	GMAW-Pulse	.045" (1.1mm) E70S-6	SuperArc L-56	90/10	25-40 (12-18 l/min)	Flat Plate	1/4" (6.4mm)	130 (±5) (3.3 mm)	0.95	DC+
5-35	FCAW-G	.045" (1.1mm) E71T-1	UC 71A85	75/25	40-50 (19.5-23.5 l/min)	Flat Plate	1/4" (6.4mm)	275 (±5) (7.0 mm)	25.00	DC+
5-36	FCAW-S	5/64" (2.0mm) E71T-8	NR 232/233	N/A	N/A	Flat Plate	1/4" (6.4mm)	140 (±5) (3.5 mm)	20.00	DC-



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 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

Identification # VRTEX® SMAW # 5-1

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 5-1

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

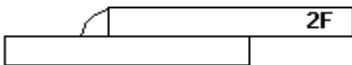
TECHNIQUE

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

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	Whip	E6010	1/8" (3.2 mm)	DC+	80 (± 5)	7.7 ipm (.19 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 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

Identification # VRTEX® SMAW # 5-2

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 5-2

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
Number of Electrodes Single
Contact Tip to Work Distance N/A
Peening Yes ☐ NO ☒
Interpass Cleaning YES ☐ NO ☒
Cleaning Method: Chipping and brushing

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	Whip	E6010	1/8" (3.2 mm)	DC+	80 (± 5)	5.2 ipm (.13 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 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

Identification # VRTEX® SMAW # 5-3

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 5-3

POSITION

Groove: N/A Fillet: 4F 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
Number of Electrodes Single
Contact Tip to Work Distance N/A
Peening Yes ☐ NO ☒
Interpass Cleaning YES ☐ NO ☒
Cleaning Method: Chipping and brushing

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	Whip	E6010	1/8" (3.2 mm)	DC+	80 (± 5)	6.3 ipm (.16 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 Gas N/A
Composition N/A

Flux N/A
Flow Rate N/A
Gas Cup Size N/A

Identification # VRTEX® SMAW # 5-4

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 5-4

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

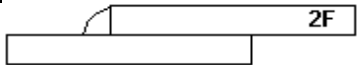
TECHNIQUE

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

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 (.23 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 Gas N/A
Composition N/A
Flux N/A
Flow Rate N/A
Gas Cup Size N/A

Identification # VRTEX® SMAW # 5-5

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 5-5

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
Number of Electrodes Single
Contact Tip to Work Distance N/A
Peening Yes ☐ NO ☒
Interpass Cleaning YES ☐ NO ☒
Cleaning Method: Chipping and brushing

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	Wire Feed Speed		
1	Stringer	E6013	1/8" (3.2 mm)	AC	125 (± 5)	16.2 ipm (.41 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 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

Identification # VRTEX® SMAW # 5-6

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 5-6

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

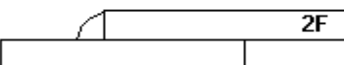
TECHNIQUE

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

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+	100 (± 5)	9.0 ipm (.23 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process GMAW

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

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

Identification # VRTEX® GMAW # 5-7

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 5-7

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

Number of Electrodes Single

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

Peening Yes ☐ NO ☒

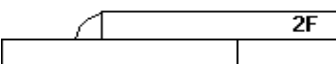
Interpass Cleaning YES ☐ NO ☒

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)	

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 ☐

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

Identification # VRTEX® GMAW # 5-8
Revision Date by
Authorized by Date
Supporting PQR No.(s) PQR VRTEX® 5-8

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
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)	

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 ☐

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. 6061
Type or Grade N/A
Thickness: Groove N/A Fillet 10 GA (3.2 mm)

FILLER METALS

AWS Specification A5.1-93
AWS Classification ER 4043

SHIELDING

Electrode Flux (Class) N/A Gas Argon
Composition 100%
Flux N/A
Flow Rate 30-40cfh (16-18 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 5-9

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 5-9

POSITION

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

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

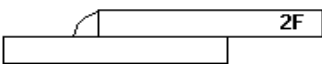
Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐
Pulse ☒
Other: N/A
Current: AC ☐ DCEP ☒ DCEN ☐
Power Source: CC ☐ CV ☒
Tungsten Electrode (GTAW)
Size: N/A
Type: N/A

TECHNIQUE

Stringer, Weave Bead, Other: Stringer
Multi-pass or Single Pass (per side) Single Pass
Number of Electrodes Single
Contact Tip to Work Distance 1/2" (12.7 mm)
Peening Yes ☐ NO ☒
Interpass Cleaning YES ☐ NO ☒
Cleaning Method: None

PREHEAT

Preheat Temp. Min. N/A Ma 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	ER 4043	.045" (1.1 mm)	DC+	240 (6.0 m/min)	1.1	16 ipm (.41 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 ☐

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. 308
Type or Grade N/A
Thickness: Groove N/A Fillet 10 GA (3.2mm)

FILLER METALS

AWS Specification A5.9
AWS Classification ER 308

SHIELDING

Electrode Flux (Class) N/A Gas Argon/Co2
Composition 98%2%
Flux N/A
Flow Rate 25-35cfh (12-16.5 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 5-10

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 5-10

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" (12.7 mm)

Peening Yes ☐ NO ☒

Interpass Cleaning YES ☐ NO ☒

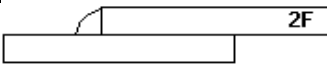
Cleaning Method: None

PREHEAT

Preheat Temp. Min. N/A Ma 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	ER 308	.045" (1.1 mm)	DC+	210 (5.4 m/min)	0.95	7.3 ipm (.19 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 ☐

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. 308
Type or Grade N/A
Thickness: Groove N/A Fillet 10 GA (3.2mm)

FILLER METALS

AWS Specification A5.9
AWS Classification ER 308

SHIELDING

Electrode Flux (Class) N/A Gas Argon/Co2
Composition 98%2%
Flux N/A
Flow Rate 25-35cfh (12-16.5 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 5-11

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 5-11

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) Multi-Pass

Number of Electrodes Single

Contact Tip to Work Distance 1/2" (12.7 mm)

Peening Yes ☐ NO ☒

Interpass Cleaning YES ☐ NO ☒

Cleaning Method: None

PREHEAT

Preheat Temp. Min. N/A Ma 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	ER 308	.045" (1.1 mm)	DC+	210 (5.4 m/min)	0.95	7.3 ipm (.19 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 ☐

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 30-40cfh (16-18 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 5-12

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 5-12

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 ☒

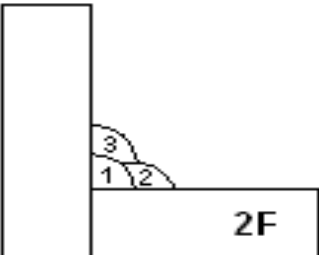
Interpass Cleaning YES ☐ NO ☒

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	.035" (.89 mm)	DC+	230 (5.8 m/min)	0.95	10 ipm (.25 m/min)	
2	Stringer	E70S-6	.035" (.89 mm)	DC+	230 (5.8 m/min)	0.95	10 ipm (.25 m/min)	
3	Stringer	E70S-6	.035" (.89 mm)	DC+	230 (5.8 m/min)	0.95	11 ipm (.28 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 ☐

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 30-40cfh (16-18 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 5-13

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 5-13

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) Multi-pass

Number of Electrodes Single

Contact Tip to Work Distance 1/2"

Peening Yes ☐ NO ☒

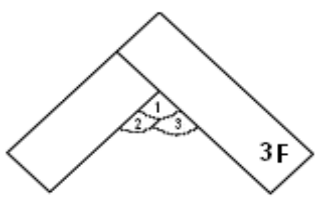
Interpass Cleaning YES ☐ NO ☒

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	.035" (.89 mm)	DC+	230 (5.8 m/min)	1.00	12 ipm (.30 m/min)	
2	Stringer	E70S-6	.035" (.89 mm)	DC+	230 (5.8 m/min)	1.00	10 ipm (.25 m/min)	
3	Stringer	E70S-6	.035" (.89 mm)	DC+	230 (5.8 m/min)	1.00	9 ipm (.23 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 ☐

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 30-40cfh (16-18 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 5-14

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 5-14

POSITION

Groove: N/A Fillet: 4F 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	.035" (.89 mm)	DC+	230 (5.8 m/min)	1.00	12 ipm (.30 m/min)	
2	Stringer	E70S-6	.035" (.89 mm)	DC+	230 (5.8 m/min)	1.00	10 ipm (.25 m/min)	
3	Stringer	E70S-6	.035" (.89 mm)	DC+	230 (5.8 m/min)	1.00	9 ipm (.23 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 ☐

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 30-40cfh (12-18 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 5-15
Revision _____ Date _____ by _____
Authorized by _____ Date _____
Supporting PQR No.(s) PQR VRTEX® 5-15

POSITION

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

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

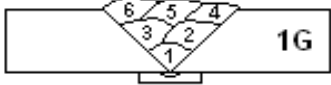
Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐
Pulse ☒
Other: N/A
Current: AC ☐ DCEP ☒ DCEN ☐
Power Source: CC ☐ CV ☒
Tungsten Electrode (GTAW)
Size: N/A
Type: N/A

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	.035" (.89 mm)	DC+	250 (6.3 m/min)	0.95	11.5 ipm (.29 m/min)	
2	Stringer	E70S-6	.035" (.89 mm)	DC+	250 (6.3 m/min)	0.95	7.7 ipm (.20 m/min)	
3	Stringer	E70S-6	.035" (.89 mm)	DC+	250 (6.3 m/min)	0.95	10 ipm (.25 m/min)	
4	Stringer	E70S-6	.035" (.89 mm)	DC+	250 (6.3 m/min)	0.95	8.3 ipm (.21 m/min)	
5	Stringer	E70S-6	.035" (.89 mm)	DC+	250 (6.3 m/min)	0.95	12 ipm (.30 m/min)	
6	Stringer	E70S-6	.035" (.89 mm)	DC+	250 (6.3 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 ☐

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 30-40cfh (12-18 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 5-17

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 5-17

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

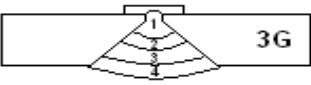
TECHNIQUE

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 / Trim	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.035" (.89 mm)	DC+	230 (5.8 m/min)	0.95	3.9 ipm (.10 m/min)	
2	Weave	E70S-6	.035" (.89 mm)	DC+	230 (5.8 m/min)	0.95	3.6 ipm (.10 m/min)	
3	Weave	E70S-6	.035" (.89 mm)	DC+	230 (5.8 m/min)	0.95	2.8 ipm (.07 m/min)	
4	Weave	E70S-6	.035" (.89 mm)	DC+	230 (5.8 m/min)	0.95	2.6 ipm (.07 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 ☐

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 30-40cfh (16-18 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 5-19

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 5-19

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 ☒

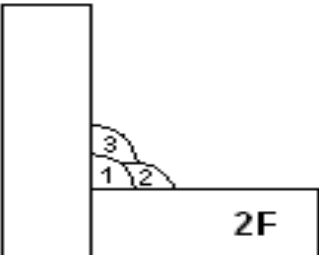
Interpass Cleaning YES ☐ NO ☒

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+	130 (3.3 m/min)	0.95	10 ipm (.25 m/min)	
2	Stringer	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	10 ipm (.25 m/min)	
3	Stringer	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	11 ipm (.28 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 ☐

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 30-40cfh (16-18 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 5-20

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 5-20

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) Multi-pass

Number of Electrodes Single

Contact Tip to Work Distance 1/2"

Peening Yes ☐ NO ☒

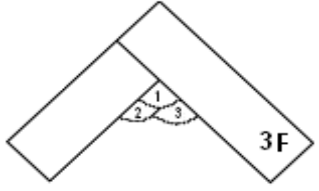
Interpass Cleaning YES ☐ NO ☒

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+	145 (3.6 m/min)	1.00	12 ipm (.30 m/min)	
2	Stringer	E70S-6	.045" (1.1 mm)	DC+	145 (3.6 m/min)	1.00	10 ipm (.25 m/min)	
3	Stringer	E70S-6	.045" (1.1 mm)	DC+	145 (3.6 m/min)	1.00	9 ipm (.23 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 ☐

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 30-40cfh (16-18 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 5-21

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 5-21

POSITION

Groove: N/A Fillet: 4F 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 ☒

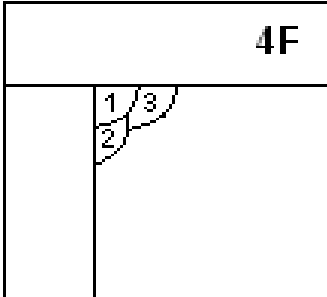
Interpass Cleaning YES ☐ NO ☒

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+	145 (3.6 m/min)	1.00	12 ipm (.30 m/min)	4F 
2	Stringer	E70S-6	.045" (1.1 mm)	DC+	145 (3.6 m/min)	1.00	10 ipm (.25 m/min)	
3	Stringer	E70S-6	.045" (1.1 mm)	DC+	145 (3.6 m/min)	1.00	9 ipm (.23 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 ☐

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 30-40cfh (16-18 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 5-22

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 5-22

POSITION

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

Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

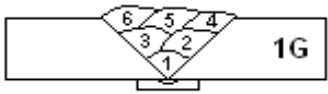
Transfer Mode: Short Circuit ☐ Globular ☐ Spray ☐
Pulse ☒
Other: N/A
Current: AC ☐ DCEP ☒ DCEN ☐
Power Source: CC ☐ CV ☒
Tungsten Electrode (GTAW)
Size: N/A
Type: N/A

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+	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)	

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 ☐

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 30-40cfh (16-18 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 5-24

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 5-24

POSITION

Groove: N/A Fillet: 4F 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	.052" (1.3 mm)	DC+	145 (3.6 m/min)	1.00	12 ipm (.30 m/min)	4F
2	Stringer	E70S-6	.052" (1.3 mm)	DC+	145 (3.6 m/min)	1.00	10 ipm (.25 m/min)	
3	Stringer	E70S-6	.052" (1.3 mm)	DC+	145 (3.6 m/min)	1.00	9 ipm (.23 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 ☐

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 30-40cfh (16-18 l/min)

Gas Cup Size N/A

Identification # VRTEX® GMAW # 5-25

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 5-25

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	.052" (1.3 mm)	DC+	130 (3.3 m/min)	0.95	11.5 ipm (.29 m/min)	
2	Stringer	E70S-6	.052" (1.3 mm)	DC+	130 (3.3 m/min)	0.95	7.7 ipm (.20 m/min)	
3	Stringer	E70S-6	.052" (1.3 mm)	DC+	130 (3.3 m/min)	0.95	10 ipm (.25 m/min)	
4	Stringer	E70S-6	.052" (1.3 mm)	DC+	130 (3.3 m/min)	0.95	8.3 ipm (.21 m/min)	
5	Stringer	E70S-6	.052" (1.3 mm)	DC+	130 (3.3 m/min)	0.95	12 ipm (.30 m/min)	
6	Stringer	E70S-6	.052" (1.3 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 ☐

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 30-40cfh (16-18 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 5-27

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 5-27

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

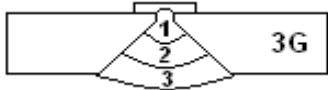
TECHNIQUE

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 / Trim	Travel Speed	Joint Details
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.052" (1.3 mm)	DC+	130 (3.3 m/min)	0.95	3.9 ipm (.10 m/min)	
2	Weave	E70S-6	.052" (1.3 mm)	DC+	130 (3.3 m/min)	0.95	3.6 ipm (.10 m/min)	
3	Weave	E70S-6	.052" (1.3 mm)	DC+	130 (3.3 m/min)	0.95	2.8 ipm (.07 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 ☐

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

Identification # VRTEX® SMAW # 5-29

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR 'RTEX® 5-29

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	Type & Polarity	AMPS		
1	Whip	E6010	1/8" (3.2 mm)	DC+	90 ± 5	13.9 ipm ± 10% (.13 m/min)	1 2 3 4 5 6 7 8 9 10 11 Surface Build Up
2	Whip	E6010	1/8" (3.2 mm)	DC+	90 ± 5	13.9 ipm ± 10% (.13 m/min)	
3	Whip	E6010	1/8" (3.2 mm)	DC+	90 ± 5	13.9 ipm ± 10% (.13 m/min)	
4	Whip	E6010	1/8" (3.2 mm)	DC+	90 ± 5	13.9 ipm ± 10% (.13 m/min)	
5	Whip	E6010	1/8" (3.2 mm)	DC+	90 ± 5	13.9 ipm ± 10% (.13 m/min)	
6	Whip	E6010	1/8" (3.2 mm)	DC+	90 ± 5	13.9 ipm ± 10% (.13 m/min)	
7	Whip	E6010	1/8" (3.2 mm)	DC+	90 ± 5	13.9 ipm ± 10% (.13 m/min)	
8	Whip	E6010	1/8" (3.2 mm)	DC+	90 ± 5	13.9 ipm ± 10% (.13 m/min)	
9	Whip	E6010	1/8" (3.2 mm)	DC+	90 ± 5	13.9 ipm ± 10% (.13 m/min)	
10	Whip	E6010	1/8" (3.2 mm)	DC+	90 ± 5	13.9 ipm ± 10% (.13 m/min)	
11	Whip	E6010	1/8" (3.2 mm)	DC+	90 ± 5	13.9 ipm ± 10% (.13 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Identification # VRTEX® SMAW # 5-30

Welding Process SMAW

Revision _____ Date _____ by _____

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

Authorized by _____ Date _____

Supporting PQR No.(s) PQR 'RTEX® 5-30

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

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

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)	1 2 3 4 5 6 7 8 9 10 11 Surface Build Up
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)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Identification # VRTEX® SMAW # 5-31

Welding Process SMAW

Revision _____ Date _____ by _____

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

Authorized by _____ Date _____

Supporting PQR No.(s) PQR 'RTEX® 5-31

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

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) 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	9.6 ipm ± 10% (.24 m/min)	1 2 3 4 5 6 7 8 9 10 11 Surface Build Up
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)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process GMAW

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

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

Identification # VRTEX® GMAW # 5-32

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 5-32

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

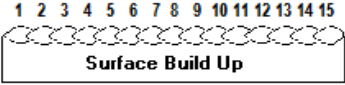
TECHNIQUE

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		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	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)	

****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 ☐

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

Identification # VRTEX® GMAW # 5-33

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 5-33

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

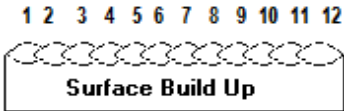
TECHNIQUE

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		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	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)	

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 ☐

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

Identification # VRTEX® GMAW # 5-34

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 5-34

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) Multiple 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	16 ipm (.41 m/min)	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 Surface Build Up
2	Stringer	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	16 ipm (.41 m/min)	
3	Stringer	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	16 ipm (.41 m/min)	
4	Stringer	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	16 ipm (.41 m/min)	
5	Stringer	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	16 ipm (.41 m/min)	
6	Stringer	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	16 ipm (.41 m/min)	
7	Stringer	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	16 ipm (.41 m/min)	
8	Stringer	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	16 ipm (.41 m/min)	
9	Stringer	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	16 ipm (.41 m/min)	
10	Stringer	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	16 ipm (.41 m/min)	
11	Stringer	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	16 ipm (.41 m/min)	
12	Stringer	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	16 ipm (.41 m/min)	
13	Stringer	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	16 ipm (.41 m/min)	
14	Stringer	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	16 ipm (.41 m/min)	
15	Stringer	E70S-6	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	16 ipm (.41 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 ☐

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

Identification # VRTEX® FCAW # 5-35

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 5-35

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	1 2 3 4 5 6 7 8 9 10 Surface Build Up
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	15 ipm (.38 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	15 ipm (.38 m/min)	
4	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	15 ipm (.38 m/min)	
5	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	15 ipm (.38 m/min)	
6	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	15 ipm (.38 m/min)	
7	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	15 ipm (.38 m/min)	
8	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	15 ipm (.38 m/min)	
9	Stringer	E71T-1	0.045" (1.2 mm)	DC+	275 (7.0 m/min)	25	15 ipm (.38 m/min)	
10	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-S**

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

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

Identification # VRTEX® FCAW # 5-36

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 5-36

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)	1 2 3 4 5 6 7 8 9 10 11 12 Surface Build Up
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)	

****This document is intended for training purposes only****

VRTEX® 360 - Default Weld Process Settings (Software Set 6)

WPS#	VR Welding Process	Consumable Type	Lincoln Brand	Gas Mixture	Gas Flow	Position	Mat'l (in) Schedule 80 on Flat Plate	WFS (lpm) or Amps	Voltage or Trim	Polarity
6-1	SMAW	1/8" (3.2mm) E6010	Fleetweld 5P+	N/A	N/A	2F	1/4" (6.4mm)	85 (±5)	N/A	DC+
6-2	SMAW	1/8" (3.2mm) E6010	Fleetweld 5P+	N/A	N/A	4F	1/4" (6.4mm)	85 (±5)	N/A	DC+
6-3	SMAW	1/8" (3.2mm) E6010	Fleetweld 5P+	N/A	N/A	5F up	1/4" (6.4mm)	85 (±5)	N/A	DC+
6-4	SMAW	1/8" (3.2mm) E7018	Excalibur 7018	N/A	N/A	2F	1/4" (6.4mm)	115 (±5)	N/A	DC+
6-5	SMAW	1/8" (3.2mm) E7018	Excalibur 7018	N/A	N/A	4F	1/4" (6.4mm)	115 (±5)	N/A	DC+
6-6	SMAW	1/8" (3.2mm) E7018	Excalibur 7018	N/A	N/A	5F up	1/4" (6.4mm)	115 (±5)	N/A	DC+
6-7	SMAW	1/8" (3.2mm) E6013	Fleetweld 37	N/A	N/A	2F	1/4" (6.4mm)	100 (±5)	N/A	AC
6-8	SMAW	1/8" (3.2mm) E6013	Fleetweld 37	N/A	N/A	4F	1/4" (6.4mm)	100 (±5)	N/A	AC
6-9	SMAW	1/8" (3.2mm) E6013	Fleetweld 37	N/A	N/A	5F down	1/4" (6.4mm)	115 (±5)	N/A	AC
6-10	GMAW-S	.035 (.89mm) ER70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	2F	1/4" (6.4mm)	350 (±5) (8.9 m/min)	20	DC+
6-11	GMAW-S	.035 (.89mm) ER70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	4F	1/4" (6.4mm)	325 (±5) (8.2 m/min)	19	DC+
6-12	GMAW-S	.035 (.89mm) ER70S-6	SuperArc L-56	75/25	25-35 (12-16.5 l/min)	5F down	1/4" (6.4mm)	275 (±5) (7.0 m/min)	19	DC+
6-13	GMAW-Pulse	.045 (1.1mm) ER70S-6	SuperArc L-56	90/10	30-40 (12-18 l/min)	2F	1/4" (6.4mm)	130 (±5) (3.3 m/min)	0.95	DC+
6-14	GMAW-Pulse	.045 (1.1mm) ER70S-6	SuperArc L-56	90/10	30-40 (12-18 l/min)	4F	1/4" (6.4mm)	130 (±5) (3.3 m/min)	0.95	DC+
6-15	GMAW-Pulse	.045 (1.1mm) ER70S-6	SuperArc L-56	90/10	30-40 (12-18 l/min)	5F up	1/4" (6.4mm)	130 (±5) (3.3 m/min)	0.95	DC+
6-16	FCAW - G	.045 (1.1mm) E71T-1	UC71A85	75/25	40-50 (19-23.5 l/min)	2F	1/4" (6.4mm)	275 (±5) (7.0 m/min)	25	DC+
6-17	FCAW - G	.045 (1.1mm) E71T-1	UC71A85	75/25	40-50 (19-23.5 l/min)	4F	1/4" (6.4mm)	275 (±5) (7.0 m/min)	25	DC+
6-18	FCAW - G	.045 (1.1mm) E71T-1	UC71A85	75/25	40-50 (19-23.5 l/min)	5F up	1/4" (6.4mm)	275 (±5) (7.0 m/min)	25	DC+
6-19	FCAW - S	5/64 (2.0mm) E71T-8	NR-232/233	N/A	N/A	2F	1/4" (6.4mm)	150 (±5) (3.5 m/min)	20	DC-
6-20	FCAW - S	5/64 (2.0mm) E71T-8	NR-232/233	N/A	N/A	4F	1/4" (6.4mm)	145 (±5) (3.5 m/min)	20	DC-
6-21	FCAW - S	5/64 (2.0mm) E71T-8	NR-232/233	N/A	N/A	5F up	1/4" (6.4mm)	150 (±5) (3.5 m/min)	20	DC-



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 Schedule 80 on plate
Type or Grade N/A
Thickness: Groove Fillet 1/4" (6.4 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

Identification # VRTEX® SMAW # 6-1

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 6-1

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 Whip
Multi-pass or Single Pass (per side) Single
Number of Electrodes Single
Contact Tip to Work Distance N/A
Peening Yes ☐ NO ☒
Interpass Cleaning YES ☐ NO ☒
Cleaning Method: Chipping and brushing

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	Whip	E6010	1/8" (3.2 mm)	DC+	85 (± 5)	5 ipm (.13 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 Schedule 80 on plate
Type or Grade N/A
Thickness: Groove Fillet 1/4" (6.4 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

Identification # VRTEX® SMAW # 6-2

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX®6-2

POSITION

Groove: N/A Fillet: 4F 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

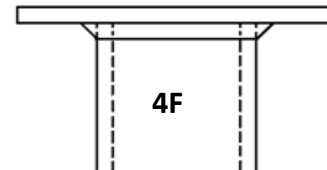
Stringer, Weave Bead, Other: Stringer Whip
Multi-pass or Single Pass (per side) Single
Number of Electrodes Single
Contact Tip to Work Distance N/A
Peening Yes ☐ NO ☒
Interpass Cleaning YES ☐ NO ☒
Cleaning Method: Chipping and brushing

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	Whip	E6010	1/8" (3.2 mm)	DC+	85 (± 5)	5 ipm (.13 m/min)	





WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 Schedule 80 on plate
Type or Grade N/A
Thickness: Groove Fillet 1/4" (6.4 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

Identification # VRTEX® SMAW # 6-3

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 6-3

POSITION

Groove: N/A Fillet: 5F 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

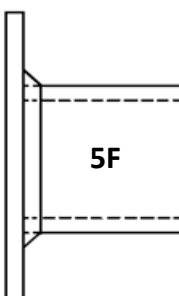
TECHNIQUE

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

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	Whip	E6010	1/8" (3.2 mm)	DC+	85 (± 5)	3.6 ipm (.09 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Identification # VRTEX® SMAW #6-4

Welding Process SMAW

Revision _____ Date _____ by _____

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

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 6-4

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: 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

BASE MATERIAL

Material Spec. ASTM A36 Schedule 80 on plate

Type or Grade N/A

Thickness: Groove _____ Fillet 1/4" (6.4 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

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 ☒

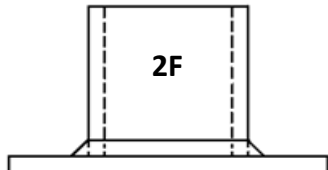
Cleaning Method: Chipping and brushing

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+	115 (± 5)	6.5 ipm (.17 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 Schedule 80 on plate
Type or Grade N/A
Thickness: Groove Fillet 1/4" (6.4 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

Identification # VRTEX® SMAW # 6-5

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 6-5

POSITION

Groove: N/A Fillet: 4F 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

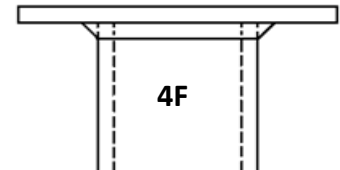
Stringer, Weave Bead, Other: Stringer
Multi-pass or Single Pass (per side) Single Pass
Number of Electrodes Single
Contact Tip to Work Distance N/A
Peening Yes ☐ NO ☒
Interpass Cleaning YES ☐ NO ☒
Cleaning Method: Chipping and brushing

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+	115 (± 5)	6.5 ipm (.17 m/min)	





WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 Schedule 80 on plate
Type or Grade N/A
Thickness: Groove Fillet 1/4" (6.4 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

Identification # VRTEX® SMAW # 6-6

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 6-6

POSITION

Groove: N/A Fillet: 5F 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

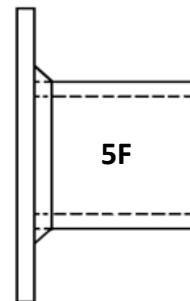
Stringer, Weave Bead, Other: Stringer
Multi-pass or Single Pass (per side) Single Pass
Number of Electrodes Single
Contact Tip to Work Distance N/A
Peening Yes ☐ NO ☒
Interpass Cleaning YES ☐ NO ☒
Cleaning Method: Chipping and brushing

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+	115 (± 5)	6.0 ipm (.15 m/min)	





WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 Schedule 80 on plate
Type or Grade N/A
Thickness: Groove Fillet 1/4" (6.4 mm)

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

Identification # VRTEX® SMAW # 6-7

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 6-7

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

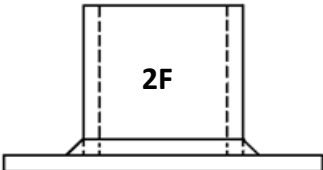
TECHNIQUE

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

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	Wire Feed Speed		
1	Stringer	E6013	1/8" (3.2 mm)	AC	100 (± 5)	9 ipm (.23 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 Schedule 80 on plate
Type or Grade N/A
Thickness: Groove Fillet 1/4" (6.4 mm)

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

Identification # VRTEX® SMAW # 6-8

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 6-8

POSITION

Groove: N/A Fillet: 4F 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

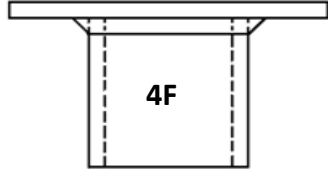
TECHNIQUE

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

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	Wire Feed Speed		
1	Stringer	E6013	1/8" (3.2 mm)	AC	100 (± 5)	8 ipm (.21 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process SMAW

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

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 Schedule 80 on plate
Type or Grade N/A
Thickness: Groove Fillet 1/4" (6.4 mm)

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

Identification # VRTEX® SMAW # 6-9

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 6-9

POSITION

Groove: N/A Fillet: 5F 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

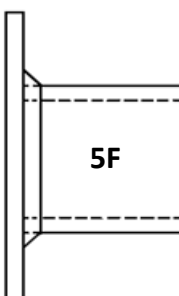
TECHNIQUE

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

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	Wire Feed Speed		
1	Stringer	E6013	1/8" (3.2 mm)	AC	115 (± 5)	16. ipm (.41 m/min)	



WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process GMAW

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

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 Schedule 80 on plate
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

Identification # VRTEX® GMAW # 6-10

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 6-10

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

Number of Electrodes Single

Contact Tip to Work Distance 1/2" (12.7 mm)

Peening Yes ☐ NO ☒

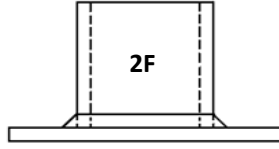
Interpass Cleaning YES ☐ NO ☒

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	
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E70S-6	.035" (.89 mm)	DC+	350 (8.9 m/min)	20	12.5 ipm (.32 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 ☐

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 Schedule 80 on plate
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 90/10
Flux N/A
Flow Rate 30-40cfh (16-19 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 6-13

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 6-13

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

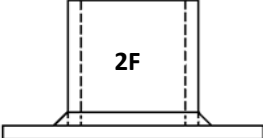
TECHNIQUE

Stringer, Weave Bead, Other: Stringer
Multi-pass or Single Pass (per side) Single-Pass
Number of Electrodes Single
Contact Tip to Work Distance 1/2" (12.7 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	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	10 ipm (.25 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 ☐

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 Schedule 80 on plate
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 90/10
Flux N/A
Flow Rate 30-40cfh (16-19 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 6-14

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 6-14

POSITION

Groove: N/A Fillet: 4F 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" (12.7 mm)

Peening Yes ☐ NO ☒

Interpass Cleaning YES ☐ NO ☒

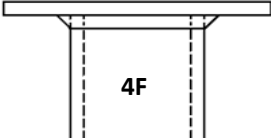
Cleaning Method: None

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	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	12 ipm (.30 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 ☐

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 Schedule 80 on plate
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 90/10
Flux N/A
Flow Rate 30-40cfh (16-19 l/min)
Gas Cup Size N/A

Identification # VRTEX® GMAW # 6-15

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No. (s) PQR VRTEX® 6-15

POSITION

Groove: N/A Fillet: 5F 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

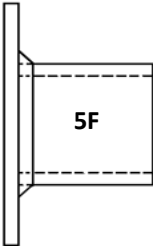
TECHNIQUE

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" (12.7 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	.045" (1.1 mm)	DC+	130 (3.3 m/min)	0.95	12 ipm (.30 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 ☐

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 Schedule 80 on plate
Type or Grade N/A
Thickness: Groove N/A Fillet 1/4" (6.4 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

Identification # VRTEX® FCAW # 6-16

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 6-16

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 3/4" (19.1 mm)

Peening Yes ☐ NO ☒

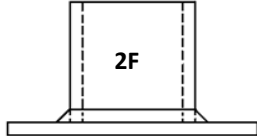
Interpass Cleaning YES ☐ NO ☒

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" (1.1 mm)	DC+	275 (7.0 m/min)	25	11.5 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 ☐

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 Schedule 80 on plate
Type or Grade N/A
Thickness: Groove N/A Fillet 1/4" (6.4 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

Identification # VRTEX® FCAW # 6-17

Revision _____ Date _____ by _____

Authorized by _____ Date _____

Supporting PQR No.(s) PQR VRTEX® 6-17

POSITION

Groove: N/A Fillet: 4F 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 ☒

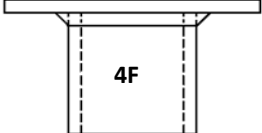
Interpass Cleaning YES ☐ NO ☒

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	
		Class	Diameter	Type & Polarity	Wire Feed Speed			
1	Stringer	E71T-1	0.045" (1.1 mm)	DC+	275 (7.0 m/min)	25	8.5 ipm (.22 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 ☐

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 Schedule 80 on plate

Type or Grade N/A

Thickness: Groove N/A Fillet 1/4" (6.4 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

Identification # VRTEX® FCAW # 6-19

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 6-19

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 1" (25 mm)

Peening Yes ☐ NO ☒

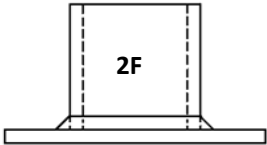
Interpass Cleaning YES ☐ NO ☒

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-	150 (3.8 m/min)	20	11.5 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 ☐

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 Schedule 80 on plate

Type or Grade N/A

Thickness: Groove N/A Fillet 1/4" (6.4 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

Identification # VRTEX® FCAW # 6-20

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 6-20

POSITION

Groove: N/A Fillet: 4F 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 ☒

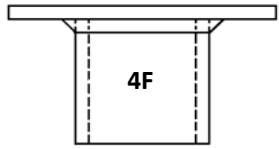
Interpass Cleaning YES ☐ NO ☒

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-	145 (3.5 m/min)	20	9.5 ipm (.24 m/min)	

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WELDING PROCEDURE SPECIFICATION (WPS)



Company Name VRTEX® VRAW™

Welding Process **FCAW-S**

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

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 Schedule 80 on plate

Type or Grade N/A

Thickness: Groove N/A Fillet **1/4" (6.4 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

Identification # VRTEX® FCAW # 6-21

Revision Date by

Authorized by Date

Supporting PQR No.(s) PQR VRTEX® 6-21

POSITION

Groove: N/A Fillet: **5F** 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 ☒

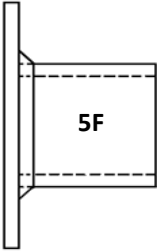
Interpass Cleaning YES ☐ NO ☒

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-	150 (3.8 m/min)	20	12.8 ipm (.33 m/min)	
								

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ID #

PIPE		Root Land		Preheat Temp	
Diameter		Root Gap		Interpass Temp	
Wall Thickness		Joint Bevel Angle		Clamp Type	
Schedule		Backing		Cleaning	

Electrode & Gas	ROOT PASS	HOT PASS	FILL - CAP PASSES
Electrode Name			
Diameter			
AWS Classification			
Shielding Gas			
Flow Rate (CFH)			
Backing Gas			
Flow Rate (CFH)			
Welding Position			
Direction of Welding			
POWER SOURCE			
Software Z #			
Mode #			
Wire Feeder			
Electrode Polarity			

PROCEDURES	ROOT PASS	HOT PASS	FILL - CAP PASSES
Process			
WFS (in/min)			
Volts			
Amps			
Travel Speed (in/min)			
Arc Length			
Synergic Mode			
Trim			
Arc Control			
Non-Synergic Mode			
Peak Amps			
Background Amps			
Tailout (0-10)			

Comments:	Joint Details