

FLUX-CORED

FCAW-S/FCAW-G
CONSUMABLES

Selection Guide

Flux-Cored Self-Shielded (FCAW-S) Wire

Product Name & AWS Class	Key Features	0.045 (1.1)	1/16 (1.6)	0.068 (1.7)	5/64 (2.0)	3/32 (2.4)	7/64 (2.8)	0.120 (3.0)
Mild Steel, Flat & Horizontal								
Innershield® NR-5 (E70T-3)	<ul style="list-style-type: none"> • Fast travel speeds • Increased resistance to porosity • Consistent bead appearance 					✓		✓
Innershield® NS-3M (E70T-4)	<ul style="list-style-type: none"> • Very high deposition rates • Increased resistance to hydrogen cracking and porosity • Soft, low penetrating arc for minimal base material admixture 				✓	✓		✓
Innershield NR-305 (E70T-6)	<ul style="list-style-type: none"> • High deposition rates in the flat and horizontal positions • Smooth arc and low spatter levels • Capable of producing weld deposits with impact properties exceeding 27 J (20 ft•lbf) at -29°C (-20°F) 				✓	✓		
Innershield® NR-311 (E70T-7)	<ul style="list-style-type: none"> • High deposition rates and fast travels speeds • Easy slag removal • Optimal toe wash-in 				✓	✓	✓	
Innershield® NR-131 (E70T-10)	<ul style="list-style-type: none"> • Fast travel speeds and high deposition rates • Maximum penetration • Flat bead profile on butt welds 					✓		
Mild Steel, All Position		0.030 (0.8)	0.035 (0.9)	0.045 (1.1)	1/16 (1.6)	0.068 (1.7)	5/64 (2.0)	3/32 (2.4)
Innershield® NR-152 (E71T-14)	<ul style="list-style-type: none"> • Designed for high speed welding of specially coated steels • Soft, consistent arc • Porosity resistant 			✓	✓	✓		
Innershield® NR-211-MP (E71T-11)	<ul style="list-style-type: none"> • Versatile welding capability on a variety of base materials • High operator appeal and good bead appearance • Easy slag removal 	✓	✓	✓		✓	✓	✓
Innershield® NR-203MP (E71T-8-J)	<ul style="list-style-type: none"> • Designed to handle poor fit-up on heavy wall tubes and gaps up to 9.5 mm (3/8 in) with 6.4 mm (1/4 in) offset • Fast freezing slag with excellent wash-in • Root bead capability without back-up bars 					✓	✓	

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Selection Guide

Flux-Cored Self-Shielded (FCAW-S) Wire						
Product Name & AWS Class	Key Features	Diameters Available in (mm)				
Mild Steel, All Position		0.045 (1.1)	1/16 (1.6)	0.068 (1.7)	0.072 (1.8)	5/64 (2.0)
Innershield® NR-232 (E71T-8)	<ul style="list-style-type: none"> • High deposition rates for out-of-position welding • Penetrating arc • Fast freezing, easy to remove slag system 			✓	✓	✓
Innershield® NR-233 (E71T-8)	<ul style="list-style-type: none"> • High deposition rates for out-of-position welding • Welder-friendly, easy to use and great bead appearance • Minimal gas marking 		✓		✓	✓
Low Alloy, Flat & Horizontal		0.045 (1.1)	0.068 (1.7)	5/64 (2.0)	3/32 (2.4)	7/64 (2.8)
Innershield® NR-311 Ni (E70T7-K2, E80TG-K2)	<ul style="list-style-type: none"> • Designed to provide a nominal 1.5% nickel weld deposit • High deposition rates and fast travel speeds • Capable of producing weld deposits with impact properties exceeding 27 J (20 ft•lbf) at -29°C (-20°F) 			✓	✓	✓
Low Alloy, All Position		0.045 (1.1)	0.068 (1.7)	5/64 (2.0)	3/32 (2.4)	7/64 (2.8)
Innershield® NR-212 (E71TG-G)	<ul style="list-style-type: none"> • Accommodates a wide range of mild steels • Fast freeze characteristics accommodate poor fit-up • Smooth arc performance 	✓	✓	✓		
Innershield® NR-203 Nickel (1%) (E71T8-Ni1)	<ul style="list-style-type: none"> • Designed to produce a nickel bearing weld deposit • Capable of producing weld deposits with impact toughness exceeding 27 J (20 ft•lbf) at -29°C (-20°F) • Color match on weathering steels 			✓		
Innershield® NR-207 (E71T8-K6)	<ul style="list-style-type: none"> • Vertical down, hot, fill and cap passes on standard cross-country pipelines and arctic grade pipe • Recommended for API grades X42 up to undermatching X70 • High deposition rates 		✓	✓		
Pipeliner® NR-207+ (E71T8-K6)	<ul style="list-style-type: none"> • Vertical down hot, fill and cap pass welding of up to X70 grade pipe • Capable of producing weld deposits with impact toughness exceeding 27 J (20 ft•lbf) at -29°C (-20°F) • Q2 Lot® - Certificate showing actual deposit chemistry available online 			✓		
Pipeliner® NR-208-P (E81T8-G)	<ul style="list-style-type: none"> • Vertical down hot, fill and cap pass welding of up to X80 grade pipe • Capable of producing weld deposits with impact toughness exceeding 83 - 133 J (61 - 98 ft•lbf) at -29°C (-20°F) • Q2 Lot® - Certificate showing actual deposit chemistry available online 			✓		

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Selection Guide

Flux-Cored Self-Shielded (FCAW-S) Wire

Product Name & AWS Class	Key Features	Diameters Available in (mm)
Low Alloy, All Position		5/64 (2.0)
Pipelinor [®] NR-208-XP (E81T8-G)	<ul style="list-style-type: none"> Vertical down hot, fill and cap pass welding of up to X80 grade pipe Capable of producing weld deposits with impact toughness exceeding 153 - 302 J (113 - 223 ft•lbf) at -29°C (-20°F) Q2 Lot[®] - Certificate showing actual deposit chemistry available online 	✓
Innershield [®] NR-208-H (E91T8-G-H8)	<ul style="list-style-type: none"> Designed to create high strength weld deposits Recommended for API grade X80 High deposition rates 	✓

Flux-Cored Gas-Shielded (FCAW-G) Wire

Product Name & AWS Class	Key Features	Diameters Available in (mm)		
Mild Steel, All Position		0.045 (1.1)	0.052 (1.3)	1/16 (1.6)
UltraCore [®] 71A85 (E71T-1M-H8, E71T-9M-H8)	<ul style="list-style-type: none"> Fast freezing slag for out-of-position welding Designed for welding with 75 - 85% Argon/balance CO₂ shielding gas Premium arc performance and bead appearance 	✓	✓	✓
UltraCore [®] 71C (E71T-1C-H8, E71T-9C-H8)	<ul style="list-style-type: none"> Fast freezing slag for out-of-position welding Designed for welding with 100% CO₂ shielding gas Premium arc performance and bead appearance 	✓	✓	✓
UltraCore [®] 71A75 Dual (E71T-1C-H8, E71T-1M-H8, E71T-9C-H8, E71T-9M-H8)	<ul style="list-style-type: none"> Fast freezing slag for out-of-position welding Designed for welding with either 100% CO₂ or 75% Argon/25% CO₂ shielding gases Premium arc performance and bead appearance 	✓	✓	✓
UltraCore [®] 712C (E71T-1M-JH8, E71T-9C-JH8, E71T-12C-JH8)	<ul style="list-style-type: none"> Capable of producing weld deposits with impact toughness exceeding 27 J (20 ft•lbf) at -40°C (-40°F) Designed for welding with 100% CO₂ shielding gas Premium arc performance and bead appearance 	✓	✓	✓
UltraCore [®] 712A80 (E71T-1M-JH8, E71T-9M-JH8, E71T-12M-JH8)	<ul style="list-style-type: none"> Capable of producing weld deposits with impact toughness exceeding 27 J (20 ft•lbf) at -40°C (-40°F) Designed for welding with 75-80% Argon/balance CO₂ shielding gas Premium arc performance and bead appearance 	✓	✓	✓

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Selection Guide

Flux-Cored Gas-Shielded (FCAW-G) Wire					
Product Name & AWS Class	Key Features	Diameters Available in (mm)			
Mild Steel, All Position		0.035 (0.9)	0.045 (1.1)	0.052 (1.3)	1/16 (1.6)
UltraCore® 712A80-H <i>(E71T-1M-JH4, E71T-9M-JH4, E71T-12M-JH4)</i>	<ul style="list-style-type: none"> Capable of producing low hydrogen weld deposits with impact toughness exceeding 27 J (20 ft•lbf) at -40°C (-40°F) Designed for welding with 75-80% Argon/balance CO₂ gas Premium arc performance and bead appearance 		✓	✓	✓
Outershield® 71 Elite <i>(E71T-1C-H8, E71T-9C-H8, E71T-1M-H8, E71T-9M-H8)</i>	<ul style="list-style-type: none"> Smooth arc transfer and low spatter Designed for welding with either 100% CO₂ or 75-82% Argon/balance CO₂ shielding gases Good bead appearance 		✓	✓	✓
Outershield® 71 Supreme ⁽¹⁾ <i>(E491T-9C-H8, E491T-9M-H8)</i>	<ul style="list-style-type: none"> Designed to be used with either 100% CO₂ or 75% Argon/25% CO₂ gas. Smooth, consistent arc performance The finished weld exhibits an extremely smooth bead appearance, even on out-of-position welds 		✓	✓	✓
Outershield® 71M <i>(E71T-1C, E71T-9C)</i>	<ul style="list-style-type: none"> High travel speeds Designed for welding with 100% CO₂ shielding gas Spray like transfer with minimal spatter 	✓	✓	✓	✓
Pipeliner® G70M <i>(E71T-1M-JH8, E71T-9M-JH8)</i>	<ul style="list-style-type: none"> Hot, fill and cap pass welding on up to X70 grade pipe Capable of producing weld deposits with impact toughness exceeding 27 J (20 ft•lbf) at -40°C (-40°F) Q2 Lot® - Certificate showing actual deposit chemistry available online 		✓		
Mild Steel, Flat & Horizontal		0.052 (1.3)	1/16 (1.6)	5/64 (2.0)	3/32 (2.4)
UltraCore® 70C <i>(E70T-1C-H8, E70T-9C-H8)</i>	<ul style="list-style-type: none"> High deposition in the flat and horizontal positions Low fume generation rates Designed for welding with 100% CO₂ shielding gas 		✓	✓	✓
UltraCore® 75C <i>(E70T-5C-JH4)</i>	<ul style="list-style-type: none"> High deposition in the flat and horizontal positions H4 diffusible hydrogen levels Designed for welding with 100% CO₂ shielding gas 		✓	✓	✓
Outershield® 70 <i>(E70T-1C, E70T-9C)</i>	<ul style="list-style-type: none"> High deposition in the flat and horizontal positions Designed for welding with 100% CO₂ shielding gas Excellent bead wetting and low spatter 		✓	✓	✓

⁽¹⁾ Made for Canada only.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Selection Guide

Flux-Cored Gas-Shielded (FCAW-G) Wire

Product Name & AWS Class	Key Features	Diameters Available in (mm)		
Low Alloy, All Position		0.045 (1.1)	0.052 (1.3)	1/16 (1.6)
UltraCore® 81Ni1A75-H <i>(E81T1-Ni1M-JH4)</i>	<ul style="list-style-type: none"> Capable of producing weld deposits with impact toughness exceeding 88 - 123 J (65 - 91 ft•lbf) at -40°C (-40°F) Designed for welding with 75-85% Argon/Balance CO₂ shielding gas Premium arc performance and bead appearance 	✓	✓	✓
UltraCore® 81Ni1C-H <i>(E81T1-Ni1C-JH4)</i>	<ul style="list-style-type: none"> Capable of producing weld deposits with impact toughness exceeding 84 - 130 J (62 - 96 ft•lbf) at -40°C (-40°F) Designed for welding with 100% CO₂ shielding gas Premium arc performance and bead appearance 	✓	✓	✓
UltraCore® 81Ni2A75-H <i>(E81T1-Ni2M-JH4)</i>	<ul style="list-style-type: none"> Capable of producing weld deposits with impact toughness exceeding 41 - 89 J (30 - 66 ft•lbf) at -51°C (-60°F) Designed for welding with 75-85% Argon/Balance CO₂ shielding gas Premium arc performance and bead appearance 	✓	✓	✓
UltraCore® 81Ni2C-H <i>(E81T1-Ni2C-JH4)</i>	<ul style="list-style-type: none"> Capable of producing weld deposits with impact toughness exceeding 54 - 84 J (40 - 62 ft•lbf) at -51°C (-60°F) Designed for welding with 100% CO₂ shielding gas Premium arc performance and bead appearance 	✓	✓	✓
UltraCore® 81K2A75-H <i>(E81T1-K2M-JH4)</i>	<ul style="list-style-type: none"> Capable of producing weld deposits with impact toughness 89 - 127 J (66 - 94 ft•lbf) at -40°C (-40°F) Designed for welding with 75-85% Argon/Balance CO₂ shielding gas Premium arc performance and bead appearance 	✓	✓	✓
UltraCore® 81K2C-H <i>(E81T1-K2C-JH4)</i>	<ul style="list-style-type: none"> Capable of producing weld deposits with impact toughness 111 - 141 J (82 - 104 ft•lbf) at -40°C (-40°F) Designed for welding with 100% CO₂ shielding gas Premium arc performance and bead appearance 	✓	✓	✓

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Selection Guide

Flux-Cored Gas-Shielded (FCAW-G) Wire				
Product Name & AWS Class	Key Features	Diameters Available in (mm)		
		0.045 (1.1)	0.052 (1.3)	1/16 (1.6)
Low Alloy, All Position				
Outersield® 91K2-H (E91T1-K2M-H8)	<ul style="list-style-type: none"> Designed for welding with 75-95% Argon/Balance CO₂ shielding gas Capable of producing weld deposits with tensile strength exceeding 620 MPa (90 ksi) Use on high strength, low alloy steel applications 	✓	✓	✓
Pipeliner® G80M (E101T1-GM-H8)	<ul style="list-style-type: none"> Hot, fill and cap pass welding of up to X80 grade pipe Charpy V-Notch impact toughness tested to -40°C (-40°F) Q2 Lot® - Certificate showing actual deposit chemistry available online 	✓		
Pipeliner® G90M (E111T1-K3M-JH8)	<ul style="list-style-type: none"> Hot, fill and cap pass welding of up to X80 grade pipe Capable of producing weld deposits with impact toughness exceeding 27 J (20 ft•lbf) at -29°C (-20°F) Q2 Lot® - Certificate showing actual deposit chemistry available online 	✓ ⁽¹⁾	✓	

⁽¹⁾ Manufactured to 1.2 mm diameter.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-5

Mild Steel, Flat & Horizontal
AWS E70T-3

Key Features

- ▶ Fast travel speeds
- ▶ Increased resistance to porosity
- ▶ Consistent bead appearance

Typical Applications

- ▶ Single pass welding on up to 48 mm (3/16 in) thicknesses
- ▶ 3 o'clock welding positions
- ▶ Welds with copper back-up
- ▶ Propane cylinders
- ▶ Robotics/hard automation

Welding Positions

Flat & Horizontal

Conformances

AWS A5.20/A5.20M: 2005 E70T-3
ASME SFA-A5.20: E70T-3

Warning

- ▶ NR-5 is NOT recommended for welding multiple passes.

Maximum Plate Thickness

Diameter in (mm)	Maximum Plate Thickness in (mm)
3/32 (2.4)	3/16 (4.8)
0.120 (3.0)	3/16 (4.8)

DIAMETERS / PACKAGING

Diameter in (mm)	600 lb (272.2 kg) Speed-Feed® Drum	600 lb (272.2 kg) Speed-Feed® Reel
3/32 (2.4) 0.120 (3.0)	ED012699	ED012698

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-5

(AWS E70T-3)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	Transverse Tensile Strength MPa (ksi)	Longitudinal Bend Test	Hardness Rockwell B
Requirements AWS E70T-3	480 (70) min.	180° over 3/4 in Radius No openings exceeding 1/8 in	–
Typical Performance⁽²⁾	505 - 560 (75 - 80)	Passed	99

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	%C	%Mn	%Si	%S	%P	%Al	%Ti
Requirements AWS E70T-3	Not Specified						
Typical Performance⁽²⁾	0.17 - 0.22	0.95 - 1.11	0.34 - 0.40	0.008 - 0.02	0.01 - 0.02	0.07 - 0.12	0.40 - 0.49

TYPICAL OPERATING PROCEDURES

Diameter, Polarity	CTWD mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)
3/32 in (2.4 mm) DC+	32 (1-1/4)	2.5 (100)	22-23	500	4.5 (9.9)	3.5 (7.8)	77
		3.8 (150)	23-24	435	6.7 (14.8)	5.6 (12.3)	83
		5.1 (200)	24-25	510	9.0 (19.8)	7.7 (16.9)	85
		6.4 (250)	25-26	575	11.2 (24.7)	9.7 (21.4)	87
0.120 in (3.0 mm) DC+	32 (1-1/4)	3.3 (130)	22-23	500	8.2 (18.0)	7.6 (16.7)	93
		4.2 (165)	23-24	600	10.4 (23.0)	9.5 (20.9)	91
		6.5 (205)	24-25	700	12.9 (28.5)	11.6 (25.6)	90
		6.5 (255)	25-26	800	16.1 (35.5)	14.3 (31.5)	90

⁽¹⁾Typical all weld metal. ⁽²⁾See test results disclaimer on pg. 9.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NS-3M

Mild Steel, Flat & Horizontal
AWS E70T-4

Key Features

- ▶ Very high deposition rates
- ▶ Increased resistance to hydrogen cracking and porosity
- ▶ Soft, low penetrating arc for minimal base material admixture

Welding Positions

Flat & Horizontal

Conformances

AWS A5.20/A5.20M: 2005	E70T-4
ASME SFA-A5.20:	E70T-4
CWB/CSA W48-06:	E492T-4 H16
DB:	EN 758 T38 Z W N 3

Typical Applications

- ▶ Open groove welds
- ▶ Machinery bases and heavy equipment repair
- ▶ Installing wear plates
- ▶ 6.4 - 12.7 mm (1/4 - 1/2 in) single pass fillet and lap welds

DIAMETERS / PACKAGING

Diameter in (mm)	14 lb (6.4 kg) Coil 56 lb (25.4 kg) Carton	50 lb (22.6 kg) Coil	600 lb (272.2 kg) Speed-Feed® Drum
5/64 (2.0)	ED012739	ED012740	
3/32 (2.4)		ED012736	ED012735
0.120 (3.0)		ED012732	ED012731

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NS-3M

(AWS E70T-4)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Hardness Rockwell B
Requirements AWS E70T-4	400 (58) min.	480 - 655 (70 - 95)	22 min.	–
Typical Performance⁽³⁾ As-Welded	415 - 450 (60 - 65)	580 - 620 (84 - 90)	25 - 28	87 - 91

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	%C	%Mn	%Si	%S	%P	%Al
Requirements AWS E70T-4	0.30 max.	1.75 max.	0.60 max.	0.03 max.	0.03 max.	1.8 max.
Typical Performance⁽³⁾	0.21 - 0.25	0.37 - 0.53	0.25 - 0.29	≤0.01	≤0.01	1.3 - 1.6

TYPICAL OPERATING PROCEDURES

Diameter, Polarity	CTWD mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)
5/64 in (2.0 mm) DC+	54 (2 1/4)	5.1 (200)	29-31	280	5.5 (12.2)	4.6 (10.1)	83
		6.1 (240)	30-32	315	6.7 (14.8)	5.5 (12.1)	82
		6.6 (260)	30-32	330	7.3 (16.0)	6.0 (13.2)	83
		7.6 (300)	31-33	350	8.4 (18.6)	6.9 (15.2)	82
3/32 in (2.4 mm) DC+	76 (3)	2.8 (110)	28-30	250	4.6 (10.1)	3.7 (8.2)	81
		3.8 (150)	29-31	300	6.4 (14.0)	5.3 (11.7)	84
		4.7 (185)	30-32	350	7.9 (17.4)	6.6 (14.6)	84
		5.8 (230)	31-33	400	9.8 (21.6)	8.3 (18.3)	85
		7.0 (275)	32-34	450	11.8 (26.0)	10.0 (22.0)	85
0.120 in (3.0 mm) DC+ Electrical Stickout: 2 - 3/4 in (70 mm)	76 (3)	3.5 (140)	28-30	380	9.0 (19.8)	7.0 (15.5)	78
		4.4 (175)	29-31	450	11.2 (24.6)	9.1 (20.0)	81
		5.1 (200)	30-32	500	12.7 (28.0)	10.5 (23.2)	83
		7.6 (225)	31-33	550	14.2 (31.4)	11.9 (26.2)	83
0.120 in (3.0 mm) DC+ Electrical Stickout: 3 - 3/4 in (95 mm)	102 (4)	5.3 (210)	35-37	450	13.2 (29.0)	11.3 (25.0)	86
		6.4 (250)	36-38	500	15.6 (34.5)	13.2 (29.0)	84
		7.6 (300)	37-39	550	18.8 (41.5)	15.4 (34.0)	82
		9.0 (355)	38-40	600	22.2 (49.0)	18.0 (39.5)	81

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-305

Mild Steel, Flat & Horizontal
AWS E70T-6



Key Features

- ▶ High deposition rates in the flat and horizontal positions
- ▶ Smooth arc and low spatter levels
- ▶ Capable of producing weld deposits with impact properties exceeding 27 J (20 ft•lbf) at -29°C (-20°F)
- ▶ Welds on lightly rusted or primed plate

Typical Applications

- ▶ General plate fabrication
- ▶ Structural fabrication, including those subject to seismic requirements [3/32 in (2.4 mm) diameter only]
- ▶ Shipyards, stiffener welding on barges
- ▶ Bridges and offshore rigs
- ▶ Welding over tack welds made with stick electrode

Welding Positions

Flat & Horizontal

Conformances

AWS A5.20/A5.20M: 2005	E70T-6 H16
ASME SFA-A5.20:	E70T-6 H16
ABS:	2YSA, E70T-6 H16
DNV Grade:	II YMS
DB:	EN 758 T42 O W N 3
TUV:	EN 758 T42 O W N 3
FEMA 353:	3/32 in (2.4 mm) only
AWS D1.8:	3/32 in (2.4 mm) only

Note

- ▶ FEMA 353 and AWS D1.8 structural steel seismic supplement test data can be found on this product at www.lincolnelectric.com.

DIAMETERS / PACKAGING

Diameter in (mm)	25 lb (11.3 kg) Steel Spool	25 lb (11.3 kg) Plastic Spool (Vacuum Sealed Foil Bag)	50 lb (22.6 kg) Coil	50 lb (22.6 kg) Plastic Spool (Vacuum Sealed Foil Bag)
5/64 (2.0) 3/32 (2.4)	ED030648	ED030971	ED012593	ED030005

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-305

(AWS E70T-6)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Hardness Rockwell B	Charpy V-Notch J (ft•lbf) @ -29°C (-20°F)
Requirements AWS E70T-6	400 (58) min.	480 - 655 (70 - 95)	22 min.	–	27 (20) min.
Typical Performance⁽³⁾ As-Welded	465 - 535 (68 - 77)	565 - 620 (82 - 90)	24 - 28	88 - 93	27 - 41 (20 - 30)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	%C	%Mn	%Si	%S	%P	%Al
Requirements AWS E70T-6	0.30 max.	1.75 max.	0.60 max.	0.03 max.	0.03 max.	1.8 max.
Typical Performance⁽³⁾	0.06 - 0.09	1.08 - 1.57	0.20 - 0.27	≤0.01	≤0.01	0.9 - 1.1

TYPICAL OPERATING PROCEDURES

Diameter, Polarity	CTWD mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)
5/64 in (2.0 mm) DC+	35-51 (1 3/8-2)	4.4 (175)	21-23	295	8.5 (10.5)	4.0 (8.8)	84
		5.6 (220)	22-24	345	6.0 (13.3)	5.0 (11.1)	83
		6.6 (260)	23-25	385	7.1 (15.7)	5.9 (13.1)	83
		7.1 (280)	24-26	404	7.7 (16.9)	6.4 (14.2)	84
		7.6 (300)	25-27	420	8.2 (18.1)	6.9 (15.2)	84
		8.3 (325)	25-27	435	8.9 (19.7)	7.4 (16.4)	83
3/32 in (2.4 mm) DC+	41-54 (1 5/8-2 1/4) ⁽⁴⁾	4.1 (160)	21-23	330	6.0 (13.3)	5.0 (11.0)	82
		6.1 (240)	24-26	425	9.1 (20.0)	7.6 (16.7)	83
		7.6 (300)	27-29	475	11.3 (25.0)	9.5 (21.0)	84
		10.2 (400)	33-35	525	15.2 (33.4)	12.7 (28.0)	83

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾Use CTWD of 2 1/4 in (64 mm) for wire feed speeds greater than 300 ipm.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-311

Mild Steel, Flat & Horizontal
AWS E70T-7

Key Features

- ▶ High deposition rates and fast travel speeds
- ▶ Easy slag removal
- ▶ Optimal toe wash-in
- ▶ Deep penetration
- ▶ High resistance to cracking

Welding Positions

Flat & Horizontal

Conformances

AWS A5.20/A5.20M: 2005	E70T-7
ASME SFA-A5.20:	E70T-7
ABS:	E70T-7
CWB/CSA W48-06:	E492T-7

Typical Applications

- ▶ Recommended for fillet, lap and butt welds on 3.2 mm (1/8 in) and thicker steel, including some low alloy steels
- ▶ Horizontal butt welds, such as column-to-column structural connections
- ▶ General fabrication
- ▶ Assembly welding

DIAMETERS / PACKAGING

Diameter in (mm)	14 lb (6.4 kg) Coil 56 lb (25.4 kg) Carton	25 lb (11.3 kg) Steel Spool	50 lb (22.6 kg) Coil	600 lb (272.2 kg) Speed-Feed® Reel	600 lb (272.2 kg) Speed-Feed® Drum
5/64 (2.0)	ED014464	ED030649	ED014459	ED012633	ED012628
3/32 (2.4)			ED012629		
7/64 (2.8)			ED012632		

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-311

(AWS E70T-7)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Hardness Rockwell B
Requirements AWS E70T-7	400 (58) min.	480 - 655 (70 - 95)	22 min.	–
Typical Performance⁽³⁾ As-Welded	420 - 475 (61 - 69)	600 - 645 (87 - 93)	23 - 26	88 - 92

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	%C	%Mn	%Si	%S	%P	%Al
Requirements AWS E70T-7	0.30 max.	1.75 max.	0.60 max.	0.03 max.	0.03 max.	1.8 max.
Typical Performance⁽³⁾	0.25 - 0.29	0.44 - 0.51	0.09 - 0.12	≤0.01	≤0.01	1.4 - 1.7

TYPICAL OPERATING PROCEDURES

Diameter, Polarity	CTWD mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)
5/64 in (2.0 mm) DC-	38 (1 1/2)	2.5 (100)	20-23	190	2.9 (6.4)	2.3 (5.0)	78
		4.1 (160)	24-28	275	4.7 (10.3)	3.6 (8.0)	78
		6.1 (240)	25-29	355	7.0 (15.4)	5.6 (12.4)	80
		7.6 (300)	27-31	410	8.8 (19.3)	7.2 (15.8)	82
3/32 in (2.4 mm) DC-	45 (1 3/4)	1.9 (75)	20-23	200	3.2 (7.0)	2.5 (5.4)	77
		3.4 (135)	23-26	300	5.9 (13.1)	4.6 (10.2)	78
		3.8 (150)	24-27	325	6.6 (14.6)	5.2 (11.4)	78
		5.3 (210)	26-28	400	9.3 (20.4)	7.5 (16.5)	81
6.9 (270)	28-30	450	11.9 (26.2)	10.0 (22.0)	84		
7/64 in (2.8 mm) DC-	45 (1 3/4)	2.5 (100)	23-26	325	5.4 (12.0)	4.5 (10.0)	83
		3.7 (145)	25-27	400	8.1 (17.8)	6.6 (14.5)	82
		4.4 (175)	26-28	450	9.8 (21.5)	8.2 (18.0)	83
		6.1 (240)	30-32	550	13.4 (29.5)	11.6 (25.5)	86
7.6 (300)	32-34	625	16.7 (36.9)	15.0 (33.0)	89		

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-131

Mild Steel, Flat & Horizontal
AWS E70T-10

Key Features

- ▶ Fast travel speeds and high deposition rates
- ▶ Maximum penetration
- ▶ Flat bead profile on butt welds
- ▶ Join dissimilar plate thicknesses with even heat distribution

Welding Positions

Flat & Horizontal

Conformances

AWS A5.20/A5.20M: 2005 E70T-10
ASME SFA-A5.20 E70T-10

Typical Applications

- ▶ Single pass welding on up to 2.8 mm (0.110 in) thicknesses
- ▶ Sheet metal
- ▶ Automotive

Warning

- ▶ NR-131 is NOT recommended for welding multiple passes.

DIAMETERS / PACKAGING

Diameter in (mm)	600 lb (272.2 kg) Speed-Feed® Reel
3/32 (2.4)	ED012163

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-131

(AWS E70T-10)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	Transverse Tensile Strength MPa (ksi)	Longitudinal Bend Test	Hardness Rockwell B
Requirements AWS E70T-10	480 (70) min.	180° over 3/4 in Radius No openings exceeding 1/8 in	–
Typical Performance⁽³⁾	505 - 560 (75 - 80)	Passed	99

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	%C	%Mn	%Si	%S	%P	%Al
Requirements AWS E70T-10	Not Specified					
Typical Performance⁽³⁾	0.22 - 0.26	0.42 - 0.65	0.20 - 0.27	0.005 - 0.007	0.007 - 0.02	1.18 - 1.49

TYPICAL OPERATING PROCEDURES

Diameter, Polarity	CTWD mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)
3/32 in (2.4 mm) Single Arc, DC-	38 (1-1/2)	3.8 (150)	25-26	390	6.5 (14.3)	5.3 (11.6)	81
		5.1 (200)	25-27	490	8.6 (19.0)	7.1 (15.6)	82
		6.4 (250)	26-27	570	10.8 (23.7)	8.9 (19.6)	82
		8.9 (350)	26-28	720	15.0 (33.1)	33.6 (27.6)	83
		10.8 (425)	27-28	810	18.2 (40.1)	15.2 (33.6)	83
3/32 in (2.4 mm) Twinarc, DC-	44 (1-3/4)	3.3 (130)	25-26	550	11.1 (24.5)	8.1 (17.9)	72
		4.4 (175)	26-27	740	15.0 (33.0)	12.0 (26.4)	79
		5.7 (225)	26-28	910	19.3 (42.5)	15.8 (34.8)	81
		7.0 (275)	27-29	1030	23.5 (51.9)	19.1 (42.0)	80
		8.3 (325)	28-30	1090	27.9 (61.4)	21.9 (48.2)	78

⁽¹⁾Typical all weld metal. ⁽²⁾See test results disclaimer on pg. 9.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-152

Mild Steel, All Position

AWS E71T-14

Key Features

- ▶ Designed for high speed welding of specially coated steels
- ▶ Soft, consistent arc
- ▶ Porosity resistant
- ▶ Excellent overlapping capabilities
- ▶ Ideal for robotic applications

Typical Applications

- ▶ Single pass welding on thicknesses from 0.8 mm - 4.8 mm (0.030 in - 3/16 in)
- ▶ Spot or short intermittent welds
- ▶ Continuous welding on galvanized or zinc coated carbon steel
- ▶ Automotive
- ▶ Transportation

Welding Positions

All

Conformances

AWS A5.20/A5.20M: 2005 E71T-14
ASME SFA-A5.20 E71T-14

Warning

NR-152 is NOT recommended for welding multiple passes.

Maximum Plate Thickness

Diameter in (mm)	Maximum Plate Thickness in (mm)
1/16 (1.6)	3/16 (4.8)
0.068 (1.7)	3/16 (4.8)

Note

- ▶ The preferred drag angle is 15°, however, NR-152 is capable of welding at zero drag angle, facilitating easy fixturing in automatic applications.

DIAMETERS / PACKAGING

Diameter in (mm)	50 lb (23 kg) Coil	500 lb (227 kg) Speed-Feed® Reel
1/16 (1.6) 0.068 (1.7)	ED012185 ED012186	ED024301

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-152

(AWS E71T-14)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	Transverse Tensile Strength MPa (ksi)	Longitudinal Bend Test	Hardness Rockwell B
Requirements AWS E71T-14	480 (70) min.	180° over 3/4 in Radius No openings exceeding 1/8 in	–
Typical Performance⁽²⁾	480 - 550 (70 - 80)	Passed	93

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	%C	%Mn	%Si	%S	%P	%Al
Requirements AWS E71T-14	Not Specified					
Typical Performance⁽²⁾	0.25 - 0.30	0.83 - 1.04	0.20 - 0.23	0.006 - 0.01	0.005 - 0.02	1.08 - 1.38

TYPICAL OPERATING PROCEDURES

Diameter, Polarity	CTWD mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)
1/16 in (1.6 mm) DC-	16 (5/8)	0.8 (30)	13-14	90	0.5 (1.3)	0.5 (1.2)	92
		1.0 (40)	14-15	115	0.8 (1.8)	0.7 (1.6)	88
		1.3 (50)	15-16	140	0.9 (2.2)	0.9 (2.0)	90
		1.8 (70)	16-17	185	1.4 (3.1)	1.3 (2.8)	90
		2.8 (110)	19-20	265	2.1 (4.8)	2.0 (4.4)	91
0.068 in (1.7 mm) Twinarc, DC-	19 (3/4)	0.8 (30)	13-14	68	0.7 (1.6)	0.6 (1.4)	87
		1.0 (40)	13-14	95	0.9 (2.2)	0.9 (1.9)	86
		1.3 (50)	14-15	120	1.2 (2.7)	1.1 (2.4)	88
		1.5 (60)	15-16	145	1.4 (3.3)	1.3 (2.9)	87
		2.0 (80)	16-17	190	1.9 (4.4)	1.8 (3.9)	88
2.8 (110)	20-21	240	2.7 (6.0)	2.4 (5.4)	90		

⁽¹⁾Typical all weld metal. ⁽²⁾See test results disclaimer on pg. 9.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-211-MP

Mild Steel, All Position
AWS E71T-11

Key Features

- ▶ Versatile welding capability on a variety of base materials
- ▶ High operator appeal and good bead appearance
- ▶ Easy slag removal
- ▶ Fast freezing characteristics accommodate poor fit-up

Typical Applications

- ▶ Plate thicknesses in the range of 7.9 mm (5/16 in) to 12.7 mm (1/2 in)
- ▶ Applications with copper back-up
- ▶ Sheet or thin gauge metal
- ▶ Propane cylinders
- ▶ Robotics/hard automation

Welding Positions

All, except 3/32 in (2.4 mm) diameter

Conformances

AWS A5.20/A5.20M: 2005	E71T-11
ASME SFA-A5.20:	E71T-11
ABS:	E71T-11*
CWB/CSA W48-06:	E491T-11-H16
DB:	EN 758 T42 Z S N 1
TUV:	EN 758 T42 Z S N 1

*Except 0.030 in (0.8 mm) and 0.035 in (0.9 mm) diameters

Maximum Plate Thickness

Diameter in (mm)	Maximum Plate Thickness in (mm)
0.030 (0.8)	5/16 (7.9)
0.035 (0.9)	5/16 (7.9)
0.045 (1.1)	5/16 (7.9)
0.068 (1.7)	1/2 (12.7)
5/64 (2.0)	1/2 (12.7)
3/32 (2.4)	1/2 (12.7)

DIAMETERS / PACKAGING

Diameter in (mm)	1 lb (0.5 kg) Plastic Spool 5 lb (2.3 kg) Carton	1 lb (0.5 kg) Plastic Spool 10 lb (4.5 kg) Carton	10 lb (4.5 kg) Plastic Spool	14 lb (6.4 kg) Coil 56 lb (25.4 kg) Carton	25 lb (11.3 kg) Steel Spool	50 lb (22.6 kg) Coil
0.030 (0.8)	ED031448	ED027641	ED033130 ED016354 ED016363	ED012506 ED012508	ED030637 ED030638 ED030641 ED030645	ED012507 ED012509 ED013869
0.035 (0.9)						
0.045 (1.1)						
0.068 (1.7)						
5/64 (2.0)						
3/32 (2.4)						

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-211-MP

(AWS E71T-11)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Hardness Rockwell B
Requirements AWS E71T-11	400 (58) min.	480 - 655 (70 - 95)	20 min.	–
Typical Performance⁽³⁾	435 - 475 (63 - 69)	605 - 645 (88 - 94)	22 - 25	89 - 92

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	%C	%Mn	%Si	%S	%P	%Al
Requirements AWS E71T-11	0.30 max.	1.75 max.	0.60 max.	0.03 max.	0.03 max.	1.8 max.
Typical Performance⁽³⁾	0.23 - 0.26	0.57 - 0.66	0.17 - 0.26	≤0.01	≤0.01	1.3 - 1.6

TYPICAL OPERATING PROCEDURES

Diameter, Polarity	CTWD mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)
0.030 in (0.8 mm) DC-	13 (1/2)	1.3 (50)	13-14	30	0.2 (0.5)	0.2 (0.4)	81
		2.5 (100)	13-14	60	0.5 (1.1)	0.4 (0.8)	75
		3.8 (150)	14-15	80	0.7 (1.6)	0.6 (1.2)	78
		5.1 (200)	14-15	100	1.0 (2.1)	0.8 (1.7)	81
		6.4 (250)	15-16	130	1.2 (2.6)	1.0 (2.1)	80
		7.6 (300)	18-19	140	1.4 (3.2)	1.2 (2.6)	81
0.035 in (0.9 mm) DC-	13-16 (1/2-5/8)	1.3 (50)	14-15	30	0.4 (0.8)	0.3 (0.7)	81
		1.8 (70)	15-16	60	0.5 (1.2)	0.5 (1.0)	83
		2.8 (110)	16-17	115	0.7 (1.6)	0.6 (1.3)	78
		3.8 (150)	17-18	130	1.0 (2.2)	0.8 (1.7)	78
		5.1 (200)	18-19	155	1.4 (3.0)	1.1 (2.5)	84
		7.0 (275)	20-21	155	2.0 (4.4)	1.5 (3.4)	78
0.045 in (1.1 mm) DC-	16 (5/8)	1.8 (70)	15-16	120	0.7 (1.6)	0.5 (1.1)	69
		2.3 (90)	16-17	140	1.0 (2.2)	0.8 (1.7)	77
		2.8 (110)	17-18	160	1.2 (2.7)	1.0 (2.3)	85
		3.3 (130)	18-19	170	1.5 (3.2)	1.2 (2.7)	84
0.068 in (1.7 mm) DC-	19-32 (3/4-1 1/4)	1.0 (40)	15-16	125	1.0 (2.1)	0.8 (1.7)	81
		1.9 (75)	18-19	190	1.8 (4.0)	1.5 (3.4)	85
		3.3 (130)	20-21	270	3.2 (7.0)	2.8 (6.1)	88
		4.4 (175)	23-24	300	4.3 (9.4)	3.8 (8.4)	89
5/64 in (2.0 mm) DC-	19-32 (3/4-1 1/4)	1.3 (50)	16-17	180	1.6 (3.5)	1.3 (2.9)	83
		1.9 (75)	18-19	235	2.4 (5.3)	2.0 (4.5)	85
		3.0 (120)	20-21	290	3.8 (8.4)	3.4 (7.4)	88
		4.1 (160)	22-23	325	5.1 (11.2)	4.5 (10.0)	89
3/32 in (2.4 mm) DC-	19-32 (3/4-1 1/4)	1.3 (50)	16-17	245	2.3 (5.0)	1.9 (4.2)	84
		1.9 (75)	19-20	305	3.4 (7.5)	2.9 (6.4)	85
		2.5 (100)	20-21	365	4.5 (10.0)	3.9 (8.7)	87
		3.3 (130)	22-23	400	5.9 (12.9)	5.1 (11.3)	88

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-203MP

Mild Steel, All Position

AWS E71T-8-J

Key Features

- ▶ Designed to handle poor fit-up on heavy wall tubes and gaps up to 9.5 mm (3/8 in) with 6.4 mm (1/4 in) offset
- ▶ Fast freezing slag with excellent wash-in
- ▶ Root bead capability without back-up bars

Typical Applications

- ▶ General plate fabrication, including bridge fabrication, hull plate and stiffener welding on ships and barges
- ▶ Storage tanks
- ▶ Structural welding
- ▶ Offshore welding in TKY joints

Welding Positions

All

Conformances

AWS A5.20/A5.20M: 2005	E71T-8-JH16
ASME SFA-A5.20:	E71T-8-JH16
ABS:	3YSA
Lloyd's Register:	3YS H15
DNV Grade:	III YMS H10
GL:	3YH15S
BV Grade:	SA3YMH
CWB/CSA W48-06:	E491T-8 H16

DIAMETERS / PACKAGING

Diameter in (mm)	14 lb (6.4 kg) Coil 56 lb (25.4 kg) Carton	25 lb (11.3 kg) Steel Spool
0.068 (1.7) 5/64 (2.0)	ED021604	ED030640

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-203MP

(AWS E71T-8-J)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Hardness Rockwell B	Charpy V-Notch J (ft•lbf)	
					@ -29°C (-20°F)	@ -40°C (-40°F)
Requirements AWS E71T-8-J	400 (58) min.	480 - 655 (70 - 95)	22 min.	–	Not Specified	27 (20) min.
Typical Performance⁽³⁾	415 - 440 (60 - 64)	510 - 545 (74 - 79)	29 - 33	82 - 87	75 - 203 (55 - 150)	68 - 224 (50 - 165)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	%C	%Mn	%Si	%S	%P	%Al
Requirements AWS E71T-8-J	0.30 max.	1.75 max.	0.60 max.	0.03 max.	0.03 max.	1.8 max.
Typical Performance⁽³⁾	0.04 - 0.07	1.35 - 1.47	0.22 - 0.32	≤0.01	≤0.01	0.8 - 1.0

TYPICAL OPERATING PROCEDURES

Diameter, Polarity	CTWD mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)
0.068 in (1.7 mm) DC-	25 (1)	1.8 (70)	16-17	145	1.5 (3.3)	1.0 (2.3)	69
		2.3 (90)	18-19	180	1.9 (4.2)	1.5 (3.2)	76
		3.0 (120)	20-21	225	2.5 (5.6)	2.0 (4.3)	76
		3.5 (140)	21-22	255	2.9 (6.4)	2.2 (4.8)	75
		3.8 (150)	23-24	265	3.1 (6.8)	2.3 (5.1)	75
5/64 in (2.0 mm) DC-	25 (1)	1.3 (50)	16-17	130	1.4 (3.1)	0.9 (1.9)	61
		1.8 (70)	18-19	180	2.0 (4.3)	1.3 (2.9)	67
		2.3 (90)	19-20	220	2.5 (5.6)	1.9 (4.2)	75
		2.8 (110)	20-21	260	3.1 (6.8)	2.4 (5.3)	77
		3.0 (120)	21-22	280	3.4 (7.4)	2.7 (5.9)	79
3.5 (140)	22-23	310	3.9 (8.7)	3.1 (6.8)	79		

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-232

Mild Steel, All Position

AWS E71T-8



Key Features

- ▶ High deposition rates for out-of-position welding
- ▶ Penetrating arc
- ▶ Fast freezing, easy to remove slag system
- ▶ Meets AWS D.18 seismic lot waiver requirements

Typical Applications

- ▶ Structural fabrication, including those subject to seismic requirements
- ▶ General plate fabrication
- ▶ Hull plate and stiffener welding on ships and barges
- ▶ Machinery parts, tanks, hoppers, racks and scaffolding

Welding Positions

All

Conformances

AWS A5.20/A5.20M: 2005	E71T-8-H16
ASME SFA-A5.20:	E71T-8-H16
ABS:	3YSA
Lloyd's Register:	3YS H15
DNV Grade:	III YMS H15
GL:	3YH10S
BV Grade:	SA3YMH
CWB/CSA W48-06:	E491T-8 H16
DB:	EN 758 T42 3 Y N 2
TUV:	EN 758 T42 3 Y N 2
MIL-E-24403/1:*	MIL-71T-8AS
FEMA 353	
AWS D1.8	

*Military Grade Classification of MIL-71T-8AS for 0.068 in (1.7 mm) and 0.072 in (1.8 mm) diameters only.

Note

- ▶ FEMA 353 and AWS D1.8 structural steel seismic supplement test data can be found on this product at www.lincolnelectric.com.

DIAMETERS / PACKAGING

Diameter in (mm)	13.5 lb (6.1 kg) Coil		25 lb (11.3 kg) Steel Spool	25 lb (11.3 kg)	
	13.5 lb (6.1 kg) Coil	54 lb (24.5 kg)		Plastic Spool (Vacuum Sealed Foil Bag)	50 lb (22.6 kg) Coil
0.068 (1.7)	ED012518	ED030232	ED030643	ED030949	ED012519
0.072 (1.8)	ED012522		ED030644		ED012523
5/64 (2.0)	ED012525		ED030647		ED012526

Innershield® NR-232

(AWS E71T-8)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Hardness Rockwell B	Charpy V-Notch J (ft•lbf) @ -29°C (-20°F)
Requirements AWS E71T-8	400 (58) min.	480 - 655 (70 - 95)	22 min.	–	27 (20) min.
Typical Performance⁽³⁾ As-Welded	460 - 520 (66 - 75)	575 - 615 (83 - 89)	25 - 31	87 - 90	47 - 75 (35 - 55)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	%C	%Mn	%Si	%S	%P	%Al
Requirements AWS E71T-8	0.30 max.	1.75 max.	0.60 max.	0.03 max.	0.03 max.	1.8 max.
Typical Performance⁽³⁾	0.16 - 0.18	0.61 - 0.72	0.26 - 0.33	≤0.01	≤0.01	0.5 - 0.8

TYPICAL OPERATING PROCEDURES

Diameter, Polarity	CTWD ⁽⁶⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage ⁽⁷⁾ (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)
0.068 in (1.7 mm) DC-	19-32 (3/4-1 1/4)	2.8 (110)	18-19	195	2.3 (5.0)	1.8 (3.9)	78
		3.3 (130)	19-21	225	2.8 (6.2)	2.0 (4.6)	74
		3.8 (150)	19-21	250	3.2 (7.1)	2.4 (5.3)	75
		4.3 (170)	20-22	270	3.5 (7.8)	2.8 (6.1)	78
		5.0 (195)	23-24	300	4.3 (9.4)	3.2 (7.0)	74
		6.4 (250)	23-24	350	5.4 (11.8)	4.0 (9.0)	76
		7.4 (320)	25-27	400	6.9 (15.2)	5.2 (11.4)	75
0.072 in (1.8 mm) DC-	19-32 (3/4-1 1/4)	2.0 (80)	16-18	130	1.8 (4.0)	1.5 (3.3)	83
		3.5 (140)	18-21	225	3.1 (6.8)	2.5 (5.5)	81
		3.9 (155)	19-22	240	3.3 (7.2)	2.7 (6.0)	83
		4.3 (170)	20-23	255	3.6 (8.0)	2.9 (6.5)	81
		6.4 (250)	22-24	315	5.3 (11.7)	4.3 (9.6)	82
7.4 (290)	23-25	350	6.2 (13.6)	5.0 (11.0)	81		
5/64 in (2.0 mm) DC-	19-32 (3/4-1 1/4)	1.5 (60)	16-17	145	1.7 (3.7)	1.2 (2.7)	73
		2.9 (115)	19-20	260	3.2 (7.0)	2.5 (5.5)	78
		3.0 (120)	19-20	270	3.3 (7.3)	2.6 (5.7)	78
		3.3 (130)	20-21	285	3.5 (7.8)	2.8 (6.2)	79
		4.6 (180)	22-23	365	5.0 (10.9)	3.9 (8.7)	80

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-233

Mild Steel, All Position

AWS E71T-8



Key Features

- ▶ High deposition rates for out-of-position welding
- ▶ Welder-friendly, easy to use and great bead appearance
- ▶ Minimal gas marking
- ▶ Meets AWS D.18 seismic lot waiver requirements

Typical Applications

- ▶ Structural fabrication, including those subject to seismic requirements
- ▶ General plate fabrication
- ▶ Ship and barge fabrication
- ▶ Vertical up and overhead fillets and groove welds

Welding Positions

All

Conformances

AWS A5.20/A5.20M: 2005 E71T-8-H16
 ASME SFA-A5.20: E71T-8-H16
 ABS: E71T-8-H16
 FEMA 353
 AWS D1.8

Notes

- ▶ Innershield® K126 Gun Assembly requires one of the following gun tube assemblies for better wire feeding - KP2454-1 (62°, 7.5 in), KP2455-1 (45°, 6 in), KP2456-1 (30°, 12 in)
- ▶ FEMA 353 and AWS D1.8 structural steel seismic supplement test data can be found on this product at www.lincolnelectric.com.

DIAMETERS / PACKAGING

Diameter in (mm)	12.5 lb (5.7 kg) Plastic Spool 50 lb (22.6 kg) Carton	25 lb (11.3 kg) Plastic Spool	25 lb (11.3 kg) Plastic Spool (Vacuum Sealed Foil Bag)
1/16 (1.6)	ED030933	ED030934	ED031576
0.072 (1.8)		ED031030	
5/64 (2.0)		ED033039	ED033024

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-233

(AWS E71T-8)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Hardness Rockwell B	Charpy V-Notch J (ft•lbf) @ -29°C (-20°F)
Requirements AWS E71T-8	400 (58) min.	480 - 655 (70 - 95)	22 min.	–	27 (20) min.
Typical Performance⁽³⁾ As-Welded	435 - 455 (63 - 66)	575 - 595 (83 - 86)	26 - 29	87 - 89	34 - 54 (25 - 40)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	%C	%Mn	%Si	%S	%P	%Al
Requirements AWS E71T-8	0.30 max.	1.75 max.	0.60 max.	0.03 max.	0.03 max.	1.8 max.
Typical Performance⁽³⁾	0.15 - 0.20	0.61 - 0.65	0.17 - 0.21	≤0.03	≤0.01	0.5 - 0.6

TYPICAL OPERATING PROCEDURES

Diameter, Polarity	CTWD ⁽⁴⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage ⁽⁵⁾ (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)
1/16 in (1.6 mm) DC-	25 (1)	3.8 (150)	17-19	220	2.4 (5.3)	1.9 (4.2)	80
		5.1 (200)	19-21	245	3.2 (7.1)	2.5 (5.4)	76
		6.4 (250)	21-23	270	4.0 (8.9)	3.0 (6.6)	74
		7.6 (300)	23-25	295	4.7 (10.4)	3.5 (7.7)	75
		8.9 (350)	25-27	315	5.6 (12.3)	4.3 (9.4)	77
0.072 in (1.8 mm) DC-	19-25 (3/4-1) ⁽⁴⁾	2.5 (100)	17-18	184	2.0 (4.5)	1.6 (3.6)	80
		3.8 (150)	18-19	250	3.1 (6.7)	2.5 (5.4)	80
		5.1 (200)	20-21	295	4.0 (8.9)	3.2 (7.1)	81
		6.4 (250)	22-23	330	5.1 (11.2)	4.0 (8.9)	79
		7.6 (300)	23-24	355	6.1 (13.4)	4.8 (10.6)	79
5/64 in (2.0 mm) DC-	19-25 (3/4-1) ⁽⁴⁾	2.3 (90)	18-19	210	2.2 (4.9)	1.8 (4.1)	82
		3.2 (125)	19-20	260	3.2 (7.0)	2.6 (5.6)	81
		3.8 (150)	20-21	300	3.8 (8.4)	3.0 (6.7)	80
		5.1 (200)	21-22	340	5.1 (11.2)	4.1 (9.0)	81
		6.1 (240)	22-23	380	6.1 (13.3)	4.9 (10.8)	81

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer below. ⁽⁴⁾CTWD for 0.072 in. (1.8 mm) and 5/64 in. (2.0 mm) for 200 ipm or greater is 1 in (25 mm).
NOTE: For horizontal welding, subtract 1 volt. NOTE: FEMA and AWS D1.8 structural steel seismic supplement test data can be found on this product at www.lincolnelectric.com/d1.8.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-311 Ni

Low Alloy, Flat & Horizontal

AWS E70T7-K2, E80TG-K2



Key Features

- ▶ Designed to provide a nominal 1.5% nickel weld deposit
- ▶ High deposition rates and fast travel speeds
- ▶ Capable of producing weld deposits with impact properties exceeding 27 J (20 ft•lbf) at -29°C (-20°F)
- ▶ Color match on weathering steel applications
- ▶ 3/32 in (2.4 mm) diameter meets FEMA 353 and AWS D.18 seismic lot waiver requirements

Typical Applications

- ▶ Fillet and lap welds
- ▶ Horizontal and square edge butt welds, such as column-to-column structural connections
- ▶ Deep groove welds
- ▶ Structural fabrication
- ▶ Weathering steels

Welding Positions

Flat & Horizontal

Conformances

AWS A5.29/A5.29M: 2005 & ASME SFA-A5.29:	E70T7-K2-H16, E80TG-K2
ABS:	2YSA
Lloyd's Register:	2YS
DNV Grade:	II YMS
GL:	2YS
BV Grade:	SA2YM
DB:	EN 758 T42 2 1, 5Ni W N 5
FEMA 353:	3/32 in (2.4 mm) only
AWS D1.8:	3/32 in (2.4 mm) only

Note

- ▶ FEMA and AWS D1.8 structural steel seismic supplement test data can be found on this product at www.lincolnelectric.com.

DIAMETERS / PACKAGING

Diameter in (mm)	25 lb (11.3 kg) Steel Spool	50 lb (22.6 kg) Coil	50 lb (22.6 kg) Coil (Vacuum Sealed Foil Bag)
5/64 (2.0)	ED030650	ED017822 ED017824	ED032530
3/32 (2.4)			
7/64 (2.8)			

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-311 Ni

(AWS E70T7-K2, E80TG-K2)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Hardness Rockwell B	Charpy V-Notch J (ft•lbf) @ -29°C (-20°F)
Requirements					
AWS E70T7-K2	400 (58) min.	480 - 620 (70 - 90)	20 min.	–	27 (20) min.
AWS E80TG-K2	470 (68) min.	550 - 690 (80 - 100)	19 min.		Not Specified
Typical Performance⁽³⁾					
As-Welded	470 - 515 (68 - 75)	575 - 615 (83 - 89)	27 - 30	88 - 93	41 - 87 (30 - 65)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	%C	%Mn	%Si	%S	%P
Requirements					
AWS E70T7-K2 / E80TG-K2	0.15 max.	0.50 - 1.75	0.80 max.	0.030 max.	0.030 max.
Typical Performance⁽³⁾	0.06 - 0.08	1.25 - 1.40	0.18 - 0.22	≤0.003	0.005 - 0.008
	%Ni	%Cr	%Mo	%V	%Al
Requirements					
AWS E70T7-K2 / E80TG-K2	1.00 - 2.00	0.15 max.	0.35 max.	0.05 max.	1.8 max.
Typical Performance⁽³⁾	1.29 - 1.56	0.03 - 0.04	≤0.03	–	1.0 - 1.3

TYPICAL OPERATING PROCEDURES

Diameter, Polarity	CTWD mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)
5/64 in (2.0 mm) DC-	32 (1 1/4)	2.5 (100)	21-23	170	2.5 (5.5)	1.8 (3.9)	70
		3.3 (130)	24-26	205	3.3 (7.2)	2.4 (5.2)	72
		4.1 (160)	25-27	235	4.0 (8.8)	2.9 (6.5)	73
		5.1 (200)	26-28	270	5.0 (11.0)	3.8 (8.3)	75
		6.1 (240)	27-29	295	6.1 (13.3)	4.5 (10.0)	75
3/32 in (2.4 mm) DC-	38 (1 1/2)	1.9 (75)	20-22	200	2.8 (6.2)	1.9 (4.2)	67
		2.5 (100)	21-23	245	3.8 (8.3)	2.7 (5.9)	71
		3.1 (125)	23-25	285	4.7 (10.4)	3.4 (7.5)	72
		3.8 (150)	25-27	330	5.7 (12.5)	4.1 (9.1)	72
		4.4 (175)	26-28	365	6.6 (14.5)	4.9 (10.8)	74
5.1 (200)	27-29	390	7.6 (16.6)	5.6 (12.3)	74		
7/64 in (2.8 mm) DC-	44.5 (1 3/4)	2.5 (100)	22-24	310	5.2 (11.4)	3.8 (8.4)	73
		3.5 (140)	24-26	370	7.2 (15.8)	5.4 (11.8)	74
		4.3 (170)	26-28	430	8.9 (19.5)	6.6 (14.5)	74
		5.1 (200)	28-30	470	10.4 (22.8)	7.7 (17.0)	74
		6.1 (240)	29-31	520	12.4 (27.2)	9.2 (20.4)	75

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-212

Low Alloy, All Position
AWS E71TG-G

Key Features

- ▶ Accommodates a wide range of mild steels
- ▶ Fast freeze characteristics accommodate poor fit-up
- ▶ Smooth arc performance
- ▶ Ease of use

Welding Positions

All

Conformances

AWS A5.29/A5.29M: 2005	E71TG-G
ASME SFA-A5.29:	E71TG-G
CWB/CSA W48-06:	E491TG-G-H16 (E71TG-G H16)

Typical Applications

- ▶ Single or multiple pass welding on up to 19 mm (3/4 in) thicknesses
- ▶ Truck bodies, tanks, hoppers, racks and scaffolding
- ▶ General fabrication
- ▶ Robotics

Maximum Plate Thickness

Diameter in (mm)	Maximum Plate Thickness in (mm)
0.045 (1.1)	3/4 (19.1)
0.068 (1.7)	3/4 (19.1)
5/64 (2.0)	3/4 (19.1)

DIAMETERS / PACKAGING

Diameter in (mm)	10 lb (4.5 kg) Plastic Spool	14 lb (6.4 kg) Coil 56 lb (25.4 kg) Carton	25 lb (11.3 kg) Steel Spool	50 lb (22.6 kg) Coil
0.045 (1.1)	ED026090	ED027803 ED027794	ED030639	ED026858
0.068 (1.7)			ED030642	
5/64 (2.0)			ED030646	

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Hardness Rockwell B
Requirements AWS E71TG-G	400 (58) min.	480 - 655 (70 - 95)	20 min.	–
Typical Performance⁽³⁾	440 - 505 (64 - 74)	575 - 605 (84 - 88)	24 - 28	89 - 92

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-212

(AWS E71TG-G)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	%C	%Mn ⁽⁴⁾	%Si	%S	%P
Requirements AWS E71TG-G	Not Specified	0.50 min.	1.00 max.	0.030 max.	0.030 max.
Typical Performance⁽³⁾	0.06 - 0.11	0.84 - 1.55	0.20 - 0.33	≤0.003	0.006 - 0.009
	%Ni ⁽⁴⁾	%Cr ⁽⁴⁾	%Mo ⁽⁴⁾	%V ⁽⁴⁾	%Al
Requirements AWS E71TG-G	0.50 min.	0.30 min.	0.20 min.	0.10 min.	1.8 max.
Typical Performance⁽³⁾	1.02 - 1.15	0.02 - 0.04	≤0.02	–	1.3 - 1.6

TYPICAL OPERATING PROCEDURES

Diameter, Polarity	CTWD mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)
0.045 in (1.1 mm) DC-	16 (5/8)	1.4 (55)	14-15	75	0.5 (1.3)	0.5 (1.1)	84
		1.8 (70)	15-16	90	0.7 (1.6)	0.6 (1.4)	87
		2.3 (90)	16-17	115	1.0 (2.1)	0.8 (1.8)	85
		2.8 (110)	17-18	135	1.2 (2.6)	1.0 (2.2)	84
		3.3 (130)	18-19	155	1.4 (3.1)	1.2 (2.6)	83
		4.1 (160)	19-20	170	1.6 (3.5)	1.4 (3.0)	85
0.068 in (1.7 mm) DC-	25 (1)	1.5 (60)	16-17	145	1.4 (3.1)	1.1 (2.4)	77
		1.9 (75)	17-18	180	1.7 (3.8)	1.4 (3.2)	84
		2.3 (90)	18-19	200	2.0 (4.5)	1.7 (3.8)	84
		3.0 (120)	19-20	230	2.7 (6.0)	2.3 (5.2)	86
		3.8 (150)	20-21	255	3.3 (7.4)	2.9 (6.4)	86
		4.4 (175)	22-23	275	3.9 (8.7)	3.4 (7.5)	86
5/64 in (2.0 mm) DC-	25 (1)	1.5 (60)	16-17	200	1.7 (3.8)	1.5 (3.3)	86
		1.9 (75)	18-19	225	2.1 (4.7)	1.8 (4.1)	87
		2.3 (90)	19-20	245	2.6 (5.7)	2.3 (5.0)	87
		2.8 (110)	20-21	275	3.2 (7.1)	2.8 (6.2)	87
		3.3 (130)	21-23	300	3.7 (8.3)	3.3 (7.3)	87
		3.8 (150)	22-23	325	4.3 (9.6)	3.8 (8.4)	87

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾In order to meet the alloy AWS requirements of the G group, the weld deposit needs to have the minimum, as specified in the table, of only one of these elements.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-203 Nickel (1%)

Low Alloy, All Position

AWS E71T8-Ni1

Key Features

- ▶ Designed to produce a nickel bearing weld deposit
- ▶ Capable of producing weld deposits with impact toughness capable of exceeding 27 J (20 ft•lbf) at -29°C (-20°F)
- ▶ Color match on weathering steels
- ▶ Handles poor fit-up
- ▶ Root bead capability

Typical Applications

- ▶ Roundabout groove welds on heavy wall tubular construction
- ▶ Offshore
- ▶ Bridges and other structural components made from weathering steels
- ▶ Structural fabrication
- ▶ NACE applications

Welding Positions

All

Conformances

AWS A5.29/A5.29M: 2005	E71T8-Ni1-H16
ASME SFA-5.29:	E71T8-Ni1-H16
ABS:	3YSA
Lloyd's Register:	3YS H15
DNV Grade:	III YMS H10
CWB/CSA W48-06:	E491T8-Ni1 H16 (E71TG-G-H16)
DB:	EN 758 T42 3 1Ni Y N
TUV:	EN 758 T42 3 1Ni Y N

DIAMETERS / PACKAGING

Diameter in (mm)	14 lb (6.4 kg) Coil 56 lb (25.4 kg) Carton	50 lb (22.7 kg) Coil
5/64 (2.0)	ED012385	ED012386

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-203 Nickel (1%)

(AWS E71T8-Ni1)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Hardness Rockwell B	Charpy V-Notch J (ft•lbf) @ -29°C (-20°F)
Requirements AWS E71T8-Ni1	400 (58) min.	480 - 620 (70 - 90)	20 min.	–	27 (20) min.
Typical Performance⁽³⁾ As-Welded	450 - 480 (65 - 70)	545 - 575 (79 - 83)	27 - 32	86 - 90	81 - 156 (60 - 115)

CHEMICAL COMPOSITION⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	%C	%Mn	%Si	%S	%P
Requirements AWS E71T8-Ni1	0.12 max.	1.50 max.	0.80 max.	0.030 max.	0.030 max.
Typical Performance⁽³⁾	0.05 - 0.07	1.10 - 1.22	0.30 - 0.33	≤0.010	0.005 - 0.008

	%Ni	%Cr	%Mo	%V	%Al
Requirements AWS E71T8-Ni1	0.80 - 1.10	0.15 max.	0.35 max.	0.05 max.	1.8 min.
Typical Performance⁽³⁾	0.89 - 1.05	0.02 - 0.03	0.01 - 0.02	≤0.01	0.8 - 1.0

TYPICAL OPERATING PROCEDURES

Diameter, Polarity	CTWD mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)
5/64 in (2.0 mm) DC-	25 (1)	1.3 (50)	16-17	145	1.4 (3.0)	1.0 (2.3)	76
		1.8 (70)	18-19	195	2.0 (4.3)	1.5 (3.3)	76
		2.3 (90)	19-20	240	2.5 (5.5)	2.0 (4.3)	78
		2.8 (110)	20-21	275	3.0 (6.7)	2.4 (5.3)	79
		3.0 (120)	21-22	290	3.3 (7.3)	2.6 (5.8)	79
		3.5 (140)	22-23	310	3.9 (8.5)	3.0 (6.9)	81

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-207

Low Alloy, All Position

AWS E71T8-K6

Key Features

- ▶ Vertical down hot, fill and cap passes on standard cross-country pipelines and arctic grade pipe
- ▶ Recommended for API grades X42 up to undermatching X70
- ▶ High deposition rates

Typical Applications

- ▶ Standard cross-country pipelines
- ▶ Arctic grade pipe up to undermatched X70

Welding Positions

All

Conformances

AWS A5.29/A5.29M: 2005	E71T8-K6-H16
ASME SFA-A5.29:	E71T8-K6-H16
ABS:	E71T-8-K6
DNV Grade:	III YMS H15
GL:	3YH15S
BV Grade:	SA3YMH

DIAMETERS / PACKAGING

Diameter in (mm)	14 lb (6.4 kg) Coil
	56 lb (25.4 kg) Hermetically Sealed Pail
0.068 (1.7)	ED016312
5/64 (2.0)	ED012438

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-207

(AWS E71T8-K6)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Hardness Rockwell B	Charpy V-Notch J (ft•lbf) @ -29°C (-20°F)
Requirements⁽⁴⁾ AWS E71T8-K6	400 (58) min.	480 - 620 (70 - 90)	20 min.	–	27 (20) min.
Typical Performance⁽³⁾	415 - 445 (60 - 64)	520 - 545 (75 - 79)	29 - 33	84 - 87	81 - 237 (60 - 175)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	%C	%Mn	%Si	%S	%P
Requirements AWS E71T8-K6	0.15 max.	0.50 - 1.50	0.80 max.	0.030 max.	0.030 max.
Typical Performance⁽³⁾	0.05 - 0.07	0.87 - 0.96	0.23 - 0.27	≤0.003	0.004 - 0.008
	%Ni	%Cr	%Mo	%V	%Al
Requirements AWS E71T8-K6	0.40 - 1.00	0.20 max.	0.15 max.	0.05 max.	1.8 max.
Typical Performance⁽³⁾	0.73 - 0.83	0.02 - 0.03	0.02 - 0.03	≤0.01	0.9 - 1.1

TYPICAL OPERATING PROCEDURES

Diameter, Polarity	CTWD mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)
0.068 in (1.7 mm) DC-	25 (1)	2.0 (80)	17-18	190	1.7 (3.8)	1.3 (3.0)	79
		2.6 (105)	18-19	230	2.2 (5.3)	1.8 (4.0)	80
		3.0 (120)	19-20	245	2.5 (5.7)	2.0 (4.5)	79
		3.5 (140)	21-22	275	3.0 (6.8)	2.4 (5.5)	81
		4.4 (175)	21-22	295	3.6 (8.0)	2.9 (6.4)	80
5/64 in (2.0 mm) DC-	25 (1)	1.7 (70)	17-18	205	2.0 (4.5)	1.5 (3.4)	76
		2.0 (80)	18-19	225	2.3 (5.1)	1.7 (3.9)	76
		2.2 (90)	18-19	240	2.6 (5.8)	2.0 (4.5)	78
		2.7 (110)	20-21	275	3.1 (7.0)	2.4 (5.5)	79
		3.3 (130)	20-21	300	3.7 (8.3)	2.9 (6.5)	78

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Pipeliners® NR-207+

Low Alloy, All Position

AWS E71T8-K6

Key Features

- ▶ Vertical down hot, fill and cap pass welding of up to X70 grade pipe
- ▶ Capable of producing weld deposits with impact toughness exceeding 27 J (20 ft•lbf) at -29°C (-20°F)
- ▶ Q2 Lot® - Certificate showing actual deposit chemistry available online
- ▶ High deposition rates
- ▶ ProTech® hermetically sealed packaging

Typical Applications

- ▶ Hot, fill and cap pass welding of up to X70 grade pipe

Welding Positions

All, except vertical up

Conformances

AWS A5.29/A5.29M: 2005 E71T8-K6
 ASME SFA-A5.29: E71T8-K6

Note

- ▶ This product contains micro-alloying elements. Additional information available upon request.

DIAMETERS / PACKAGING

Diameter in (mm)	14 lb (6.4 kg) Coil 56 lb (25.4 kg) Hermetically Sealed Pail
5/64 (2.0)	ED030924

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Pipeliner[®] NR-207+

(AWS E71T8-K6)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf) @ -29°C (-20°F)
Requirements AWS E71T8-K6	400 (58) min.	485 - 620 (70 - 90)	20 min.	27 (20) min.
Typical Performance⁽³⁾ As-Welded	425 - 470 (62 - 68)	540 - 565 (78 - 82)	29 - 31	119 - 205 (88 - 151)

DEPOSIT COMPOSITION⁽¹⁾ - As Required per AWS A5.29/A5.29M: 2005

	%C	%Mn	%Si	%P	%S
Requirements AWS E71T8-K6	0.15 max.	0.75 - 2.25	0.80 max.	0.030 max.	0.030 max.
Typical Performance⁽³⁾	0.04 - 0.06	1.18 - 1.33	0.24 - 0.28	≤ 0.01	≤ 0.01
	%Ni ⁽⁴⁾	%Cr ⁽⁴⁾	%Mo ⁽⁴⁾	%V ⁽⁴⁾	%Al ⁽⁴⁾
Requirements AWS E71T8-K6	1.25 - 2.60	0.15 max.	0.25 - 0.65	0.05 max.	8.0 max.
Typical Performance⁽³⁾	0.78 - 0.93	0.02 - 0.03	0.01 - 0.02	< 0.01	0.9 - 1.2

TYPICAL OPERATING PROCEDURES

Diameter, Polarity	CTWD ⁽⁴⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)
5/64 in (2.0 mm), DC-	19 (3/4)	1.7-3.3 (70 -130)	18-21	210-305	2.0-3.7 (4.3-8.1)

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾For electrical stickout (ESO) subtract 6.4 mm (1/4 in) from contact tip to work distance (CTWD).

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Pipelinor[®] NR-208-P

Low Alloy, All Position

AWS E81T8-G

Key Features

- ▶ Vertical down hot, fill and cap pass welding of up to X80 grade pipe
- ▶ Capable of producing weld deposits with impact toughness exceeding 83 - 133 J (61 - 98 ft•lbf) @ -29°C (-20°F)
- ▶ Q2 Lot[®] - Certificate showing actual deposit chemistry available online
- ▶ High operator appeal
- ▶ ProTech[®] hermetically sealed packaging

Typical Applications

- ▶ Hot, fill and cap pass welding of up to X80 grade pipe
- ▶ Warm weather cross country pipe welding applications

Welding Positions

All, except vertical up

Conformances

AWS A5.29/A5.29M: 2005 E81T8-G
ASME SFA-A5.29: E81T8-G

Note

- ▶ This product contains micro-alloying elements. Additional information available upon request.

DIAMETERS / PACKAGING

Diameter mm (in)	6.3 kg (14 lb) Coil 25.4 kg (56 lb) Hermetically Sealed Pail
2.0 (5/64)	ED032890

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Pipelin[®] NR-208-P

(AWS E81T8-G)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf) @ -29°C (-20°F)
Requirements AWS E81T8-G	470 (68) min.	550 - 690 (80 - 100)	21 min.	Not Specified
Typical Performance⁽³⁾ As-Welded	490 - 515 (71 - 75)	595 - 622 (86 - 90)	26 - 31	83 - 133 (61 - 98)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	%C	%Mn	%Si	%P	%S
Requirements AWS E81T8-G	Not Specified	0.50 min	1.00 max.	0.030 max.	0.030 max.
Typical Performance⁽³⁾	0.04 - 0.08	1.74 - 1.96	0.32 - 0.37	0.012 - 0.019	0.004 - 0.009
	%Ni ⁽⁴⁾	%Cr ⁽⁴⁾	%Mo ⁽⁴⁾	%V ⁽⁴⁾	%Al ⁽⁴⁾
Requirements AWS E81T8-G	0.50 min.	0.30 min.	0.20 min.	0.10 min.	1.8 max.
Typical Performance⁽³⁾	0.94 - 1.11	≤ 0.01	0.01 - 0.02	≤ 0.03	1.0 - 1.2

TYPICAL OPERATING PROCEDURES

Diameter, Polarity	CTWD ⁽⁵⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)
2.0 mm (5/64 in), DC-	19 (3/4)	1.7-3.3 (70-130)	18-21	210-305	1.6-3.0 (3.6-6.7)

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾In order to meet the alloy requirements of the "G" group, the undiluted weld metal shall have not less than the minimum of at least one of the elements listed. ⁽⁵⁾For electrical stickout (ESO) subtract 6.4 mm (1/4 in) from contact tip to work distance (CTWD).

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Pipeliners® NR-208-XP

Low Alloy, All Position

AWS E81T8-G

Key Features

- ▶ Vertical down hot, fill and cap pass welding of up to X80 grade pipe
- ▶ Capable of producing weld deposits with impact toughness exceeding 153 - 302 J (113 - 223 ft•lbf) @ -29°C (-20°F)
- ▶ Q2 Lot® - Certificate showing actual deposit chemistry available online
- ▶ ProTech® hermetically sealed packaging

Welding Positions

All, except vertical up

Conformances

AWS A5.29/A5.29M: 2005 E81T8-G
ASME SFA-A5.29: E81T8-G

Note

- ▶ This product contains micro-alloying elements. Additional information available upon request.

Typical Applications

- ▶ Hot, fill and cap pass welding of up to X80 grade pipe
- ▶ Cold temperature cross country pipe applications

DIAMETERS / PACKAGING

Diameter mm (in)	6.3 kg (14 lb) Coil 25.4 kg (56 lb) Hermetically Sealed Pail
2.0 (5/64)	ED031968

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Pipeliner® NR-208-XP

(AWS E81T8-G)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength ⁽⁴⁾ MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf) @ -29°C (-20°F)
Requirements AWS E81T8-G	470 (68) min.	550 - 690 (80 - 100)	19 min.	Not Specified
Typical Performance⁽³⁾ As-Welded	485 - 515 (70 - 75)	550 - 585 (80 - 85)	27 - 29	153 - 302 (113 - 223)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	%C	%Mn ⁽⁴⁾	%Si	%P	%S
Requirements AWS E81T8-G	Not Specified	0.50 min	1.00 max.	0.030 max.	0.030 max.
Typical Performance⁽³⁾	≤ 0.02	2.10 - 2.20	0.12 - 0.13	0.004 - 0.007	< 0.003
	%Ni ⁽⁴⁾	%Cr ⁽⁴⁾	%Mo ⁽⁴⁾	%V ⁽⁴⁾	%Al ⁽⁴⁾
Requirements AWS E81T8-G	0.50 min.	0.30 min.	0.20 min.	0.10 min.	1.8 max.
Typical Performance⁽³⁾	0.74 - 0.80	0.04 - 0.05	0.01 - 0.03	< 0.004	0.9 - 1.1

TYPICAL OPERATING PROCEDURES

Diameter, Polarity	CTWD ⁽⁵⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)
2.0 mm (5/64 in), DC-	19 (3/4)	1.7-3.3 (70-130)	17-20	195-295	1.8-3.5 (4.0-7.6)

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾In order to meet the alloy requirements of the "G" group, the undiluted weld metal shall have not less than the minimum of at least one of the elements listed. ⁽⁵⁾For electrical stickout (ESO) subtract 6.4 mm (1/4 in) from contact tip to work distance (CTWD).

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-208-H

Low Alloy, All Position

AWS E91T8-G-H8

Key Features

- ▶ Designed to create high strength weld deposits
- ▶ Recommended for API grade X80
- ▶ High deposition rates

Welding Positions

All, except vertical up

Conformances

AWS A5.29/A5.29M: 2005 E91T8-G-H8
 ASME SFA-A5.29: E91T8-G-H8

Typical Applications

- ▶ Standard cross-country pipelines
- ▶ Undermatched X80 grade pipe

DIAMETERS / PACKAGING

Diameter in (mm)	14 lb (6.4 kg) Coil 56 lb (25.4 kg) Hermetically Sealed Pail
5/64 (2.0)	ED023366

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Innershield® NR-208-H

(AWS E91T8-G-H8)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Hardness Rockwell B	Charpy V-Notch J (ft•lbf) @ -29°C (-20°F)
Requirements AWS E91T8-G-H8	540 (78) min.	620 - 760 (90 - 110)	17 min.	–	Not Specified
Typical Performance⁽³⁾ As-Welded	555 - 600 (81 - 87)	630 - 670 (91 - 97)	24 - 27	91 - 95	54 - 129 (40 - 95)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	%C	%Mn	%Si	%S	%P	%Ni ⁽⁴⁾
Requirements AWS E91T8-G-H8	Not Specified	0.50 min.	1.00 max.	0.030 max.	0.030 max.	0.50 min.
Typical Performance⁽³⁾	0.04 - 0.07	1.48 - 2.02	0.11 - 0.31	≤0.003	0.004 - 0.010	0.71 - 0.98
	%Cr ⁽⁴⁾	%Mo ⁽⁴⁾	%V ⁽⁴⁾	%Al ⁽⁴⁾	Diffusible Hydrogen (mL/100g)	
Requirements AWS E91T8-G-H8	0.30 min.	0.20 max.	0.10 min.	1.8 min.	8.0 max.	
Typical Performance⁽³⁾	0.02 - 0.03	≤0.04	≤0.01	0.9 - 1.2	≤8	

TYPICAL OPERATING PROCEDURES

Diameter, Polarity	CTWD mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)
5/64 in (2.0 mm) DC-	25 (1)	1.7 (70)	16-17	195	1.8 (4.0)	1.4 (3.2)	81
		2.0 (80)	17-18	220	2.1 (4.6)	1.7 (3.9)	84
		2.2 (90)	18-19	235	2.5 (5.4)	2.0 (4.5)	84
		2.7 (110)	19-20	270	2.9 (6.5)	2.4 (5.5)	85
		3.3 (130)	19-20	295	3.5 (7.6)	2.9 (6.5)	85

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾In order to meet the alloy requirements of the G group, the weld deposit needs to have the minimum, as specified in the table, of only one of the elements marked.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

UltraCore® 71A85

Mild Steel, All Position
 AWS E71T-1M-H8, E71T-9M-H8



Key Features

- ▶ Fast freezing slag for out-of-position welding
- ▶ Designed for welding with 75 - 85% Argon/
balance CO₂ shielding gas
- ▶ Premium arc performance and bead
appearance
- ▶ ProTech® foil bag packaging
- ▶ Meets AWS D1.8 seismic lot waiver
requirements

Typical Applications

- ▶ Shipbuilding
- ▶ Seismic structural fabrication
- ▶ General fabrication

Welding Positions

All

Conformances

AWS A5.20/A5.20M: 2005
 & ASME SFA-A5.20: E71T-1M-H8,
 E71T-9M-H8

ABS: 3YSA H10
 Lloyd's Register: 3YS H10
 DNV Grade: III YMS H10
 CWB/CSA W48-06: E491T-9M H8
 FEMA 353:
 AWS D1.8:

Shielding Gas

75% - 85% Argon/Balance CO₂
 Flow Rate: 40 - 50 CFH

Notes

- ▶ FEMA and AWS D1.8 structural steel seismic
supplement test data can be found on this
product at www.lincolnelectric.com.
- ▶ This product contains micro-alloying elements.
Additional information available upon request.

DIAMETERS / PACKAGING

Diameter in (mm)	15 lb (7 kg) Plastic Spool 60 lb (28 kg) Carton	33 lb (15 kg) Plastic Spool (Foil Bag)	50 lb (23 kg) Fiber Spool	500 lb (272 kg) Accu-Trak® Drum
0.045 (1.1)	ED031885	ED031663	ED031847	ED032047
0.052 (1.3)	ED031886	ED031664	ED031848	ED032048
1/16 (1.6)	ED031887	ED031665	ED031849	ED032049

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf)	
				@ -18°C (0°F)	@ -29°C (-20°F)
Requirements⁽⁴⁾ AWS E71T-1M-H8, AWS E71T-9M-H8	400 (58) min.	480 - 655 (70 - 95)	22 min.	27 (20) min. Not Specified	Not Specified 27 (20) min.
Typical Performance⁽³⁾ As-Welded with 75%-85% Ar/balance CO ₂	550 - 600 (80 - 88)	600 - 650 (87 - 94)	24 - 26	64 - 115 (47 - 85)	43 - 95 (32 - 70)

UltraCore® 71A85

(AWS E71T-1M-H8, E71T-9M-H8)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	%C	%Mn	%Si	%S	%P	Diffusible Hydrogen (mL/100g weld deposit)
Requirements⁽⁴⁾ AWS E71T-1M-H8, AWS E71T-9M-H8	0.12 max.	1.75 max.	0.90 max.	0.03 max.	0.03 max.	8.0 max.
Typical Performance⁽³⁾ As-Welded with 75%-85% Ar/balance CO ₂	0.04	1.43 - 1.56	0.52 - 0.59	<0.01	0.01	6 - 8

TYPICAL OPERATING PROCEDURES

Diameter, Polarity Shielding Gas	CTWD ⁽⁵⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)	
0.045 in (1.1 mm), DC+ 75%-85% Ar/ balance CO ₂	25 (1)	All Position						86-88
		4.4 (175)	21-26	115-135	1.8 (4.0)	1.6 (3.5)		
		6.4 (250)	22-27	135-165	2.6 (5.7)	2.3 (5.0)		
		7.6 (300)	23-28	150-180	3.1 (6.8)	2.7 (6.0)		
		8.9 (350)	23-29	175-205	3.6 (8.0)	3.2 (7.0)		
		10.2 (400)	25-30	190-220	4.1 (9.1)	3.6 (8.0)		
		11.4 (450)	26-31	215-235	4.7 (10.3)	4.1 (9.0)		
		Flat & Horizontal						
		12.7 (500)	27-32	230-260	5.2 (11.4)	4.5 (10.0)		
		14.0 (550)	28-33	250-280	5.7 (12.5)	5.0 (10.9)		
15.2 (600)	28-34	265-295	6.2 (13.7)	5.4 (11.9)				
0.052 in (1.3 mm), DC+ 75%-85% Ar/ balance CO ₂	25 (1)	All Position						86-88
		3.8 (150)	21-26	135-165	2.0 (4.5)	1.8 (3.9)		
		5.1 (200)	21-27	150-180	2.7 (6.0)	2.4 (5.2)		
		6.4 (250)	22-27	175-205	3.4 (7.5)	2.9 (6.5)		
		7.6 (300)	23-28	200-230	4.1 (9.0)	3.5 (7.8)		
		8.9 (350)	24-29	220-250	4.7 (10.5)	4.1 (9.1)		
		9.5 (375)	25-30	240-270	5.1 (11.2)	4.4 (9.8)		
		Flat & Horizontal						
		10.8 (425)	26-31	260-290	5.8 (12.7)	5.0 (11.1)		
		12.1 (475)	27-32	280-310	6.4 (14.2)	5.6 (12.4)		
12.7 (500)	27-33	300-330	6.8 (15.0)	5.9 (13.0)				
1/16 in (1.6 mm), DC+ 75%-85% Ar/ balance CO ₂	25 (1)	All Position						86-88
		3.2 (125)	20-25	170-200	2.4 (5.3)	2.1 (4.6)		
		4.4 (175)	21-26	200-230	3.3 (7.4)	2.9 (6.4)		
		5.1 (200)	22-27	220-250	3.8 (8.4)	3.3 (7.3)		
		5.7 (225)	23-28	250-280	4.3 (9.5)	3.7 (8.2)		
		6.4 (250)	24-29	270-300	4.8 (10.5)	4.2 (9.2)		
		7.6 (300)	25-30	300-330	5.7 (12.6)	5.0 (11.0)		
		Flat & Horizontal						
		8.3 (325)	26-31	320-350	6.2 (13.7)	5.4 (11.9)		
		8.9 (350)	27-32	350-380	6.7 (14.7)	5.8 (12.8)		
10.2 (400)	28-33	370-400	7.6 (16.8)	6.6 (14.6)				

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾As-Welded with 75%-85% Argon/Balance CO₂. ⁽⁵⁾To estimate ESO, subtract 1/4 in (6.0 mm) from CTWD.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

UltraCore® 71C

Mild Steel, All Position

AWS E71T-1C-H8, E71T-9C-H8



Key Features

- ▶ Fast freezing slag for out-of-position welding
- ▶ Designed for welding with 100% CO₂ shielding gas
- ▶ Premium arc performance and bead appearance
- ▶ ProTech® foil bag packaging
- ▶ Meets AWS D1.8 seismic lot waiver requirements

Typical Applications

- ▶ Shipbuilding
- ▶ General fabrication
- ▶ Seismic structural fabrication
- ▶ Barge and railcar fabrication

Welding Positions

All

Conformances

AWS A5.20/A5.20M: 2005
& ASME SFA-A5.20: E71T-1C-H8,
E71T-9C-H8
ABS: E71T-1C-H8,
E71T-9C-H8
Lloyd's Register: 3YS H10
DNV Grade: III YMS H10
CWB/CSA W48-06: E491T-9 H8
FEMA 353:
AWS D1.8:

Shielding Gas

100% CO₂
Flow Rate: 40 - 50 CFH

Note

- ▶ FEMA and AWS D1.8 structural steel seismic supplement test data can be found on this product at www.lincolnelectric.com.

DIAMETERS / PACKAGING

Diameter in (mm)	15 lb (7 kg) Plastic Spool 60 lb (28 kg) Carton	33 lb (15 kg) Plastic Spool (Foil Bag)	50 lb (23 kg) Fiber Spool	500 lb (272 kg) Accu-Trak® Drum
0.045 (1.1)	ED031818	ED031666	ED031822	ED031876
0.052 (1.3)	ED031819	ED031667	ED031823	ED031877
1/16 (1.6)	ED031820	ED031668	ED031824	ED031878

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf)	
				@ -18°C (0°F)	@ -29°C (-20°F)
Requirements⁽⁴⁾ AWS E71T-1C-H8 AWS E71T-9C-H8	400 (58) min.	480 - 655 (70 - 95)	22 min.	27 (20) min. Not Specified	Not Specified 27 (20) min.
Typical Performance⁽³⁾ As-Welded with 100% CO ₂	515 - 560 (74 - 81)	570 - 605 (82 - 84)	25 - 27	56 - 115 (41 - 85)	34 - 72 (25 - 53)

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

UltraCore® 71C

(AWS E71T-1C-H8, E71T-9C-H8)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	%C	%Mn	%Si	%S	%P	Diffusible Hydrogen (mL/100g weld deposit)
Requirements⁽⁴⁾ AWS E71T-1C-H8 AWS E71T-9C-H8	0.12 max.	1.75 max.	0.90 max.	0.03 max.	0.03 max.	8.0 max.
Typical Performance⁽³⁾ As-Welded with 100% CO ₂	0.03 - 0.04	1.31 - 1.41	0.43 - 0.49	0.01	0.01	4 - 7

TYPICAL OPERATING PROCEDURES

Diameter, Polarity Shielding Gas	CTWD ⁽⁵⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)	
0.045 in (1.1 mm), DC+ 100% CO ₂	25 (1)	All Position						86-88
		4.4 (175)	21-26	110-140	1.8 (4.0)	1.6 (3.5)		
		6.4 (250)	22-27	135-175	2.6 (5.7)	2.3 (5.0)		
		7.6 (300)	23-28	150-180	3.1 (6.8)	2.7 (6.0)		
		8.9 (350)	24-29	175-205	3.6 (8.0)	3.2 (7.0)		
		10.2 (400)	25-30	190-220	4.1 (9.1)	3.6 (8.0)		
		11.4 (450)	26-31	215-245	4.7 (10.3)	4.1 (9.0)		
		Flat & Horizontal						
		12.7 (500)	27-32	230-260	5.2 (11.4)	4.5 (10.0)		
		14.0 (550)	28-33	250-280	5.7 (12.5)	5.0 (10.9)		
		15.2 (600)	29-34	260-290	6.2 (13.7)	5.4 (11.9)		
		0.052 in (1.3 mm), DC+ 100% CO ₂	25 (1)	All Position				
3.8 (150)	21-26			135-165	2.0 (4.5)	1.8 (3.9)		
5.1 (200)	22-27			150-180	2.7 (6.0)	2.4 (5.2)		
6.4 (250)	23-28			175-205	3.4 (7.5)	2.9 (6.5)		
7.6 (300)	24-29			200-230	4.1 (9.0)	3.5 (7.8)		
8.9 (350)	25-30			220-250	4.7 (10.5)	4.1 (9.1)		
9.5 (375)	26-31			240-270	5.1 (11.2)	4.4 (9.8)		
Flat & Horizontal								
10.8 (425)	28-33			260-290	5.8 (12.7)	5.0 (11.1)		
12.1 (475)	29-34			280-310	6.4 (14.2)	5.6 (12.4)		
12.7 (500)	30-36			300-330	6.8 (15.0)	5.9 (13.0)		
1/16 in (1.6 mm), DC+ 100% CO ₂	25 (1)			All Position				
		3.2 (125)	21-26	170-200	2.4 (5.3)	2.1 (4.6)		
		4.4 (175)	22-27	200-230	3.3 (7.4)	2.9 (6.4)		
		5.1 (200)	23-28	220-250	3.8 (8.4)	3.3 (7.3)		
		5.7 (225)	24-29	250-280	4.3 (9.5)	3.7 (8.2)		
		6.4 (250)	25-30	270-300	4.8 (10.5)	4.2 (9.2)		
		7.6 (300)	27-31	300-330	5.7 (12.6)	5.0 (11.0)		
		Flat & Horizontal						
		8.3 (325)	26-33	320-350	6.2 (13.7)	5.4 (11.9)		
		8.9 (350)	29-34	350-380	6.7 (14.7)	5.8 (12.8)		
		10.2 (400)	30-36	380-410	7.6 (16.8)	6.6 (14.6)		

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾As-Welded with 100% CO₂. ⁽⁵⁾To estimate ESO, subtract 1/4 in (6.0 mm) from CTWD.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

UltraCore® 71A75 Dual

Mild Steel, All Position

AWS E71T-1C-H8, E71T-1M-H8, E71T-9C-H8, E71T-9M-H8

Key Features

- ▶ Fast freezing slag for out-of-position welding
- ▶ Designed for welding with either 100% CO₂ or 75% Argon/25% CO₂ shielding gases
- ▶ Premium arc performance and bead appearance
- ▶ ProTech® foil bag packaging

Typical Applications

- ▶ General fabrication

Welding Positions

All

Conformances

AWS A5.20/A5.20M: 2005
& ASME SFA-A5.20: E71T-1C-H8,
E71T-1M-H8,
E71T-9C-H8,
E71T-9M-H8
CWB/CSA W48-06: E491T-9 H8,
E491T-9M H8

Shielding Gas

100% CO₂
75% Argon/25% CO₂
Flow Rate: 40 - 50 CFH

Note

- ▶ This product contains micro-alloying elements. Additional information available upon request.

DIAMETERS / PACKAGING

Diameter in (mm)	15 lb (7 kg) Plastic Spool 60 lb (28 kg) Carton	33 lb (15 kg) Plastic Spool (Foil Bag)	50 lb (23 kg) Fiber Spool (Foil Bag)	500 lb (272 kg) Accu-Trak® Drum
0.045 (1.1)	ED031882	ED031669	ED031844	ED032044
0.052 (1.3)		ED031670	ED031845	
1/16 (1.6)		ED031671	ED031846	ED032046

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf)	
				@ -18°C (0°F)	@ -29°C (-20°F)
Requirements⁽⁴⁾ AWS E71T-1C-H8, E71T-1M-H8 AWS E71T-9C-H8, E71T-9M-H8	400 (58) min.	480 - 655 (70 - 95)	22 min.	27 (20) min. Not Specified	Not Specified 27 (20) min.
Typical Performance⁽³⁾ As-Welded with: 100% CO ₂ 75% Ar/25% CO ₂	510 - 550 (73 - 79) 570 - 610 (82 - 88)	570 - 600 (82 - 87) 620 - 660 (89 - 95)	26 - 28 24 - 26	38 - 95 (28 - 70) 62 - 111 (46 - 82)	27 - 65 (20 - 48) 39 - 85 (29 - 63)

UltraCore® 71A75 Dual

(AWS E71T-1C-H8, E71T-1M-H8, E71T-9C-H8, E71T-9M-H8)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	%C	%Mn	%Si	%S	%P	Diffusible Hydrogen (mL/100g weld deposit)
Requirements⁽⁴⁾ AWS E71T-1C-H8, E71T-1M-H8 AWS E71T-9C-H8, E71T-9M-H8	0.12 max.	1.75 max.	0.90 max.	0.03 max.	0.03 max.	8.0 max.
Typical Performance⁽³⁾ As-Welded with 100% CO ₂ As-Welded with 75% Ar/25% CO ₂	0.03 - 0.04 0.03 - 0.04	1.28 - 1.41 1.45 - 1.60	0.42 - 0.49 0.54 - 0.62	0.01 0.01	0.01 - 0.02 0.01 - 0.02	3 - 8 4 - 8

TYPICAL OPERATING PROCEDURES

Diameter, Polarity Shielding Gas	CTWD ⁽⁶⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)	
0.045 in (1.1 mm), DC+ 75% Ar/25% CO ₂	25 (1)	All Position						86-88
		4.4 (175)	20-25	120-150	1.8 (4.0)	1.6 (3.5)		
		6.4 (250)	21-26	135-165	2.6 (5.7)	2.3 (5.0)		
		7.6 (300)	22-27	150-180	3.1 (6.8)	2.7 (6.0)		
		8.9 (350)	23-28	175-205	3.6 (8.0)	3.2 (7.0)		
		10.2 (400)	24-29	190-220	4.1 (9.1)	3.6 (8.0)		
		11.4 (450)	25-30	215-235	4.7 (10.3)	4.1 (9.0)		
		Flat & Horizontal						
		12.7 (500)	26-31	230-260	5.2 (11.4)	4.5 (10.0)		
		14.0 (550)	27-32	250-280	5.7 (12.5)	5.0 (10.9)		
		15.2 (600)	27-33	270-300	6.2 (13.7)	5.4 (11.9)		
		0.052 in (1.3 mm), DC+ 75% Ar/25% CO ₂	25 (1)	All Position				
3.8 (150)	20-25			140-170	2.0 (4.5)	1.8 (3.9)		
5.1 (200)	21-26			150-180	2.7 (6.0)	2.4 (5.2)		
6.4 (250)	22-27			175-205	3.4 (7.5)	2.9 (6.5)		
7.6 (300)	23-28			200-230	4.1 (9.0)	3.5 (7.8)		
8.9 (350)	24-29			220-250	4.7 (10.5)	4.1 (9.1)		
9.5 (375)	25-30			240-270	5.1 (11.2)	4.4 (9.8)		
Flat & Horizontal								
10.8 (425)	27-31			260-290	5.8 (12.7)	5.0 (11.1)		
12.1 (475)	28-33			280-310	6.4 (14.2)	5.6 (12.4)		
12.7 (500)	29-35			310-340	6.8 (15.0)	5.9 (13.0)		
1/16 in (1.6 mm), DC+ 75% Ar/25% CO ₂	25 (1)			All Position				
		3.2 (125)	20-25	180-210	2.4 (5.3)	2.1 (4.6)		
		4.4 (175)	21-26	200-230	3.3 (7.4)	2.9 (6.4)		
		5.1 (200)	22-27	220-250	3.8 (8.4)	3.3 (7.3)		
		5.7 (225)	23-28	250-280	4.3 (9.5)	3.7 (8.2)		
		6.4 (250)	24-29	270-300	4.8 (10.5)	4.2 (9.2)		
		7.6 (300)	25-31	300-330	5.7 (12.6)	5.0 (11.0)		
		Flat & Horizontal						
		8.3 (325)	25-32	320-350	6.2 (13.7)	5.4 (11.9)		
		8.9 (350)	26-33	350-380	6.7 (14.7)	5.8 (12.8)		
		10.2 (400)	28-35	390-420	7.6 (16.8)	6.6 (14.6)		

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾As-Welded with 100% CO₂ & As-Welded 75% Argon / 25% CO₂.

⁽⁵⁾To estimate ESD, subtract 1/4 in (6.0 mm) from CTWD. ⁽⁶⁾When welding under CO₂, increase voltage by 1 Volt.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

UltraCore® 712C

Mild Steel, All Position

AWS E71T-1C-JH8, E71T-9C-JH8, E71T-12C-JH8

Key Features

- ▶ Capable of producing weld deposits with impact toughness exceeding 27 J (20 ft•lbf) at -40°C (-40°F)
- ▶ Designed for welding with 100% CO₂ shielding gas
- ▶ Premium arc performance and bead appearance
- ▶ ProTech® foil bag packaging

Typical Applications

- ▶ Bridge fabrication
- ▶ Pressure vessels
- ▶ Shipbuilding
- ▶ Offshore
- ▶ ASME related applications

Conformances

AWS A5.20/A5.20M: 2005
& ASME SFA-A5.20: E71T-1C-JH8, E71T-9C-JH8, E71T-12C-JH8

ABS: 3YSA H10
Lloyd's Register: 3YS H10
DNV Grade: III YMS H10
CWB/CSA W48-06: E491T-12J H8, E491T-9J H8

Welding Positions

All

Shielding Gas

100% CO₂
Flow Rate: 40-50 CFH

Note

- ▶ This product contains micro-alloying elements. Additional information available upon request.

DIAMETERS / PACKAGING

Diameter in (mm)	15 lb (7 kg) Plastic Spool 60 lb (28 kg) Carton	33 lb (15 kg) Plastic Spool (Foil Bag)	50 lb (23 kg) Fiber Spool (Foil Bag)	500 lb (272 kg) Accu-Trak® Drum
0.045 (1.1)		ED031672		ED031681
0.052 (1.3)		ED031673	ED031839	
1/16 (1.6)	ED031896	ED031674	ED031840	ED031799

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf)		
				@ -18°C (0°F)	@ -29°C (-20°F)	@ -40°C (-40°F)
Requirements⁽⁴⁾ AWS E71T-1C-JH8 AWS E71T-9C-JH8 AWS E71T-12C-JH8	400 (58) min.	480 - 655 (70 - 95)	22 min.	27 (20) min.	Not Specified	27 (20) min.
480 - 620 (70 - 90)		Not Specified		27 (20) min.		
Not Specified		27 (20) min.				
Typical Performance⁽³⁾ As-Welded with 100% CO ₂	485 - 535 (70 - 77)	540 - 585 (78 - 84)	25 - 28	135 - 193 (100 - 143)	91 - 164 (67 - 121)	57 - 133 (42 - 98)

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

UltraCore® 712C

(AWS E71T-1C-JH8, E71T-9C-JH8, E71T-12C-JH8)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	%C	%Mn	%Si	%S	%P	%Ni	Diffusible Hydrogen (mL/100g weld deposit)
Requirements⁽⁴⁾							
AWS E71T-1C-JH8, E71T-9C-JH8	0.12 max.	1.75 max.	0.90 max.	0.03 max.	0.03 max.	0.50 max.	8.0 max.
AWS E71T-12C-JH8		1.60 max.					
Typical Performance⁽³⁾							
As-Welded with 100% CO ₂	0.03	1.34 - 1.49	0.26 - 0.32	0.01	0.01 - 0.02	0.33 - 0.41	3 - 8

TYPICAL OPERATING PROCEDURES

Diameter, Polarity Shielding Gas	CTWD ⁽⁵⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)	
0.045 in (1.1 mm), DC+ 100% CO ₂	25 (1)	All Position						86-88
		4.4 (175)	20-25	120-150	1.8 (4.0)	1.6 (3.5)		
		5.7 (225)	21-26	135-165	2.3 (5.1)	2.0 (4.5)		
		7.0 (275)	22-27	150-180	2.8 (6.3)	2.5 (5.5)		
		8.3 (325)	23-28	175-205	3.4 (7.4)	2.9 (6.5)		
		8.9 (350)	24-29	190-220	3.6 (8.0)	3.2 (7.0)		
		10.2 (400)	25-30	215-245	4.1 (9.1)	3.6 (8.0)		
		Flat & Horizontal						
		11.4 (450)	26-31	230-260	4.7 (10.3)	4.1 (9.1)		
		12.1 (475)	27-32	250-280	4.9 (10.8)	4.3 (9.5)		
		13.3 (525)	28-33	270-300	5.4 (12.0)	4.7 (10.4)		
		0.052 in (1.3 mm), DC+ 100% CO ₂	25 (1)	All Position				
3.8 (150)	22-27			145-175	2.0 (4.5)	1.8 (3.9)		
5.1 (200)	23-28			150-180	2.7 (6.0)	2.4 (5.2)		
6.4 (250)	24-29			175-205	3.4 (7.5)	2.9 (6.5)		
7.6 (300)	26-31			200-230	4.1 (9.1)	3.5 (7.8)		
8.9 (350)	27-32			220-250	4.7 (10.5)	4.1 (9.1)		
9.5 (375)	28-33			240-270	5.1 (11.2)	4.4 (9.8)		
Flat & Horizontal								
10.8 (425)	30-35			260-290	5.8 (12.7)	5.0 (11.1)		
12.1 (475)	31-36			280-310	6.4 (14.2)	5.6 (12.4)		
12.7 (500)	32-37			325-355	6.8 (15.0)	5.9 (13.0)		
1/16 in (1.6 mm), DC+ 100% CO ₂	25 (1)			All Position				
		3.8 (150)	21-27	200-230	2.9 (6.3)	2.5 (5.5)		
		4.4 (175)	23-28	235-265	3.3 (7.4)	2.9 (6.4)		
		5.1 (200)	24-29	275-305	3.8 (8.4)	3.3 (7.3)		
		5.7 (225)	25-31	300-330	4.3 (9.5)	3.7 (8.2)		
		6.4 (250)	27-34	315-345	4.8 (10.5)	4.2 (9.2)		
		7.6 (300)	29-36	350-380	5.7 (12.6)	5.0 (11.0)		
		Flat & Horizontal						
		8.3 (325)	31-38	375-405	6.2 (13.7)	5.4 (11.9)		
		8.9 (350)	32-39	405-435	6.7 (14.7)	5.8 (12.8)		
		11.4 (450)	34-39	430-460	8.6 (18.9)	7.5 (16.5)		

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾As-Welded with 100% CO₂. ⁽⁵⁾To estimate ESO, subtract 1/4 in (6.0 mm) from CTWD.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

UltraCore® 712A80

Mild Steel, All Position

AWS E71T-1M-JH8, E71T-9M-JH8, E71T-12M-JH8

Key Features

- ▶ Capable of producing weld deposits with impact toughness exceeding 27 J (20 ft•lbf) at -40°C (-40°F)
- ▶ Designed for welding with 75-80% Argon/balance CO₂ shielding gas
- ▶ Premium arc performance and bead appearance
- ▶ ProTech® foil bag packaging

Typical Applications

- ▶ Offshore
- ▶ Pressure vessels
- ▶ Shipbuilding
- ▶ Heavy equipment
- ▶ ASME related applications

Welding Positions

All

Conformances

AWS A5.20/A5.20M: 2005
& ASME SFA-A5.20: E71T-1M-JH8
E71T-9M-JH8
E71T-12M-JH8

ABS: 4YSA H10
Lloyd's Register: 4YS H10
DNV Grade: IV YMS H10
CWB/CSA W48-06: E491T-12MJ-H8,
E491T-9MJ-H8

Shielding Gas

75% - 80% Argon/Balance CO₂
Flow Rate: 40 - 50 CFH

Note

- ▶ This product contains micro-alloying elements. Additional information available upon request.

DIAMETERS / PACKAGING

Diameter in (mm)	15 lb (7 kg) Plastic Spool 60 lb (28 kg) Carton	33 lb (15 kg) Plastic Spool (Foil Bag)	50 lb (23 kg) Fiber Spool (Foil Bag)	500 lb (272 kg) Accu-Trak® Drum
0.045 (1.1)		ED031675	ED031850	ED032050
0.052 (1.3)		ED031676	ED031851	ED032051
1/16 (1.6)	ED031890	ED031677	ED031852	ED032052

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf)		
				@ -18°C (0°F)	@ -29°C (-20°F)	@ -40°C (-40°F)
Requirements⁽⁴⁾ AWS E71T-1M-JH8 AWS E71T-9M-JH8 AWS E71T-12M-JH8	400 (58) min.	480 - 655 (70 - 95)	22 min.	27 (20) min.	Not Specified	27 (20) min.
480 - 620 (70 - 90)		Not Specified		27 (20) min.		
Typical Performance⁽³⁾ As-Welded with 75%-80% Ar/balance CO ₂	505 - 555 (73 - 80)	565 - 610 (82 - 88)	25 - 27	166 - 186 (123 - 137)	100 - 160 (74 - 118)	72 - 142 (53 - 105)

UltraCore® 712A80

(AWS E71T-1M-JH8, E71T-9M-JH8, E71T-12M-JH8)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	%C	%Mn	%Si	%S	%P	%Ni	Diffusible Hydrogen (mL/100g weld deposit)
Requirements⁽⁴⁾							
AWS E71T-1M-JH8, E71T-9M-JH8	0.12 max.	1.75 max.	0.90 max.	0.03 max.	0.03 max.	0.50 max.	8.0 max.
AWS E71T-12M-JH8		1.60 max.					
Typical Performance⁽³⁾							
As-Welded with 75%-80% Ar/balance CO ₂	0.03 - 0.04	1.40 - 1.53	0.31 - 0.36	0.01	0.01	0.32 - 0.38	4 - 8

TYPICAL OPERATING PROCEDURES

Diameter, Polarity Shielding Gas	CTWD ⁽⁵⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)	
0.045 in (1.1 mm), DC+ 75%-80% Ar/ balance CO ₂	25 (1)	All Position						86-88
		4.4 (175)	20-25	125-155	1.8 (4.0)	1.6 (3.5)		
		5.7 (225)	21-26	135-165	2.3 (5.1)	2.0 (4.5)		
		7.0 (275)	22-27	150-180	2.8 (6.3)	2.5 (5.5)		
		8.3 (325)	22-27	175-205	3.4 (7.4)	2.9 (6.5)		
		8.9 (350)	23-28	190-220	3.6 (8.0)	3.2 (7.0)		
		10.2 (400)	24-29	215-245	4.1 (9.1)	3.6 (8.0)		
		Flat & Horizontal						
		11.4 (450)	25-31	230-255	4.7 (10.3)	4.1 (9.0)		
		12.1 (475)	26-32	250-280	4.9 (10.8)	4.3 (9.5)		
		13.3 (525)	27-33	265-395	5.4 (12.0)	4.7 (10.4)		
		0.052 in (1.3 mm), DC+ 75%-80% Ar/ balance CO ₂	25 (1)	All Position				
3.8 (150)	20-25			135-165	2.0 (4.5)	1.8 (3.9)		
4.4 (175)	21-26			150-180	2.4 (5.2)	2.1 (4.6)		
5.1 (200)	22-27			175-205	2.7 (6.0)	2.4 (5.2)		
5.7 (225)	23-28			200-230	3.1 (6.7)	2.7 (5.9)		
6.4 (250)	24-29			220-250	3.4 (7.5)	2.9 (6.5)		
7.6 (300)	25-30			240-270	4.1 (9.0)	3.5 (7.8)		
8.3 (325)	27-31			260-290	4.4 (9.7)	3.8 (8.5)		
Flat & Horizontal								
8.9 (350)	28-32			280-310	4.7 (10.5)	4.1 (9.1)		
11.4 (450)	29-34			315-345	6.1 (13.5)	5.3 (11.7)		
1/16 in (1.6 mm), DC+ 75%-80% Ar/ balance CO ₂	25 (1)			All Position				
		3.8 (150)	21-26	185-215	2.9 (6.3)	2.5 (5.5)		
		4.4 (175)	22-27	200-230	3.3 (7.4)	2.9 (6.4)		
		5.1 (200)	22-28	220-250	3.8 (8.4)	3.3 (7.3)		
		5.7 (225)	24-29	250-280	4.3 (9.5)	3.7 (8.2)		
		6.4 (250)	25-30	270-300	4.8 (10.5)	4.2 (9.2)		
		7.6 (300)	26-31	300-330	5.7 (12.6)	5.0 (11.0)		
		Flat & Horizontal						
		8.3 (325)	27-32	320-350	6.2 (13.7)	5.4 (11.9)		
		8.9 (350)	28-33	350-380	6.7 (14.7)	5.8 (12.8)		
		10.2 (400)	29-34	400-430	7.6 (16.8)	6.6 (14.6)		

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾As-Welded 75%-80% Argon/Balance CO₂. ⁽⁵⁾To estimate ESO, subtract 1/4 in (6.0 mm) from CTWD.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

UltraCore® 712A80-H

Mild Steel, All Position

AWS E71T-1M-JH4, E71T-9M-JH4, E71T-12M-JH4

Key Features

- ▶ Capable of producing low hydrogen weld deposits with impact toughness exceeding 27 J (20 ft•lbf) at -40°C (-40°F)
- ▶ Designed for welding with 75-80% Argon/balance CO₂ gas
- ▶ Premium arc performance and bead appearance
- ▶ ProTech® foil bag packaging

Typical Applications

- ▶ Offshore
- ▶ Shipbuilding
- ▶ Heavy equipment
- ▶ Pressure vessels

Welding Positions

All

Conformances

AWS A5.20/A5.20M: 2005
& ASME SFA-A5.20: E71T-1M-JH4,
E71T-9M-JH4,
E71T-12M-JH4
4YSA H5
ABS: 4YS H5
Lloyd's Register: IV YMS H5
DNV Grade: E491T-12MJ H4,
CWB/CSA W48-06: E491T-9MJ H4

Shielding Gas

75% - 80% Argon/Balance CO₂
Flow Rate: 40 - 50 CFH

Note

- ▶ This product contains micro-alloying elements. Additional information available upon request.

DIAMETERS / PACKAGING

Diameter in (mm)	15 lb (7 kg) Plastic Spool 60 lb (28 kg) Carton	33 lb (15 kg) Plastic Spool (Foil Bag)
0.045 (1.1)	ED031891	ED031678
0.052 (1.3)		ED031679
1/16 (1.6)	ED031893	ED031680

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf)		
				@ -18°C (0°F)	@ -29°C (-20°F)	@ -40°C (-40°F)
Requirements⁽⁴⁾ AWS E71T-1M-JH4 AWS E71T-9M-JH4 AWS E71T-12M-JH4	400 (58) min.	480 - 655 (70 - 95)	22 min.	27 (20) min.	Not Specified	27 (20) min.
		480 - 620 (70 - 90)		Not Specified	27 (20) min.	
Typical Performance⁽³⁾ As-Welded with 75%-80% Ar/balance CO ₂	490 - 570 (71 - 83)	550 - 615 (80 - 89)	27 - 28	149 - 180 (111 - 133)	56 - 164 (41 - 121)	27 - 98 (20 - 72)

UltraCore® 712A80-H

(AWS E71T-1M-JH4, E71T-9M-JH4, E71T-12M-JH4)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	%C	%Mn	%Si	%S	%P	%Ni	Diffusible Hydrogen (mL/100g weld deposit)
Requirements⁽⁴⁾							
AWS E71T-1M-JH4, E71T-9M-JH4	0.12 max.	1.75 max.	0.90 max.	0.03 max.	0.03 max.	0.50 max.	4.0 max.
AWS E71T-12M-JH4		1.60 max.					
Typical Performance⁽³⁾							
As-Welded with 75%-80% Ar/balance CO ₂	0.03 - 0.04	1.25 - 1.37	0.28 - 0.33	0.01	0.01	0.35 - 0.41	2 - 4

TYPICAL OPERATING PROCEDURES

Diameter, Polarity Shielding Gas	CTWD ⁽⁶⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)
0.045 in (1.1 mm), DC+ 75%-80% Ar/ balance CO ₂	25 (1)	All Position					86-88
		4.4 (175)	21-25	125-155	1.8 (4.0)	1.6 (3.5)	
		5.1 (200)	22-26	135-165	2.1 (4.6)	1.8 (4.0)	
		6.4 (250)	23-27	150-180	2.6 (5.7)	2.3 (5.0)	
		7.6 (300)	23-28	175-205	3.1 (6.8)	2.7 (6.0)	
		8.9 (350)	24-29	190-220	3.6 (8.0)	3.2 (7.0)	
		9.5 (375)	25-30	215-235	3.9 (8.6)	3.4 (7.5)	
		Flat & Horizontal					
		10.8 (425)	26-31	230-260	4.4 (9.7)	3.8 (8.5)	
		12.1 (475)	27-32	250-280	4.9 (10.8)	4.3 (9.5)	
12.7 (500)	28-33	260-290	5.2 (11.4)	4.5 (10.0)			
0.052 in (1.3 mm), DC+ 75%-80% Ar/ balance CO ₂	25 (1)	All Position					86-88
		3.8 (150)	21-25	135-165	2.0 (4.5)	1.8 (3.9)	
		4.7 (185)	22-26	150-180	2.5 (5.5)	2.2 (4.8)	
		5.7 (225)	23-27	175-205	3.1 (6.7)	2.7 (5.9)	
		6.4 (250)	24-28	200-230	3.4 (7.5)	2.9 (6.5)	
		6.9 (275)	24-29	220-250	3.7 (8.2)	3.2 (7.2)	
		7.6 (300)	24-30	240-270	4.1 (9.0)	3.5 (7.8)	
		Flat & Horizontal					
		8.5 (335)	25-31	260-290	4.5 (10.0)	4.0 (8.7)	
		9.5 (375)	26-32	280-310	5.1 (11.2)	4.4 (9.8)	
10.2 (400)	26-33	295-325	5.4 (12.0)	4.7 (10.4)			
1/16 in (1.6 mm), DC+ 75%-80% Ar/ balance CO ₂	25 (1)	All Position					86-88
		3.8 (150)	22-26	185-215	2.9 (6.3)	2.5 (5.5)	
		4.4 (175)	23-27	195-225	3.3 (7.4)	2.9 (6.4)	
		5.1 (200)	24-29	220-250	3.8 (8.4)	3.3 (7.3)	
		5.7 (225)	24-29	250-280	4.3 (9.5)	3.7 (8.2)	
		6.4 (250)	24-30	270-300	4.8 (10.5)	4.2 (9.2)	
		6.9 (275)	26-31	300-330	5.3 (11.6)	4.6 (10.1)	
		Flat & Horizontal					
		8.3 (325)	27-32	320-350	6.2 (13.7)	5.4 (11.9)	
		8.9 (350)	28-33	350-380	6.7 (14.7)	5.8 (12.8)	

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾As-Welded 75%-80% Argon/Balance CO₂. ⁽⁵⁾To estimate ESO, subtract 1/4 in (6.0 mm) from CTWD.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Outershield® 71 Elite

Mild Steel, All Position

AWS E71T-1C-H8, E71T-9C-H8, E71T-1M-H8, E71T-9M-H8



Key Features

- ▶ Smooth arc transfer and low spatter
- ▶ Designed for welding with either 100% CO₂ or 75-82% Argon/balance CO₂ shielding gases
- ▶ Good bead appearance
- ▶ Fast freezing slag for out-of-position welding
- ▶ Meets AWS D1.8 seismic lot waiver requirements

Typical Applications

- ▶ Shipbuilding, barges and offshore platforms
- ▶ Heavy equipment
- ▶ Structural fabrication
- ▶ General fabrication

Welding Positions

All

Conformances

AWS A5.20/A5.20M: 2005
& ASME SFA-A5.20: E71T-1C-H8,
E71T-9C-H8,
E71T-1M-H8,
E71T-9M-H8

FEMA 353
AWS D1.8

Shielding Gas

100% CO₂
75 - 82% Argon/Balance CO₂
Flow Rate: 40 - 50 CFH

Note

- ▶ FEMA and AWS D1.8 structural steel seismic supplement test data can be found on this product at www.lincolnelectric.com.

DIAMETERS / PACKAGING

Diameter in (mm)	15 lb (7 kg) Plastic Spool 60 lb (28 kg) Carton	33 lb (15 kg) Steel Spool	60 lb (27 kg) Coil	600 lb (272 kg) Accu-Trak® Drum
0.045 (1.1)	ED029418	ED029201	ED029202	
0.052 (1.3)	ED029419	ED029204	ED029205	
1/16 (1.6)		ED029206	ED029207	ED029387

Outershield® 71 Elite

(AWS E71T-1C-H8, E71T-9C-H8, E71T-1M-H8, E71T-9M-H8)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf)	
				@ -18°C (0°F)	@ -29°C (-20°F)
Requirements AWS E71T-1C-H8 AWS E71T-9C-H8	400 (58) min.	485 (70) min.	22 min.	27 (20) min.	–
				–	27 (20) min.
Typical Performance⁽³⁾ As-Welded with 100% CO ₂ As-Welded with 75% Ar/25% CO ₂	545 - 565 (79 - 82) 585 - 595 (85 - 87)	585 - 615 (85 - 90) 625 - 630 (91 - 92)	28 25 - 28	74 - 83 (55 - 61) 92 - 99 (68 - 73)	58 - 64 (43 - 47) 70 - 83 (52 - 61)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	%C	%Mn	%Si	%S	%P
Requirements AWS E71T-1C-H8, E71T-9C-H8	0.180 max.	1.75 max.	0.900 max.	0.030 max.	0.030 max.
Typical Performance⁽³⁾ As-Welded with 100% CO ₂ As-Welded with 75% Ar/25% CO ₂	0.016 - 0.040 0.021 - 0.040	1.41 - 1.50 1.55 - 1.65	0.440 - 0.600 0.560 - 0.750	0.008 - 0.013 0.009 - 0.013	0.009 - 0.014 0.008 - 0.014

TYPICAL OPERATING PROCEDURES

Diameter, Polarity Shielding Gas	CTWD ⁽⁶⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)
0.045 in (1.1 mm) DC+ 100% CO ₂	19 (3/4)	4.5 (175)	22-25	130	1.7 (3.8)	1.5 (3.3)	87
		6.4 (250)	24-27	155	2.4 (5.4)	2.1 (4.7)	87
		7.6 (300)	25-28	180	2.9 (6.4)	2.5 (5.6)	87
		8.9 (350)	26-29	205	3.4 (7.6)	3.0 (6.6)	87
		10.2 (400)	27-30	230	4.0 (8.7)	3.5 (7.6)	87
		12.8 (500)	28-31	260	5.0 (10.9)	4.3 (9.5)	87
15.3 (600)	29-32	290	6.0 (13.1)	5.2 (11.4)	87		
0.052 in (1.3 mm) DC+ 100% CO ₂	19 (3/4)	3.8 (150)	22-25	150	2.1 (4.6)	1.8 (3.9)	86
		5.1 (200)	23-26	180	2.8 (6.1)	2.4 (5.2)	86
		6.4 (250)	24-27	210	3.4 (7.6)	3.0 (6.5)	86
		7.6 (300)	25-28	240	4.8 (10.6)	4.1 (9.1)	86
		10.2 (400)	27-29	315	6.2 (13.7)	5.4 (11.8)	86
		12.8 (500)	29-32	335	6.9 (15.2)	6.0 (13.1)	86
3/32 (2.4 mm) DC+ 100% CO ₂	19 (3/4)	3.2 (125)	22-25	190	2.4 (5.2)	2.0 (4.4)	85
		3.8 (150)	23-26	205	2.8 (6.2)	2.4 (5.3)	85
		5.1 (200)	23-27	240	3.8 (8.3)	3.2 (7.0)	85
		6.4 (250)	24-28	290	4.7 (10.3)	4.0 (8.8)	85
		7.6 (300)	25-29	325	5.6 (12.4)	4.8 (10.5)	85
		10.2 (400)	28-32	400	7.5 (16.5)	6.4 (14.0)	85

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾To estimate ESO, subtract 1/4 in (6.0 mm) from CTWD.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Outershield® 71 Supreme



Mild Steel, All Position
 AWS E491T-9C-H8, E491T-9M-H8

Key Features

- ▶ Designed to be used with either 100% CO₂ or 75% Argon/25% CO₂ gas
- ▶ Smooth, consistent arc performance
- ▶ The finished weld exhibits an extremely smooth bead appearance, even on out-of-position welds

Typical Applications

- ▶ Mining
- ▶ Offshore
- ▶ Bridge fabrication
- ▶ High strength fabrication
- ▶ Structural steel

Welding Positions

All

Conformances

AWS A5.20/A5.20M: 2005 E491T-9C-H8, E491T-9M-H8
 CWB/CSA W48-06: E491T-9-H8, E491T-9M-H8

Shielding Gas

75% Argon/25% CO₂
 100% CO₂
 Flow Rate: 40 - 50 CFH

Note

- ▶ This product is only sold in Canada.
- ▶ This product contains micro-alloying elements. Additional information available upon request.

DIAMETERS / PACKAGING

Diameter in (mm)	33 lb (15 kg) Spool	60 lb (27 kg) Coil	500 lb (227 kg) Accu-Trak® Drum	600 lb (272 kg) Accu-Trak® Drum
0.045 (1.1)	ED503040	ED503043	ED503046	
0.052 (1.3)	ED503041	ED503044	ED503047	
1/16 (1.6)	ED503042	ED503045		ED503048

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Outershield® 71 Supreme

(AWS E491T-9C-H8, E491T-9M-H8)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per CSA W48.06

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf) @ -29°C (-20°F)
Requirements				
CWB E491T-9-H8, E491T-9M-H8	400 (58) min.	490 (71) min.	22 min.	27 (20) min.
Test Results⁽³⁾				
100% CO ₂	595 (86)	640 (93)	26	98 (72)
75%Ar/25% CO ₂	645 (94)	700 (102)	25	119 (88)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per CSA W48.06

	%C	%Mn	%Si	%S	%P	%Ni
Requirements						
CWB E491T-9-H8, E491T-9M-H8	0.18 max.	1.75 max.	0.90 max.	0.03 max.	0.80 max.	0.50 max.
Test Results⁽³⁾						
100% CO ₂	0.04	1.43	0.43	0.01	0.01	0.02
75%Ar/25% CO ₂	0.03	1.64	0.68	0.01	0.01	0.02
	%Cr	%Mo	%V	%Cu	Diffusible Hydrogen (mL/100g)	
Requirements						
CWB E491T-9-H8, E491T-9M-H8	0.20 max.	0.30 max.	0.08 max.	0.35 max.	8.0 max.	
Test Results⁽³⁾						
100% CO ₂	0.04	0.02	0.03	0.04	8.0	
75%Ar/25% CO ₂	0.04	0.02	0.03	0.04	4.8	

TYPICAL OPERATING PROCEDURES – All Position

Diameter, Polarity Shielding Gas	CTWD ⁽⁴⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)
0.045 in (1.1 mm), DC+ 100% CO ₂	22 (7/8)	4.4-12.7 (175-500)	22-28	125-260	2.0-5.2 (4.5-11.3)	1.8-4.6 (4.0-10.05)	89
0.052 in (1.3 mm), DC+ 100% CO ₂	22 (7/8)	3.8-10.2 (150-400)	22-31	135-295	2.1-5.4 (4.6-12.0)	1.8-4.9 (4.0-10.07)	89
1/16 in (1.6 mm), DC+ 100% CO ₂	22 (7/8)	3.8-8.9 (150-350)	23-31	135-365	2.9-6.7 (6.4-14.7)	2.5-5.9 (5.6-13.1)	89

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾To estimate ESO, subtract 1/4 in (6.0 mm) from CTWD.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Outershield® 71M

Mild Steel, All Position

AWS E71T-1C, E71T-9C

Key Features

- ▶ Dual classified for both 100% CO₂ and mixed gas
- ▶ Charpy V-Notch impact toughness tested to -40°C (-40°F)
- ▶ High travel speeds
- ▶ Spray like transfer with minimal spatter
- ▶ Rod based manufacturing for industry leading wire stiffness and feedability

Typical Applications

- ▶ Bridge, ship, barge or offshore drilling rig construction
- ▶ General fabrication
- ▶ Machinery fabrication
- ▶ Structural fabrication

Welding Positions

All, except vertical down

Conformances

AWS A5.20/A5.20M: 2005 & ASME SFA-A5.20:	E71T-1C-H16, E71T-9C-H16
ABS:	3YSA H15
Lloyd's Register:	3YS H15
DNV Grade:	III YMS H10
BV Grade:	SA3YH (CO ₂ only)
CWB/CSA W48-06:	E491T-9 H16, E491T-9M H16
MIL-E-24403/1:	MIL-71T-1C, MIL-71T-1M

Shielding Gas

100% CO₂
75% Argon / 25% CO₂
Flow Rate: 40 - 50 CFH

Note

- ▶ This product contains micro-alloying elements. Additional information available upon request.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Outershield® 71M

(AWS E71T-1C, E71T-9C)

DIAMETERS / PACKAGING

Diameter in (mm)	10 lb (4.5 kg) Plastic Spool	25 lb (11 kg) Plastic Spool	33 lb (15 kg) Steel Spool	50 lb (23 kg) Coil
0.035 (0.9)	ED026804	ED026805		
0.045 (1.1)	ED020836	ED022659	ED030007	ED020844
0.052 (1.3)		ED022660	ED030008	ED020845
1/16 (1.6)		ED022661	ED030009	ED020846

Diameter in (mm)	300 lb (136 kg) Speed-Feed® Reel	500 lb (227 kg) Accu-Trak® Drum	600 lb (272 kg) Speed-Feed® Reel
0.035 (0.9)			
0.045 (1.1)		ED027364	
0.052 (1.3)		ED029778	
1/16 (1.6)	ED020848	ED029779	ED020851

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lb ^f)		
				@ -18°C (0°F)	@ -29°C (-20°F)	@ -40°C (-40°F)
Requirements						
AWS E71T-1C-J / E71T-1M-J	400 (58)	485 (70)	22	27 (20) min.	–	27 (20) min. ^(a)
AWS E71T-9C-J / E71T-9M-J	min.	min.	min.	–	27 (20) min.	27 (20) min. ^(a)
Typical Performance⁽³⁾						
As-Welded with 100% CO ₂ and 75% Ar/25% CO ₂	500 - 570 (72 - 83)	560 - 630 (81 - 91)	27 - 29	176 - 190 (130 - 140)	176 - 190 (130 - 140)	130 - 163 (96 - 120)

^(a)Electrodes with the optional supplemental designator "J" shall meet the minimum Charpy V-Notch impact energy requirement for its classification at a test temperature of 10°C lower than the test temperature for its classification.

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	%C	%Mn	%Si	%S	%P
Requirements					
AWS E71T-1C-J / E71T-1M-J	0.18	1.75	0.90	0.03	0.03
AWS E71T-9C-J / E71T-9M-J	max.	max.	max.	max.	max.
Typical Performance⁽³⁾					
As-Welded with 100% CO ₂ and 75% Ar/25% CO ₂	0.05-0.07	1.04-1.60	0.25-0.50	≤ 0.01	< 0.01

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Outershield® 71M

(AWS E71T-1C, E71T-9C)

TYPICAL OPERATING PROCEDURES

Diameter, Polarity Shielding Gas	CTWD ⁽¹⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)
0.035 in (0.9 mm) DC+ 100% CO ₂ and 75% Argon/25% CO ₂	19-25 (3/4-1)	5.1 (200)	20-23	85	1.3 (2.8)	1.1 (2.4)	85
		6.4 (250)	21-24	100	1.6 (3.5)	1.4 (2.8)	85
		7.6 (300)	22-25	115	1.9 (4.2)	1.6 (3.4)	86
		8.9 (350)	23-26	130	2.2 (4.9)	1.9 (4.0)	86
		10.2 (400)	24-27	145	2.5 (5.6)	2.2 (4.6)	86
		12.7 (500)	26-30	170	3.1 (6.9)	2.7 (5.7)	86
		15.2 (600)	28-32	190	3.8 (8.4)	3.3 (7.1)	86
		17.8 (700)	30-34	210	4.4 (9.8)	3.8 (8.2)	86
0.045 in (1.1 mm) DC+ 100% CO ₂ and 75% Argon/25% CO ₂	19-25 (3/4-1)	5.1 (200)	23-26	155	2.1 (4.6)	1.8 (4.0)	83
		6.4 (250)	24-27	175	2.6 (5.8)	2.3 (5.0)	84
		7.6 (300)	25-28	190	3.1 (6.9)	2.7 (5.9)	84
		8.9 (350)	26-29	210	3.6 (8.0)	3.1 (6.9)	84
		10.2 (400)	27-30	225	4.2 (9.2)	3.6 (7.9)	84
		12.7 (500)	28-31	255	5.2 (11.5)	4.5 (9.9)	84
		15.2 (600)	30-33	285	6.3 (13.8)	5.4 (11.9)	85
		17.8 (700)	32-35	315	7.3 (16.0)	6.3 (13.9)	85
0.052 in (1.3 mm) DC+ 100% CO ₂ and 75% Argon/25% CO ₂	19-25 (3/4-1)	3.8 (150)	23-26	175	2.1 (4.6)	1.8 (3.9)	81
		5.1 (200)	24-27	205	2.8 (6.1)	2.4 (5.2)	83
		6.4 (250)	25-28	235	3.4 (7.6)	3.0 (6.5)	83
		7.6 (300)	26-29	260	4.1 (9.1)	3.6 (7.9)	84
		8.9 (350)	27-30	285	4.8 (10.6)	4.2 (9.2)	84
		11.4 (450)	28-31	330	6.2 (13.7)	5.4 (11.8)	85
		12.7 (500)	30-33	350	6.9 (15.2)	6.0 (13.2)	85
		15.2 (600)	31-34	390	8.3 (18.2)	7.2 (15.8)	85
1/16 in (1.6 mm) DC+ 100% CO ₂ and 75% Argon/25% CO ₂	19-25 (3/4-1)	3.2 (125)	24-27	195	2.4 (5.4)	2.1 (4.6)	82
		3.8 (150)	24-27	215	3.0 (6.5)	2.5 (5.5)	82
		5.1 (200)	25-28	250	3.9 (8.6)	3.3 (7.3)	83
		6.4 (250)	26-29	290	4.9 (10.8)	4.2 (9.2)	83
		7.6 (300)	27-30	320	5.9 (13.0)	5.0 (11.0)	84
		10.2 (400)	30-33	385	7.9 (17.3)	6.7 (14.7)	84
		12.7 (500)	34-37	440	9.8 (21.6)	8.4 (18.4)	84

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾To estimate ESO, subtract 1/4 in (6.0 mm) from CTWD.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Pipelinex® G70M

Mild Steel, All Position
AWS E71T-1M-JH8, E71T-9M-JH8

Key Features

- ▶ Hot, fill and cap pass welding on up to X70 grade pipe
- ▶ Capable of producing weld deposits with impact toughness exceeding 27 J (20 ft•lbf) at -40°C (-40°F)
- ▶ Q2 Lot® - Certificate showing actual deposit chemistry available online
- ▶ High deposition rates
- ▶ ProTech® hermetically sealed packaging

Typical Applications

- ▶ Hot, fill and cap pass welding on up to X70 grade pipe

Welding Positions

All

Conformances

AWS A5.20/A5.20M: 2005
& ASME SFA-A5.20: E71T-1M-JH8,
E71T-9M-JH8

Shielding Gas

75 - 80% Argon/Balance CO₂
Flow Rate: 40 - 50 CFH

Note

- ▶ This product contains micro-alloying elements. Additional information available upon request.

DIAMETERS / PACKAGING

Diameter in (mm)	10 lb (4.5 kg) Plastic Spool Vacuum Sealed Foil Bag	25 lb (11 kg) Plastic Spool Vacuum Sealed Foil Bag
0.045 (1.1)	ED030926	ED030927

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Pipeliner® G70M

(AWS E71T-1M-JH8, E71T-9M-JH8)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lb/ft) @ -40°C (-40°F)
Requirements AWS E71T-1M-JH8, E71T-9M-JH8	400 (58) min.	485 (70) min.	22 min.	27 (20) min.
Typical Performance⁽³⁾ As-Welded with 75-80% Ar/balance CO ₂	550 - 580 (80 - 84)	635 - 655 (92 - 95)	25 - 27	119 -130 (88 - 96)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	%C	%Mn	%Si	%P
Requirements AWS E71T-1M-JH8, E71T-9M-JH8	0.18 max.	1.75 max.	0.90 max.	0.03 max.
Typical Performance⁽³⁾ As-Welded with 75-80% Ar/balance CO ₂	0.04 - 0.06	1.43 - 1.50	0.35 - 0.40	0.009 - 0.02
	%S	%Ni	Diffusible Hydrogen (mL/100g weld deposit)	
Requirements AWS E71T-1M-JH8, E71T-9M-JH8	0.03 max.	0.50 max.	8.0 max.	
Typical Performance⁽³⁾ As-Welded with 75-80% Ar/balance CO ₂	0.01 - 0.02	0.34 - 0.36	4 - 8	

TYPICAL OPERATING PROCEDURES

Diameter, Polarity Shielding Gas	CTWD mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)
0.045 in (1.1 mm) DC+ 75-80% Ar/balance CO ₂	25 (1)	4.4-10.2 (175-400)	23-30	130-275	1.8-5.4 (3.9-11.9)

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

UltraCore® 70C



Mild Steel, Flat & Horizontal
AWS E70T-1C-H8, E70T-9C-H8

Key Features

- ▶ High deposition in the flat and horizontal positions
- ▶ Low fume generation rates
- ▶ Designed for welding with 100% CO₂ shielding gas
- ▶ Premium arc performance and bead appearance
- ▶ ProTech® foil bag packaging

Typical Applications

- ▶ Structural fabrication
- ▶ Heavy equipment
- ▶ Shipbuilding

Welding Positions

Flat & Horizontal

Conformances

AWS A5.20/A5.20M: 2005
& ASME SFA-A5.20: E70T-1C-H8, E70T-9C,
E70T-9C-H8
CWB/CSA W48-06: E492T-9 H8
FEMA 353:
AWS D1.8:

Shielding Gas

100% CO₂
Flow Rate: 40-55 CFH

Note

- ▶ This product contains micro-alloying elements. Additional information available upon request.

DIAMETERS / PACKAGING

Diameter in (mm)	50 lb (22.7 kg) Coil (Vacuum Sealed Foil Bag)	50 lb (226.8 kg) Accu-Trak® Drum	500 lb (226.8 kg) Speed-Feed® Drum
1/16 (1.6)	ED032978	ED033064	
5/64 (2.0)	ED032977		ED033065
3/32 (2.4)	ED032941		ED033066

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

UltraCore® 70C

(AWS E70T-1C-H8, E70T-9C-H8)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf)	
				@ -18°C (0°F)	@ -29°C (-20°F)
Requirements⁽⁴⁾ AWS E70T-1C-H8 AWS E70T-9C-H8	400 (58) min.	480 - 655 (70 - 95)	22 min.	27 (20) min.	27 (20) min.
Typical Performance⁽³⁾ As-Welded with 100% CO ₂	485 - 520 (70 - 75)	555 - 590 (81 - 86)	28 - 30	47 - 72 (35 - 53)	28 - 47 (21 - 35)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	%C	%Mn	%Si	%S	%P	Diffusible Hydrogen
						(mL/100g weld deposit)
Requirements⁽⁴⁾ AWS E70T-1C-H8 AWS E70T-9C-H8	0.12 max.	1.75 max.	0.90 max.	0.03 max.	0.03 max.	8.0 max.
Typical Performance⁽³⁾ As-Welded with 100% CO ₂	0.04 - 0.05	1.46 - 1.59	0.54 - 0.59	≤ 0.01	≤ 0.01	5 - 8

TYPICAL OPERATING PROCEDURES – Flat & Horizontal

Diameter, Polarity Shielding Gas	CTWD ⁽⁵⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)
1/16 in (1.6 mm), DC+ 100% CO ₂	25 (1)	3.2 (125)	23-27	160-180	2.4 (5.3)	2.1 (4.7)	84 - 89
		5.1 (200)	24-28	215-235	3.8 (8.4)	3.2 (7.1)	
		6.4 (250)	25-30	250-270	4.8 (10.5)	4.1 (9.0)	
		7.6 (300)	27-31	270-290	5.7 (12.6)	4.9 (10.8)	
		9.5 (375)	28-32	310-330	7.1 (15.7)	6.1 (13.5)	
5/64 in (2.0 mm), DC+ 100% CO ₂	25 (1)	3.2 (125)	23-27	220-240	3.8 (8.4)	3.2 (7.1)	84 - 88
		4.4 (175)	24-29	295-315	5.4 (11.8)	4.6 (10.1)	
		5.7 (225)	25-30	355-375	6.8 (15.0)	5.9 (13.0)	
		6.4 (250)	26-32	375-395	7.7 (16.9)	6.5 (14.3)	
		7.6 (300)	27-33	410-430	9.0 (19.8)	7.8 (17.2)	
3/32 in (2.4 mm), DC+ 100% CO ₂	25 (1)	3.2 (125)	26-33	340-360	5.4 (11.9)	4.7 (10.3)	87 - 89
		5.1 (200)	27-34	490-510	8.6 (19.0)	7.6 (16.7)	
	31 (1 1/4)	6.4 (250)	29-35	560-580	10.6 (23.3)	9.4 (20.8)	
		7.6 (300)	31-37	620-640	13.1 (28.8)	11.4 (25.1)	
		8.3 (325)	32-38	710-730	14.3 (31.5)	12.4 (27.2)	

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾As-Welded with 100% CO₂. ⁽⁵⁾To estimate ESO, subtract 1/4 in (6.0 mm) from CTWD.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

UltraCore® 75C

Mild Steel, Flat & Horizontal
AWS E70T-5C-JH4

Key Features

- ▶ High deposition in the flat and horizontal positions
- ▶ H4 diffusible hydrogen levels
- ▶ Designed for welding with 100% CO₂ shielding gas
- ▶ Premium arc performance and bead appearance
- ▶ ProTech® foil bag packaging

Typical Applications

- ▶ Highly restrained joints
- ▶ Hard to weld base metals
- ▶ Thick steel sections in structural fabrication
- ▶ Heaving equipment
- ▶ Mining

Welding Positions

Flat & Horizontal

Conformances

AWS A5.20/A5.20M: 2005	E70T-5C-JH4
ASME SFA-A5.20:	E70T-5C-JH4
CWB/CSA W48-06:	E492T-5J H4

Shielding Gas

100% CO₂
Flow Rate: 40-55 CFH

DIAMETERS / PACKAGING

Diameter in (mm)	50 lb (22.7 kg) Coil (Vacuum Sealed Foil Bag)
1/16 (1.6)	ED032974
5/64 (2.0)	ED032975
3/32 (2.4)	ED032940

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

UltraCore® 75C

(AWS E70T-5C-JH4)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	Yield Strength ⁽²⁾	Tensile Strength	Elongation	Charpy V-Notch	
	MPa (ksi)	MPa (ksi)	%	J (ft•lbf) @ -29°C (-20°F)	@ -40°C (-40°F)
Requirements⁽⁴⁾ AWS E70T-5C-JH4	400 (58) min.	480 - 655 (70 - 95)	22 min.	27 (20) min.	27 (20) min.
Typical Performance⁽³⁾ As-Welded with 100% CO ₂	465 - 510 (68 - 74)	545 - 580 (79 - 84)	29 - 32	91 - 142 (67 - 105)	53 - 113 (39 - 83)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	%C	%Mn	%Si	%S	%P	Diffusible Hydrogen
	(mL/100g weld deposit)					
Requirements⁽⁴⁾ AWS E70T-5C-JH4	0.12 max.	1.75 max.	0.90 max.	0.03 max.	0.03 max.	4.0 max.
Typical Performance⁽³⁾ As-Welded with 100% CO ₂	0.06 - 0.08	1.51 - 1.66	0.44 - 0.53	0.01	0.01	2 - 4

TYPICAL OPERATING PROCEDURES – Flat & Horizontal

Diameter, Polarity Shielding Gas	CTWD ⁽⁵⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)
1/16 in (1.6 mm), DC+ 100% CO ₂	19-25 (3/4-1)	5.1 (200)	29-34	220-240	3.6-4.5 (8-10)	2.7-3.6 (6-8)	76-86
		6.4 (250)	31-36	260-280	4.5-5.4 (10-12)	3.6-4.5 (8-10)	
		7.62 (300)	32-37	285-305	5.4-6.3 (12-14)	4.1-5.0 (9-11)	
		8.89 (350)	33-38	325-345	6.3-7.2 (14-16)	5.0-5.9 (11-13)	
		10.16 (400)	33-38	350-370	7.2-8.1 (16-18)	5.9-6.8 (13-15)	
		11.43 (450)	34-39	375-395	8.6-9.5 (19-21)	6.8-7.7 (15-17)	
12.7 (500)	35-40	405-425	9.5-10.4 (21-23)	8.2-9.1 (18-20)			
5/64 in (2.0 mm), DC+ 100% CO ₂	25-32 (1-1 1/4)	5.1 (200)	29-34	285-305	5.4-6.3 (12-14)	4.5-5.4 (10-12)	82-86
		6.4 (250)	30-35	335-355	6.8-7.7 (15-17)	5.4-6.4 (12-14)	
		7.62 (300)	32-37	380-400	8.2-9.1 (18-20)	6.8-7.7 (15-17)	
		8.89 (350)	33-38	415-435	9.5-10.4 (21-23)	8.2-9.1 (18-20)	
		10.16 (400)	34-39	455-475	10.9-11.8 (24-26)	9.5-10.4 (21-23)	
3/32 in (2.4 mm), DC+ 100% CO ₂	32 (1-3/8)	3.2 (125)	23-28	320-350	5.0-5.9 (11-13)	4.5-5.4 (10-12)	87-90
		5.1 (200)	27-32	435-455	8.2-9.1 (18-20)	7.3-8.2 (16-18)	
		6.4 (250)	29-34	490-510	10.4-11.3 (23-25)	9.1-10.0 (20-22)	
		7.62 (300)	31-36	580-600	12.7-13.6 (28-30)	11.3-12.2 (25-27)	
		8.3 (325)	32-37	595-615	13.6-14.5 (30-32)	12.2-13.2 (27-29)	

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾As-Welded with 100% CO₂. ⁽⁵⁾To estimate ESO, subtract 1/4 in (6.0 mm) from CTWD.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Outershield® 70

Mild Steel, Flat & Horizontal

AWS E70T-1C, E70T-9C

Key Features

- ▶ High deposition in the flat and horizontal positions
- ▶ Designed for welding with 100% CO₂ shielding gas
- ▶ Excellent bead wetting and low spatter
- ▶ Tolerates mild levels of surface contaminants
- ▶ Stiff wire for easy breaking

Typical Applications

- ▶ Structural fabrication
- ▶ Barge fabrication
- ▶ Heavy fabrication
- ▶ Construction equipment

Welding Positions

Flat & Horizontal

Conformances

AWS A5.20/A5.20M: 2005
& ASME SFA-A5.20:

E70T-1C-H16,
E70T-9C-H16

ABS:
DNV Grade:
CWB/GSA W48-06:
TUV:

2YSA
II YMS H15
E492T-9 H16
EN 758 T 46 0 R C3 /
M3 H10

MIL-E-24403/1:

MIL-70T-1C

Shielding Gas

100% CO₂
Flow Rate: 40-50 CFH

Note

- ▶ This product contains micro-alloying elements. Additional information available upon request.

DIAMETERS / PACKAGING

Diameter in (mm)	50 lb (23 kg) Coil	600 lb (272 kg) Speed-Feed® Reel	600 lb (272 kg) Speed-Feed® Drum
1/16 (1.6)	ED012782	ED014588	
5/64 (2.0)	ED012785		
3/32 (2.4)	ED012784	ED014120	ED030262

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Outershield® 70

(AWS E70T-1C, E70T-9C)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf)	
				@ -18°C (0°F)	@ -29°C (-20°F)
Requirements AWS E70T-1C AWS E70T-9C	400 (58) min.	485 (70) min.	22 min.	27 (20) min. –	– 27 (20) min.
Typical Performance⁽³⁾ As-Welded with 100% CO ₂	525 - 575 (76 - 83)	620 - 635 (90 - 92)	27 - 28	39 - 42 (29 - 31)	31 - 34 (21 - 25)
Stress Relieved with 100% CO ₂ for 1 hr @ 621°C (1150°F)	525 (76)	555 (80)	27 - 28	27 (20)	24 (18)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.20/A5.20M: 2005

	%C	%Mn	%Si	%S	%P
Requirements AWS E70T-1C, E70T-9C	0.180 max.	1.75 max.	0.900 max.	0.030 max.	0.030 max.
Typical Performance⁽³⁾ As-Welded with 100% CO ₂	0.080 - 0.084	1.41 - 1.43	0.640 - 0.730	0.010 - 0.011	0.009 - 0.010

TYPICAL OPERATING PROCEDURES

Diameter, Polarity Shielding Gas	CTWD ⁽⁵⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)
1/16 in (1.6 mm), DC+ 100% CO ₂	25 (1)	3.2 (125)	23-25	170	2.4 (5.3)	2.1 (4.6)	87
		5.1 (200)	25-27	235	3.8 (8.5)	3.4 (7.6)	87
		6.4 (250)	25-28	275	4.8 (10.6)	4.2 (9.2)	87
		7.6 (300)	27-29	310	5.8 (2.7)	5.0 (11.1)	87
		9.5 (375)	29-31	365	7.2 (15.9)	6.4 (14.0)	88
5/64 in (2.0 mm), DC+ 100% CO ₂	28 (1-1/8)	3.2 (125)	23-26	250	3.8 (8.4)	3.2 (7.0)	83
		4.4 (175)	26-28	350	5.4 (11.8)	4.5 (10.0)	85
		5.7 (225)	27-29	375	6.9 (15.2)	5.9 (13.0)	86
		6.4 (250)	29-31	400	7.7 (16.9)	6.5 (14.4)	86
		7.6 (300)	30-32	450	9.2 (20.2)	7.9 (17.4)	86
8.3 (325)	31-33	470	9.9 (21.9)	8.5 (18.8)	86		
3/32 in (2.4 mm), DC+ 100% CO ₂	32 (1-1/4)	3.2 (125)	24-27	335	5.3 (11.7)	4.4 (9.8)	84
		5.1 (200)	28-31	455	8.5 (18.6)	7.3 (16.0)	86
		6.4 (250)	30-32	530	10.6 (23.3)	9.2 (20.2)	87
		7.6 (300)	31-34	590	12.7 (28.0)	11.0 (24.3)	87
		8.3 (325)	33-35	615	13.7 (30.3)	12.0 (26.4)	87

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾To estimate ESO, subtract 1/4 in (6.0 mm) from CTWD.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

UltraCore® 81Ni1A75-H



Low Alloy, All Position
AWS E81T1-Ni1M-JH4

Key Features

- ▶ Capable of producing weld deposits with impact toughness exceeding 88 - 123 J (65 - 91 ft•lbf) at -40°C (-40°F)
- ▶ Designed for welding with 75-85% Argon/balance CO₂ shielding gas
- ▶ Premium arc performance and bead appearance
- ▶ Meets AWS D1.8 seismic lot waiver requirements
- ▶ ProTech® foil bag packaging

Typical Applications

- ▶ Bridge fabrication
- ▶ Weathering steels
- ▶ Offshore
- ▶ Structural fabrication
- ▶ NACE applications

Welding Positions

All

Conformances

- AWS A5.29/A5.29M: 2005
ASME SFA-A5.29: E81T1-Ni1M-JH4
E81T1-Ni1M-JH4
4YQ460SA H5
ABS: 4Y46S H5
Lloyd's Register: IV 46MS H5
DNV Grade: E551T1-Ni1M-JH4
CWB/CSA W48-06: (E81T1-Ni1M-JH4)
- FEMA 353:
AWS D1.8:

Shielding Gas

75% - 85% Argon/Balance CO₂
Flow Rate: 40-50 CFH

Notes

- ▶ FEMA and AWS D1.8 structural steel seismic supplement test data can be found on this product at www.lincolnelectric.com.
- ▶ This product contains micro-alloying elements. Additional information available upon request.

DIAMETERS / PACKAGING

Diameter in (mm)	33 lb (15 kg) Plastic Spool (Foil Bag)
0.045 (1.1)	ED032206
0.052 (1.3)	ED032279
1/16 (1.6)	ED032207

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf)	
				@ -29°C (-20°F)	@ -40°C (-40°F)
Requirements⁽⁴⁾ AWS E81T1-Ni1M-JH4	470 (68) min.	550 - 690 (80 - 100)	19 min.	27 (20) min.	27 (20) min.
Typical Performance⁽³⁾ As-Welded with 75% Ar/25% CO ₂	545 - 595 (79 - 86)	595 - 640 (86 - 93)	24 - 28	107 - 142 (79 - 105)	88 - 123 (65 - 91)

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

UltraCore® 81Ni1A75-H

(AWS E81T1-Ni1M-JH4)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	%C	%Mn	%Si	%S	%P
Requirements⁽⁴⁾ AWS E81T1-Ni1M-JH4	0.12 max.	1.50 max.	0.80 max.	0.030 max.	0.030 max.
Typical Performance⁽³⁾ As-Welded with 75% Ar/25% CO ₂	0.04 - 0.05	1.26 - 1.36	0.25 - 0.29	0.006 - 0.009	0.005 - 0.008
	Diffusible Hydrogen (mL/100g weld deposit)				
	%Ni	%Mo	%Cr	%V	
Requirements⁽⁴⁾ AWS E81T1-Ni1M-JH4	0.80 - 1.10	0.35 max.	0.15 max.	0.05 max.	4.0 max.
Typical Performance⁽³⁾ As-Welded with 75% Ar/25% CO ₂	0.86 - 0.96	0.01	0.04 - 0.05	0.02 - 0.03	2 - 4

TYPICAL OPERATING PROCEDURES

Diameter, Polarity Shielding Gas	CTWD ⁽⁶⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)	
0.045 in (1.1 mm), DC+ 75%-85% Ar/ balance CO ₂	25 (1)	All Position						86-88
		4.4 (175)	22-27	125-155	1.8 (4.0)	1.6 (3.5)		
		5.1 (200)	23-28	135-165	2.1 (4.6)	1.8 (4.0)		
		6.4 (250)	24-29	150-180	2.6 (5.7)	2.3 (5.0)		
		7.6 (300)	24-29	175-205	3.1 (6.8)	2.7 (6.0)		
		8.9 (350)	25-30	190-220	3.6 (8.0)	3.2 (7.0)		
		9.5 (375)	25-30	215-235	3.9 (8.6)	3.4 (7.5)		
		Flat & Horizontal						
		10.8 (425)	26-31	230-260	4.4 (9.7)	3.8 (8.5)		
		12.1 (475)	27-32	250-280	4.9 (10.8)	4.3 (9.5)		
		12.7 (500)	28-33	260-290	5.2 (11.4)	4.5 (10.0)		
		0.052 in (1.3 mm), DC+ 75%-85% Ar/ balance CO ₂	25 (1)	All Position				
3.8 (150)	22-27			135-165	2.0 (4.5)	1.8 (3.9)		
4.7 (185)	23-28			150-180	2.5 (5.5)	2.2 (4.8)		
5.7 (225)	23-28			175-205	3.1 (6.7)	2.7 (5.9)		
6.4 (250)	24-29			200-230	3.4 (7.5)	2.9 (6.5)		
7.0 (275)	24-29			220-250	3.7 (8.2)	3.2 (7.2)		
7.6 (300)	25-30			240-270	4.1 (9.0)	3.5 (7.8)		
Flat & Horizontal								
8.5 (335)	25-31			260-290	4.5 (10.0)	4.0 (8.7)		
9.5 (375)	26-32			280-310	5.1 (11.2)	4.4 (9.8)		
10.2 (400)	26-33			295-325	5.4 (12.0)	4.7 (10.4)		
1/16 in (1.6 mm), DC+ 75%-85% Ar/ balance CO ₂	25 (1)			All Position				
		3.8 (150)	22-27	185-215	2.9 (6.3)	2.5 (5.5)		
		4.4 (175)	23-28	195-225	3.3 (7.4)	2.9 (6.4)		
		5.1 (200)	24-29	220-250	3.8 (8.4)	3.3 (7.3)		
		5.7 (225)	24-29	250-280	4.3 (9.5)	3.7 (8.2)		
		6.5 (250)	25-30	270-300	4.8 (10.5)	4.2 (9.2)		
		7.0 (275)	25-31	300-330	5.3 (11.6)	4.6 (10.1)		
		Flat & Horizontal						
		8.3 (325)	26-32	320-350	6.2 (13.7)	5.4 (11.9)		
		8.9 (350)	27-33	350-380	6.7 (14.7)	5.8 (12.8)		

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾As-Welded with 75% Argon / 25% CO₂. ⁽⁵⁾To estimate ESO, subtract 1/4 in (6.0 mm) from CTWD.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

UltraCore® 81Ni1C-H



Low Alloy, All Position
AWS E81T1-Ni1C-JH4

Key Features

- ▶ Capable of producing weld deposits with impact toughness exceeding 84 - 130 J (62 - 96 ft•lbf) at -40°C (-40°F)
- ▶ Designed for welding with 100% CO₂ shielding gas
- ▶ Premium arc performance and bead appearance
- ▶ Meets AWS D1.8 seismic lot waiver requirements
- ▶ ProTech® foil bag packaging

Typical Applications

- ▶ Bridge fabrication
- ▶ Weathering steels
- ▶ Offshore
- ▶ Structural fabrication
- ▶ NACE applications

Welding Positions

All

Conformances

AWS A5.29/A5.29M: 2005
ASME SFA-A5.29: E81T1-Ni1C-JH4
E81T1-Ni1C-JH4
4YQ460SA H5
ABS: 4Y46S H5
Lloyd's Register: IV Y46MS H5
DNV Grade: E551T1-Ni1C-JH4
CWB/CSA W48-06: (E81T1-Ni1C-JH4)

FEMA 353:
AWS D1.8:

Shielding Gas

100% CO₂
Flow Rate: 40-50 CFH

Notes

- ▶ FEMA and AWS D1.8 structural steel seismic supplement test data can be found on this product at www.lincolnelectric.com.
- ▶ This product contains micro-alloying elements. Additional information available upon request.

DIAMETERS / PACKAGING

Diameter in (mm)	33 lb (15 kg) Plastic Spool (Foil Bag)
0.045 (1.1)	ED032204
0.052 (1.3)	ED032280
1/16 (1.6)	ED032205

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf)	
				@ -29°C (-20°F)	@ -40°C (-40°F)
Requirements⁽⁴⁾ AWS E81T1-Ni1C-JH4	470 (68) min.	550 - 690 (80 - 100)	19 min.	27 (20) min.	27 (20) min.
Typical Performance⁽³⁾ As-Welded with 100% CO ₂	540 - 585 (78 - 84)	595 - 635 (86 - 91)	25 - 28	111 - 152 (82 - 112)	84 - 130 (62 - 96)

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

UltraCore[®] 81Ni1C-H

(AWS E81T1-Ni1C-JH4)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	%C	%Mn	%Si	%S	%P
Requirements⁽⁴⁾ AWS E81T1-Ni1C-JH4	0.12 max.	1.50 max.	0.80 max.	0.030 max.	0.030 max.
Typical Performance⁽³⁾ As-Welded with 100% CO ₂	0.04 - 0.05	1.24 - 1.34	0.27 - 0.31	0.006 - 0.007	0.007 - 0.009
	%Ni	%Mo	%Cr	%V	Diffusible Hydrogen (mL/100g weld deposit)
Requirements⁽⁴⁾ AWS E81T1-Ni1C-JH4	0.80 - 1.10	0.35 max.	0.15 max.	0.05 max.	4.0max.
Typical Performance⁽³⁾ As-Welded with 100% CO ₂	0.88 - 0.99	0.01	0.04 - 0.05	0.02 - 0.03	3 - 4

TYPICAL OPERATING PROCEDURES

Diameter, Polarity Shielding Gas	CTWD ⁽⁵⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)	
0.045 in (1.1 mm), DC+ 100% CO ₂	25 (1)	All Position						86-88
		4.4 (175)	23-28	125-155	1.8 (4.0)	1.6 (3.5)		
		5.1 (200)	24-29	135-165	2.1 (4.6)	1.8 (4.0)		
		6.4 (250)	25-30	150-180	2.6 (5.7)	2.3 (5.0)		
		7.6 (300)	25-30	175-205	3.1 (6.8)	2.7 (6.0)		
		8.9 (350)	26-31	190-220	3.6 (8.0)	3.2 (7.0)		
		9.5 (375)	26-31	215-235	3.9 (8.6)	3.4 (7.5)		
		Flat & Horizontal						
		10.8 (425)	27-32	230-260	4.4 (9.7)	3.8 (8.5)		
		12.1 (475)	28-33	250-280	4.9 (10.8)	4.3 (9.5)		
12.7 (500)	29-34	260-290	5.2 (11.4)	4.5 (10.0)				
0.052 in (1.3 mm), DC+ 100% CO ₂	25 (1)	All Position						86-88
		3.8 (150)	23-28	135-165	2.0 (4.5)	1.8 (3.9)		
		4.7 (185)	24-29	150-180	2.5 (5.5)	2.2 (4.8)		
		5.7 (225)	24-29	175-205	3.1 (6.7)	2.7 (5.9)		
		6.4 (250)	25-30	200-230	3.4 (7.5)	2.9 (6.5)		
		7.0 (275)	25-30	220-250	3.7 (8.2)	3.2 (7.2)		
		7.6 (300)	26-31	240-270	4.1 (9.0)	3.5 (7.8)		
		Flat & Horizontal						
		8.5 (335)	26-31	260-290	4.5 (10.0)	4.0 (8.7)		
		9.5 (375)	27-32	280-310	5.1 (11.2)	4.4 (9.8)		
10.2 (400)	27-34	295-325	5.4 (12.0)	4.7 (10.4)				
1/16 in (1.6 mm), DC+ 100% CO ₂	25 (1)	All Position						86-88
		3.8 (150)	24-29	185-215	2.9 (6.3)	2.5 (5.5)		
		4.4 (175)	24-30	195-225	3.3 (7.4)	2.9 (6.4)		
		5.1 (200)	25-30	220-250	3.8 (8.4)	3.3 (7.3)		
		5.7 (225)	25-31	250-280	4.3 (9.5)	3.7 (8.2)		
		6.4 (250)	26-31	270-300	4.8 (10.5)	4.2 (9.2)		
		7.0 (275)	26-32	290-320	5.3 (11.6)	4.6 (10.1)		
		Flat & Horizontal						
		8.3 (325)	27-32	320-350	6.2 (13.7)	5.4 (11.9)		
		8.9 (350)	28-34	350-380	6.7 (14.7)	5.8 (12.8)		

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾As-Welded with 100% CO₂. ⁽⁵⁾To estimate ESO, subtract 1/4 in (6.0 mm) from CTWD.

UltraCore[®] 81Ni2A75-H

Low Alloy, All Position

AWS E81T1-Ni2M-JH4

Key Features

- ▶ Capable of producing weld deposits with impact toughness exceeding 41 - 89 J (30 - 66 ft•lbf) at -51°C (-60°F)
- ▶ Designed for welding with 75-85% Argon/balance CO₂ shielding gas
- ▶ Premium arc performance and bead appearance
- ▶ H4 diffusible hydrogen levels
- ▶ ProTech[®] foil bag packaging

Typical Applications

- ▶ Mining
- ▶ Offshore
- ▶ Bridge fabrication
- ▶ High strength fabrication

Welding Positions

All

Conformances

AWS A5.29/A5.29M: 2005	E81T1-Ni2M-JH4
ASME SFA-A5.29:	E81T1-Ni2M-JH4
ABS:	3YSA H5
Lloyd's Register:	3YS H5
DNV Grade:	III Y40MS H5
CWB/CSA W48-06:	E551T1-Ni2M-JH4 (E81T1-Ni2M-JH4)

Shielding Gas

75% - 85% Argon/Balance CO₂
Flow Rate: 40-55 CFH

Note

- ▶ This product contains micro-alloying elements. Additional information available upon request.

DIAMETERS / PACKAGING

Diameter in (mm)	33 lb (15 kg) Plastic Spool (Foil Bag)	
	0.045 (1.1)	ED032217
0.052 (1.3)	ED032277	
1/16 (1.6)	ED032216	

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf)	
				@ -40°C (-40°F)	@ -51°C (-60°F)
Requirements⁽⁴⁾ AWS E81T-1Ni2M-JH4	470 (68) min.	550-670 (80 - 100)	19 min.	27 (20) min.	27 (20) min.
Typical Performance⁽³⁾ As-Welded with: 75% Ar/25% CO ₂	555 - 580 (80 - 84)	615 - 635 (89 - 92)	25 - 28	69 - 115 (51 - 85)	41 - 89 (30 - 66)

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

UltraCore® 81Ni2A75-H

(AWS E81T1-Ni2M-JH4)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	%C	%Mn	%Si	%S
Requirements⁽⁴⁾ AWS E81T1-Ni2M-JH4	0.12 max.	1.50 max.	0.80 max.	0.030 max.
Typical Performance⁽³⁾ As-Welded with 75% Ar/25% CO ₂	0.04 - 0.05	0.93 - 1.05	0.25 - 0.28	0.005 - 0.006
	%P	%Ni	Diffusible Hydrogen (mL/100g weld deposit)	
Requirements⁽⁴⁾ AWS E81T1-Ni2M-JH4	0.030 max.	1.75 - 2.75	4.0 max.	
Typical Performance⁽³⁾ As-Welded with 75% Ar/25% CO ₂	0.006 - 0.008	2.01 - 2.13	3 - 4	

TYPICAL OPERATING PROCEDURES

Diameter, Polarity Shielding Gas	CTWD ⁽⁵⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)	
0.045 in (1.1 mm), DC+ 75%-85% Ar/ balance CO ₂	25 (1)	All Position						86-88
		4.4 (175)	21-26	125-155	1.8 (4.0)	1.6 (3.5)		
		5.1 (200)	22-27	135-165	2.1 (4.6)	1.8 (4.0)		
		6.4 (250)	22-27	150-180	2.6 (5.7)	2.3 (5.0)		
		7.6 (300)	23-28	175-205	3.1 (6.8)	2.7 (6.0)		
		8.9 (350)	24-29	190-220	3.6 (8.0)	3.2 (7.0)		
		9.5 (375)	24-29	215-235	3.9 (8.6)	3.4 (7.5)		
		Flat & Horizontal						
		10.8 (425)	25-30	230-260	4.4 (9.7)	3.8 (8.5)		
		12.1 (475)	26-31	250-280	4.9 (10.8)	4.3 (9.5)		
12.7 (500)	27-32	260-290	5.2 (11.4)	4.5 (10.0)				
0.052 in (1.3 mm), DC+ 75%-85% Ar/ balance CO ₂	25 (1)	All Position						86-88
		3.8 (150)	21-26	135-165	2.0 (4.5)	1.8 (3.9)		
		4.7 (185)	22-27	150-180	2.5 (5.5)	2.2 (4.8)		
		5.7 (225)	22-27	175-205	3.1 (6.7)	2.7 (5.9)		
		6.4 (250)	23-28	200-230	3.4 (7.5)	2.9 (6.5)		
		7.0 (275)	23-28	220-250	3.7 (8.2)	3.2 (7.2)		
		7.6 (300)	24-29	240-270	4.1 (9.0)	3.5 (7.8)		
		Flat & Horizontal						
		8.5 (335)	24-30	260-290	4.5 (10.0)	4.0 (8.7)		
		9.5 (375)	25-31	280-310	5.1 (11.2)	4.4 (9.8)		
10.2 (400)	25-32	295-325	5.4 (12.0)	4.7 (10.4)				
1/16 in (1.6 mm), DC+ 75%-85% Ar/ balance CO ₂	25 (1)	All Position						86-88
		3.8 (150)	21-27	185-215	2.9 (6.3)	2.5 (5.5)		
		4.4 (175)	21-28	195-225	3.3 (7.4)	2.9 (6.4)		
		5.1 (200)	22-29	220-250	3.8 (8.4)	3.3 (7.3)		
		5.7 (225)	23-30	250-280	4.3 (9.5)	3.7 (8.2)		
		6.4 (250)	24-31	270-300	4.8 (10.5)	4.2 (9.2)		
		7.0 (275)	24-32	300-330	5.3 (11.6)	4.6 (10.1)		
		Flat & Horizontal						
		8.3 (325)	24-32	320-350	6.2 (13.7)	5.4 (11.9)		
		8.9 (350)	25-33	350-380	6.7 (14.7)	5.8 (12.8)		

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾As-Welded with 75% Argon / 25% CO₂. ⁽⁵⁾To estimate ESD, subtract 1/4 in (6.0 mm) from CTWD.

UltraCore® 81Ni2C-H

Low Alloy, All Position
AWS E81T1-Ni2C-JH4

Key Features

- ▶ Capable of producing weld deposits with impact toughness exceeding 54 - 84 J (40 - 62 ft•lbf) at -51°C (-60°F)
- ▶ Designed for welding with 100% CO₂ shielding gas
- ▶ Premium arc performance and bead appearance
- ▶ H4 diffusible hydrogen levels
- ▶ ProTech® foil bag packaging

Typical Applications

- ▶ Mining
- ▶ Offshore
- ▶ Bridge fabrication
- ▶ High strength fabrication

Welding Positions

All, except vertical down

Conformances

AWS A5.29/A5.29M: 2005	E81T1-Ni2C-JH4
ASME SFA-A5.29:	E81T1-Ni2C-JH4
ABS:	3YSA H5
Lloyd's Register:	3YS H5
DNV Grade:	III Y40MS H5
CWB/CSA W48-06:	E551T1-Ni2C-JH4 (E81T1-Ni2C-JH4)

Shielding Gas

100% CO₂
Flow Rate: 40-50 CFH

Note

- ▶ This product contains micro-alloying elements. Additional information available upon request.

DIAMETERS / PACKAGING

Diameter in (mm)	33 lb (15 kg) Spool
0.045 (1.1)	ED032215
0.052 (1.3)	ED032278
1/16 (1.6)	ED032214

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf)	
				@ -40°C (-40°F)	@ -51°C (-60°F)
Requirements⁽⁴⁾ AWS E81T1-Ni2C-JH4	470 (68) min.	550-670 (80 - 100)	19 min.	27 (20) min.	27 (20) min.
Typical Performance⁽³⁾ As-Welded with 100% CO ₂	555 - 600 (80 - 86)	615 - 650 (89 - 94)	26 - 28	76 - 111 (56 - 82)	54 - 84 (40 - 62)

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

UltraCore[®] 81Ni2C-H

(AWS E81T1-Ni2C-JH4)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	%C	%Mn	%Si	%S
Requirements⁽⁴⁾ AWS E81T1-Ni2C-JH4	0.12 max.	1.50 max.	0.80 max.	0.030 max.
Typical Performance⁽³⁾ As-Welded with 100% CO ₂	0.04 - 0.05	1.14 - 1.24	0.27 - 0.32	0.006 - 0.007
	%P	%Ni	Diffusible Hydrogen (mL/100g weld deposit)	
Requirements⁽⁴⁾ AWS E81T1-Ni2C-JH4	0.030 max.	1.75 - 2.75	4.0 max.	
Typical Performance⁽³⁾ As-Welded with 100% CO ₂	0.006 - 0.007	1.86 - 2.19	2 - 4	

TYPICAL OPERATING PROCEDURES

Diameter, Polarity Shielding Gas	CTWD ⁽⁵⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)		
0.045 in (1.1 mm), DC+ 100% CO ₂	25 (1)	All Position						86-88	
		4.4 (175)	23-28	125-155	1.8 (4.0)	1.6 (3.5)			
		5.1 (200)	24-29	135-165	2.1 (4.6)	1.8 (4.0)			
		6.4 (250)	25-30	150-180	2.6 (5.7)	2.3 (5.0)			
		7.6 (300)	25-30	175-205	3.1 (6.8)	2.7 (6.0)			
		8.9 (350)	26-31	190-220	3.6 (8.0)	3.2 (7.0)			
		9.5 (375)	26-31	215-235	3.9 (8.6)	3.4 (7.5)			
		10.8 (425)	27-32	230-260	4.4 (9.7)	3.8 (8.5)			
		Flat & Horizontal							
		12.1 (475)	28-33	250-280	4.9 (10.8)	4.3 (9.5)			
		12.7 (500)	29-34	260-290	5.2 (11.4)	4.5 (10.0)			
		0.052 in (1.3 mm), DC+ 100% CO ₂	25 (1)	All Position					
3.8 (150)	23-28			135-165	2.0 (4.5)	1.8 (3.9)			
4.7 (185)	24-29			150-180	2.5 (5.5)	2.2 (4.8)			
5.7 (225)	24-29			175-205	3.1 (6.7)	2.7 (5.9)			
6.4 (250)	25-30			200-230	3.4 (7.5)	2.9 (6.5)			
7.0 (275)	25-30			220-250	3.7 (8.2)	3.2 (7.2)			
7.6 (300)	26-31			240-270	4.1 (9.0)	3.5 (7.8)			
Flat & Horizontal									
8.5 (335)	26-31			260-290	4.5 (10.0)	4.0 (8.7)			
9.5 (375)	27-32			280-310	5.1 (11.2)	4.4 (9.8)			
10.2 (400)	27-34			295-325	5.4 (12.0)	4.7 (10.4)			
1/16 in (1.6 mm), DC+ 100% CO ₂	25 (1)			All Position					
		3.8 (150)	24-29	185-215	2.9 (6.3)	2.5 (5.5)			
		4.4 (175)	24-30	195-225	3.3 (7.4)	2.9 (6.4)			
		5.1 (200)	25-30	220-250	3.8 (8.4)	3.3 (7.3)			
		5.7 (225)	25-31	250-280	4.3 (9.5)	3.7 (8.2)			
		6.4 (250)	26-31	290-320	4.8 (10.5)	4.2 (9.2)			
		Flat & Horizontal							
		7.0 (275)	26-32	290-320	5.3 (11.6)	4.6 (10.1)			
		8.3 (325)	27-32	320-350	6.2 (13.7)	5.4 (11.9)			
		8.9 (350)	28-34	350-380	6.7 (14.7)	5.8 (12.8)			

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾As-Welded with 100% CO₂. ⁽⁵⁾To estimate ESO, subtract 1/4 in (6.0 mm) from CTWD.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

UltraCore® 81K2A75-H

Low Alloy, All Position

AWS E81T1-K2M-JH4

Key Features

- ▶ Capable of producing weld deposits with impact toughness exceeding 89 - 127 J (66 - 94 ft•lbf) at -40°C (-40°F)
- ▶ Designed for welding with 75-85% Argon/ balance CO₂ shielding gas
- ▶ Premium arc performance and bead appearance
- ▶ H4 diffusible hydrogen levels
- ▶ ProTech® foil bag packaging

Welding Positions

All, except vertical down

Typical Applications

- ▶ High strength steels with 550 MPa (80 ksi) tensile strength
- ▶ Offshore
- ▶ Shipbuilding

Conformances

AWS A5.29/A5.29: 2005	E81T1-K2M-JH4
ASME SFA-A5.29:	E81T1-K2M-JH4
ABS:	4YQ460SA H5
Lloyd's Register:	4Y46S H5
DNV Grade:	IV 46MS H5

Shielding Gas

75% - 85% Argon/Balance CO₂
Flow Rate: 35 - 45 CFH

DIAMETERS / PACKAGING

Diameter in (mm)	33 lb (15 kg) Plastic Spool
0.045 (1.1)	ED032385
0.052 (1.3)	ED032386
1/16 (1.6)	ED032387

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf)	
				@ -29°C (-20°F)	@ -40°C (-40°F)
Requirements⁽⁴⁾ AWS E81T1-K2M-JH4	470 (68) min.	550 - 690 (80 - 100)	19 min.	27 (20) min.	27 (20) min.
Typical Performance⁽³⁾ As-Welded with 75% Argon/25% CO ₂	535 - 550 (78 - 80)	585 - 605 (85 - 88)	26 - 27	117 - 155 (86 - 114)	89 - 127 (66 - 94)

UltraCore® 81K2A75-H

(AWS E81T1-K2M-JH4)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	%C	%Mn	%Si	%S	%P
Requirements⁽⁴⁾ AWS E81T1-K2M-JH4	0.15 max.	0.50 - 1.75	0.80 max.	0.030 max.	0.030 max.
Typical Performance⁽³⁾ As-Welded with 75% Ar/25% CO ₂	0.04 - 0.05	0.98 - 1.09	0.25 - 0.28	0.006 - 0.009	0.005 - 0.008
	%Ni	%Cr	%Mo	%V	Diffusible Hydrogen (mL/100g weld deposit)
Requirements⁽⁴⁾ AWS E81T1-K2M-JH4	1.00 - 2.00	0.15 max.	0.35 max.	0.05 max.	4 max.
Typical Performance⁽³⁾ As-Welded with 75% Ar/25% CO ₂	1.40 - 1.63	0.03 - 0.04	0.01 - 0.02	0.02 - 0.03	2 - 4

TYPICAL OPERATING PROCEDURES

Diameter, Polarity Shielding Gas	CTWD ⁽⁵⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)	
0.045 in (1.1 mm), DC+ 75%-85% Ar/ balance CO ₂	25 (1)	All Position						86-88
		4.4 (175)	22-27	125-155	1.8 (4.0)	1.6 (3.5)		
		5.1 (200)	23-28	135-165	2.1 (4.6)	1.8 (4.0)		
		6.4 (250)	24-29	150-180	2.6 (5.7)	2.3 (5.0)		
		7.6 (300)	24-29	175-205	3.1 (6.8)	2.7 (6.0)		
		8.9 (350)	25-30	190-220	3.6 (8.0)	3.2 (7.0)		
		9.5 (375)	25-30	215-235	3.9 (8.6)	3.4 (7.5)		
		Flat & Horizontal						
		10.8 (425)	26-31	230-260	4.4 (9.7)	3.8 (8.5)		
		12.1 (475)	27-32	250-280	4.9 (10.8)	4.3 (9.5)		
12.7 (500)	28-33	260-290	5.2 (11.4)	4.5 (10.0)				
0.052 in (1.3 mm), DC+ 75%-85% Ar/ balance CO ₂	25 (1)	All Position						86-88
		3.8 (150)	22-27	135-165	2.0 (4.5)	1.8 (3.9)		
		4.7 (185)	23-28	150-180	2.5 (5.5)	2.2 (4.8)		
		5.7 (225)	23-28	175-205	3.1 (6.7)	2.7 (5.9)		
		6.4 (250)	24-29	200-230	3.4 (7.5)	2.9 (6.5)		
		6.9 (275)	24-29	220-250	3.7 (8.2)	3.2 (7.2)		
		7.6 (300)	25-30	240-270	4.1 (9.0)	3.5 (7.8)		
		Flat & Horizontal						
		8.5 (335)	25-31	260-290	4.5 (10.0)	4.0 (8.7)		
		9.5 (375)	26-32	280-310	5.1 (11.2)	4.4 (9.8)		
10.2 (400)	26-33	295-325	5.4 (12.0)	4.7 (10.4)				
1/16 in (1.6 mm), DC+ 75%-85% Ar/ balance CO ₂	25 (1)	All Position						86-88
		3.8 (150)	22-27	185-215	2.9 (6.3)	2.5 (5.5)		
		4.4 (175)	23-28	195-225	3.3 (7.4)	2.9 (6.4)		
		5.1 (200)	24-29	220-250	3.8 (8.4)	3.3 (7.3)		
		5.7 (225)	24-29	250-280	4.3 (9.5)	3.7 (8.2)		
		6.4 (250)	25-30	270-300	4.8 (10.5)	4.2 (9.2)		
		6.9 (275)	25-31	300-330	5.3 (11.6)	4.6 (10.1)		
		Flat & Horizontal						
		8.3 (325)	26-32	320-350	6.2 (13.7)	5.4 (11.9)		
		8.9 (350)	27-33	350-380	6.7 (14.7)	5.8 (12.8)		

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾As-Welded with 75% Argon/25% CO₂. ⁽⁵⁾To estimate ESO, subtract 1/4 in (6.0 mm) from CTWD.

UltraCore® 81K2C-H

Low Alloy, All Position
AWS E81T1-K2C-JH4

Key Features

- ▶ Capable of producing weld deposits with impact toughness exceeding 111 - 141 J (82 - 104 ft•lbf) at -40°C (-40°F)
- ▶ Designed for welding with 100% CO₂ shielding gas
- ▶ Premium arc performance and bead appearance
- ▶ H4 diffusible hydrogen levels
- ▶ ProTech® foil bag packaging

Welding Positions

All

Typical Applications

- ▶ High strength steels with 550 MPa (80 ksi) tensile strength
- ▶ Offshore
- ▶ Shipbuilding

Conformances

AWS A5.29/A5.29: 2005	E81T1-K2C-JH4
ASME SFA-A5.29:	E81T1-K2C-JH4
ABS:	4YQ460SA H5
Lloyd's Register:	4Y46S H5
DNV Grade:	IV 46MS H5

Shielding Gas

100% CO₂
Flow Rate: 35 - 45 CFH

DIAMETERS / PACKAGING

Diameter in (mm)	33 lb (15 kg) Plastic Spool
0.045 (1.1)	ED032388
0.052 (1.3)	ED032389
1/16 (1.6)	ED032390

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf)	
				@ -29°C (-20°F)	@ -40°C (-40°F)
Requirements AWS E81T1-K2C-J H4 As-Welded with 100% CO ₂	470 (68) min.	550 - 690 (80 - 100)	19 min.	27 (20) min.	27 (20) min.
Typical Performance⁽³⁾ As-Welded with 100% CO ₂	530 - 555 (77 - 80)	580 - 610 (84 - 88)	27 - 29	127 - 157 (94 - 116)	111 - 141 (82 - 104)

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

UltraCore[®] 81K2C-H

(AWS E81T1-K2C-JH4)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	%C	%Mn	%Si	%S	%P
Requirements⁽⁴⁾ AWS E81T1-K2C-JH4	0.15 max.	0.50-1.75	0.80 max.	0.030 max.	0.030 max.
Typical Performance⁽³⁾ As-Welded with 100% CO ₂	0.04	1.08 - 1.15	0.23 - 0.31	0.005 - 0.009	0.005 - 0.009
	%Ni	%Cr	%Mo	%V	Diffusible Hydrogen (mL/100g weld deposit)
Requirements⁽⁴⁾ AWS E81T1-K2C-JH4	1.00 - 2.00	0.15 max.	0.35 max.	0.05 max.	4.0 max.
Typical Performance⁽³⁾ As-Welded with 100% CO ₂	1.30 - 1.62	0.03 - 0.05	0.01 - 0.02	0.01 - 0.02	2 - 3

TYPICAL OPERATING PROCEDURES

Diameter, Polarity Shielding Gas	CTWD ⁽⁶⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)	
0.045 in (1.1 mm), DC+ 100% CO ₂	25 (1)	All Position						86-88
		4.4 (175)	23-28	125-155	1.8 (4.0)	1.6 (3.5)		
		5.1 (200)	24-29	135-165	2.1 (4.6)	1.8 (4.0)		
		6.4 (250)	25-30	150-180	2.6 (5.7)	2.3 (5.0)		
		7.6 (300)	25-30	175-205	3.1 (6.8)	2.7 (6.0)		
		8.9 (350)	26-31	190-220	3.6 (8.0)	3.2 (7.0)		
		9.5 (375)	26-31	215-235	3.9 (8.6)	3.4 (7.5)		
		10.8 (425)	27-32	230-260	4.4 (9.7)	3.8 (8.5)		
		Flat & Horizontal						
		12.1 (475)	28-33	250-280	4.9 (10.8)	4.3 (9.5)		
12.7 (500)	29-34	260-290	5.2 (11.4)	4.5 (10.0)				
0.052 in (1.3 mm), DC+ 100% CO ₂	25 (1)	All Position						86-88
		3.8 (150)	23-28	135-165	2.0 (4.5)	1.8 (3.9)		
		4.7 (185)	24-29	150-180	2.5 (5.5)	2.2 (4.8)		
		5.7 (225)	24-29	175-205	3.1 (6.7)	2.7 (5.9)		
		6.4 (250)	25-30	200-230	3.4 (7.5)	2.9 (6.5)		
		6.9 (275)	25-30	220-250	3.7 (8.2)	3.2 (7.2)		
		7.6 (300)	26-31	240-270	4.1 (9.0)	3.5 (7.8)		
		Flat & Horizontal						
		8.5 (335)	26-31	260-290	4.5 (10.0)	4.0 (8.7)		
		9.5 (375)	27-32	280-310	5.1 (11.2)	4.4 (9.8)		
10.2 (400)	27-34	295-325	5.4 (12.0)	4.7 (10.4)				
1/16 in (1.6 mm), DC+ 100% CO ₂	25 (1)	All Position						86-88
		3.8 (150)	24-29	185-215	2.9 (6.3)	2.5 (5.5)		
		4.4 (175)	24-30	195-225	3.3 (7.4)	2.9 (6.4)		
		5.1 (200)	25-30	220-250	3.8 (8.4)	3.3 (7.3)		
		5.7 (225)	25-31	250-280	4.3 (9.5)	3.7 (8.2)		
		6.4 (250)	26-31	270-300	4.8 (10.5)	4.2 (9.2)		
		6.9 (275)	26-32	290-320	5.3 (11.6)	4.6 (10.1)		
		Flat & Horizontal						
		8.3 (325)	27-32	320-350	6.2 (13.7)	5.4 (11.9)		
		8.9 (350)	28-34	350-380	6.7 (14.7)	5.8 (12.8)		

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾As-Welded with 100% CO₂. ⁽⁵⁾To estimate ESO, subtract 1/4 in (6.0 mm) from CTWD.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Outershield® 91K2-H

Low Alloy, All Position
AWS E91T1-K2M-H8

Key Features

- ▶ Designed for welding with 75-95% Argon/ balance CO₂ shielding gas
- ▶ Capable of producing weld deposits with tensile strength exceeding 620 MPa (90 ksi)
- ▶ Use on high strength, low alloy steel applications
- ▶ H8 diffusible hydrogen levels

Typical Applications

- ▶ For applications requiring high strength weld metal, such as HY-80, HSLA 80 and ASTM A710 steels

Welding Positions

All, except vertical down

Conformances

AWS A5.29/A5.29M: 2005	E91T1-K2M-H8
ASME SFA-A5.29:	E91T1-K2M-H8
ABS:	E91T1-K2M-H8

Shielding Gas

75 - 95% Argon/Balance CO₂
Flow Rate: 35 - 45 CFH

DIAMETERS / PACKAGING

Diameter in (mm)	25 lb (11 kg) Plastic Spool Vacuum Sealed Foil Bag
0.045 (1.1)	ED030975
0.052 (1.3)	ED030976
1/16 (1.6)	ED030977

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf)	
				@ -18°C (0°F)	@ -51° C (-60° F)
Requirements AWS E91T1-K2M-H8	540 (78) min.	620 - 760 (90 - 110)	17 min.	27 (20) min. –	– 27 (20) min.
Typical Performance⁽³⁾ As-Welded with:					
75% Ar/25% CO ₂	565 - 605 (82 - 88)	620 - 690 (90 - 100)	22 - 28	81 - 149 (60 - 110)	47 - 95 (35 - 70)
95% Ar/5% CO ₂	650 (94)	660 (96)	27	108 (80)	79 (58)

Outershield[®] 91K2-H

(AWS E91T1-K2M-H8)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	%C	%Mn	%Ni	%Si	%Mo
Requirements AWS E91T1-K2M-H8	0.150 max.	0.500 -1.750	1.00 -2.00	0.800 max.	0.350 max.
Typical Results⁽³⁾ As-Welded with 75% Ar/25% CO ₂	0.060	1.350	1.80	0.300	0.020
As-Welded with 95% Ar/5% CO ₂	0.060	1.450	1.80	0.320	0.020
	%P	%S	%Cr	%V	
Requirements AWS E91T1-K2M-H8	0.030 max.	0.030 max.	0.150 max.	0.050 max.	
Typical Results⁽³⁾ As-Welded with 75% Ar/25% CO ₂	0.005	0.010	0.030	0.005	
As-Welded with 95% Ar/5% CO ₂	0.005	0.010	0.030	0.005	

TYPICAL OPERATING PROCEDURES

Diameter, Polarity Shielding Gas	CTWD ⁽⁴⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)	Deposition Rate kg/hr (lb/hr)	Efficiency (%)
0.045 in (1.2 mm) DC+ 75-95% Ar/ balance CO ₂	25 (1)	4.4 (175)	20-22	130	2.0 (4.3)	1.5 (3.4)	79
		7.0 (275)	23-25	180	3.0 (6.7)	2.4 (5.4)	81
		9.5 (375)	25-27	220	4.1 (9.1)	3.4 (7.4)	81
		12.7 (500)	27-29	265	5.2 (12.2)	4.3 (10.0)	82
		15.9 (625)	30-32	305	6.9 (15.2)	5.8 (12.7)	84
1/16 in (1.6 mm) DC+ 75-95% Ar/ balance CO ₂	25 (1)	3.2 (125)	21-23	170	2.4 (5.3)	2.0 (4.3)	81
		5.1 (200)	22-24	235	3.8 (8.4)	3.2 (7.0)	83
		6.4 (250)	24-25	275	4.8 (10.5)	4.0 (8.8)	84
		7.6 (300)	25-27	310	5.7 (12.5)	4.8 (10.6)	85
		8.9 (350)	27-29	350	6.6 (14.6)	5.6 (12.4)	85
		10.2 (400)	28-30	385	7.6 (16.7)	6.5 (14.2)	85
10.8 (425)	30-31	400	8.1 (17.8)	6.9 (15.2)	85		

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾To estimate ESO, subtract 1/4 in (6.0 mm) from CTWD.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Pipelin[®]er G80M

Low Alloy, All Position
AWS E101T1-GM-H8

Key Features

- ▶ Hot, fill and cap pass welding of up to X80 grade pipe
- ▶ Charpy V-Notch impact toughness tested to -40°C (-40°F)
- ▶ Q2 Lot[®] - Certificate showing actual deposit chemistry available online
- ▶ High deposition rates
- ▶ ProTech[®] hermetically sealed packaging

Typical Applications

- ▶ Hot, fill and cap pass welding of up to X80 grade pipe

Welding Positions

All, except vertical down

Conformances

AWS A5.29/A5.29M: 2005	E101T1-GM-H8
ASME SFA-A5.29	E101T1-GM-H8

Shielding Gas

75 - 80% Argon/Balance CO₂
Flow Rate: 40 - 50 CFH

Note

- ▶ This product contains micro-alloying elements. Additional information available upon request.

DIAMETERS / PACKAGING

Diameter in (mm)	10 lb (4.5 kg) Plastic Spool Vacuum Sealed Foil Bag	25 lb (11 kg) Plastic Spool Vacuum Sealed Foil Bag
0.045 (1.1)	ED031107	ED031486

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Pipeliner® G80M

(AWS E101T-GM-H8)

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength ⁽⁴⁾ MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf)	
				@ -29°C (-20°F)	@ -40°C (-40°F)
Requirements AWS E101T1-GM-H8	605 (88) min.	690 - 825 (100 - 120)	16 min.	Not Specified	Not Specified
Typical Performance⁽³⁾ As-Welded with 75% Ar/25% CO ₂	660 - 700 (95 - 102)	700 - 740 (102 - 107)	21 - 26	52 - 58 (44 - 64)	46 - 49 (34 - 36)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	%C	%Mn	%Si	%P	%S
Requirements AWS E101T1-GM-H8	Not Specified	1.75 min.	0.80 min.	0.03 max.	0.03 max.
Typical Performance⁽³⁾ As-Welded with 75% Ar/25% CO ₂	0.03 - 0.04	1.70 - 1.79	0.37 - 0.41	0.015 - 0.017	0.008 - 0.012
	%Ni ⁽⁴⁾	%Cr ⁽⁴⁾	%Mo ⁽⁴⁾	%V ⁽⁴⁾	Diffusible Hydrogen (mL/100g weld deposit)
Requirements AWS E101T1-GM-H8	0.50 min.	0.30 min.	0.20 min.	0.10 min.	8.0 max.
Typical Performance⁽³⁾ As-Welded with 75% Ar/25% CO ₂	0.90 - 0.98	0.07 - 0.11	0.24 - 0.27	0.022 - 0.023	4 - 7

TYPICAL OPERATING PROCEDURES

Diameter, Polarity Shielding Gas	CTWD mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)
0.045 in (1.1 mm) DC+ 75-80% Ar/ balance CO ₂	25 (1)	4.4-10.2 (175-400)	23-30	130-275	1.8-4.1 (4.0-9.0)

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾In order to meet the alloy requirements of the "G" group, the undiluted weld metal shall have not less than the minimum of at least one of the elements listed. NOTE: This product contains micro-alloying elements. Additional information available upon request.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Pipeliners® G90M

Low Alloy, All Position
AWS E111T1-K3M-JH8

Key Features

- ▶ Hot, fill and cap pass welding of up to X80 grade pipe
- ▶ Capable of producing weld deposits with impact toughness exceeding 27 J (20 ft•lbf) at -29°C (-20°F)
- ▶ Q2 Lot® - Certificate showing actual deposit chemistry available online
- ▶ High stacking efficiency
- ▶ ProTech® hermetically sealed packaging

Typical Applications

- ▶ Hot, fill and cap pass welding of up to X80 grade pipe

Welding Positions

All, except vertical down

Conformances

AWS A5.29/A5.29M: 2005	E111T1-K3M-JH8
ASME SFA-A5.29	E111T1-K3M-JH8
ABS:	E111T1-K3MJ-H8

Shielding Gas

75 - 80% Argon/Balance CO₂
Flow Rate: 40 - 50 CFH

Note

- ▶ This product contains micro-alloying elements. Additional information available upon request.

DIAMETERS / PACKAGING

Diameter mm (in)	10 lb (4.5 kg) Plastic Spool Vacuum Sealed Foil Bag	33 lb (15 kg) Plastic Spool Vacuum Sealed Foil Bag
1.2 (0.047)	ED032860	ED031931
1.3 (0.052)	ED032664	

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf) @ -29°C (-20°F)
Requirements AWS E111T1-K3M-JH8	675 (98) min.	760 - 860 (110 - 125)	15 min.	27 (20) min.
Typical Performance⁽³⁾ As-Welded with 75% Ar/25% CO ₂	760 - 825 (110 - 120)	795 - 860 (115 - 125)	19 - 22	56 - 85 (41 - 63)

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING

Pipelinor® G90M

(AWS E111T1-K3M-JH8)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.29/A5.29M: 2005

	%C	%Mn	%Si	%P	%S
Requirements					
AWS E111T1-K3M-JH8	0.15 max.	0.75 - 2.25	0.80 max.	0.030 max.	0.030 max.
Typical Performance⁽⁹⁾					
As-Welded with 75% Ar/25% CO ₂	0.05 - 0.07	1.45 - 1.70	0.21 - 0.28	0.01 - 0.02	0.01 - 0.02
	%Ni	%Cr	%Mo	%V	Diffusible Hydrogen (mL/100g weld deposit)
Requirements					
AWS E111T1-K3M-JH8	1.25 - 2.60	0.15 max.	0.25 - 0.65	0.05 max.	4.0 max.
Typical Performance⁽⁹⁾					
As-Welded with 75% Ar/25% CO ₂	1.80 - 2.22	0.03 - 0.06	0.50 - 0.61	0.02	2 - 3

TYPICAL OPERATING PROCEDURES

Diameter, Polarity Shielding Gas	CTWD ⁽⁴⁾ mm (in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)
1.2 mm (0.045 in) DC+ 75-80% Ar/ balance CO ₂	25 (1)	4.4-10.2 (175-400)	23-30	130-275	1.8-4.1 (3.9-9.0)
1.3 mm (0.052) DC+ 75-80% Ar/ balance CO ₂	25 (1)	4.4-9.5 (175-375)	23-30	130-275	2.5-5.0 (5.5-11.0)

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer on pg. 9. ⁽⁴⁾For electrical stickout (ESO) subtract 6.4 mm (1/4 in) from contact tip to work distance (CTWD).
NOTE: This product contains micro-alloying elements. Additional information available upon request.

FLUX-CORED

SUBMERGED ARC

STAINLESS & NICKEL

HARDFACING