

THE TRUSTED LEADER IN TUBULAR WIRES

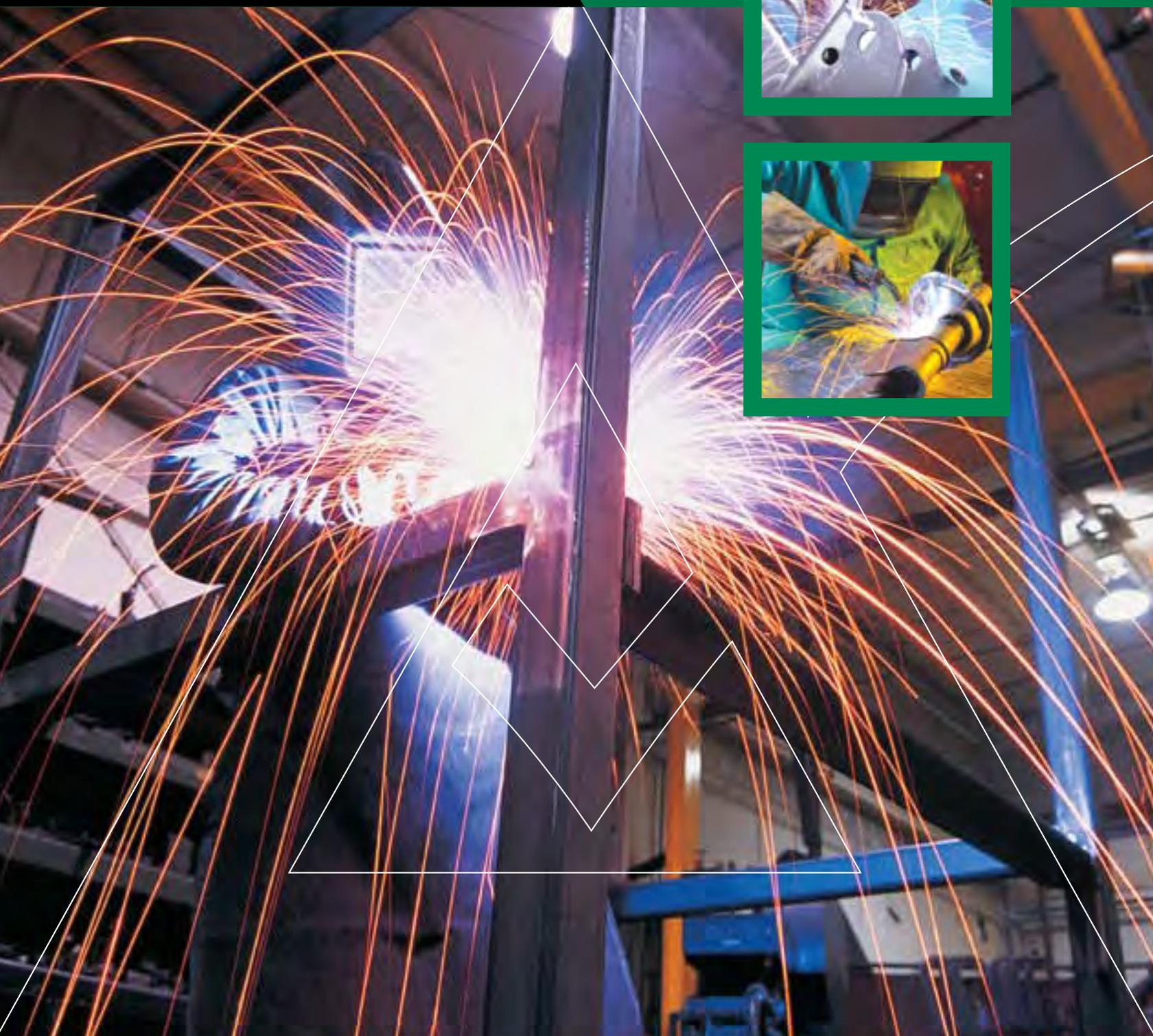


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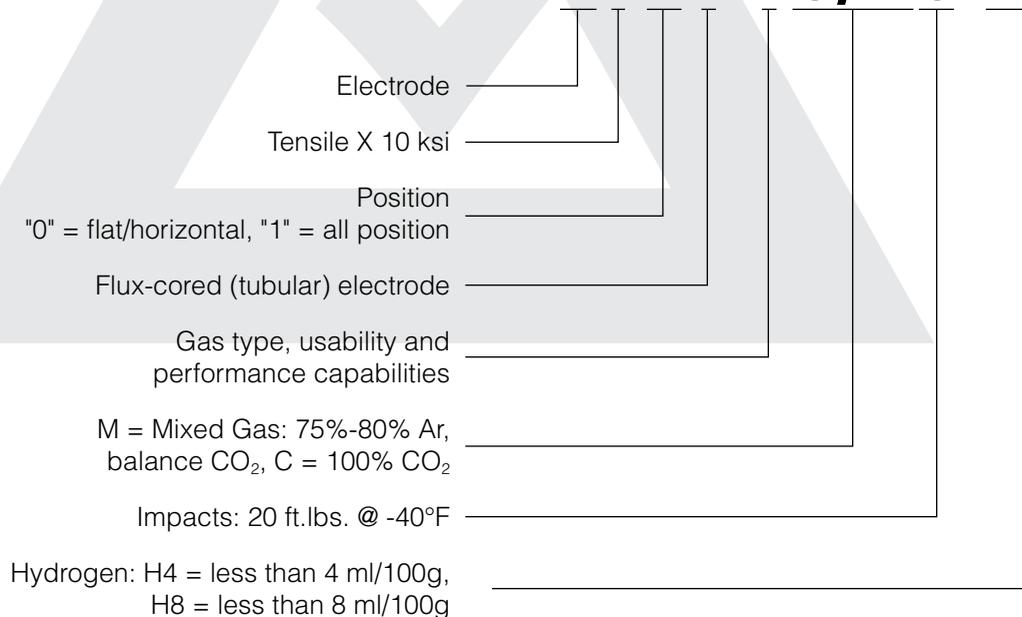
Tri-Mark® has served major metal fabrication markets as a top-quality manufacturer of flux-cored and metal-cored wires for over 20 years. Throughout that time, we've consistently focused our efforts on welding research and product development and, as a result, now offer one of the most complete product lines in the industry today. Recognized worldwide as the "specialists in flux-cored and metal-cored wires," Tri-Mark features over 52 different products for welding carbon and low-alloy steels, in addition to special formulations for applications in the shipbuilding, infrastructure construction, offshore oil, and heavy equipment industries.

Tri-Mark's commitment to product excellence is second to none. Our quality standard begins with the raw materials and continues through production into the finished product. To assure customer satisfaction, we use only the best materials, then we inspect and weld test every dry mix of wires. Our knowledgeable customer service team is available to assist customers with information concerning product use, diameter sizes, packaging, and technical information. Have a question about a Tri-Mark product? Call our service team at: 1.800.424.1543.

YOU'LL FIND MANY OUTSTANDING FEATURES WHEN YOU LOOK AMONG TRI-MARK'S LINE OF FLAT AND HORIZONTAL FLUX-CORED WIRES FOR WELDING CARBON STEELS. DESIGNED FOR USE WITH CO₂ SHIELDING GAS, FLAT AND HORIZONTAL WIRES DELIVER THE KIND OF PERFORMANCE WELDERS SEEK MOST FOR MAXIMUM WELDING PRODUCTIVITY EXCELLENT ARC STABILITY, LOW SPATTER, GOOD WELD BEAD APPEARANCE, AND EASY TO REMOVE SLAG.

HOW AWS CLASSIFIES MILD STEEL FLUX-CORED (TUBULAR) WIRES, FCAW PROCESS (AWS A5.20)

E70T-1C/MJ H8



POSITION OF WELDING, SHIELDING, POLARITY, AND APPLICATION REQUIREMENTS

AWS Classification	Welding Position ^a	Shielding ^b	Current ^c	Application ^d	AWS Classification	Welding Position ^a	Shielding ^b	Current ^c	Application ^d
E70T-1C	H and F	CO ₂	DCEP	M	E70T-9C	H and F	CO ₂	DCEP	M
E70T-1M	H and F	75-80% Ar/bal CO ₂	DCEP	M	E70T-9M	H and F	75-80% Ar/bal CO ₂	DCEP	M
E71T-1C	H, F, VU, OH	CO ₂	DCEP	M	E71T-9C	H, F, VU, OH	CO ₂	DCEP	M
E71T-1M	H, F, VU, OH	75-80% Ar/bal CO ₂	DCEP	M	E71T-9M	H, F, VU, OH	75-80% Ar/bal CO ₂	DCEP	M
E70T-2C	H and F	CO ₂	DCEP	S	E70T-10	H and F	None	DCEN	S
E70T-2M	H and F	75-80% Ar/bal CO ₂	DCEP	S	E70T-11	H and F	None	DCEN	M
E71T-2C	H, F, VU, OH	CO ₂	DCEP	S	E71T-11	H, F, VD, OH	None	DCEN	M
E71T-2M	H, F, VU, OH	75-80% Ar/bal CO ₂	DCEP	S	E70T-12C	H and F	CO ₂	DCEP	M
E70T-3	H and F	None	DCEP	S	E70T-12M	H and F	75-80% Ar/bal CO ₂	DCEP	M
E70T-4	H and F	None	DCEP	M	E71T-12C	H, F, VU, OH	CO ₂	DCEP	M
E70T-5C	H and F	CO ₂	DCEP	M	E71T-12M	H, F, VU, OH	75-80% Ar/bal CO ₂	DCEP	M
E70T-5M	H and F	75-80% Ar/bal CO ₂	DCEP	M	E61T-13	H, F, VD, OH	None	DCEN	S
E71T-5C	H, F, VU, OH	CO ₂	DCEP or DCENe	M	E71T-13	H, F, VD, OH	None	DCEN	S
E71T-5M	H, F, VU, OH	75-80% Ar/bal CO ₂	DCEP or DCENe	M	E71T-14	H, F, VD, OH	None	DCEN	S
E70T-6	H and F	None	DCEP	M	EX0T-G	H and F	Not Specified	Not Specified	M
E70T-7	H and F	None	DCEN	M	EX1T-G	H, F, VD or VU, OH	Not Specified	Not Specified	M
E71T-7	H, F, VU, OH	None	DCEN	M	EX0T-GS	H and F	Not Specified	Not Specified	S
E70T-8	H and F	None	DCEN	M	EX1T-GS	H, F, VD or VU, OH	Not Specified	Not Specified	S
E71T-8	H, F, VU, OH	None	DCEN	M					

a. H = horizontal position; F = flat position; OH = overhead position; VD = vertical position with downward progression; VU = vertical position with upward progression

b. Properties of weld metal from electrodes that are used with external gas shielding (EXXT-1C, EXXT-1M, EXXT-2C, EXXT-2M, EXXT-5C, EXXT-5M, EXXT-9C, EXXT-9M, EXXT-12C, and EXXT-12M) vary according to the shielding gas employed. Electrodes classified with the specified shielding gas should not be used with other shielding gases without first consulting the manufacturer of the electrode.

c. The term "DCEP" refers to direct current electrode positive (dc, reverse polarity). The term "DCEN" refers to direct current electrode negative (dc, straight polarity).

d. M = single- or multiple-pass; S = single-pass only.

e. Some E71T-5C and E71T-5M electrodes may be recommended for use on DCEN for improved out-of-position welding.

TM-11

TM-11 is designed for the semi-automatic welding of carbon steels and some higher strength steels in applications where E70T-1 weld properties are acceptable. It provides excellent welding characteristics at higher current levels than many E70T-1 wires, and has found acceptance in many heavy section applications. The slag freezes at a moderate rate, contributing to smooth, flat, and uniformly rippled beads in both the flat and horizontal positions. Typical applications include heavy equipment repair, machinery, structural components, and general fabrication. The wire is recommended for single and multiple pass welding with 100% CO₂ shielding gas.

Specifications:

E70T-1C per AWS A5.20, ASME SFA 5.20

Shielding Gas:

100% CO₂, 35-50 cfm

Welding Positions:

Flat and horizontal

Standard Diameters:

1/16", 5/64", 3/32"

Characteristics:

- Intended for general purpose, high amperage welding of carbon steels.
- Performance is better at higher amperage levels than at the low end.
- Good weld bead geometry.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S
100% CO ₂	.08	1.14	.72	.015	.012

Mechanical Properties:

Tensile Strength:	92,000 psi
Yield Strength:	80,000 psi
Elongation:	25%
CVN @ 0°F:	35 ft-lbs

The above properties were determined with 100% CO₂ shielding gas.

For additional information, see Tri-Mark data sheet **TM11-060828**.

TM-72

TM-72 is designed for semi-automatic welding of carbon steels. It is also used for the welding of higher strength steels in applications where the properties of E70T-1 filler metal are deemed adequate. TM-72 features excellent arc stability over its entire recommended current range. Spatter is almost non-existent and the slag cover removes easily and cleanly, even from weld beads in deep grooves. The relatively fast-freezing nature of the slag facilitates welding on modestly inclined surfaces and girth welds. Weld bead appearance is excellent; surfaces are smooth and uniformly rippled and tie-in is good in both the flat and horizontal positions. Overall welder appeal is excellent. TM-72 is recommended for single and multiple pass welding in the flat and horizontal positions with 100% CO₂ shielding gas.

Specifications:

E70T-1C, E70T-9C per AWS A5.20, ASME

SFA 5.20

ABS to AWS E70T-1C

Military Spec. MIL-E-24403/1,

Class MIL-70T-1C

Shielding Gas:

100% CO₂, 35-50 cfm

Welding Positions:

Flat and horizontal

Standard Diameters:

1/16", 5/64", 3/32"

Characteristics:

- Faster freezing slag than TM-11.
- Excellent arc stability.
- Easy slag removal even in deep grooves.
- Lower spatter than TM-11, especially at the lower amperage settings of the current range.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S
100% CO ₂	.07	1.22	.61	.014	.011

Mechanical Properties:

Tensile Strength:	93,000 psi
Yield Strength:	77,000 psi
Elongation:	24%
CVN @ 0°F:	33 ft-lbs
CVN @ -20°F:	20 ft-lbs

The above properties were determined with 100% CO₂ shielding gas.

For additional information, see Tri-Mark data sheet **TM72-060613**.

TM-RX7

TM-RX7 offers excellent arc stability over the complete recommended welding range. Spatter losses are very low, the slag removes easily and cleanly, and bead appearance is excellent. High deoxidizers enable TM-RX7 to weld over mill scale, rust and other contaminants better than most T-1 wires. However, this level of deoxidization will also cause increased hardening as multiple layers are welded, and caution should be exercised in welding thick or highly restrained joints. TM-RX7 is used for single and multiple pass welding in the flat and horizontal positions using 100% CO₂ shielding gas.

Specifications:

E70T-1C, E70T-9C per AWS A5.20, ASME

SFA 5.20

ABS 2SA, 2YSA H10

CWB 492T-9 H8

Shielding Gas:

100% CO₂, 35-50 cfm

Welding Positions:

Flat and horizontal

Standard Diameters:

1/16", 5/64", 3/32"

Characteristics:

- Good performance over the entire range of amperage.
- More deoxidization than the usual E70T-1 for improved performance on rusted and scaled plate.
- Excellent weld bead configuration on horizontal fillets.
- An outstanding general purpose E70T-1.
- Caution should be exercised on heavy multiple pass weldments.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S
100% CO ₂	.07	1.70	.68	.010	.014

Mechanical Properties:

Tensile Strength:	91,000 psi
Yield Strength:	80,000 psi
Elongation:	27%
CVN @ 0°F:	40 ft-lbs
CVN @ -20°F:	36 ft-lbs

The above properties were determined with 100% CO₂ shielding gas.

For additional information, see Tri-Mark data sheet **TMRX7-070227**.

PREMIER 70

Premier 70 has been specially designed to weld over steel that has been coated with weldable primers. It is a flat and horizontal wire that will give you no porosity when welding over a maximum of 1.0 mil of Nippe Ceramo-937 and 997 primers. Its unique design allows increased travel speeds over traditional 70T-1 types when welding primers. Minimal spatter and easy slag removal allows this product to be used in many different industries like shipyards, barge construction, and railcar manufacturing.

Specifications:

E70T-1C, E70T-9CJ, H8 per AWS A5.20, ASME SFA 5.20
ABS 3SA, 3YSA

Shielding Gas:

100% CO₂, 35-50 cfh

Welding Position:

Flat and horizontal

Standard Diameters:

.045", .052", 1/16", 5/64", 3/32"

Characteristics:

- Welds through primer without porosity.
- Smooth and stable arc.
- High deposition rate.
- Easy to set up and control.
- Increased productivity.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Ni
100% CO ₂	.04	1.38	.41	.009	.01	.42

Mechanical Properties:

Tensile Strength:	82,600 psi
Yield Strength:	71,100 psi
Elongation:	25.5%
CVN @ -0°F:	100 ft-lbs
CVN @ -40°F:	71 ft-lbs

The above properties were determined with 100% CO₂ shielding gas.

For additional information, see Tri-Mark data sheet **PREMIER 70-061218**.

TM-73

TM-73 is designed to produce welds with good soundness and bead contour on steel surfaces with moderate mill scale, rust, and other foreign matter present. To achieve this, the wire contains higher deoxidizer levels than otherwise similar E70T-1 wires. TM-73 has excellent arc stability across its recommended current range and good overall operator appeal. Very low spatter and easy and complete slag removal combine to greatly reduce cleanup costs. Bead appearance is good, with a smooth uniform ripple and excellent tie-in in both flat and horizontal applications. The wire is recommended for single pass welding in the flat and horizontal positions using CO₂ shielding gas.

Specifications:

E70T-2 C per AWS A5.20, ASME SFA 5.20

Shielding Gas:

100% CO₂, 35-50 cfh

Welding Positions:

Flat and horizontal

Standard Diameters:

7/64"

Characteristics:

- Intended for single pass weldments on rusted or scaled steel.
- Smooth arc even at the lower current settings.

Mechanical Properties:

Transverse	82,000 psi
Tensile Strength:	(base metal fracture)
Longitudinal	
Guide Bend:	Satisfactory

For additional information, see Tri-Mark data sheet **TM73-060911**.

TM-55

TM-55 is made with a basic slag formulation and is intended for use where deposit quality and properties are of first concern. It is designed for the semi-automatic welding of carbon steels, and also for the welding of higher strength steels in applications where E70T-5 properties are deemed adequate. Weld metal hydrogen levels are very low. Deposits are much more crack-resistant than those made with acid slag E70T-1 wires. TM-55 provides exceptionally high Charpy V-notch impact values at sub-zero temperatures. TM-55 is the recommended wire where weld soundness or toughness is paramount. It is recommended for single and multiple pass welding in the flat and horizontal positions using 100% CO₂ or Ar/CO₂ mixed gas shielding.

Specifications:

E70T-5CJ H4, E70T-5MJ H4 per AWS A5.20, ASME SFA 5.20
ABS to AWS E70T-5C
Military Spec. MIL-E-24403/1,
Class MIL-70T-5CJ (CO₂ only)
CWB E492T-5CJ H4, E492T-5MJ H4

Shielding Gas:

100% CO₂, 75-80% Ar/bal CO₂,
35-50 cfh

Welding Positions:

Flat and horizontal

Standard Diameters:

1/16", 3/32"

Characteristics:

- Basic slag wires provide low crack sensitivity on certain problem steels.
- Excellent CVN impact properties at sub-zero temperatures.
- Low weld metal hydrogen levels.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S
100% CO ₂	.06	1.18	.60	.009	.013
80% Ar/20% CO ₂	.07	1.47	.75	.010	.014

Mechanical Properties:

	100% CO ₂	80% Ar/20%CO ₂
Tensile Strength:	79,000 psi	90,000 psi
Yield Strength:	63,000 psi	76,000 psi
Elongation:	29%	24%
CVN @ -40°F:	77 ft-lbs	46 ft-lbs

For additional information, see Tri-Mark data sheet **TM55-061218**.

FLUX CORED GAS-SHIELDED WIRES CARBON STEEL, FLAT & HORIZONTAL

PRODUCT CHARACTERISTICS

Product	AWS Class	AWS Spec.	Tensile	Yield	Elongation	Impact	C	Mn	Si	P	S	Ni	Shielding Gas
			Strength (ksi)	Strength (ksi)	%, in 2"	Strength, CVN (ft•lbs @ °F)							
TM-11	E70T-1C	A5.20	92.0	80.0	25	35 @ 0°F	.08	1.14	.72	.015	.012	—	CO ₂
TM-72	E70T-1C E70T-9C	A5.20	93.0	77.0	24	33 @ 0°F 20 @ -20°F	.07	1.22	.61	.014	.011	—	CO ₂
TM-RX7	E70T-1C E70T-9C	A5.20	96.0	84.0	24	36 @ 0°F 20 @ -20°F	.07	1.37	.61	.010	.011	—	CO ₂
PREMIER 70	E70T-1C H8 E70T-9CJ H8	A5.20	82.6	71.1	25	100 @ 0°F 71 @ -40°F	.04	1.38	.41	.009	.01	.42	CO ₂
TM-73	E70T-2C	A5.20	82.0*	—	—	—	—	—	—	—	—	—	CO ₂
TM-55	E70T-5CJ H4 E70T-5MJ H4	A5.20	79.0	63.0	29	77 @ -40°F	.06	1.18	.60	.009	.013	—	CO ₂

* Transverse Tensile Strength (base metal fracture); Longitudinal Guide Bend: Satisfactory

WELDING PARAMETERS

Diameter	Position	Amperage	Approximate Parameters		Operating Ranges	
			Wire Feed Speed (ipm)	Voltage	Amperage	Voltage
.045" 1/2" to 3/4"		175	290	25	140-175	22-25
		200	362	27	175-250	24-28
		250	513	29	200-300	27-31
		300	725	32	250-350	29-34
.052 1/2" to 3/4"		250	359	27	200-300	25-29
		275	420	28	225-325	26-30
		325	555	30	275-375	28-32
		350	637	32	300-400	30-34
1/16"	Flat & Horizontal	225	160	25	150-275	22-27
		350	300	29	150-400	22-35
		300*	310	26	200-400	22-35
		225	160	26	150-300	22-28
5/64"	Flat & Horizontal	400	250	30	200-500	25-30
3/32"	Flat & Horizontal	450	180	30	350-600	26-37
		400*	175	28	300-500	24-35
7/64"	Flat & Horizontal	550	150	30	400-650	27-38
1/8"	Flat & Horizontal	600	125	33	450-800	31-35

* Welding parameters for T5-based wires.

PRODUCT COMPARISON

Tri-Mark	AWS Classification	Hobart	Lincoln	ESAB	Kobelco	Select Arc
TM-11	E70T-1C		Outershield HD70	Dual Shield 111-AC	MX 1005	Select 79
TM-72	E70T-1C, E70T-9C	FabCO® TR-70	Outershield 70	Dual Shield R-70 Ultra	DW 100F, DW 200	Select 70
TM-RX7	E70T-1C, E70T-9C	FabCO® RXR		Dual Shield R-70 Ultra	FA 701	Select 70
PREMIER 70	E70T-1C H8, E70T-9CJ H8					
TM-73	E70T-2C			Dual Shield SP		Select 72 Select Super 72
TM-55	E70T-5CJ H4, E70T-5MJ H4	FabCO® 85	Outershield 75H	Dual Shield T-5, T-75		Select 75

For additional product information call customer service **1.800.424.1543**

FLUX CORED

GAS-SHIELDED WIRES
ALL POSITION

Tri-Mark's all-position flux-cored wires for welding carbon steels are popular among welders because of their fast-freezing slag and low fume levels. Designed for use with shielding gas, all-position wires maintain good bead contour regardless of the welding position and require very little clean up because they're virtually spatter-free. Ideal for shipbuilding, railcar and pressure vessel fabrication, or general structural welding, Tri-Mark's flux-cored all-position gas-shielded wires deliver outstanding performance to help bring welding ease to even the most demanding positions.

TRIPLE 7

Triple 7 is designed for the semi-automatic gas-shielded welding of carbon steel and some higher strength steels where requirements and conditions do not exceed its capabilities. It is intended for single and multiple pass welding in all positions and has a fast-freezing slag that permits the welder to use higher current to deposit more metal faster and still produce a flat bead in all positions.

The slag removes easily even from deep groove weldments and spatter is low so a welder spends more time welding and less time cleaning up.

The X-ray quality surpasses the radiographic specifications of AWS A5.20 and ASME SFA 5.20 when welded with the recommended procedures. Typical applications include shipbuilding, railcar fabrication, general plate fabrication, heavy gauge sheet metal, pressure vessels, and certain pipe weldments.

Specifications:

E71T-1C H8, E71T-1M H8 per AWS A5.20, ASME SFA 5.20
ABS Grade 2SA, 2YSA
CWB E491T-1 H8, E491T-1M H8
DNV II YMS

Shielding Gas:

100% CO₂, 75% Ar/25% CO₂, 35-50 cfm

Welding Positions:

All positions

Standard Diameters:

.035", .045", .052", 1/16"

Characteristics:

- Excellent weldability with either 100% CO₂ or 75% Ar/25% CO₂.
- A fast-freezing slag permits the welder to use higher current to deposit more metal faster and still produce a flat bead in all positions.
- Slag removes easily, even from deep groove weldments.
- Spatter is low, so a welder spends more time welding and less time cleaning up.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S
100% CO ₂	.03	1.01	.34	.012	.011
75% Ar/25% CO ₂	.03	1.43	.53	.010	.015

Mechanical Properties:

	100% CO ₂	75%Ar/25% CO ₂
Tensile Strength:	83,000 psi	87,000 psi
Yield Strength:	73,000 psi	77,000 psi
Elongation:	27%	28%
CVN @ 0°F:	93 ft-lbs	89 ft-lbs

For additional information, see Tri-Mark data sheet **TRIPLE 7-060911**.

TRIPLE 8

Triple 8 is designed for the semi-automatic gas-shielded welding of carbon and some higher strength steels. It has higher impact values than most E71T-1 wires. Intended for single and multiple pass applications, the fast-freezing slag system makes this wire ideal for use in all positions. Easy slag removal allows for deep groove welding as well as standard joint configurations. Spatter level is low so a welder spends more time welding as opposed to cleaning. Typical applications will include the shipbuilding industry, railcar, fabrication, heavy equipment, structural steel, and pressure vessels.

Specifications:

E71T-1CJ H8, E71T-9CJ H8 per AWS A5.20, ASME SFA 5.20
ABS Grade 4YSA H5
DNV IV YMS H5
Lloyd's Register of Shipping 4YS H5
CWB E491T-9 H8

Shielding Gas:

100% CO₂, 35-50 cfm

Welding Positions:

All positions

Standard Diameters:

.045", .052", 1/16"

Characteristics:

- All position capability, fast-freezing slag with CO₂ gas.
- Easy slag removal.
- High productivity due to smooth arc and low spatter level.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S
100% CO ₂	.07	1.25	.53	.013	.008

Mechanical Properties:

Tensile Strength:	87,000 psi
Yield Strength:	78,000 psi
Elongation:	26%
CVN @ 0°F:	103 ft-lbs
CVN @ -40°F:	43 ft-lbs

The above properties were determined with 100% CO₂ shielding gas.

For additional information, see Tri-Mark data sheet **TRIPLE 8-061218**.

TM-711M

TM-711M is a gas-shielded flux-cored wire for the semi-automatic welding of carbon steels. It can also be used for welding higher strength steels in applications where E71T-1 filler metal properties are deemed adequate. The wire is recommended for single and multiple pass welding in all positions. Its stiff arc action enhances deep penetration and arc control for out of position welding. Arc characteristics are superior with both 100% CO₂ and 75% Ar/25% CO₂ gas shielding. TM-711M has a quick-freezing slag which facilitates welding, and the attainment of good bead contour, in the vertical up and overhead positions. Typical applications include shipbuilding and repair, and general structural and fabrication work.

Specifications:

E71T-1C H8, E71T-1M H8 per AWS A5.20, ASME SFA 5.20
ABS Grade 2SA, 2YSA

Shielding Gas:

100% CO₂, 75% Ar/25% CO₂, 35-50 cfm

Welding Positions:

All positions

Standard Diameters:

.035", .045", .052", 1/16"

Characteristics:

- Eliminates lack of fusion problems in all-position weldments.
- Higher deposition rates than GMAW wires in out of position welding.
- Stiff arc transfer for overhead welding.
- Can be used with straight CO₂ or 75% Ar/25% CO₂.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S
100% CO ₂	.08	.98	.52	.009	.006
75% Ar/25% CO ₂	.10	1.18	.69	.010	.006

Mechanical Properties:

	100% CO ₂	75% Ar/25% CO ₂
Tensile Strength:	89,000 psi	94,000 psi
Yield Strength:	78,000 psi	81,000 psi
Elongation:	29%	28%
CVN @ 0°F:	54 ft-lbs	39 ft-lbs

For additional information, see Tri-Mark data sheet **TM711M-060613**.

TM-771

TM-771 combines excellent operator appeal with mechanical properties superior to most conventional E71T-1 wires. The arc is soft and quiet, with virtually no spatter. Fume and particulate generation are reduced up to 60% when compared to older generation E71T-1 products. Diffusible hydrogen levels typically are less than the 5 ml/100 g required by MIL-E-24403/1. Mechanical properties rival those of E7018 covered electrodes. These features, along with the high deposition rates obtained in out of position welding, make TM-771 an excellent choice for shipbuilding, pressure vessel fabrication, and structural welding. TM-771 is designed for use with 100% CO₂ shielding gas.

Specifications:

E71T-1C, E71T-12CJ H8 per AWS A5.20, ASME SFA 5.20
ABS Grade 3SA, 3YSA H10
CWB 491T-9 H8
Military Spec. MIL-E-24403/1,
Class MIL-71T-1C, MIL-71T-1-HYC
Lloyd's Register of Shipping,
Grade 3S, 3YS H15
Bureau Veritas S3YM
DNV Grade III Y40MS

Shielding Gas:

100% CO₂, 35-50 cfm

Welding Positions:

All positions

Standard Diameters:

.035", .045", .052", 1/16"

Characteristics:

- Excellent CVN impact values.
- Diffusible hydrogen meets stringent military requirement of 5 ml per 100 g of weld metal.
- Extremely low spatter and fume generation.
- NOT TO BE USED WITH MIXED GAS.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Ni
100% CO ₂	.05	.70	.16	.009	.012	.40

Mechanical Properties:

Tensile Strength: 74,500 psi
Yield Strength: 65,700 psi
Elongation: 26%
CVN @ 0°F: 113 ft-lbs
CVN @ -40°F: 81 ft-lbs

The above properties were determined with 100% CO₂ shielding gas.

For additional information, see Tri-Mark data sheet **TM771-061218**.

TM-770

TM-770 combines superior welding performance with outstanding mechanical properties. TM-770 has exceptional operator appeal for a wire with such superb physical properties, an arc that is soft and stable, and low fume levels with virtually no spatter. Even in the vertical-up position, the welds produced with TM-770 will have a flat bead profile. This wire is designed for both single and multiple pass welding in all positions, using a shielding gas of 75-85% Ar/15-25% CO₂. Typical applications include shipbuilding, offshore structures, and general fabrication where high impact properties, ease of operation and high productivity are required.

Specifications:

E71T-1M, E71T-12MJ H8 per AWS A5.20, ASME SFA 5.20
ABS Grade 3SA, 3YSA
Military Spec. MIL-E-24403/1,
Class MIL-71T-1M, MIL-71T-1-HYM
DNV Grade III Y40MS
Lloyd's Register of Shipping,
Grade 3S, 3YS H15
Bureau Veritas S3YM
CWB E491T-9M H8

Shielding Gas:

75-85% Ar/bal CO₂, 35-50 cfm

Welding Positions:

All positions

Standard Diameters:

.035", .045", .052", 1/16"

Characteristics:

- Low fume levels with virtually no spatter.
- Good CVN toughness at sub-zero temperatures.
- Meets MIL specifications for mechanical properties and diffusible hydrogen levels.
- NOT TO BE USED WITH 100% CO₂.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Ni
80% Ar/20% CO ₂	.06	1.04	.26	.011	.014	.38

Mechanical Properties:

Tensile Strength: 80,000 psi
Yield Strength: 71,000 psi
Elongation: 29%
CVN @ 0°F: 99 ft-lbs
CVN @ -40°F: 55 ft-lbs

The above properties were determined with 80% Ar/20% CO₂ shielding gas.

For additional information, see Tri-Mark data sheet **TM770-070227**.

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TM-910

TM-910 has been specially designed for use with high Argon shielding gas mixes such as 95% Ar/5% CO₂. It is also suitable for high heat input, slow cooling rate, and low heat input, high cooling rate. TM-910 combines superior welding performance with outstanding mechanical properties. Excellent performance in all positions.

Specifications:

E71T-1M, E71T-12MJ per AWS A5.20, ASME SFA 5.20
Military Spec. MIL-E-24403/1D,
Class MIL-71T-1-HYR

Shielding Gas:

75-95% Ar/bal CO₂, 35-50 cfm

Welding Positions:

All positions

Standard Diameters:

.045", .052", 1/16"

Characteristics:

- Low fume levels with virtually no spatter.
- Good CVN toughness at sub-zero temperatures.
- NOT TO BE USED WITH 100% CO₂.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S
80% Ar/20% CO ₂	.041	.72	.40	.007	.009
95% Ar/5% CO ₂	.07	.90	.47	.014	.011

Mechanical Properties:

	80% Ar/20% CO ₂	95% Ar/5% CO ₂
Tensile Strength:	80,000 psi	84,800 psi
Yield Strength:	66,000 psi	77,100 psi
Elongation:	29%	25.5%
CVN @ 0°F:	89 ft-lbs	121 ft-lbs
CVN @ -40°F:	35 ft-lbs	47 ft-lbs

For additional information, see Tri-Mark data sheet **TM910-060911**.

FLUX CORED GAS-SHIELDED WIRES CARBON STEEL ALL POSITION

PRODUCT CHARACTERISTICS

Product	AWS Class	AWS Spec.	Tensile	Yield	Elongation	Impact	C	Mn	Si	P	S	Mo	Cr	Ni	Shielding Gas
			Strength (ksi)	Strength (ksi)	%, in 2"	Strength, CVN (ft•lbs @ °F)									
Triple-7	E71T-1C H8	A5.20	83.0	73.0	27	93 @ 0°F	.03	1.01	.34	.012	.011	—	—	—	100% CO ₂
	E71T-1M H8		87.0	77.0	28	89 @ 0°F	.03	1.43	.53	.010	.015	—	—	—	75% Ar/25% CO ₂
Triple-8	E71T1CJ H8	A5.20	87.0	78.0	26	103 @ 0°F	.07	1.25	.53	.013	.008	—	—	—	100% CO ₂
	E71T-9CJ H8					43 @ -40°F									
TM-711M	E71T-1C H8	A5.20	89.0	78.0	29	54 @ 0°F	.08	.98	.52	.009	.006	—	—	—	100% CO ₂
	E71T-1M H8		94.0	81.0	28	39 @ 0°F	.10	1.18	.69	.010	.006	—	—	—	75% Ar/25% CO ₂
TM-771	E71T-1C E71T-12CJ H8		74.5	65.7	26	113 @ 0°F 81 @ -40°F	.05	.70	.16	.009	.012	—	—	.40	100% CO ₂
TM-770	E71T-1M E71T-12MJ H8	A5.20	80.0	71.0	29	99 @ 0°F 55 @ -40°F	.06	1.04	.26	.011	.014	—	—	.38	80% Ar/20% CO ₂
TM-910	E71T-1M E71T-12MJ	A5.20	80.0	66	29	56 @ 0°F 77 @ -40°F	.06	.82	.40	.08	.009	—	—	—	80% Ar/20% CO ₂
TM-910	E71T-1M E71T-12MJ	A5.20	84.8	77.1	25.5	109 @ 0°F 95 @ -40°F	.07	.90	.47	.014	.011	—	—	—	95% Ar/5% CO ₂

WELDING PARAMETERS

Diameter	Position	Approximate Parameters			Operating Ranges	
		Amperage	Wire Feed Speed (ipm)	Voltage	Amperage	Voltage
.035"	Vertical Up	150	320	26	100-225	23-30
	Flat	250	720	32	200-325	30-34
	Overhead	150	320	26	100-225	25-31
.045"	Vertical Up	200	260	25	100-220	22-28
	Flat	250	375	28	100-300	22-31
	Overhead	200	260	26	150-275	22-29
.052"	Vertical Up	225	240	25	100-275	19-27
	Flat	300	360	28	100-325	19-31
	Overhead	225	240	26	150-300	22-28
1/16"	Vertical Up	225	160	25	150-275	22-27
	Flat	350	300	29	150-400	22-35
	Overhead	225	160	26	150-300	22-28

PRODUCT COMPARISON

Tri-Mark	AWS Classification	Hobart	Lincoln	ESAB	Kobelco	Select Arc
Triple-7	E71T-1C, E71T-1M H8	Excel Arc 71	Outershield 71M Elite Outershield 71M	Dual Shield 7100 Ultra	Frontiarc 711, DW-50	Select 712
Triple-8	E71T-1CJ, E71T-9CJ H8	Excel Arc 71	Outershield 71M Elite Outershield 71M	Dual Shield II 71 Ultra	Frontiarc 711, DW-50	Select 720, 716
TM-711M	E71T-1C, E71T-1M H8		Outershield 71	Dual Shield 7000, FC-717		Select 710
TM-771	E71T-1C, E71T-12CJ H8	Formula XL®-550	Outershield 71 Elite	Dual Shield II 71 Ultra	DW-55ESR	Select 720
TM-770	E71T-1M, E71T-12MJ H8	Formula XL®-525	Outershield 71 Elite	Dual Shield II 70T-12	DW-55ESR	Select 720
TM-910	E71T-1M, E71T-12MJ			Dual Shield 70 Ultra Plus		

METAL CORED

GAS-SHIELDED WIRES
CARBON STEEL

High deposition and superior weld nugget shape are what welders like most about Tri-Mark's metal-cored wires for carbon steels. Because metal-cored wires produce a higher current density, along with a wider projection area for increased deposition and a less turbulent weld pool, the penetration pattern is more uniform and reduces the chance for cold lap. Compared to the performance of solid wires, metal-cored wires allow for faster travel speeds and a higher quality weld bead, which translates into increased productivity and reduced costs. For many applications, metal-cored wires are often found to be superior to those of solid wires because they offer improved characteristics and benefits which include the following:

CHARACTERISTIC: Higher Deposition Rates

BENEFIT: Increased Productivity

CHARACTERISTIC: Improved Side Wall Fusion

BENEFIT: Better Quality Welds

CHARACTERISTIC: Specialized Alloys Available

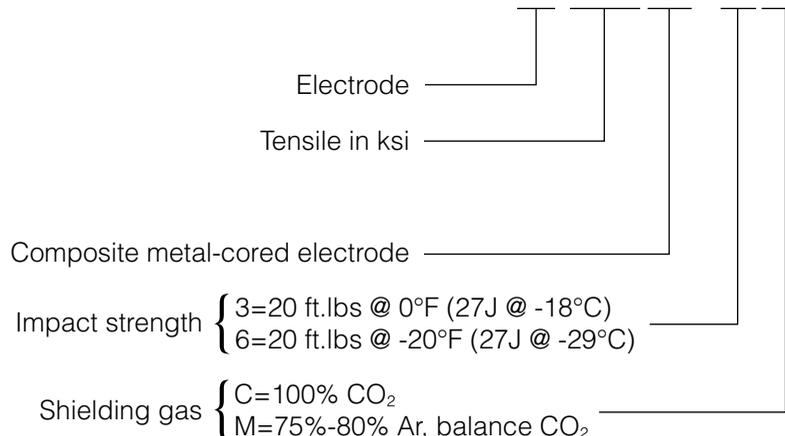
BENEFIT: Lower Filler Metal Costs

CHARACTERISTIC: Reduced Spatter

BENEFIT: Reduced Clean-up Cost

HOW AWS CLASSIFIES MILD STEEL METAL-CORED WIRES, GMAW PROCESS (AWS A5.18)

E70C-6M



METALLOY 70X

Metalloy 70X is a metal-cored wire with lower fume generation rates than other metal-cored wires. The fume generation rates compare to solid wires, while offering the higher deposition rates of a metal-cored wire. The wire is recommended for single and multiple pass welding in both the flat and horizontal positions. The recommended shielding is a mixture of argon and carbon dioxide, with a minimum of 75% argon and a maximum of 92% argon. Arc characteristics improve with richer argon gases, while fume levels decrease. Metalloy 70X has the lowest spatter level of all the Tri-Mark metal-cored wires.

Specifications:

E70C-6M H4 per
AWS A5.18, ASME SFA 5.18

Shielding Gas:

75-92% Ar/bal CO₂, 35-50 cfm

Welding Positions:

CV Spray—flat, horizontal, vertical down
Pulse and Short Arc—all positions

Standard Diameters:

.035", .045", .052", 1/16", 3/32"

Characteristics:

- Lowest fume level of our cored products.
- Exceptionally clear arc.
- Better wetting action than solid wire, minimizing cold lap.
- Slag-free welds reduce clean-up time.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S
75% Ar/25% CO ₂	.04	1.50	.70	.008	.013
90% Ar/10% CO ₂	.03	1.67	.80	.013	.012

Mechanical Properties:

	75% Ar/25% CO ₂	90% Ar/10% CO ₂
Tensile Strength:	82,000 psi	89,500 psi
Yield Strength:	70,000 psi	78,200 psi
Elongation:	29%	24.5%
CVN @ -20°F:	91 ft-lbs	56 ft-lbs

The above properties were determined with 75% Ar/25% CO₂ shielding gas.

For additional information, see Tri-Mark data sheet **METALLOY70X-060714**.

METALLOY 76

Metalloy 76 has higher manganese and silicon levels than Metalloy 70 with slightly lower spatter and higher strength. The increased deoxidization level allows for more tolerance of mill scale, with fewer root pores than Metalloy 70. Metalloy 76 is recommended for single and multiple pass welding in flat and horizontal positions with 75-90% Ar/CO₂ with no detrimental effects at the higher argon levels. The wetting action is better than solid wire, minimizing cold lap on heavier sections of steel.

Specifications:

E70C-6M H4 per
AWS A5.18, ASME SFA 5.18
DNV Grade III Y40MS
CWB E491C-6M H4
Bureau Veritas S3YM
Lloyd's Register of Shipping,
Grade 3Y40S H15
ABS Grade 3SA, 3YSA

Shielding Gas:

75-90% Ar/bal CO₂, 35-50 cfm

Welding Positions:

CV Spray—flat, horizontal, vertical down
Pulse and Short Arc—all position

Standard Diameters:

.035", .045", .052", 1/16", 5/64"

Characteristics:

- Higher deoxidizer level than Metalloy 70 to improve performance on mill scale plate.
- Better wetting action than solid wire minimizes cold lap.
- Superb operator appeal.
- Good choice to use for short-circuit or pulse applications.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S
75% Ar/25% CO ₂	.06	1.64	.75	.012	.019
90% Ar/10% CO ₂	.05	1.69	.78	.012	.013

Mechanical Properties:

	75% Ar/25% CO ₂	90% Ar/10% CO ₂
Tensile Strength:	91,000 psi	92,500 psi
Yield Strength:	81,000 psi	82,600 psi
Elongation:	27%	26%
CVN @ -20°F:	75 ft-lbs	68 ft-lbs

The above properties were determined with 75% Ar/25% CO₂ shielding gas.

For additional information, see Tri-Mark data sheet **METALLOY76-061218**.

METALLOY 70R

Metalloy 70R is a metal-cored wire especially formulated to weld over reasonable amounts of mill scale, rust and other foreign materials such as primer, paint and oil. The wire has a smooth spray arc action, relatively low smoke emission and virtually no spatter. Low spatter and low slag combine to greatly reduce clean-up costs and provide very high deposition efficiency. The wire is recommended for single and limited multiple pass welding in flat and horizontal positions. A shielding gas mixture of argon and carbon dioxide is recommended, with a minimum of 75% argon. Argon-carbon dioxide mixtures provide optimum weldability, but in some applications, welding with 100% carbon dioxide is acceptable.

Specifications:

E70C-6M H4 per
AWS A5.18, ASME SFA 5.18
ABS Grade 2SA, 2YSA

Shielding Gas:

75% Ar/25% CO₂, 35-50 cfm

Welding Positions:

CV Spray—flat, horizontal, vertical down
Pulse and Short Arc—all positions

Standard Diameters:

5/64"

Characteristics:

- Designed for welding over rust, oil, paint, primer, and other contaminants.
- Basically a single-pass wire with limited multiple pass use.
- Produces sound weldments on most heavily scaled surfaces.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S
75% Ar/25% CO ₂	.06	1.58	.61	.010	.020

Mechanical Properties:

Tensile Strength:	88,000 psi
Yield Strength:	74,000 psi
Elongation:	28%
CVN @ -20°F:	25 ft-lbs

The above properties were determined with 75% Ar/25% CO₂ shielding gas.

For additional information, see Tri-Mark data sheet **METALLOY 70R-060911**.

METAL CORED GAS-SHIELDED WIRES CARBON STEEL

METALLOY VANTAGE™

Metalloy Vantage is a metal-cored wire with fewer silicon islands than other metal-cored wires. Together with exceptional low spatter rates, Metalloy Vantage will save time and money spent cleaning prior to painting, coating, or plating. This wire is recommended for single or multiple pass applications in flat or horizontal positions. The recommended shielding gas is a mixture of argon and carbon dioxide with the percentage being 75% to 95% argon. Arc characteristics improve with higher argon levels, while spatter and fumes levels decrease.

Specifications:

E70C-6M H4 per AWS A5. 18,
ASME SFA 5.18
CWB E492C-6M 4H
ABS 3SA, 3YSA

Shielding Gas:

75-95% Ar/Bal CO₂, 35-50 cfh

Welding Positions:

CV Spray—flat, horizontal, vertical down
Pulse and Short Arc—all positions

Standard Diameters:

.035", .045", .052", 1/16"

Characteristics:

- Exceptionally clean weld beads with minimal silicon islands; almost self-peeling.
- Weld bead toe lines are almost completely free of silicon deposits.
- Better wetting action than solid wire.
- Better gap bridging and reduced burn through than solid wire.
- Higher deposition rates, travel speeds and side wall fusion than solid wire.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Ni
75% Ar/25% CO ₂	.05	1.38	.65	.011	.013	.40
90% Ar/10% CO ₂	.05	1.50	.72	.010	.012	.42

Mechanical Properties:

	75% Ar/25% CO ₂	90% Ar/10% CO ₂
Tensile Strength:	90,200 psi	97,000 psi
Yield Strength:	80,000 psi	87,000 psi
Elongation:	25%	22.5%
CVN @ 0°F:	50 ft-lbs	56 ft-lbs
CVN @ -20°F:	42 ft-lbs	47 ft-lbs

For additional information, see Tri-Mark data sheet **METALLOY VANTAGE-070326**.

METALLOY X-CEL

Metalloy X-CEL is a metal-cored wire specifically formulated to maximize the benefits of using DCEN (straight) polarity. This unique wire is best suited for applications where high deposition, fast fill characteristics are required along with a "soft arc" for reduced burn through and improved gap bridging capability. With deposition rates 30-40% higher than solid wire, Metalloy X-CEL is ideally suited for semi-automatic, automatic and robotic welding on clean mild steel in thicknesses 1/4" (6.35 mm) and less. The recommended shielding gas is a mixture of argon and carbon dioxide, with a minimum of 75% and a maximum of 95% argon.

Specifications:

E70C-6M H4 per
AWS A5.18, ASME SFA 5.18

Shielding Gas:

75-95% ar/Bal CO₂, 35-50 cfh

Welding Positions:

CV Spray—flat, horizontal, vertical down
Pulse and Short Arc—all positions

Standard Diameters:

.045", .052", 1/16"

Characteristics:

- "Soft arc" characteristics for reduced burn through and improved gap bridging compared to solid or conventional DCEP metal-core wires.
- Deposition rates 30-40% higher than solid wire.
- Travel speeds 30-40% higher than solid wire.
- Fast-fill arc with lower amperage and voltage settings (heat input) than conventional DCEP welding.
- Highly resistant to undercut even at higher current settings.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S
DCEP** 75/25	.05	1.25	.60	.01	.012
DCEN 75/25	.06	1.28	.65	.011	.011
DCEN 90/10	.06	1.35	.70	.011	.010

Mechanical Properties:

	DCEP**	DCEN	DCEN
	75% Ar/25% CO ₂	75% Ar/25% CO ₂	90% Ar/10% CO ₂
Tensile Strength:	88,500psi	90,000 psi	95,500 psi
Yield Strength:	76,500 psi	80,500 psi	82,500 psi
Elongation:	24.5%	24.2%	22.1%
CVN @ -20°F(-29°C):	55 ft-lbs	45 ft-lbs	42 ft-lbs

** Note: DCEP data is provided for AWS classification purposes only.

Metalloy X-CEL is intended for operation in DCEN polarity.

For additional information, see Tri-Mark data sheet **METALLOY X-CEL-060421**.

METAL CORED GAS-SHIELDED WIRES CARBON STEEL

PRODUCT CHARACTERISTICS

Product	AWS Class	AWS Spec.	Tensile Strength (ksi)	Yield Strength (ksi)	Elongation %, in 2"	Impact Strength, CVN (ft•lbs @ °F)	C	Mn	Si	P	S	Ni	Shielding Gas
Metalloy® 70X	E70C-6M H4	A5.18	82.0	70.0	29	91 @ -20°F	.04	1.50	.70	.008	.013		75% Ar/25% CO ₂
Metalloy® 76	E70C-6M H4	A5.18	91.0	81.0	27	75 @ -20°F	.06	1.64	.75	.012	.019		75% Ar/25% CO ₂
Metalloy® 70R	E70C-6M H4	A5.18	88.0	74.0	28	25 @ -20°F	.06	1.58	.61	.010	.020		75% Ar/25% CO ₂
Metalloy Vantage™	E70C-6M H4	A5.18	90.2	80.0	25	42 @ -20°F	.05	1.38	.65	.011	.013	.40	75% Ar/25% CO ₂
			97.0	87.0	22.5	47 @ -20°F	.05	1.50	.72	.010	.012	.42	90% Ar/10% CO ₂
Metalloy X-Cel™	E70C-6M H4	A5.18	90.8	80.5	24.2	45 @ -20°F	.06	1.28	.65	.011	.011		75%Ar/25% CO ₂ DCEN
			95.5	82.5	22.1	42 @ -20°F	.06	1.35	.70	.011	.010		90%Ar/10% CO ₂ DCEN

WELDING PARAMETERS

Diameter	Position	Approximate Parameters			Operating Ranges	
		Amperage	Wire Feed Speed (ipm)	Voltage	Amperage	Voltage
.035"	Vertical Down & Up	100	145	15	50-175	13-17
	Flat	200	395	24	200-325	24-31
	Overhead	100	145	15	50-175	13-17
.045"	Vertical Down & Up	150	160	18	85-200	14-17
	Flat	300	480	32	85-350	14-38
.052"	Vertical Up	125	120	17	100-125	16-17
	Flat	300	320	29	100-450	15-40
	Overhead	125	120	18	100-130	16-18
1/16"	Flat	350	275	29	145-485	20-36
5/64"	Flat	450	235	28	350-550	26-37
3/32"	Flat	450	155	29	350-600	26-38

PRODUCT COMPARISON

Tri-Mark	AWS Classification	Hobart	Lincoln	ESAB	Select Arc
Metalloy® 70X	E70C-6M H4		Outershield MC 710 XL		Select 70C-7, 70C-T
Metalloy® 76	E70C-6M H4	FabCOR® 86R	Outershield MC 710, MC6	Coreweld Ultra	Select 70C-6
Metalloy® 70R	E70C-6M H4				Select 70C-8
Metalloy Vantage™	E70C-6M H4				
Metalloy X-Cel™	E70C-6M H4				

For additional information, call customer service. **1.800.424.1543.**

METAL CORED

GAS-SHIELDED WIRES LOW ALLOY

Tri-Mark's metal-cored low alloy wires are uniquely formulated for specific metal types like nickel, chrome-moly, high-strength and T1-type steels. Much like their carbon steel counterparts, metal-cored wires for low alloys possess outstanding characteristics and deliver many benefits to enhance the "total welding solution."

E80C-X

Electrode

Tensile X 10 ksi

Composite metal-cored electrode

Indicates the chemical composition of a solid electrode or the chemical composition of the weld metal produced by a composite electrode (see below)

HOW AWS CLASSIFIES LOW-ALLOY METAL-CORED (COMPOSITE) WIRES, GMAW PROCESS (AWS A5.28)

COMPOSITE ELECTRODE ALLOY DESIGNATOR CHART

Chromium-Molybdenum Weld Metal

E80C-B2	1.00 - 1.50% Chrome, .50% Moly
E70C-B2L	1.00 - 1.50% Chrome, .50% Moly with Lower Carbon
E90C-B3	2.00 - 2.50% Chrome, 1.00% Moly
E80C-B3L	2.00 - 2.50% Chrome, .50% Moly with Lower Carbon
E80C-B6	4.50 - 6.00% Chrome, .50% Moly
E80C-B8	8.00 - 10.50% Chrome, .50% Moly
E80C-B9	8.00 - 10.50% Chrome, .50% Moly, Microalloyed

Nickel Steel Weld Metal

E80C-Ni1	1.00% Nickel, 80ksi
E70C-Ni2	2.00% Nickel, 70ksi
E80C-Ni2	2.00% Nickel, 80ksi
E80C-Ni3	3.00% Nickel, 80ksi

Manganese-Molybdenum Steel Weld Metal

E90C-D2	1.00 - 1.90% Manganese, .50% Moly
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Manganese-Nickel-Molybdenum Steel Weld Metal

E90C-K3	.75 - 2.25% Mn, .50 - 2.50% Ni, .25 - .65% Moly, 90ksi
E100C-K3	.75 - 2.25% Mn, .50 - 2.50% Ni, .25 - .65% Moly, 100ksi
E110C-K4	.75 - 2.25% Mn, .50 - 2.50% Ni, .25 - .65% Moly, .15- .65% Chrome, 110ksi

Weld Metal for Weathering Steels

E80C-W2	Addition of Copper for Weathering Steels
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METALLOY VANTAGE™ Ni1

Metalloy Vantage Ni1 is a metal-cored wire designed for single or multiple pass welding of nickel-molybdenum steels such as 1/2 Ni-1/4 Mo, 1 Ni-1/4 Mo and 1 1/2 Ni-1/4 Mo. This wire also incorporates patented formulation technology to reduce silicon island formation. Weld bead toe lines are almost completely free of silicon deposits, eliminating troublesome clean-up time and effort. In addition, the weld bead face is virtually free from silicon island deposits; those remaining islands of silicon are almost self-peeling. Metalloy Vantage Ni1 is ideal for welding castings, equipment and those applications requiring toughness at sub-zero temperatures. Additionally it is well suited for joining HSLA weathering steels in structural construction applications where color match is not required.

Specifications:

E80C-Ni1 H4 per AWS A5.28, ASME SFA 5.28 CWB E80C-Ni1 H4

Shielding Gas:

95-98% Ar/Bal O₂, 75% Ar/25% CO₂, 35-50 cfm

Welding Positions:

CV Spray—flat, horizontal, vertical down Pulse and Short Arc—all positions

Standard Diameters:

.045", .052", 1/16"

Characteristics:

- Exceptionally clean weld beads with minimal silicon islands; almost self-peeling.
- Weld bead toe lines are almost completely free of silicon deposits.
- Better gap bridging and reduced burn through than solid wire.
- Higher deposition rates and travel speeds than solid wire.
- High impacts at sub-zero temperatures.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	Ni
75% Ar/25% CO ₂	.05	1.38	.65	1.0
95% Ar/5% O ₂	.06	1.45	.66	1.04

Mechanical Properties*:

	75% Ar/25% CO ₂	95% Ar/5% O ₂
Tensile Strength:	92,000 psi	91,000 psi
Yield Strength:	81,000 psi	79,000 psi
Elongation:	25%	26%
CVN @ -20°F (-29°C):	48 ft-lbs (65J)	-
CVN @ -50°F (-46°C):	44 ft-lbs (60J)	49 ft-lbs

For additional information, see Tri-Mark data sheet **METALLOY VANTAGE Ni1-070502**.

METALLOY 80B2

Metalloy 80B2 is a gas-shielded metal-cored wire that's designed for the single or multiple pass welding of chrome-moly steels. Designed for use with 98% Ar/2% O₂ or 75% Ar/25% CO₂ shielding gas, Metalloy 80B2 is used for welding castings and equipment.

Specifications:

E80C-B2 per AWS A5.28

Shielding Gas:

98% Ar/2% O₂, 75% Ar/25% CO₂, 35-50 cfm

Welding Positions:

CV Spray—flat, horizontal, vertical down Pulse and Short Arc—all positions

Standard Diameters:

.045"

Characteristics:

- Suitable for welding 1/2 Cr/1/2 Mo, 1 Cr/1/4 Mo and 1-1/4 Cr/1/2 Mo steels.
- Single or multiple pass welding.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	Cr	Mo
98% Ar/2% O ₂	.07	.78	.42	1.25	.47
75% Ar/25% CO ₂	.06	.82	.29	1.36	.50

Mechanical Properties:

	98% Ar/2% O ₂	75% Ar/25% CO ₂
Tensile Strength:	96,900 psi*	83,300 psi
Yield Strength:	83,700 psi	69,600 psi
Elongation:	22.5%	23%

* Stress relieved 1 hr. @ 1150°F.

For additional information, see Tri-Mark data sheet **METALLOY 80B2-060731**.

METALLOY VANTAGE™ D2

Metalloy Vantage D2 is a gas-shielded metal-cored wire that is equivalent to ER80S-D2 solid wire. Metalloy Vantage D2 offers improved welding performance through higher deposition rates and better wet-in than solid wire. In addition, weld toe lines are almost completely free of silicon deposits which will save time and money by eliminating troublesome cleanup and part preparation. With excellent mechanical properties, Metalloy Vantage D2 was developed for high-strength, low alloy steels found in heavy equipment and structural applications. Metalloy Vantage D2 is recommended for single-pass and multiple-pass welding with Ar/CO₂ and Ar/O₂ shielding gas. Arc characteristics improve with richer argon gases while spatter and fume levels decrease.

Specifications:

E90C-D2 per AWS A5.28

Shielding Gas:

95-98% Ar/Bal O₂, 75-95% Ar/Bal CO₂

Welding Positions:

CV Spray—flat, horizontal, vertical down Pulse and Short Arc—all positions

Standard Diameters:

.045", .052"

Characteristics:

- Weld toe lines are almost completely free of silicon deposits.
- Exceptionally clean weld beads with minimal silicon islands.
- High deposition rates and travel speeds compared to solid wire.
- Better wetting compared to solid wire.
- Single or multiple pass welding.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	Mo
98% Ar/2% O ₂	.05	1.47	.48	.45
90% Ar/10% CO ₂	.06	1.36	.43	.45

Mechanical Properties*:

	98% Ar/2% O ₂	90% Ar/10% CO ₂
Tensile Strength:	99,400 psi	97,900 psi
Yield Strength:	91,600 psi	90,200 psi
Elongation:	21.8%	18.5%
CVN@ -20°F (-29°C):	50 ft-lbs (68J)	45 ft-lbs (61J)

For additional information, see Tri-Mark data sheet **Metalloy Vantage D2 070118**.

METALLOY 80D2

Metalloy 80D2 is a gas-shielded metal-cored wire that's equivalent to ER80S-D2 solid wire, but offers improved welding performance through higher deposition rates and better wet-in. Developed for high-strength, low alloy steels found in heavy equipment and structural parts, Metalloy 80D2 is designed for use with Ar/O₂ shielding gas and is ideal for both single and multiple pass applications. Excellent mechanical properties are achieved with 98% Ar/2% O₂ shielding gas.

Specifications:

E90C-D2 per AWS A5.28, ASME SFA5.28

Shielding Gas:

95-98% Ar/Bal O₂, 90% Ar/10% CO₂
35-50 cfm

Welding Positions:

CV Spray—flat, horizontal, vertical down
Pulse and Short Arc—all positions

Standard Diameters:

.045", .052", 1/16"

Characteristics:

- High deposition rates compared to solid wire.
- Better wetting action compared to solid wire.
- Single or multiple pass welding.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	Ni	Mo	Cu
95% Ar/5% O ₂	.08	1.34	.53	.02	.50	.06
90% Ar/10% CO ₂	.08	1.80	.66	.01	.50	.02

Mechanical Properties:

	95% Ar/5% O ₂	90% Ar/10% CO ₂
Tensile Strength:	105,000psi	106,000psi
Yield Strength:	97,000psi	98,400psi
Elongation:	20%	22.5%
CVN @ -20°F:	48 ft-lbs	52 ft-lbs

For additional information, see Tri-Mark data sheet **METALLOY80D2-060911**.

METALLOY 80N1

Metalloy 80N1 is a gas-shielded metal-cored wire that's designed for the single or multiple pass welding of nickel-molybdenum steels such as 1/2 Ni/1/4 Mo, 1 Ni/1/4 Mo, and 1-1/2 Ni/1/4 Mo. Designed for use with argon gas mixtures, Metalloy 80N1 is ideal for welding castings, equipment and those applications requiring toughness at sub-zero temperatures.

Specifications:

E80C-Ni1 per AWS A5.28
ABS Grade 3SA, 3YSA
CWB E80C-Ni1 H8

Shielding Gas:

98% Ar/2% O₂, 75% Ar/25% CO₂,
35-50 cfm

Welding Positions:

CV Spray—flat, horizontal, vertical down
Pulse and Short Arc—all positions

Standard Diameters:

.045", .052", 1/16"

Characteristics:

- Suitable for nickel-molybdenum steels.
- High impacts at sub-zero temperatures.
- Single or multiple pass welding.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	Ni	Mo
98% Ar/2% O ₂	.04	1.14	.40	.97	.12
75% Ar/25% CO ₂	.05	.86	.21	.97	.14

Mechanical Properties:

	98% Ar/2% O ₂	75% Ar/25% CO ₂
Tensile Strength:	90,000psi	85,900psi
Yield Strength:	77,600psi	74,000psi
Elongation:	26%	25%
CVN @ -50°F:	46 ft-lbs	56 ft-lbs

For additional information, see Tri-Mark data sheet **METALLOY80N1-060911**.

METALLOY 80N2

Metalloy 80N2 is a metal-cored low alloy wire that is designed for single and multiple pass welding of structures where high Charpy-impact values are required at sub-zero temperatures. This higher nickel alloy product offers superior mechanical properties when used with 98% Ar/2% O₂ or 75% Ar/25% CO₂ shielding gas and is appropriate for the offshore oil platforms, shipbuilding, and other applications where good toughness is desired.

Specifications:

E80C-Ni2 per AWS A5.28

Shielding Gas:

98% Ar/2% O₂, 75% Ar/25% CO₂,
35-50 cfm

Welding Positions:

CV Spray—flat, horizontal, vertical down
Pulse and Short Arc—all positions

Standard Diameters:

.045"

Characteristics:

- High impacts at sub-zero temperatures.
- High deposition rates.
- Single or multiple pass welding.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	Ni
98% Ar/2% O ₂	.04	1.09	.34	2.26
75% Ar/25% CO ₂	.03	.77	.28	2.23

Mechanical Properties:

	98% Ar/2% O ₂	75% Ar/25% O ₂
Tensile Strength:	90,000psi*	78,200psi**
Yield Strength:	77,000psi	65,800psi
Elongation:	26%	30%
CVN @ -50°F:	—	38 ft-lbs
CVN @ -80°F:	48 ft-lbs	—

* Stress relieved 1 hr. @ 1150°F.

** Stress relieved 8 hrs. @ 1150°F.

For additional information, see Tri-Mark data sheet **METALLOY80N2-060421**.

METALLOY 90

Metalloy 90 is a metal-cored wire designed for welding high-strength steels, particularly those requiring high toughness at sub-zero temperatures. Ideal for castings, pressure vessels and other applications associated with building ships and offshore platforms, Metalloy 90 can be used for both single and multiple pass welding with 75% Ar/25% CO₂ shielding gas.

Specifications:

E90C-K3 per AWS A5.28

Shielding Gas:

75% Ar/25% CO₂, 35-50 cfh

Welding Positions:

CV Spray—flat, horizontal, vertical down
Pulse and Short Arc—all positions

Standard Diameters:

.045", 1/16"

Characteristics:

- Suitable for welding high strength low alloy steels.
- Single or multiple pass welding.
- Higher deposition rates compared to solid wire.
- High CVN at sub-zero temperatures.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	Ni	Mo
75% Ar/25% CO ₂	.03	1.27	.30	1.83	.38

Mechanical Properties:

Tensile Strength: 97,000 psi
Yield Strength: 91,000 psi
Elongation: 23%
CVN @ -60°F: 41 ft-lbs

The above properties were determined with 75% Ar/25% CO₂ shielding gas.

For additional information, see Tri-Mark data sheet **METALLOY90-060911**.

METALLOY 100

Metalloy 100 is a low alloy steel metal-cored welding electrode designed to produce weld metal with a minimum of 100 ksi tensile strength. In addition to high tensile strength, the weld metal has excellent low temperature toughness to -60°C. Metalloy 100 produces these properties over a wide heat input range. Like most metal-cored wires, Metalloy 100 has low diffusible hydrogen levels below 4 ml/100g.

Specifications:

E100C-K3 per AWS A5.28

Shielding Gas:

90% Ar/10% CO₂ and 95% Ar/5% CO₂, 35-50 cfh

Welding Positions:

CV Spray—flat, horizontal, vertical down
Pulse and Short Arc—all positions

Standard Diameters:

.045", 1/16"

Characteristics:

- Single or multiple-pass welding of high strength low alloy steels, such as A514, A517, T-1, HY-80, HSLA A80, A710 and many others.
- Higher deposition rates compared to solid wire.
- Designed for Ar/CO₂ shielding gas mixtures containing up to 10% CO₂.
- Shielding gas mixtures containing more than 10% CO₂ may be used but will result in tensile strength below 100 ksi.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	Ni	Mo
75%Ar/25%CO ₂	.07	1.50	.38	1.58	.34

Mechanical Properties:

Tensile Strength: 113,300psi
Yield Strength: 103,300psi
Elongation: 21%
CVN @ -60°F: 49 ft-lbs

For additional information, see Tri-Mark data sheet **METALLOY100-060911**.

METALLOY 110

Metalloy 110 is a metal-cored, gas-shielded wire that's designed for the single and multiple pass welding of quenched and tempered steels including T1-type, HY80 and HY100. For use with 75% Ar/25% CO₂, it is also highly recommended for welding high-strength steels. Metalloy 110 can be used for welding castings, heavy equipment, and shipbuilding projects.

Specifications:

E110C-K4 AWS A5.28
CWB E110C-G H4

Shielding Gas:

75% Ar/25% CO₂*, 35-50 cfh

Welding Positions:

CV Spray—flat, horizontal, vertical down
Pulse and Short Arc—all positions

Standard Diameters:

.045", 1/16"

Characteristics:

- Single or multiple pass welding of high strength low alloy steels.
- Higher deposition rates compared to solid wire.
- Recommended for welding quenched and tempered HSLA steels.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	Ni	Cr	Mo
75% Ar/25% CO ₂	.07	1.63	.48	2.22	.21	.59

Mechanical Properties:

Tensile Strength: 119,900psi
Yield Strength: 109,200psi
Elongation: 22%
CVN @ -60°F: 39 ft-lbs

The above properties were determined with 75%Ar/25% CO₂ shielding gas.

* Other shielding gas may be used, but must be agreed upon by supplier and purchaser.

For additional information, see Tri-Mark data sheet **METALLOY110-060911**.

METAL CORED

GAS-SHIELDED WIRES LOW ALLOY

PRODUCT CHARACTERISTICS

Product	AWS Class	AWS Spec.	Tensile Strength (ksi)	Yield Strength (ksi)	Elongation %, in 2"	Impact Strength, CVN (ft•lbs @°F)	Chemical Composition								Shielding Gas
							C	Mn	Si	Ni	Cr	Mo	Cu		
Metalloy® Vantage Ni1	E80C-Ni1 H4	A5.28	92.0	81.0	25	44 @ -50°F	.05	1.38	.65	1.0	—	—	—	75% Ar/25% CO ₂	
Metalloy® 80B2	E80C-B2	A5.28	96.9†	83.7	22.5	—	.07	.78	.42	—	1.25	.47	—	98% Ar/2% O ₂	
			83.3	69.6	23	—	.06	.82	.29	—	1.36	.50	—	75% Ar/25% CO ₂	
Metalloy® Vantage D2	E90C-D2	A5.28	105	97	20%	48 @ -20°F	.08	1.34	.53	.02	—	.50	.06	98% Ar/Bal O ₂	
			106	98.4	22.5	52 @ -20°F	.08	1.80	.66	.01	—	.50	.02	90% Ar/10% CO ₂	
Metalloy® 80D2	E90C-D2	A5.28	105	97	20	48 @ -20°F	.08	1.34	.53	.02	—	.50	.06	95-98% Ar/Bal O ₂	
			106	98.4	22.5	52 @ -20°F	.08	1.80	.66	.01	—	.50	.02	90% Ar/10% CO ₂	
Metalloy® 80N1	E80C-Ni1	A5.28	90.0	77.6	26	46 @ -50°F	.04	1.14	.40	.97	—	.12	—	95-98% Ar/Bal O ₂	
			85.9	74.0	25	56 @ -50°F	.05	.86	.21	.97	—	.14	—	75% Ar/25% CO ₂	
Metalloy® 80N2	E80C-Ni2	A5.28	90.0†	77.0	26	48 @ -80°F	.04	1.09	.34	2.26	—	—	—	98% Ar/2% O ₂	
			78.2††	65.8	30	38 @ -50°F	.03	.77	.28	2.23	—	—	—	75% Ar/25% CO ₂	
Metalloy® 90	E90C-K3	A5.28	97.0	91.0	23	41 @ -60°F	.03	1.27	.30	1.83	—	.38	—	75% Ar/25% CO ₂	
Metalloy® 100	E100C-K3	A5.28	113.3	103.3	21	49@-60°F	.07	1.50	.38	1.58	—	.34	—	75% Ar/25% CO ₂	
Metalloy® 110	E110C-K4	A5.28	119.9	109.2	22	39 @ -60°F	.07	1.63	.48	2.22	.21	.59	—	75% Ar/25% CO ₂ *	

† Stress relieved 1 hr. @ 1150°F.

†† Stress relieved 8 hrs. @ 1150°F.

††† Stress relieved 1 hr. @ 1275°F.

* Other shielding gases may be used, but must be agreed upon by supplier and purchaser.

WELDING PARAMETERS

Diameter	Position	Approximate Parameters			Operating Ranges	
		Amperage	Wire Feed Speed (ipm)	Voltage	Amperage	Voltage
.045"	Vertical Down & Up	150	160	18	85-200	14-17
	Flat	300	480	32	85-350	14-38
.052"	Vertical Up	125	120	17	100-125	16-17
	Flat	300	320	29	100-450	15-40
	Overhead	125	120	18	100-130	16-18
1/16"	Flat	350	275	29	145-485	17-36

PRODUCT COMPARISON

Tri-Mark	AWS Classification	Lincoln	Select Arc	ESAB
Metalloy® Vantage Ni1	E80C-Ni1 H4			
Metalloy® 80B2	E80C-B2			Coreweld 80 B2
Metalloy® Vantage D2	E80C-D2			
Metalloy® 80D2	E90C-D2		Select 80C-D2	Coreweld 80 D2
Metalloy® 80N1	E80C-Ni1		Select 80C-Ni1	
Metalloy® 80N2	E80C-Ni2		Select 80C-Ni2	
Metalloy® 90	E90C-K3	MC-900	Select 90C-M2	
Metalloy® 100	E100C-K3		Select 100C	
Metalloy® 110	E110C-K4	MC-1100	Select 110C-M2	Coreweld 110

For additional information, call customer service. **1.800.424.1543.**

FLUX CORED

SELF-SHIELDED WIRES CARBON STEEL

Tri-Mark's flux-cored carbon steel self-shielded wires are known throughout the world for their high quality and performance. The flux ingredients, formulated to protect the molten weld pool from the atmosphere, provides maximum deoxidation and denitrification of the weld metal. In addition, welders have come to rely on Tri-Mark's self-shielded wires for their outstanding welding capacity in drafty conditions, especially outdoors in high winds, and in locations where space restrictions won't allow the use of shielding gas.

TM-44

TM-44 produces weld beads with good appearance, low spatter, and nearly self-removing slag. High deposition rates are achievable, assisted by the use of a recommended 2-3/4" electrical stickout. The highly basic slag desulfurizes weld metal, minimizing cracking tendencies on higher sulfur steels. Penetration is shallow on DCEP (reverse polarity), allowing the use of this product on applications with poor fitup. TM-44 is a good choice for weldments where the use of shielding gas is not practical, as in windy conditions or where smoke extraction equipment causes shielding problems. Typical applications include the welding of heavy machinery, large construction components where appropriate, and stiffeners in barge building. This wire is intended for semi-automatic and automatic, single and multiple pass welding in the flat and horizontal positions. The use of any external shielding gas is not recommended.

Specifications:

E70T-4 per AWS A5.20, ASME SFA 5.20

Shielding Gas:

None

Welding Positions:

Flat and horizontal

Standard Diameters:

5/64", 3/32", .120"

Characteristics:

- Extremely high deposition rates can be achieved.
- More tolerance than E70T-1 wires on higher sulfur steel.
- Self-shielded to facilitate welding outdoors.
- Uses DCEP (reverse polarity).

Undiluted Weld Metal Chemistry:

C	Mn	Si	P	S	Al
.28	.45	.13	.008	.004	1.36

Mechanical Properties:

Tensile Strength:	92,000 psi
Yield Strength:	69,000 psi
Elongation:	22%

For additional information, see Tri-Mark data sheet **TM44-060821**.

TM-121

TM-121 is a versatile wire with excellent operator appeal because of its smooth arc, low spatter emission and overall ease of handling. With no shielding gas needed, it is a good choice for welding in hard-to-reach locations or where the provision of gas cylinders is not practical. It is a good wire for applications where windy or other adverse conditions prevail and where mechanical properties are of less concern. TM-121 has little tendency to burn through and is well suited for butt, fillet, and lap joints on steel thicknesses from 16 gauge to 3/8". It is not recommended for welding steel thicknesses greater than 3/4". When welding on steels in the 3/8 to 3/4" thickness range, a preheat temperature of 325°F is advisable. This wire is recommended for single pass and limited multiple pass welding in all positions, using no shielding gas.

Specifications:

E71T-11 per AWS A5.20, ASME SFA 5.20

Shielding Gas:

None

Welding Positions:

All positions

Standard Diameters:

1/16", 5/64"

Characteristics:

- Limited multiple pass, all-position wire.
- Can be used on up to 3/4" thick steel.
- Can be used with CC power sources* and voltage sensing wire feeders.
- Uses DCEN polarity.
- Smooth arc and low spatter emission.

Undiluted Weld Metal Chemistry:

C	Mn	Si	P	S	Al
.30	.49	.15	.009	.003	1.18

Mechanical Properties:

Tensile Strength:	91,000 psi
Yield Strength:	64,000 psi
Elongation:	21%

* providing that the power source can produce a low voltage range between 14-19 volts.

For additional information, see Tri-Mark data sheet **TM121-060812**.

TM-123

TM-123 offers extremely high operator appeal in applications involving thin gauge galvanized or carbon steels. Arc action is smooth, stable, and excellent at low welding currents. DCEN (straight polarity) operation facilitates the welding of sections as thin as 18 gauge with little tendency for burn through. Good wetting action makes TM-123 well suited for the lap and butt joint welds encountered in body panel and sheet metal duct work. With vertical down welding, bead geometry and appearance are excellent; and spatter levels are low. TM-123 is very well suited for use in portable welding systems, as the small diameters perform well on portable 110 volt input welding machines. It is recommended only for single pass welding and can be used in all positions using no shielding gas.

Specifications:

E71T-GS per AWS A5.20, ASME SFA 5.20

Shielding Gas:

None

Welding Positions:

All positions

Standard Diameters:

.030", .035", .045"

Characteristics:

- Uses DCEN (straight polarity), minimizing burn-through.
- Designed specifically for welding thin gauge galvanized steels.
- Single pass weldments on galvanized and carbon steel sheet metal from 18 gauge up to 3/16".
- Very smooth arc, minimal spatter when applied to carbon steel.

Mechanical Properties:

Transverse 87,000 psi
Tensile Strength: (base metal fracture)
Longitudinal
Guide Bend: Satisfactory

For additional information, see Tri-Mark data sheet **TM123-060414**.

FLUX CORED

SELF-SHIELDED WIRES CARBON STEEL

PRODUCT CHARACTERISTICS

Product	AWS Class	AWS Spec.	Tensile	Yield	Elongation	C	Mn	Si	P	S	Al	Ni	Shielding Gas
			Strength (ksi)	Strength (ksi)	%, in 2"								
TM-44	E70T-4	A5.20	92.0	69.0	22	.28	.45	.13	.008	.004	1.36	.01	none required
TM-121	E71T-11	A5.20	91.0	64.0	21	.30	.49	.15	.009	.003	1.18	—	none required
TM-123	E71T-GS	A5.20	87.0*	—	—	—	—	—	—	—	—	—	none required

* Transverse Tensile Strength (base metal fracture); Longitudinal Guide Bend: Satisfactory

WELDING PARAMETERS

Product	Diameter	Stick-out	Position	Amperage	Approximate Parameters		Operating Ranges	
					Wire Feed Speed (ipm)	Voltage	Amperage	Voltage
TM-44	5/64"	2-3/4"	Flat & Horizontal	250	185	30	200-350	29-36
AWS E70T-4	3/32"	2-3/4"	Flat & Horizontal	350	190	31	250-400	29-32
Electrode Positive	.120"	2-3/4"	Flat & Horizontal	450	135	31	400-550	28-31
TM-121	1/16"	1/2"	Flat & Horizontal	230	120	17	125-300	16-20
AWS E71T-11	1/16"	1/2"	Vertical Up & Overhead	175	95	16	125-250	15-19
Electrode Negative	5/64"	1/2"	Flat & Horizontal	275	71	19	175-350	16-22
TM-123	.030"	3/8"	Flat & Horizontal	125	225	16	25-200	14-18
AWS E71T-GS	.030"	3/8"	Vertical Up & Overhead	100	170	15	25-150	14-17
Electrode Negative	.035"	3/8"	Flat & Horizontal	150	250	18	50-225	13-29
	.035"	3/8"	Vertical Up & Overhead	150	250	18	75-175	13-19
	.045"	3/8"	Flat & Horizontal	200	190	17	75-250	15-19
	.045"	3/8"	Vertical Up & Overhead	175	160	17	100-200	16-18

PRODUCT COMPARISON

Tri-Mark	AWS Classification	Hobart	Lincoln	ESAB	Kobelco	Select Arc
TM-44	E70T-4	Fabshield® 4	Innershield NS-3M	Coreshield 40	OW-56A	Select 74
TM-121	E71T-11	Fabshield® 21B	Innershield NR 211 MP	Coreshield 11		Select 701
TM-123	E71T-GS	Fabshield® 23	Innershield NR 151 Innershield NR 152	Coreshield 15		Select 700 GS

For additional information, call customer service. **1.800.424.1543.**

METALLOY EM12KS

Metalloy submerged arc electrodes provide higher deposition rates as compared to the solid wires of equal size, with the same amperage, electrical stickout and flux. Since Metalloy products are made using steel sheath with alloying metal powders, customers will enjoy industry leading performance. Penetration patterns are broader than solid wires, making it easier to bridge-fit-up gaps; and higher current levels can be used on the root passes and then materials without burning through. Feed and straightening roll pressure should be set lower than solid wire to avoid tracking problems since these electrodes are softer. Metal cored electrodes will also reduce tip and liner wear.

Specifications:

AWS A5.17, ASME SFA 5.17, Class EC1

Standard Diameter:

5/64", 3/32", 1/8", 5/32"

Characteristics:

- Metal cored electrode for submerged arc welding.
- Designed with a composition to match the solid wire classification EM12K in AWS A5.17.
- Can be used to weld over light mill scale and rust, while still producing quality welds.

For additional information, see Tri-Mark data sheet **METALLOY EM12KS-050610**.

METALLOY EM13KS

Metalloy submerged arc electrodes provide higher deposition rates using the same flux when compared to solid wire. Penetration patterns tend to be broader in width than solid electrodes. Adjustments in parameters allow composite electrodes to bridge moderate gaps more easily than the deep narrow penetration of solid wire. Feed and straightening roll pressure should be set lower than solid wire to avoid tracking problems since these electrodes are softer.

Specifications:

AWS A5.17, ASME SFA 5.17, Class EC1

Standard Diameters:

5/64", 3/32", 1/8", 5/32"

Characteristics:

- Carbon steel metal cored electrode for submerged arc welding.
- Designed with a composition to match the solid wire classification, EM13K in AWS A5.17.
- Allows the use of a wide variety of fluxes, since the chemistry will rarely be lean in manganese and silicon.
- Its richer levels of manganese and silicon give excellent bead tie-in with an even appearance.

For additional information, see Tri-Mark data sheet **METALLOY EM13KS-050610**.

METALLOY N1S

Metalloy submerged arc electrodes provide higher deposition rates as compared to the solid wires of equal size, with the same amperage, electrical stickout and flux. Since Metalloy products are made using a steel sheath with alloying metal powders, customers will enjoy industry leading performance. Penetration patterns are broader than solid wires, making it easier to bridge-fit-up gaps; and higher current levels can be used on the root passes and then materials with burning through. Feed and straightening roll pressure should be set lower than solid wire to avoid tracking problems since these electrodes are softer.

Specifications:

AWS A5.23, ASME SFA 5.23 ECNi1

Standard Diameters:

3/32", 1/8", 5/32"

Characteristics:

- A metal cored electrode for submerged arc welding where a 1% nickel deposit is required.
- Improves low temperature toughness, while only raising the tensile strength slightly.
- Typical applications include structural and weathering steels (such as A242 and A588 where color match is not required) ship building, and offshore fabrication.

For additional information, see Tri-Mark data sheet **METALLOY N1S-050616**.

FLUXES

Basic Flux

Hobart HN-590

is an agglomerated basic type flux producing weld deposits with good mechanical properties at low temperatures. HN-590 may be used in single and multiple pass applications with no limitations on weld metal thickness. HN-590 is suitable to use on both DC and AC polarities. HN-590 has good weldability, good slag removal in groove welds and good resistance to cracking and porosity. Typical applications include structural steels, high strength low-alloy (HSLA), quenched and tempered and other low alloy steels.

Basic Flux

Hobart HN-511

is a highly basic agglomerated flux producing excellent low temperature mechanical properties. The HN-511 has excellent weldability and slag removal common to most basic fluxes, good resistance to cracking and porosity and good bead appearance. HN-511 is suitable to use with both DC and AC polarities. The composite low alloy Metalloy electrodes may be used with HN-511 flux to achieve these low temperature properties used in such applications as offshore structures, structural steel, shipbuilding and heavy equipment.

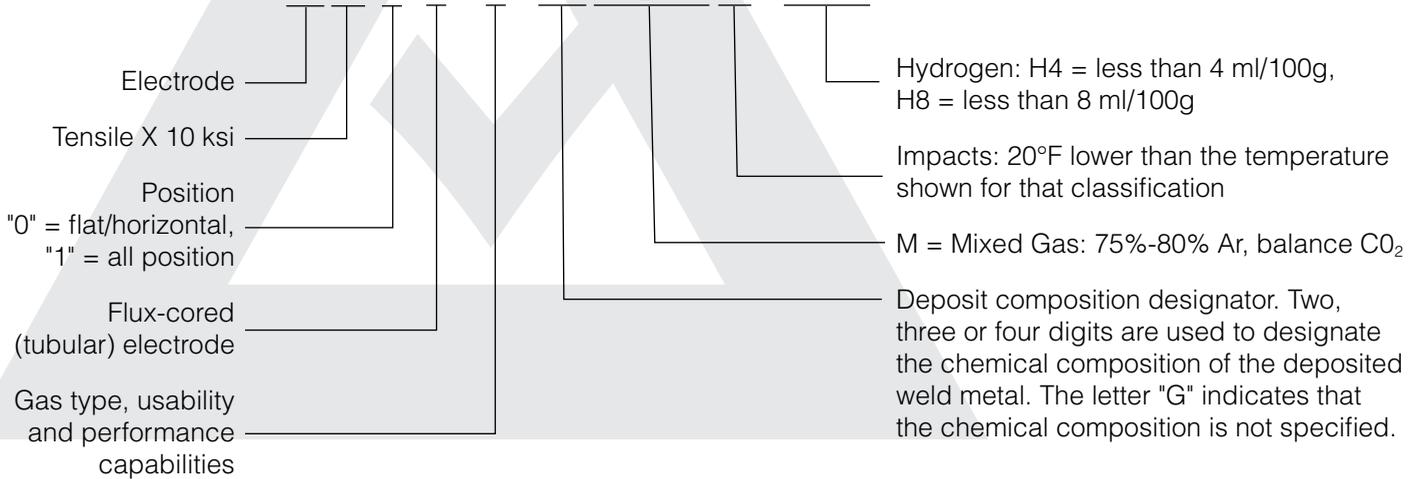
Active Flux

Hobart HA-495

is an agglomerated active type flux primarily for single and double pass fillet welds. The HA-495 may be used for other fillet and butt welds on carbon steel limited to a maximum thickness of 1" (25mm). HA-495 has superior performance in single, tandem and other multiple electrode applications with electrical currents of DC and/or AC, as well as Variable Balance AC (VBAC) square-wave polarities. The HA-495 has excellent resistance to rust and mill scale, excellent wetting of fillet weld toes and excellent slag removal. Typical applications include single pass fillets and butt welds in excess of 40 inches of travel speed over mill scaled, thin wall pressure vessels, thin structural steel and in railroad manufacturing.

HOW AWS CLASSIFIES LOW-ALLOY FLUX-CORED (TUBULAR) WIRES, FCAW PROCESS (AWS A5.29)

E81T 1-XC/MJ H8



POSITION OF WELDING, SHIELDING, POLARITY, AND APPLICATION REQUIREMENTS

AWS	Welding Position	Shielding Gas	Current	Application
EX0T1-XC	H. F	CO ₂	DCEP	M
EX0T1-XM		75-80 Ar/bal CO ₂		
EX1T1-XC	H. F. VU. OH	CO ₂		
EX1T1-XM		75-80 Ar/bal CO ₂		
EX0T4-X	H. F	None	DCEP	M
EX0T5-XC	H. F	CO ₂	DCEP	M
EX0T5-XM		75-80 Ar/bal CO ₂		
EX1T5-XC	H. F. VU. OH	CO ₂	DCEP or DCEN ¹	
EX1T5-XM		75-80 Ar/bal CO ₂		
EX0T6-X	H. F	None	DCEP	M
EX0T7-X	H. F	None	DCEP	M
EX1T7-X	H. F. VU. OH			
EX0T8-X	H. F	None	DCEP	M
EX1T8-X	H. F. VU. OH			
EX0T11-X	H. F	None	DCEP	M
EX1T11-X	H. F. VD. OH			
EX0TX-G	H. F	None	(g)	M
EX0TX-GC		CO ₂	(g)	
EX0TX-GM		75-80 Ar/bal CO ₂	(g)	
EX0TG-X		Not Specified	Not Specified	
EX0TG-G		Not Specified	Not Specified	
EX1TX-G	H. F. VU or VD. OH	None	(g)	M
EX1TX-GC		CO ₂	(g)	
EX1TX-GM		75-80 Ar/bal CO ₂	(g)	
EX1TG-X		Not Specified	Not Specified	
EX1TG-G		Not Specified	Not Specified	

H = horizontal position. F = flat position. OH = overhead position. VU = vertical position with upward progression. VD = vertical position with downward progression.

Electrode sizes suitable for out-of-position welding, i.e., welding positions other than flat or horizontal, are usually those sizes that are smaller than 3/32" (2.4 mm) size or the nearest one called for in 9.4.1 for the groove weld. For that reason, electrodes meeting the requirements for the groove weld tests and the fillet weld tests may be classified as EX1TX-XX (where X represents the tensile strength, usability, deposit composition and shielding gas, if any, designators) regardless of their size. See Section A7 in Annex A and Figure 1 for more information.

Properties of weld metal from electrodes that are used with external shielding gas will vary according to the shielding gas employed. Electrodes classified with a specific shielding gas should not be used with other shielding gases without first consulting the manufacturer of the electrodes.

The term "DCEP" refers to direct current electrode positive (dc. reverse polarity). The term "DCEN" refers to direct current electrode negative (dc. straight polarity).

M = suitable for use on either single or multiple-pass operations.

Some EX1T5-XC, -XM electrodes may be recommended for use on DCEN for improved out-of-position welding. Consult the manufacturer for the recommended polarity.

The polarity for electrodes with usability designators for other than G is as prescribed for those designators in this table.

Welders know they can rely on Tri-Mark's line of flux-cored low alloy wires for jobs having specific metallurgical and mechanical requirements. Each is uniquely designed to provide the metal composition or tensile strength necessary for the effective welding of chrome-moly, nickel, high-strength, weathering and many other low alloy steels. In addition to delivering outstanding performance, Tri-Mark's line of flux-cored low alloy wires also provides a host of welding benefits with individual products designed to provide excellent arc stability, low diffusible hydrogen levels, good crack-resistance, low spatter or superior impact values at sub-zero temperatures.

TM-811A1

TM-811A1 deposits weld metal with 1/2% molybdenum, which prevents deterioration in tensile strength after stress relief under specified conditions. It is intended for the welding of parts of similar composition, such as those found in power plant pipe systems. It is used for the repair as well as the fabrication of 1/2% molybdenum steel castings. TM-811A1 offers good weldability in all positions, with a fast-freezing slag that removes very easily. The wire is recommended for single and multiple pass welding in all positions using 100% CO₂ shielding gas.

Specifications:

E81T1-A1C per AWS A5.29, ASME SFA 5.29

Shielding Gas:

100% CO₂, 35-50 cfm

Welding Positions:

All positions

Standard Diameters:

.045", 1/16"

Characteristics:

- Good weldability in all positions.
- Fast-freezing slag removes easily.
- Recommended for single and multiple pass welding using CO₂ shielding gas.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Mo
100% CO ₂	.04	.83	.26	.014	.016	.48

Mechanical Properties:

Tensile Strength: 94,000 psi
 Yield Strength: 83,000 psi
 Elongation: 26%
 CVN: not required

The above properties were determined with 100% CO₂ shielding gas.

Stress Relieved 1 hr. @ 1150°F

For additional information, see Tri-Mark data sheet **TM811A1-060620**.

TM-81B2

TM-81B2 deposits weld metal similar to the chemistry found in 1-1/4 Cr/1/2 Mo steels. It is used to weld steels that must maintain high tensile strengths when subject to high service temperatures and also where creep resistance is required. TM-81B2 would make a good replacement for E8018-B2 electrodes when productivity is a major consideration. It is recommended for single and multiple pass welding in the flat and horizontal positions, using 100% CO₂ shielding gas.

Specifications:

E80T1-B2C, per AWS A5.29, ASME SFA 5.29

Shielding Gas:

100% CO₂, 35-50 cfm

Welding Positions:

Flat and horizontal

Standard Diameter:

1/16", 3/32"

Characteristics:

- Intended for welding Cr-Mo steels containing 1-1/4 Cr/1/2 Mo.
- Excellent welder appeal, with low spatter levels.
- Can be used for those weldments requiring some creep resistance.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Mo	Cr
100%CO ₂	.06	.70	.29	.011	.015	.43	1.33

Mechanical Properties:

Tensile Strength: 99,000 psi
 Yield Strength: 87,000 psi
 Elongation: 21%
 CVN: not required

The above properties were determined with 100% CO₂ shielding gas.

Stress Relieved 1 hr. @ 1275°F

For additional information, see Tri-Mark data sheet **TM81B2-060620**.

TM-811B2

TM-811B2 deposits weld metal similar to the chemistry found in 1-1/4 Cr/1/2 Mo steels. It is used to weld steels that must maintain high tensile strengths when subject to high service temperatures and also where creep resistance is required. The excellent all-position characteristics make this a good replacement for E8018-B2 electrodes. It is recommended for single and multiple pass welding in all positions, using 100% CO₂ shielding gas.

Specifications:

E81T1-B2C H4, E81T1-B2M H4 per AWS A5.29, ASME SFA 5.29
CWB E81T1-B2

Shielding Gas:

100% CO₂, 75% Ar/25% CO₂,
35-50 cfh

Welding Positions:

All positions

Standard Diameter:

.045", .052", 1/16"

Characteristics:

- Adaptable to Cr-Mo pipe welding.
- Can be used on Cr-Mo steels where creep resistance is required.
- Excellent all-position characteristics make this a good replacement for E8018-B2 electrodes.
- Ar/CO₂ gas shielding may be used but tensile strength may exceed 100,000 psi.

Undiluted Weld Metal Chemistry*:

	C	Mn	Si	P	S	Mo	Cr
100% CO ₂	.05	.91	.42	.009	.012	.50	1.50

Mechanical Properties:

	100% CO ₂	75%Ar/25% CO ₂
Tensile Strength:	96,000psi**	110,600psi**
Yield Strength:	84,000psi	99,600psi
Elongation:	23%	19%
CVN:	not required	not required

* Determined with 100% CO₂ shielding gas.

** Stress relieved 1 hr. @ 1275°F.

For additional information, see Tri-Mark data sheet **TM811B2-061218**.

TM-91B3

TM-91B3 is intended for welding applications involving 2-1/4 Cr/1 Mo steels, such as those found in steam or chemical piping systems where elevated temperature conditions prevail. Weld contents match the base metal chromium and molybdenum levels, providing high temperature creep resistance and some oxidation resistance. In suitable applications, TM-91B3 replaces the AWS A5.5 E9018-B3 covered electrode, and provides similar weld metal chemistry. In addition to the economic advantages of semi-automatic welding, TM-91B3 offers excellent welder appeal and good bead geometry. TM-91B3 is recommended for single and multiple pass welding in the flat and horizontal positions with 100% CO₂ shielding gas.

Specifications:

E90T1-B3C per AWS A5.29, ASME SFA 5.29

Shielding Gas:

100% CO₂, 35-50 cfh

Welding Positions:

Flat and horizontal

Standard Diameter:

1/16", 3/32"

Characteristics:

- Excellent welder appeal with good bead geometry.
- Intended for 2-1/4 Cr/1 Mo applications, such as steam or chemical piping systems.
- Very good creep resistance.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Mo	Cr
100%CO ₂	.06	.64	.25	.010	.013	1.06	2.47

Mechanical Properties:

Tensile Strength:	106,000 psi
Yield Strength:	93,000 psi
Elongation:	19%
CVN:	not required

The above properties were determined with 100% CO₂ shielding gas.

Stress Relieved 1 hr. @ 1275°F

For additional information, see Tri-Mark data sheet **TM91B3-060828**.

TM-911B3

TM-911B3 provides 2-1/4% chromium/1% molybdenum steel weld metal in combination with excellent welder appeal. Bead geometry is good in all positions. TM-911B3 is recommended for the welding of 2-1/4% chromium/1% molybdenum steels, specifically ASTM A387, Grades 21 and 22, which are normally used in applications requiring creep resistance at elevated temperatures. TM-911B3 also provides some corrosion resistance. The wire is recommended for single and multiple pass welding in all positions using 100% CO₂ or 80% Ar/ 20% CO₂ shielding gas.

Specifications:

E91T1-B3C H4, E91T1-B3M H4 per AWS A5.29, ASME SFA 5.29

Shielding Gas:

100% CO₂, 75% Ar/25% CO₂, 35-50 cfh

Welding Positions:

All positions

Standard Diameters:

.045", .052", 1/16"

Characteristics:

- Provides weld metal with a 2-1/4 Cr/1 Mo composition.
- Intended for applications requiring creep resistance at elevated temperatures, such as pressure piping.
- Argon/CO₂ gas shielding may be used but tensile strength may exceed 110,000 psi.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Mo	Cr
100% CO ₂	.05	.64	.27	.011	.013	.93	2.04
75% Ar/25% CO ₂	.06	.70	.38	.010	.011	.97	2.30

Mechanical Properties:

	100% CO ₂	75% Ar/25% CO ₂
Tensile Strength:	100,000psi	109,000psi*
Yield Strength:	86,000psi	86,000psi
Elongation:	20%	18 %
CVN:	not required	not required

* Stress relieved 1 hr. @ 1275°F.

For additional information, see Tri-Mark data sheet **TM911B3-060921**.

TM-B9

TM-B9 is designed for the semi-automatic gas shielded welding of modified Grade 91 steels which is used in high temperature and high pressure applications in the power generation and petroleum industry. Its all position capability will fully match the base material properties. The low diffusible hydrogen content in the deposited metal is an asset for crack control during the preheat and postweld heat treat cycles of high strength steel. The x-ray quality weld has high operator appeal while the high alloy content of this product makes following the weld procedure extremely important.

Specifications:

E91T1-B9M per AWS A5.29, ASME SFA 5.29

Shielding Gas:

75% Ar/25% CO₂, 35-50 cfh

Welding Positions:

All positions

Standard Diameters:

.045"

Characteristics:

- Fast freezing slag for out-of-position welding
- Excellent arc stability with flat bead appearance
- Low splatter level
- X-ray quality weld

Undiluted Weld Metal Chemistry*:

	C	Mn	Si	P	S	Cr	Ni	Mo
75% Ar/25% CO ₂	0.12	0.6	0.15	0.008	0.008	9.0	0.7	1.0
	Nb	V	Ti	As	Sb	Sn		
	0.03	0.21	0.04	0.007	0.003	0.005		

Bruscati Factor, X=11.8, [X=100 (10P+5Sb+4Sn+As)]

Mechanical Properties*:

Tensile Strength 116,000 psi (798 MPa)
Yield Strength 96,000 psi (665 MPa)
Elongation 16%

For additional information, see Tri-Mark data sheet **TM-B9-081130**

TM-81N1

TM-81N1 is comparable in deposit composition and properties to E8018-C3 covered electrodes in deposit composition and properties. In many applications, TM-81N1 is more economical to use than stick electrodes. It is recommended for petro-chemical applications where deposit nickel must be kept low, for weathering-steel fabrication where color match is not required, and for mining and earthmoving equipment and other fabrication where good low temperature impact values are needed. The unique slag system of this wire provides the welder appeal found with acid slag (EXXT-1) products and the mechanical properties normally associated with basic slag wires. Weld metal diffusible hydrogen levels also rival those of basic slag (EXXT-5) wires, making this an excellent choice for the more demanding applications. This wire is intended for use with 100% CO₂ or 75% Ar/25% CO₂ gas shielding.

Specifications:

E80T1-Ni1C H8, E80T1-Ni1M H8 per AWS A5.29, ASME SFA 5.29
Military Spec. MIL-E-24403/1,
Class MIL-80T1-Ni1C (CO₂ only)
ABS to AWS E80T1-Ni1
CWB 100%CO₂ E80T1-Ni1 H16,
90% Ar/10%CO₂ E80T1-Ni1M H16

Shielding Gas:

100% CO₂, 75% Ar/25% CO₂, 35-50 cfh

Welding Positions:

Flat and horizontal

Standard Diameter:

1/16", 5/64", 3/32"

Characteristics:

- 1% nickel weld metal.
- Provides good toughness at low temperatures.
- Intended for welding steels requiring good CVN values at sub-zero temperatures.
- Excellent welder appeal.
- Low weld metal hydrogen levels approach those of an EXXT-5 wire.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Ni
100% CO ₂	.10	.89	.38	.011	.008	.98
75% Ar/25% CO ₂	.08	1.29	.43	.007	.011	.91

Mechanical Properties:

	100% CO ₂	75% Ar/25% CO ₂
Tensile Strength:	91,000psi	98,700psi
Yield Strength:	76,000psi	83,500psi
Elongation:	25%	24%
CVN @ -20°F:	52 ft-lbs	46 ft-lbs

For additional information, see Tri-Mark data sheet **TM81N1-061222**.

TM-811N1

TM-811N1 is comparable in deposit composition and properties to E8018-C3 covered electrodes in deposit composition and properties. In many applications, TM-811N1 is more economical to use than stick electrodes. It is recommended for petro-chemical applications where deposit nickel must be kept low for weathering-steel fabrication where color match is not required. It is used for mining and earth moving equipment and other fabrication where good low temperature impact values are needed. TM-811N1 offers good welder appeal, with excellent arc stability, low spatter, fast-freezing slag to facilitate all-position welding, and very easy slag removal. It is recommended for single and multiple pass welding in all positions using either CO₂ or a 75% Ar/25% CO₂ gas mixture for shielding.

Specifications:

E81T1-Ni1CJ H8, E81T1 Ni1MJ H8 per AWS A5.29, ASME SFA 5.29
ABS Grade 3SA, 3YSA
CWB 100%CO₂ E81T1-Ni1 H8,
90% Ar/10% CO₂ E81T-Ni1M H8

Shielding Gas:

100% CO₂, 75% Ar/25% CO₂, 35-50 cfh

Welding Positions:

All positions

Standard Diameter:

.045", .052", 1/16"

Characteristics:

- 1% nickel weld deposit.
- Can be used in place of E8018-C3 covered electrodes.
- Excellent arc stability and low spatter levels.
- Can be used with either 100% CO₂ or 75% Ar/25% CO₂ shielding gas.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Ni
100% CO ₂	.06	1.20	.57	.009	.015	.94

Mechanical Properties:

	100% CO ₂	75%Ar/25%CO ₂
Tensile Strength:	84,000 psi	89,000psi
Yield Strength:	75,000 psi	78,000psi
Elongation:	28%	23%
CVN @ -40°F:	38ft-lbs	54ft-lbs.

For additional information, see Tri-Mark data sheet **TM811N1-061218**.

TM-811N2

TM-811N2 offers excellent arc stability and low spatter when using CO₂ or Ar/CO₂ mixtures with up to 80% argon. These weldability features, combined with low diffusible hydrogen levels and good impact values, make the TM-811N2 a superior choice for shipbuilding, offshore drilling rigs, HSLA steels, and weathering steels where color match is not required. The wire is recommended for single and multiple pass welding in all positions using either 100% CO₂ or Ar/CO₂ mixtures with up to 80% Ar.

Specifications:

E81T1-Ni2C H8, E81T1-Ni2M H8 per AWS A5.29, ASME SFA 5.29
ABS Grade 3YSA
Military Spec. MIL-E-24403/1, Class MIL-81T1-Ni2C (CO₂ only)
CWB E81T1-Ni2 H8, E81T1-Ni2M H8
Lloyd's Register of Shipping, Grade 3S, 3YS H15
DNV Grade III Y40MS

Shielding Gas:

100% CO₂, 75-80% Ar/bal CO₂, 35-50 cfm

Welding Positions:

All positions

Standard Diameters:

.045", .052", 1/16"

Characteristics:

- Superior welding characteristics in all positions.
- 2% nickel weld metal promotes good CVN impact properties.
- Can be used with either 100% CO₂ or 75-80% Ar/bal CO₂ shielding gas.
- Capable of being used to weld several HSLA steels.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Ni
100% CO ₂	.05	.94	.37	.011	.018	2.42
75% Ar/25% CO ₂	.05	1.06	.42	.012	.016	2.40

Mechanical Properties:

	100% CO ₂	75%Ar/25% CO ₂
Tensile Strength:	85,000psi	99,000psi
Yield Strength:	72,000psi	90,000psi
Elongation:	25%	20%
CVN @ -40°F:	23 ft-lbs	27 ft-lbs

For additional information, see Tri-Mark data sheet **TM811N2-061218**.

TM-911N2

TM-911N2 is alloyed with over 2% nickel to combine tensile strength in the 90,000/110,000 psi range with good impact values at -40°F. It is used for welding various steels, including ASTM A203, Grades A & B. It has excellent operator appeal; the smooth, stable arc and quick-freezing slag facilitate vertical and overhead welding. Flat and horizontal welds can also be readily deposited; welds are of excellent quality. It is used for single and multiple pass welding in all positions with 100% CO₂ shielding gas.

Specifications:

E91T1-Ni2C per AWS A5.29, ASME SFA 5.29
ABS E91T1-Ni2

Shielding Gas:

100% CO₂, 35-50 cfm

Welding Positions:

All positions

Standard Diameters:

.045", .052", 1/16"

Characteristics:

- Excellent operator appeal with quick freezing slag for out of position welding.
- Good low temperature impact.
- Used for welding 2% nickel and other high strength steels.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Ni
100%CO ₂	.07	1.18	.60	.012	.021	2.41

Mechanical Properties:

Tensile Strength: 99,000 psi
Yield Strength: 86,000 psi
Elongation: 23%
CVN @ -40°F: 36 ft-lbs

The above properties were determined with 100%CO₂ shielding gas.

For additional information, see Tri-Mark data sheet **TM911N2-061218**.

TM-105D2

TM-105D2 provides a combination of good low temperature impact toughness with minimum 100,000 psi tensile strength following stress relieving. The basic slag also minimizes any hydrogen-induced crack sensitivity. The molybdenum in the weld deposit helps prevent the deterioration of tensile strength during long term stress relieving. The chemical composition of this wire is well suited for the repair of manganese-moly castings. It can also be used to weld components which undergo post weld heat treatment and must maintain a tensile strength in the neighborhood of 100,000 psi. This wire is recommended for flat and horizontal positions, single and multiple pass welding, using 100% CO₂ or 75% Ar/25% CO₂ shielding gas.

Specifications:

E100T5-D2C per AWS A5.29, ASME SFA 5.29

Shielding Gas:

100% CO₂ or 75% Ar/25% CO₂, 35-50 cfm

Welding Positions:

Flat and horizontal

Standard Diameter:

.052", 1/16", 3/32"

Characteristics:

- Excellent low temperature toughness.
- Low weld metal hydrogen.
- Manganese-molybdenum weld metal well suited to repair castings of similar composition.
- After several hours of stress relieving, weld metal maintains tensile strength.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Mo
100% CO ₂	.11	2.00	.55	.009	.010	.44

Mechanical Properties:

Tensile Strength: 111,000 psi
Yield Strength: 97,000 psi
Elongation: 24%
CVN @ -40°F: 49 ft-lbs

The above properties were determined with 100% CO₂ shielding gas.

Stress Relieved 1 hr. @ 1150°F

For additional information, see Tri-Mark data sheet **TM105D2-061218**.

TM-881K2

TM-881K2 was developed in .045" (1.2 mm) diameter to be used primarily in the offshore market because of outstanding impact resistance at low temperatures. Shipbuilding applications will likely benefit from the all-position capabilities of TM-881K2. The wire has a stable soft spray transfer with almost no spatter when using 75-85% Ar/20-15% CO₂. 100% CO₂ gas shielding may be used with some sacrifice in fume, spatter, and impact resistance. Excellent all-position characteristics give this product the advantage over competitive products.

Specifications:

E81T1-K2CJ H8; E81T1-K2MJ H8 per AWS A5.29, ASME SFA 5.29
ABS to AWS E81T1-K2M
DNV Grade VY42MS H10
Lloyds Register of Shipping Grade 4Y42S H10
Bureau Veritas S5Y42M

Shielding Gas:

100% CO₂, 75-85% Ar/bal CO₂,
35-50 cfh

Welding Positions:

All positions

Standard Diameter:

.045"

Characteristics:

- Designed for offshore applications.
- Argon/CO₂ shielding gas for lower spatter and fume.
- CTOD exceeds .25 mm at -10°C.
- Good impacts at -60°C (-76°F) both as welded and stress relieved.
- Hydrogen levels below 5 ml/100 g.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Mo	Cr	Ni
100%CO ₂	.05	.81	.14	.008	.015	.02	1.64	
80%Ar/20%CO ₂	.08	1.11	.26	.009	.019	.01	1.46	

Mechanical Properties:

	80%Ar/20%CO ₂	100%CO ₂
Tensile Strength:	95,000psi (Aged 48hrs.@200°F)	85,000psi
Yield Strength:	85,000psi	75,000psi
Elongation:	24%	27%
CVN @ -40°F:	78ft-lbs	70ft-lbs

For additional information, see Tri-Mark data sheet **TM881K2-061218**.

TM-91K2

TM-91K2 offers good weldability together with excellent properties for the semi-automatic and automatic welding of many higher strength steels. Several features combine to reduce the tendency for cracking in highly restrained joints. As compared to most EXXT-1 wire deposits, weld metal diffusible hydrogen content is low. The moderately high strength level is such that the tendency to overmatch many base metal yield strengths is minimized. TM-91K2 is thus a good choice for fillet welds on T-1, HY-80, and other quenched and tempered steels. It is also recommended for other high strength steel applications where weld metal with 90,000-110,000 psi tensile strength is appropriate.

Specifications:

E90T1-K2C per AWS A5.29, ASME SFA 5.29

Shielding Gas:

100% CO₂, 35-50 cfh

Welding Positions:

Flat and horizontal

Standard Diameter:

1/16", 5/64", 3/32"

Characteristics:

- Good welder appeal. For use on higher strength steels such as A710, HY-80, and A514.
- Lower weld metal hydrogen than most EXXT-1 slag systems.
- Intermediate tensile range helps minimize "overmatching" base plate yield strengths.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Mo	Cr	Ni
100%CO ₂	.05	1.00	.34	.008	.015	.13	.031	1.41

Mechanical Properties:

Tensile Strength:	96,000 psi
Yield Strength:	86,000 psi
Elongation:	24%
CVN @ 0°F:	32 ft-lbs

The above properties were determined with 100%CO₂ shielding gas.

For additional information, see Tri-Mark data sheet **TM91K2-060906**.

TM-991K2

TM-991K2 offers an exceptional combination of properties for an all-position wire, good low temperature toughness combined with tensile strength in the 90,000-110,000 psi range. TM-991K2 is designed for welder appeal, with smooth, stable arc action and low spatter levels. The quick-freezing slag is easily removed and bead geometry in all positions is excellent. TM-991K2 is a superior choice for all-position work with many high-strength low alloy steels, such as A514, A710, and HY-80. It is recommended for single and multiple pass welding in all positions with 100% CO₂ or 75% argon/25% CO₂ shielding gases.

Specifications:

E91T1-K2C H8, E91T1-K2M H8 per AWS A5.29, ASME SFA 5.29
ABS to AWS E91T1-K2; E91T1-K2M

Shielding Gas:

100% CO₂, 75% Ar/25% CO₂,
35-50 cfh

Welding Positions:

All positions

Standard Diameters:

.045", .052", 1/16"

Characteristics:

- Superior impact toughness combined with tensile strength in the range of 90,000-110,000 psi.
- Ideal for welding steels such as A514, A710, and other HSLA or Q+T grades.
- Excellent all-position performance.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Mo	Ni
100% CO ₂	.05	1.04	.19	.009	.014	.01	1.92
75% Ar/25% CO ₂	.06	1.57	.35	.009	.015	.01	1.69

Mechanical Properties:

	100% CO ₂	75%Ar/25% CO ₂
Tensile Strength:	92,000psi	101,800psi
Yield Strength:	80,000psi	93,400psi
Elongation:	27%	24%
CVN @ 0°F:	85 ft-lbs	70 ft-lbs

For additional information, see Tri-Mark data sheet **TM991K2-060913**.

TM-95K2

TM-95K2 is excellent where higher tensile strengths and outstanding impact properties are of importance. It is produced with a basic slag formulation which promotes superior deposit quality. The weld metal is low in diffusible hydrogen and less sensitive to high base metal sulfur content than are acid slag (EXXT-1) welds. These characteristics make TM-95K2 a good choice for applications where cracking might be a problem, or where good impact values down to -60°F are needed. TM-95K2 is used for welding such HSLA steels as ASTM A710 and many high strength quenched and tempered steels, such as A514 and HY-80. The wire is recommended for single and multiple pass welding in the flat and horizontal positions using 100% CO₂ or 75-80% Ar/bal CO₂ shielding gas.

Specifications:

E90T5-K2C H4 per AWS A5.29, ASME SFA 5.29

Shielding Gas:

100% CO₂, 75-80% Ar/bal CO₂, 35-50 cfm

Welding Positions:

Flat and horizontal

Standard Diameter:

1/16", 3/32"

Characteristics:

- Excellent low temperature toughness.
- Low hydrogen weld metal.
- Less sensitive to higher sulfur contents in base material than acid slag filler metals.
- Can be used for welding several HSLA steels, such as ASTM A710, A514 and HY-80.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Mo	Ni
100%CO ₂	.05	.83	.33	.009	.016	.22	1.65

Mechanical Properties:

Tensile Strength: 91,000 psi
Yield Strength: 79,000 psi
Elongation: 26%
CVN @ -60°F: 49 ft-lbs

The above properties were determined with 100% CO₂ shielding gas.

For additional information, see Tri-Mark data sheet **TM95K2-060913**.

TM-101

TM-101 is an all-position gas-shielded flux-cored wire designed for welding of high strength steels such as A514, A710, and similar HSLA and Q&T steels. TM-101 offers exceptional low temperature impact toughness with tensile strength in the 105,000-115,000 psi range. TM-101 provides excellent welder appeal by offering a smooth stable arc, low spatter, low smoke generation, and smooth bead profile. The quick freezing slag is ideal for high deposition welding while maintaining a flat bead profile. It is recommended for single and multiple pass welding in all positions with 75% Ar/25% CO₂ shielding gas.

Specifications:

E101T1-GM per AWS A5.29, ASME SFA 5.29

Shielding Gas:

75% Ar/25% CO₂, 35-50 cfm

Welding Positions:

All positions

Standard Diameter:

.045", 1/16"

Characteristics:

- Superior impact toughness combined with tensile strength in the range of 105,000-115,000 psi.
- Ideal for welding steels such as A514 (T1), A710, RIVERS A 610, Weldten 610, EQ56, and other HSLA or Q&T grades.
- Excellent all-position performance.
- Low spatter.
- Low diffusible hydrogen.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Mo	Ni
75%Ar/25%CO ₂	.06	1.60	.38	.011	.011	.01	1.95

Mechanical Properties:

Tensile Strength: 110,000 psi
Yield Strength: 102,000 psi
Elongation: 20%
CVN @ 0°F: 78 ft-lbs
CVN @ -20°F: 70 ft-lbs
CVN @ -40°F: 52 ft-lbs
CVN @ -60°F: 35 ft-lbs

The above properties were determined with 75%Ar /25% CO₂ shielding gas.

For additional information, see Tri-Mark data sheet **TM101K3-060615**.

TM-101K3

TM-101K3 provides 100,000 psi tensile strength with good impact values. It is intended for both HSLA and quenched and tempered steels on certain applications. TM-101K3 deposits weld metal with low diffusible hydrogen levels, approaching that of the T-5 (basic) wires, making it more resistant to hydrogen-induced cracking. Welder appeal exceeds that of the basic slag wires. It is used for single and multiple pass welding in the flat and horizontal positions using 100% CO₂ shielding gas.

Specifications:

E100T1-K3C per AWS A5.29, ASME SFA 5.29

Shielding Gas:

100% CO₂, 35-50 cfm

Welding Positions:

Flat and horizontal

Standard Diameter:

1/16", 3/32"

Characteristics:

- Can be used to weld steels where a 100,000 psi minimum tensile strength is required.
- Intended for both HSLA and Q+T steels in certain applications.
- Weld metal diffusible hydrogen levels are nearly as low as an EXXT-5 wire.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Mo	Ni	V
100%CO ₂	.05	1.16	.46	.011	.018	.39	1.88	.01

Mechanical Properties:

Tensile Strength: 102,000 psi
Yield Strength: 92,000 psi
Elongation: 22%
CVN @ 0°F: 38 ft-lbs

The above properties were determined with 100% CO₂ shielding gas.

For additional information, see Tri-Mark data sheet **TM101K3-060907**.

TM-111K3

TM-111K3 is intended for welding those steels where a minimum tensile strength of 110,000 psi is required. These would encompass several of the quench and tempered low alloy steels, such as ASTM A514. Welder appeal is excellent and spatter is low for this type product. Advancements in acid slag technology provide low diffusible hydrogen levels and mechanical properties approaching those of basic slag wires. These are important criteria in minimizing crack sensitivity with such high strength wires.

Specifications:

E110T1-K3C per AWS A5.29, ASME SFA 5.29

Shielding Gas:

100% CO₂, 35-50 cfh

Welding Positions:

Flat and horizontal

Standard Diameter:

1/16", 5/64", 3/32"

Characteristics:

- Better welder appeal than basic slag wires.
- Low hydrogen weld metal.
- Intended to weld steels where a minimum tensile strength of 100,000 psi is required.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Mo	Ni	V
100% CO ₂	.05	1.15	.50	.010	.012	.52	2.25	.02

Mechanical Properties:

Tensile Strength: 113,000 psi
Yield Strength: 98,000 psi
Elongation: 21%
CVN @ 0°F: 44 ft-lbs

The above properties were determined with 100% CO₂ shielding gas.

For additional information, see Tri-Mark data sheet **TM111K3-060911**.

TM-1101K3-C

TM-1101K3-C offers excellent arc stability and low spatter with CO₂ shielding gas. It also has a fast-freezing slag for all-position welding. These features, along with relatively low diffusible hydrogen levels, excellent slag removal, good impact values and high strength levels, make TM-1101K3-C a superior choice for welding higher-strength steels. It is recommended for single and multiple pass welding in all positions using 100% CO₂ for shielding gas.

Specifications:

E111T1-K3CJ H8 per AWS A5.29, ASME SFA 5.29
ABS to AWS E110T1-K3C

Shielding Gas:

100% CO₂, 35-50 cfh

Welding Positions:

All positions

Standard Diameters:

.045", .052", 1/16"

Characteristics:

- Designed for those applications requiring tensile strength above 110,000 psi.
- Good CVN toughness.
- Must be used with CO₂ shielding gas.
- Relatively low diffusible hydrogen levels.
- Better penetration than the mixed gas version.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Mo	Cr	Ni	V
100% CO ₂	.07	1.55	.34	.009	.017	.37	.03	1.97	.02

Mechanical Properties:

Tensile Strength: 117,000 psi
Yield Strength: 105,000 psi
Elongation: 22%
CVN @ 0°F: 50 ft-lbs

The above properties were determined with 100% CO₂ shielding gas.

For additional information, see Tri-Mark data sheet **TM1101K3C-070402**.

TM-1101K3-M

TM-1101K3-M offers excellent arc stability and low spatter with 75-80% Ar/ 20-25% CO₂ mixtures. It also has a fast-freezing slag for all-position welding. These features, along with relatively low diffusible hydrogen levels, excellent slag removal, good impact values and high strength levels, make TM-1101K3-M a superior choice for welding higher strength steels. It is recommended for single and multiple pass welding in all positions using 75-80% argon/bal CO₂ mixtures for shielding.

Specifications:

E111T1-K3MJ H8 per AWS A5.29, ASME SFA 5.29
ABS to AWS E110T1-K3M

Shielding Gas:

75-80% Ar/bal CO₂, 35-50 cfh

Welding Positions:

All positions

Standard Diameters:

.045", .052", 1/16"

Characteristics:

- Designed for those applications requiring tensile strength above 110,000 psi.
- Good CVN toughness.
- Relatively low diffusible hydrogen levels.
- NOT TO BE USED WITH 100% CO₂ SHIELDING GAS.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Mo	Cr	Ni	V
75%Ar/25% CO ₂	.05	1.46	.32	.008	.014	.36	.03	2.08	.02

Mechanical Properties:

Tensile Strength: 113,000 psi
Yield Strength: 104,000 psi
Elongation: 21%
CVN @ 0°F: 45 ft-lbs

The above properties were determined with 75% Ar/25% CO₂ shielding gas.

For additional information, see Tri-Mark data sheet **TM1101K3M-060505**.

TM-115

TM-115 is designed for welding high strength, low alloy steels, and quenched and tempered steels where high quality welds are needed. The wire is produced with a basic slag system which greatly benefits both deposit quality and properties. Welds combine tensile strength in the 110,000-130,000 psi range with excellent low temperature toughness. The weld metal is low in hydrogen and highly resistant to cracking in thicker sectioned or highly restrained joints. TM-115 is commonly used in applications involving A514, A517, and many similar higher strength low alloy steels. It is recommended for single and multiple pass welding in the flat and horizontal positions using 100% CO₂ or 75% Ar/25% CO₂ shielding gas.

Specifications:

E110T5-K3C H4, E110T5-K3M H4 per AWS A5.29, ASME SFA 5.29
ABS to AWS E110T5-K3C

Shielding Gas:

100% CO₂, 75% Ar/25% CO₂, 35-50 cfh

Welding Positions:

Flat and horizontal

Standard Diameters:

1/16", 5/64", 3/32"

Characteristics:

- Excellent low temperature toughness.
- Low hydrogen weld metal.
- Intended for HSLA and Q+T steels requiring 100,000-130,000 psi tensile strength.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Mo	Ni
100% CO ₂	.05	1.49	.33	.011	.017	.37	2.24
75% Ar/25% CO ₂	.08	2.04	.62	.014	.012	.41	1.84

Mechanical Properties:

	100% CO ₂	75% Ar/25% CO ₂
Tensile Strength:	112,000psi	126,800psi
Yield Strength:	98,000psi	105,800psi
Elongation:	22%	22%
CVN @ -60°F:	57 ft-lbs	47 ft-lbs

For additional information, see Tri-Mark data sheet **TM115-060913**.

TM-125K4

TM-125K4 is designed for welding high-strength steels, including many of the quenched and tempered low alloy grades. It is an excellent choice for applications requiring good impact values at low temperatures, combining high tensile strengths with good Charpy V-notch impact values down to -60°F. Its basic slag formulation promotes resistance to weld cracking and produces low diffusible hydrogen levels in the weld. TM-125K4 is also a good wire for casting repair, offering high deposition rates and high efficiency. It is recommended for single and multiple pass welding in the flat and horizontal positions using 100% CO₂ shielding gas.

Specifications:

E120T5-K4C H4 per AWS A5.29, ASME SFA 5.29

Shielding Gas:

100% CO₂, 35-50 cfh

Welding Positions:

Flat and horizontal

Standard Diameter:

1/16", 3/32"

Characteristics:

- Designed for semi-automatic and automatic welding of high strength steels where minimum tensile of 120,000 psi is required.
- Recommended for single or multiple pass applications in flat and horizontal using CO₂ shielding gas.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Mo	Cr	Ni	V
100 CO ₂	.07	1.88	.42	.010	.016	.61	.52	2.13	.01

Mechanical Properties:

Tensile Strength:	133,000 psi
Yield Strength:	118,000 psi
Elongation:	20%
CVN @ -60°F:	26 ft-lbs

The above properties were determined with 100% CO₂ shielding gas.

For additional information, see Tri-Mark data sheet **TM125K4-060913**.

TM-811W

TM-811W meets Structural Welding Code D1.1 filler metal requirements for exposed bare applications of ASTM A242, A588, and A709 Grade 50W steels. These weathering steels are normally used on bridges and buildings. TM-811W is alloyed to provide a weld metal color match in the weathering condition, as well as good properties in the 80,000-100,000 psi strength range with good impact values. It is recommended for single and multiple pass welding in all positions with 100% CO₂ shielding gas.

Specifications:

E81T1-W2C H8 per AWS A5.29, ASME SFA 5.29

Shielding Gas:

100% CO₂, 35-50 cfh

Welding Positions:

All positions

Standard Diameters:

.045", .052", 1/16"

Characteristics:

- Meets D1.1 structural code to weld A242, A588 and A709 Grade 50W.
- Produces color match to weathering grade base material.
- Capable of welding in all positions.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Cr	Ni	Cu
100% CO ₂	.06	1.30	.70	.008	.014	.59	.74	.38

Mechanical Properties:

Tensile Strength:	99,000 psi
Yield Strength:	85,000 psi
Elongation:	25%
CVN @ -20°F:	25 ft-lbs

The above properties were determined with 100% CO₂ shielding gas.

For additional information, see Tri-Mark data sheet **TM811W-060913**.

FLUX CORED GAS-SHIELDED WIRES LOW ALLOY

PRODUCT CHARACTERISTICS

Product	AWS Class	AWS Spec.	Tensile	Yield	Elongation	Impact											Shielding Gas
			Strength (ksi)	Strength (ksi)	%, in 2"	Strength, CVN (ft•lbs @ °F)	C	Mn	Si	P	S	Mo	Cr	Ni	V	Cu	
TM-811A1	E81T1-A1C	A5.29	94.0†	83.0	26	—	.04	.83	.26	.014	.016	.48	—	—	—	—	CO ₂
TM-81B2	E80T1-B2C	A5.29	99.0††	87.0	21	—	.06	.70	.29	.011	.015	.43	1.33	—	—	—	CO ₂
TM-811B2	E81T1-B2C	A5.29	96.0††	84.0	23	—	.05	.91	.42	.009	.012	.50	1.50	—	—	—	CO ₂
		A5.29	110.6††	99.6	19	—	—	—	—	—	—	—	—	—	—	—	—
TM-91B3	E90T1-B3C	A5.29	106.0††	93.0	19	—	.06	.64	.25	.010	.013	1.06	2.47	—	—	—	CO ₂
TM-911B3	E91T1-B3C H4	A5.29	107.0††	93.0	20	—	.05	.64	.27	.011	.013	.93	2.04	—	—	—	CO ₂
	E91T1-B3M H4	A5.29	112.6††	100.0	18.5	—	.05	.92	.38	.010	.011	.97	2.30	—	—	—	75% Ar/25% CO ₂
TM-B9	E91T1-B9M	A5.29	116.0	96.0	16	—	.12	.60	.15	.008	.008	1.0	9.0	.70	.21	—	75% Ar/25% CO ₂
TM-81N1	E80T1-Ni1C H8	A5.29	91.0	76.0	25	52 @ -20°F	.10	.89	.3	.011	.008	—	—	.98	—	—	CO ₂
	E80T1-Ni1M H8	A5.29	90.7	76.8	24	46 @ -20°F	.08	1.29	.43	.007	.011	—	—	.91	—	—	75% Ar/25% CO ₂
TM-811N1	E81T1-Ni1C/M H8	A5.29	88.0	78.0	25	38 @ 0°F	.06	1.20	.57	.009	.015	—	—	.94	—	—	CO ₂
TM-811N2	E81T1-Ni2C H8	A5.29	85.0	72.0	25	40 @ -40°F	.05	.94	.37	.011	.01	—	—	2.42	—	—	CO ₂
	E81T1-Ni2M H8	A5.29	88.3	76.0	24	37 @ -40°F	—	—	—	—	—	—	—	—	—	—	75% Ar/25% CO ₂
TM-911N2	E91T1-Ni2C	A5.29	99.0	86.0	23	36 @ -40°F	.07	1.18	.60	.012	.021	—	—	2.41	—	—	CO ₂
TM-105D2	E100T5-D2C	A5.29	111.0†	97.0	24	49 @ -40°F	.11	2.00	.55	.009	.010	.44	—	—	—	—	CO ₂ /75% Ar/25% CO ₂
TM-881K2	E81T1-K2CJ H8	A5.29	89.0	78.0	24	78 @ -40°F	.08	1.11	.26	.009	.019	.01	—	1.46	—	—	80% Ar/20% CO ₂
TM-91K2	E90T1-K2C	A5.29	96.0	86.0	24	52 @ 0°F	.05	1.00	.34	.008	.015	.13	.03	1.41	—	—	CO ₂
TM-991K2	E91T1-K2C H8	A5.29	92.0	80.0	27	85 @ 0°F	.05	1.04	.19	.009	.014	.01	—	1.92	—	—	CO ₂
	E91T1-K2M H8	A5.29	101.8	93.4	24	70 @ 0°F	.06	1.57	.35	.009	.015	.01	—	1.69	—	—	75% Ar/25% CO ₂
TM-95K2	E90T5-K2C/M H4	A5.29	91.0	79.0	26	49 @ -60°F	.05	.83	.33	.009	.016	.22	—	1.65	—	—	CO ₂ /75-80Ar/BalCO ₂
TM-101	E101T1-GM	A5.29	110.0	92.0	20	35 @ -60°F	.06	1.60	.38	.011	.011	.01	—	1.95	—	—	75%5Ar/25% CO ₂
TM-101K3	E100T1-K3C	A5.29	102.0	92.0	22	38 @ 0°F	.05	1.16	.4	.011	.018	.39	—	1.88	.01	—	CO ₂ /75-80% Ar/BAL CO ₂
TM-111K3	E110T1-K3C	A5.29	113.0	98.0	21	44 @ 0°F	.05	1.15	.50	.010	.012	.52	—	2.25	.02	—	CO ₂
TM-1101K3-C	E111T1-K3CJ H8	A5.29	117.0	105.0	22	50 @ 0°F	.07	1.55	.34	.009	.017	.37	.03	1.97	.02	—	CO ₂
TM-1101K3-M	E111T1-K3MJ H8	A5.29	113.0	104.0	21	45 @ 0°F	.05	1.46	.32	.008	.014	.36	.03	2.0	.02	—	75% Ar/25% CO ₂
TM-115	E110T5-K3C H4	A5.29	112.0	98.0	22	57 @ -60°F	.05	1.49	.33	.011	.017	.37	—	2.24	—	—	CO ₂
	E110T5-K3M H4	A5.29	126.8	105.8	22	47 @ -60°F	.08	2.04	.62	.014	.012	.41	—	1.84	—	—	75% Ar/25% CO ₂
TM-125K4	E120T5-K4C H4	A5.29	133.0	118.0	20	26 @ -60°F	.07	1.88	.42	.010	.016	.61	.52	2.13	.01	—	CO ₂
TM-811W	E81T1-W2C H8	A5.29	99.0	85.0	25	25 @ -20°F	.06	1.30	.70	.008	.014	—	.59	.74	—	.38	CO ₂

* Typical weld metal properties and chemistries as welded with shielding gas noted. † Stress relieved 1 hr. @ 1150°F. †† Stress relieved 1 hr. @ 1275°F.

WELDING PARAMETERS

Diameter	Position	Approximate Parameters			Operating Ranges	
		Amperage	Wire Feed Speed (ipm)	Voltage	Amperage	Voltage
.045"	Vertical Up	200	260	25	100-220	22-28
	Flat	250	375	28	100-300	22-31
	Overhead	200	260	26	150-275	22-29
.052"	Vertical Up	225	240	25	100-275	19-27
	Flat	300	360	28	100-325	19-31
	Overhead	225	240	26	150-300	22-28
1/16"	Vertical Up	225	160	25	150-275	22-27
	Flat	350	300	29	150-400	22-35
	Overhead	225	160	26	150-300	22-28
5/64"	Flat	400	250	30	200-500	25-30
3/32"	Flat	450	180	30	350-600	26-37

* Drop voltage approximately 1 volt when using argon/CO₂ mixtures.

For additional information, call customer service. **1.800.424.1543.**

FLUX CORED GAS-SHIELDED WIRES LOW ALLOY

PRODUCT COMPARISON						
Tri-Mark	AWS Classification	Select Arc	Lincoln	ESAB	Kobelco	Hobart
TM-811A1	E81T1-A1C	Select 810-A1		Dual Shield 7000 A1		
TM-81B2	E80T1-B2C	Select 81-B2		Dual Shield 88 CM		
TM-811B2	E81T1-B2C H4	Select 810-B2	Outershield 81B2-H	Dual Shield 8000 B2	DW-1CMA	
TM-91B3	E90T1-B3C	Select 91-B3		Dual Shield 98 CM		
TM-911B3	E91T1-B3C/M H4	Select 910-B3		Dual Shield 9000 B3	DW-2CMA	
TM-B9	E91T1-89M	Select 910-B9		Dual Shield B9		
TM-81N1	E80T1-Ni1C/M H8			Dual Shield 88 C3		
TM-811N1	E81T1-Ni1C/MJ H8 E81T1-Ni1MJ	Select 810-Ni1	Outershield 81 Ni1-H	Dual Shield II 8000C3 Dual Shield II 80Ni1		Formula XL-8Ni1
TM-811N2	E81T1-Ni2C/M H8	Select 810-Ni2		Dual Shield 8000Ni2		
TM-911N2	E91T1-Ni2C	Select 910-Ni2		Dual Shield 9100Ni2		
TM-105D2	E100T5-D2C	Select 105-D2				
TM-881K2	E81T1-K2MJ H8 E81T1-K2CJ H8	Select 812-K2	Outershield 81K2-H	Dual Shield II 81K2	MXA 55T DW 55L	
TM-91K2	E90T1-K2C					
TM-991K2	E91T1-K2C H8 E91T1-K2M H8	Select 910-K2	Outershield 91K2-H	Dual Shield II 90K2 Dual Shield 9100K2		Fabco 91K2
TM-95K2	E90T5-K2C H4	Select 95-K2				
TM 101	E101T1-GM	Select 100-K3		Dual Shield II 100-D1		
TM-101K3	E100T1-K3C	Select 100-K3		Dual Shield T-100 Dual Shield II-100		
TM-111K3	E110T1-K3C	Select 110-K3		Dual Shield T-8		
TM-1101K3-C	E111T1-K3C H8	Select 111-K3-C		Dual Shield II-110		
TM-1101K3-M	E111T1-K3MJ H8 E110T5-K3M H4	Select 111-K3-M		Dual Shield II 110		
TM-115	E110T5-K3C H4	Select 115-K3		Dual Shield T-115		Fabco 115
TM-125K4	E120T5-K4C H4	Select 125-K4				
TM-811W	E81T1-W2C H8	Select 810-W		Dual Shield 8100W		

For additional information, call customer service. **1.800.424.1543.**

PACKAGING INFORMATION

PACKAGING OF TRI-MARK WELDING WIRES

Package Size	Pallet Net weight lbs. (kg)	Flange Diameter In. (m)	Hub Diameter In. (m)	Width In. (m)	Inside Diameter In. (m)	Arbor Hole In. (m)	Engaging Hole In. (m)	Engagine Hole Off Center In. (m)
10 lb. Spool	1,920 (871.7)	8.0" (.20)	3-3/4" (.1)	2-1/8" (.05)	n/a	2-1/16" (.05)	7/16" (.01)	1-3/4" (.04)
15 lb. Spool	2,400 (1091.0)	8.0" (.20)	3-5/16" (.09)	2-1/2" (.06)	n/a	2-1/32"	7/16" (.01)	1-3/4" (.04)
33 lb. Spool	2,376 (1080.0)	11-7/8" (.30)	8-1/4" (.21)	4" (.10)	n/a	2-1/16" (.05)	7/16" (.01)	1-3/4" (.04)
50 lb. Spool	1,600 (726.4)	14" (.35)	8-1/4" (.21)	4" (.10)	n/a	2-1/16" (.05)	7/16" (.01)	1-3/4" (.04)
50 lb. Coil	1,600 (726.4)	n/a	n/a	4" (.10)	12" (.30)	n/a	n/a	n/a
60 lb. Coil	1,920 (871.7)	n/a	n/a	4" (.10)	12" (.30)	n/a	n/a	n/a
60 lb. Bulk Coil	2,100 (953.4)	n/a	n/a	4" (.10)	12" (.30)	n/a	n/a	n/a
600 lb. Reel*	1,800 (817.2)	30" (.76)	11-3/4" (.30)	11-1/2" (.29)	n/a	1-5/16" (.03)	7/8" (.02)	2-1/2" (.06)
800 lb. Reel**	1,600 (726.4)	30" (.76)	11-3/4" (.30)	11-1/2" (.29)	n/a	1-5/16" (.03)	7/8" (.02)	2-1/2" (.06)
950 lb. Reel**	1,900 (862.6)	30" (.76)	11-3/4" (.30)	11-1/2" (.29)	n/a	1-5/16" (.03)	7/8" (.02)	2-1/2" (.06)
400 lb. Precision Pack® Drum	1,600 (726.4)	32-1/4" (.82 m) height, 20-3/8" (.52 m) diameter, 13" (.33 m) core diameter						
600 lb. Drum	1,200 (544.8)	35" (.89 m) height, 23-3/8" (.59 m) diameter, 16-1/8" (.41 m) core diameter						
400 lb. X-PK	1,600 (726.4)	32-1/4" (.82 m) height, 20-3/8" (.52 m) diameter, no core						
600 lb. X-PK	2,400 (1088.9)	35" (.89 m) height, 23-3/8" (.59 m) diameter, no core						

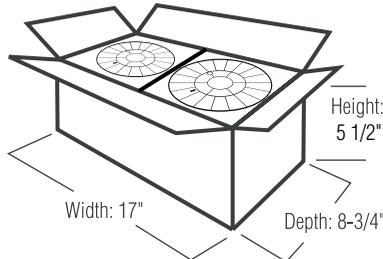
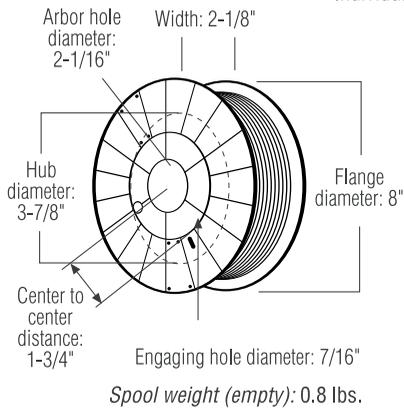
* Shipped in the vertical position.

** Shipped in the flat position.

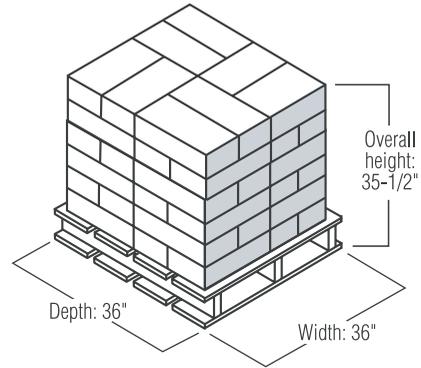
CORED WIRE PACKAGING INFORMATION

10-lb. Plastic Spool

- Color-coded labels for easy wire identification
- Colorful packaging—great for P.O.P. displays
- Handy application and wire size reference chart on back
- Individually packed for increased portability and protection



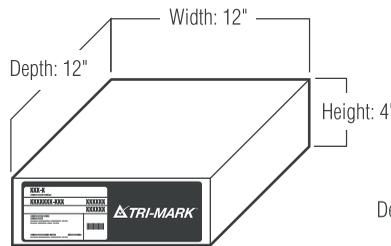
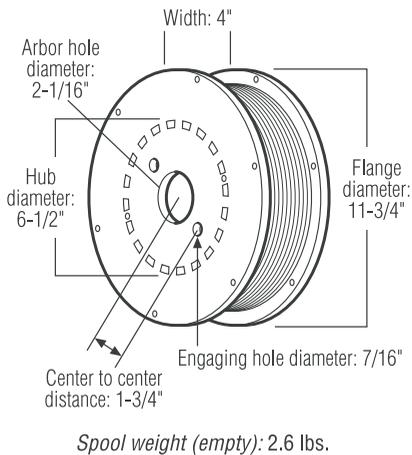
Weight: 40 lbs.
Spoils per master carton: 4



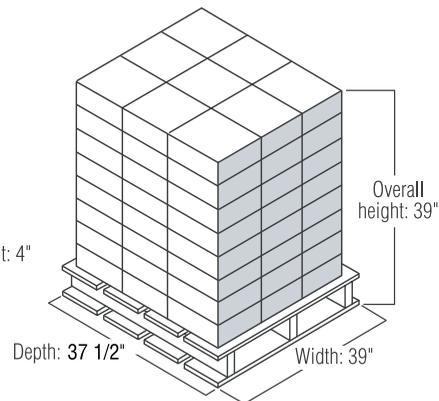
Weight: 1,920 lbs. Net; 2115 lbs. gross
Stacking sequence: 4 wide, 4 deep, 6 high
Master cartons per pallet: 48
Spoils per pallet: 192

33-lb. Fiber Spool

- Uses standard spool hub – no special adapters required
- Durable – designed to withstand most kinds of everyday wear and tear
- Convenient, easy to change-over

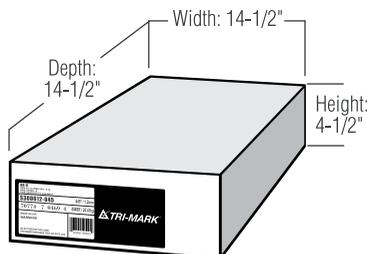
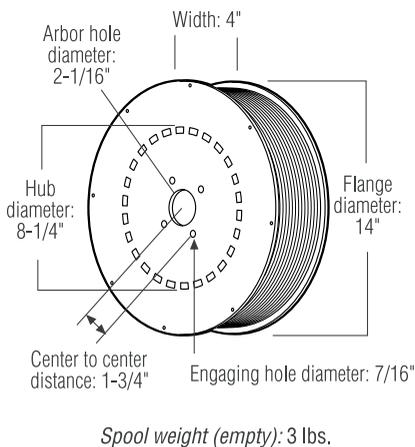


Weight: 2376 lbs. net; 2645 lbs., gross (est.)
Stacking sequence: 3 wide, 3 deep, 8 high
Spoils per pallet: 72

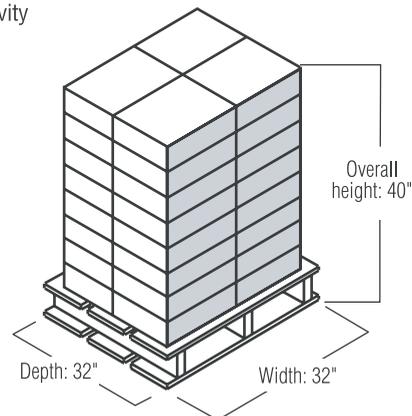


50-lb. Fiber Spool

- Convenient, easy to changeover
- Simplicity reduces changeover time, increases productivity
- More wire on spool means fewer changeovers



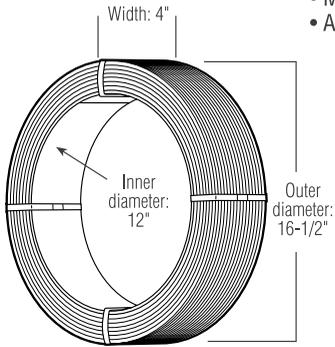
Weight: 1,600 lbs. net; 2,115 lbs., gross (est.)
Stacking sequence: 2 wide, 2 deep, 8 high
Spoils per pallet: 32



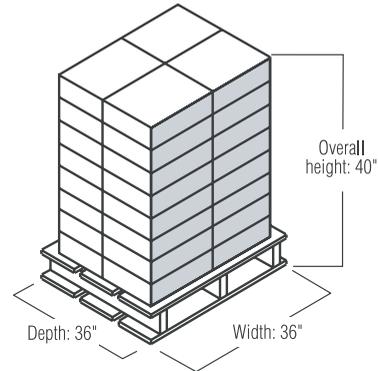
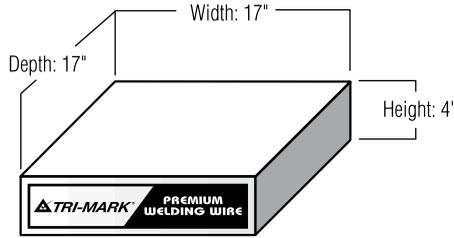
CORED WIRE PACKAGING INFORMATION

60-lb. Coil

- No spool to dispose of after wire is consumed
- Uses standard coil adapters
- More wire on coil means fewer changeovers
- Available in: HB BR

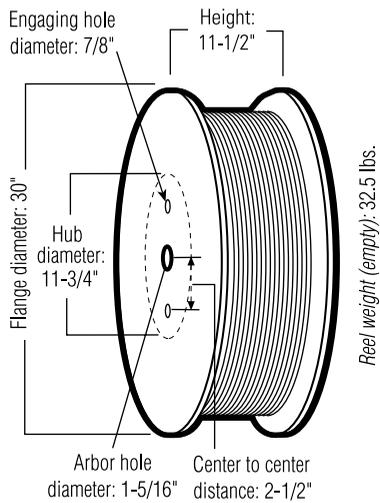


Coil weight (empty): 4 oz.



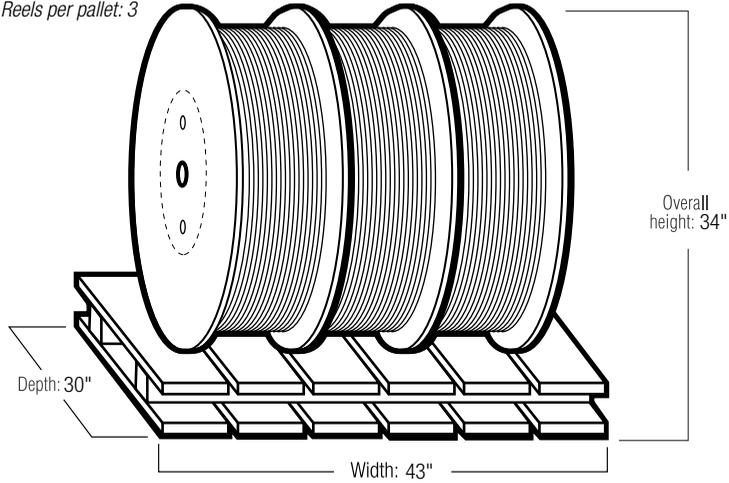
Weight: 1,920 lbs. net; 1,987 lbs., gross (est.)
Stacking sequence: 2 wide, 2 deep, 8 high
Coils per pallet: 32

600-lb. Vertical Reel

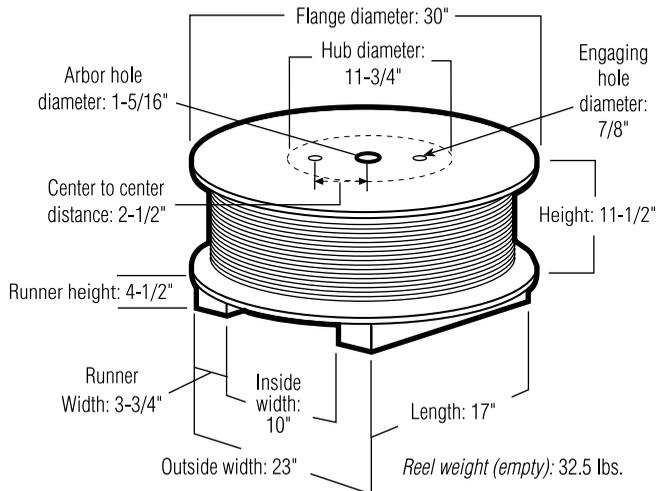


Reel weight (empty): 32.5 lbs.

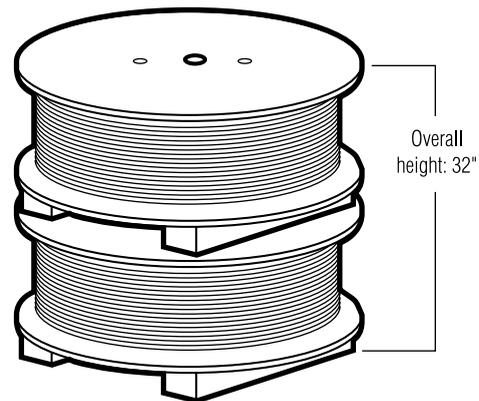
Weight: 1800 lbs. 1925 lbs. gross (est.)
Stacking sequence: 3 across
Reels per pallet: 3



950-lb. Flat Reel



Reel weight (empty): 32.5 lbs.

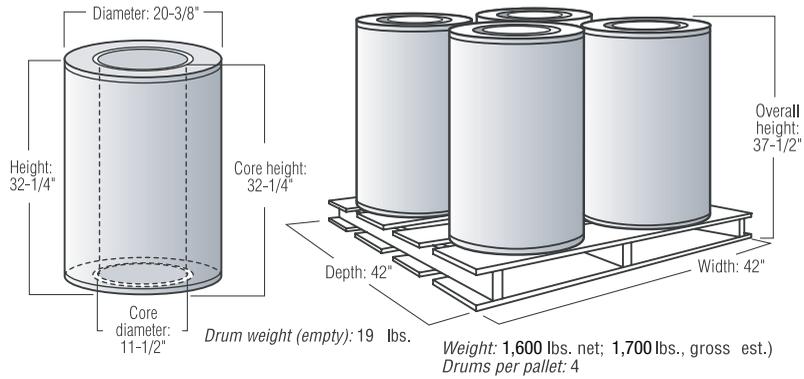


Weight: 1,900 lbs. net; 1,984 lbs. gross (est.)
Stacking sequence: 2 high
Reels per pallet: 2

DRUM PACKAGING INFORMATION

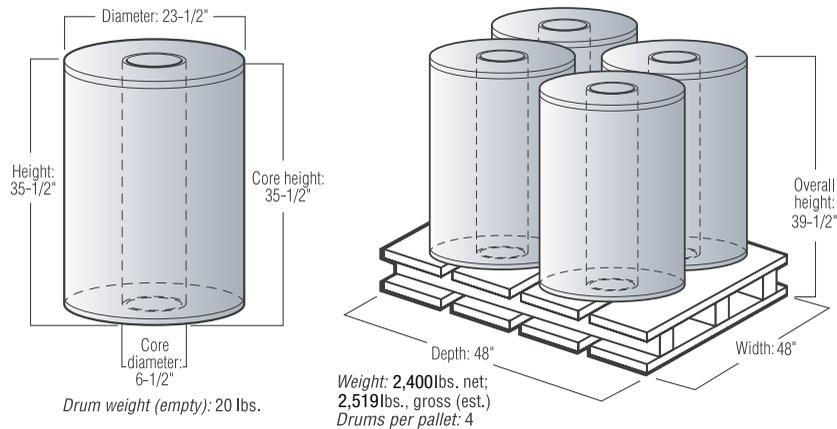
400-lb. Precision Pak

- Tangle-free feeding, no wire flip
- Compact drum to reduce floor-space requirements
- Precision Pak protects wire from manufacturing environment (dust, spatter, oil, etc.)
- Can be located away from the weld station for convenient change-over
- Four drums per pallet reduces excess handling



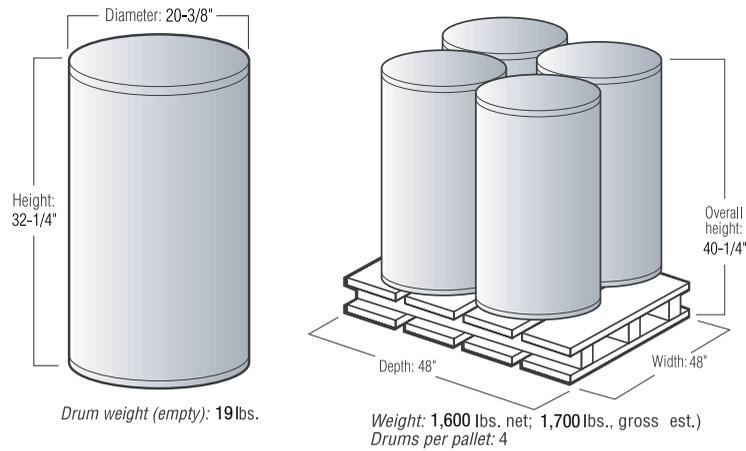
600-lb. Precision Pak

- Tangle-free feeding, no wire flip
- Compact drum to reduce floor-space requirements
- Precision Pak protects wire from manufacturing environment (dust, spatter, oil, etc.)
- Can be located away from the weld station for convenient change-over
- Two drums per pallet reduces excess handling



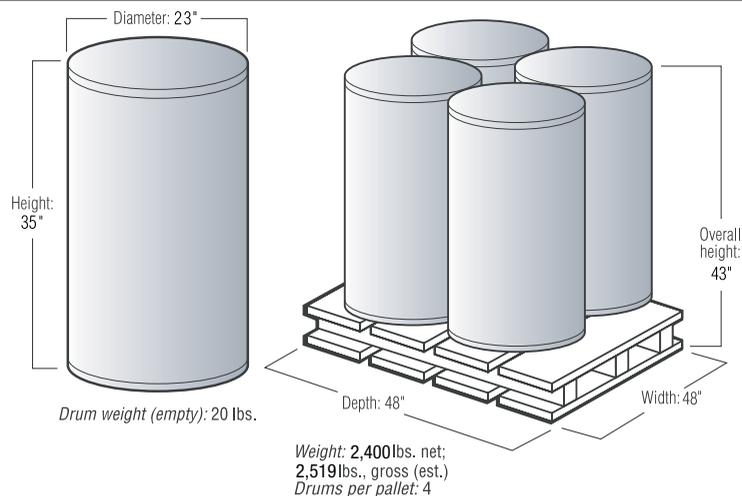
400-lb. X-Pak™

- Precision straight wire payout for robotic & automatic welding
- Wire wander is essentially eliminated
- Requires cone/bonnet direct pull type (no arm recommended)
- Lazy susan not recommended



600-lb. X-Pak™

- Precision straight wire payout for robotic & automatic welding
- Wire wander is essentially eliminated
- Requires cone/bonnet direct pull type (no arm recommended)
- Lazy susan not recommended





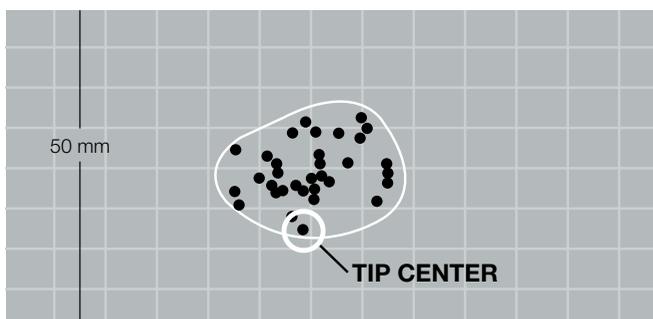
Inside view of wire in X-Pak drum

- Precision wire payout drum for automatic and robotic welding
- Straighter wire provides better weld joint tracking
- Higher weld quality due to the arc being consistently focused in the center of the weld joint
- Quality defects attributed to wire wander such as undercut and lack of fusion are essentially eliminated
- Improved wire feedability
- Extended liner and contact tip life

wire straightness shoot test results

X-PAK DRUMS

Wire Deviation = $\pm 15\text{MM}$

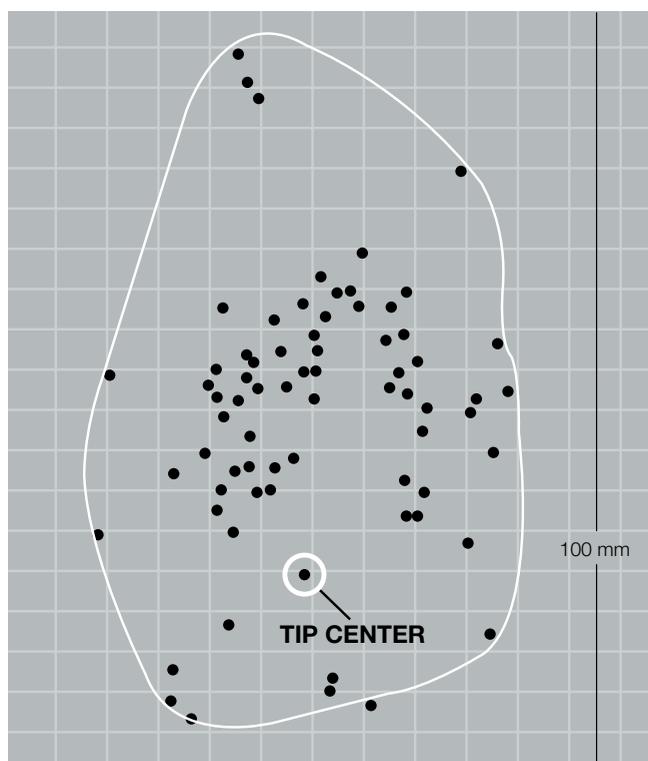


Test Description:

A torch is held six inches away from a sheet of densely grid graph paper. The wire is then fed through the torch until it punctures the paper. This procedure is repeated and the area of the punctures is outlined showing the wire deviation from the torch's center point.

COMPETITIVE DRUMS

Wire Deviation = $\pm 75\text{MM}$



PRODUCT APPROVALS

QPL MIL-E 24403

MIL Designation	Wire	Qualification Reference	Standard Diameters	SPEC. MIL-E
70T-5C (CO ₂ only)	TM-55	CL-67TM-4	1/16", 3/32"	24403/1
70T-1C	TM-72	CL-67TM-3	1/16" - 3/32"	24403/1
71T-1M	TM-770	TM-90-18	.035"-1/16"	24403/1
71T-1-HYM	TM-770	TM-90-18	.035" - 1/16"	24403/1
71T-1C	TM-771	CL-67TM-13	.035"	24403/1
71T-1C	TM-771	CL-67TM-1	.045" - 1/16"	24403/1
71T-1-HYC	TM-771	CL-67TM-14	.035" - 1/16"	24403/1
80T1-Ni1C (CO ₂ only)	TM-81N1	CL-67TM-5	1/16", 3/32"	24403/1
81T1-Ni2C (CO ₂ only)	TM-811N2	CL-67TM-2	.045" - 1/16"	24403/1
101TC	TM-811N3/101TC	CL-67TM-10	.045" - 1/16"	24403/2
101TM	TM-811N3/101TM	CL-67TM-10	.045" - 1/16"	24403/2
71T-1-HYR	TM-910	05Q/2002-296	.045" - 1/16"	24403/1

CANADIAN WELDING BUREAU:

Wire	Approval	Position*
TM-55	E492T-5CJ H4, E492T-5 MJ H4	F, H
TM-811-B2, CO ₂	E81T1-B2C (AWS)	F, H, VU, OH
TM-811-N1, CO ₂	81T1-Ni1C H8 (AWS)	F, H, VU, OH
TM-811-N1, 90%Ar/10% CO ₂	E81T1-Ni1M-H8 (AWS)	F, H, VU, OH
METALLOY 110, CO ₂ 95%Ar/5% CO ₂	E110C-G (AWS)	F, H
METALLOY 110, 75% Ar/25% CO ₂	E110C-6 H4 (AWS)	F, H
METALLOY 80N1, 90%Ar/10%	E80C-Ni1 H8 (AWS)	F, H
TRIPLE 8, CO ₂	E491T-9 H8	F, H, VU, OH
TM-771, CO ₂	E491T-9-CH	F, H, VU, OH
TM-RX7, CO ₂	E492T-9-J H16	F, H
METALLOY 71, 75% Ar/25% CO ₂	E491C-6M H4	F, H
TM-811N2, CO ₂	E81T1-Ni2 H8 (AWS)	F, H, VU, OH
TM-770, 75% Ar/25% CO ₂	E491T-9M H8	F, H, VU, OH
METALLOY 76, CO ₂	E491C-6M H4	F, H
METALLOY 76, 75% Ar/25% CO ₂	E491C-6M H4	F, H
METALLOY 76, 92% Ar/8% CO ₂	E491C-6M H4	F, H
TRIPLE 7, CO ₂	E491T-1 H8	F, H, VU, OH
TRIPLE 7, 75% Ar/25% CO ₂	E491T-1M H8	F, H, VU, OH
METALLOY VANTAGE, 75% Ar/25% CO ₂	E492C-6M H4	F, H
METALLOY VANTAGE, Ni1, Ar + 1 - 5% O ₂	E80C-Ni1 H4 (AWS)	F, H

* D = down-hand, H = horizontal, VU = vertical up, OH = overhead

BUREAU VERITAS:

Wire	Approval	Position*
TM-771, CO ₂	S3YM	F, H, VU, OH
METALLOY 71, 80% Ar/20% CO ₂	S3YM	F, H
TM-881 K2	S5Y42M	F, H, VU, OH
METALLOY 76, 80% Ar/20% CO ₂	S3YM	F, H
TM-770, 80% Ar/20% CO ₂	S3YM	F, H, VU, OH

* F = flat, H = horizontal, VU = vertical up, OH = overhead

For additional information, call customer service. **1.800.424.1543.**

PRODUCT APPROVALS

AMERICAN BUREAU OF SHIPPING

Wire	Shielding Gas	Approval	Position*
TM-72	CO ₂	E70T-1C (AWS A5.20)	F, H
TM-RX7	CO ₂	2SA, 2YSA H10	F, H
PREMIER 70	CO ₂	3SA, 3YSA	F, H
TM-55	CO ₂	E70T-5C (AWS A5.20)	F, H
TM-55	80% Ar/20% CO ₂	E70T-5M (AWS A5.20)	F, H
TRIPLE 7	CO ₂	2SA, 2YSA	F, H, VU, OH
TRIPLE 7	75% Ar/25% CO ₂	2SA, 2YSA	F, H, VU, OH
TRIPLE 8	CO ₂	4YSA, H5	F, H, VU, OH
TM-711M	CO ₂	2SA, 2YSA	F, H, VU, OH
TM-711M	75% Ar/25% CO ₂	2SA, 2YSA	F, H, VU, OH
TM-770	75% Ar/25% CO ₂	E71T-1M-MIL	F, H, VU, OH
TM-770	80% Ar/20% CO ₂	3SA, 3YSA IMPACT @ -40°C = 34 ft-lbf	F, H, VU, OH
TM-771	CO ₂	3SA, 3YSA, H10	F, H, VU, OH
METALLOY 70	75% Ar/25% CO ₂	2SA, 2YSA	F, H
METALLOY 70R	CO ₂	2SA, 2YSA	F, H
METALLOY 70R	75% Ar/25% CO ₂	2SA, 2YSA	F, H
METALLOY 71	75% Ar/25% CO ₂	3SA, 3YSA	F, H, VU, OH
METALLOY 76	80% Ar/20% CO ₂	3SA, 3YSA IMPACT @ -40°C = 34 ft-lbf	F, H
METALLOY VANTAGE™	75% Ar/25% CO ₂	3SA, 3YSA	F, H
METALLOY 80N1	80% Ar/20% CO ₂	3SA, 3YSA IMPACT @ -40°C = 34 ft-lbf	F, H
TM-81N1	CO ₂	E80T1-Ni1 (AWS A5.29)	F, H
TM-811N1	CO ₂	3SA, 3YSA	F, H, VU, OH
TM-811N2	CO ₂	3YSA	F, H, VU, OH
TM-911N2	CO ₂	E91T1-Ni2C (AWS A5.29) IMPACT @ -50°F = 20 ft-lbf	F, H, VU, OH
		E81 T1-K2 M(AWS A5.29)	
TM-881K2	80% Ar/20% CO ₂	IMPACT @ -60°C = 34 ft-lbf	F, H, VU, OH
TM-991K2	TM-991K2 CO ₂	E91T1-K2C (AWS A5.29)	F, H, VU, OH
TM-115	E91T1-K2M (AWS A5.29)CO ₂	E110T5-K3C (AWS A5.29)	F, H
TM-1101K3-C	CO ₂	E110T1-K3C (AWS A5.29)	F, H, VU, OH
TM-1101K3-M	75% Ar/25% CO ₂	E110T1-K3M (AWS A5.29)	F, H, VU, OH
TM-121	None	E71T-11 (AWS A5.20)	F, H, VU, OH

* F = flat, H = horizontal, VU = vertical up, OH = overhead

PRODUCT APPROVALS

DET NORSKE VERITAS:

Wire	Approval	Position*
TM-811N2 CO ₂	III Y40MS	F, H, VU, OH
TRIPLE 7, 75% Ar/25% CO ₂	II YMS	F, H, VU, OH
TRIPLE 8, CO ₂	IV YMS H5	F, H, VU, OH
TM-771, CO ₂	III Y40MS	F, H, VU, OH
TM-811N2, CO ₂ HIGH STRENGTH, LOW ALLOY	III Y40MS IMPACTS TESTED @ -40°F.	F, H, VU, OH
TM-811N2, 75% Ar/25% CO ₂ HIGH STRENGTH, LOW ALLOY	III Y40MS IMPACTS TESTED @ -40°F.	F, H, VU, OH
METALLOY 71, 80% Ar/20% CO ₂	III Y40MS	F, H, VU, VD, OH
TM-771, CO ₂ W/CERAMIC BACKING, ONE-SIDED WELDING	III Y40MS	F, H, VU, OH
METALLOY 71, 80% Ar/20% CO ₂ W/CERAMIC BACKING, ONE-SIDED WELDING	III Y40MS	F, H, VU, VD, OH
METALLOY 76, 80% Ar/20% CO ₂	III Y40MS	F, H
METALLOY 76, 75% Ar/25% CO ₂	III Y40MS	F, H, VU, OH
TM-770, 80% Ar/20% CO ₂	III Y40MS	F, H, VU, OH
TM-770, 75% Ar/25% CO ₂	III Y40MS	F, H, VU, OH
TM-881K2, CO ₂	V Y42MS H10	F, H, VU, OH

* F = flat, H = horizontal, VU = vertical, up, OH = overhead

LLOYD'S REGISTER OF SHIPPING:

Wire	Approval	Position*
TRIPLE 8, CO ₂	4 YS H5	F, HV, VU, OH
TM-771, CO ₂	3S, 3YS, H15	F, H, VU, VD, OH
TM-770, 75% Ar/25% CO ₂	3S, 3YS, H15	F, HV, VU, OH
TM-770, 80% Ar/20% CO ₂	3S, 3YS, H15	F, H, HV, VU, OH
METALLOY 71, 80% Ar/20% CO ₂	3S, 3YS, H15	F, H, HV, VU, VD
METALLOY 76, 80% Ar/20% CO ₂	3Y, 40S, H15	F, H
TM-811N2 CO ₂ , 75% Ar/25% CO ₂	3S, 3YS, H15	F, VU, VD, OH
TM-881 K2, 80% Ar/20% CO ₂	4Y, 42S, H10	F, H, VU, OH

* F = flat, H = horizontal, HV = horizontal V-groove, VU = vertical, up, OH = overhead

For additional information, call customer service. **1.800.424.1543**.

AWS CLASSIFICATION OF TRI-MARK FILLER METALS

These tables classify Tri-Mark Flux-Cored filler metals according to AWS classifications. Where more than one filler metal has been recommended, please refer to the individual product descriptions in this catalog for the most suitable Tri-Mark filler metal.

Aws Classification	Product
G A S S H I E L D E D	
E70T-1C	TM-11, TM-72, TM-RX7
E70T-2C	TM-73
E70T-5C, E70T-5M	TM-55
E70C-6M H4	Metalloy 76, 70R, VANTAGE, 70X
E71T-1C, E71T-1M	TRIPLE-7, TM-711M, TM-770, TM-771, TM-910
E71T-1 CJ H8, E71T-9 CJ H8	TRIPLE 8
E71T-12C, E71T-12M	TM-770, TM-771, TM-910
E80C-Ni1	Metalloy 80N1, VANTAGE Ni1
E80C-Ni2	Metalloy 80N2
E80C-B2	Metalloy 80B2
E90C-K3	Metalloy 90
E90C-D2	Metalloy 80D2
E90C-B3	Metalloy 90B3
E100C-K3	Metalloy 100
E110C-K4	Metalloy 110
E81T1-A1C	TM-811A1
E80T1-B2C	TM-81B2
E81T1-B2C	TM-811B2
E90T1-B3C	TM-91B3
E91T1-B3C, E91T1-B3M	TM-911B3
E91T1-B9M	TM-B9
E80T1-Ni1C, E80T1-Ni1M	TM-81N1
E81T1-Ni1C, E81T1-Ni1M	TM-811N1
E81T1-Ni2C, E81T1-Ni2M	TM-811N2
E91T1-Ni2C	TM-911N2
E100T5-D2C, E100T5-D2M	TM-105D2
E81T1-K2C, E81T1-K2M	TM-881K2
E90T1-K2C	TM-91K2
E91T1-K2C, E91T1-K2M	TM-991K2
E90T5-K2C, E90T5-K2M	TM-95K2
E101T1-GM	TM-101
E100T1-K3C	TM-101K3
E110T1-K3C	TM-111K3
E111T1-K3C/E111T1-K3M	TM-1101K3-C, TM-1101K3-M
E110T5-K3C/E110T5-K3M	TM-115
E120T5-K4C	TM-125K4
E81T1-W2C	TM-811W
No AWS Class	TM-811N3/101TC, TM-811N3/101TM
S E L F - S H I E L D E D	
E70T-4	TM-44
E71T-11	TM-121
E71T-GS	TM-123

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HOW TO CALCULATE FILLER METAL CONSUMPTION

Use the tables below to estimate the quantity of filler metal required for horizontal fillet welds, and square groove and V-groove butt joints. In cases where joint information differs from the tables, simply substitute your numbers in the following formula:

$$W = \frac{D}{(1-L)}$$

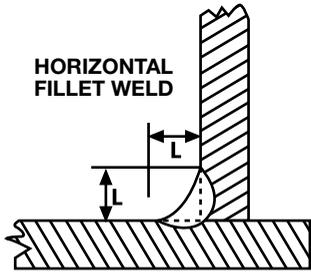
Where:

- W** is the weight of the wire consumed
- D** is the weight of the steel deposited*
- L** is the total amount of wire losses

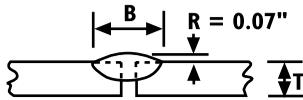
$$D = [(Area\ of\ groove\ \times\ Length\ of\ groove\ \times\ 0.283) + Reinforcement\ (if\ applicable)]$$

*Table data for square and V-groove joints are based on the efficiency of stick electrodes. To calculate for flux-cored wires, divide D by .80; for solid wire, divide D by .90.

To determine D, calculate the area of the groove multiplied by the length; then multiply the result by 0.283, the volume-to-weight conversion factor for steel. If weld reinforcement is involved, be sure to add this amount into your calculation, e.g.,

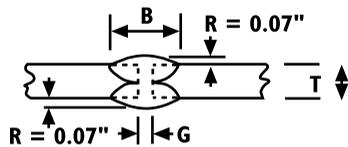


SQUARE GROOVE BUTT JOINT
...welded one side

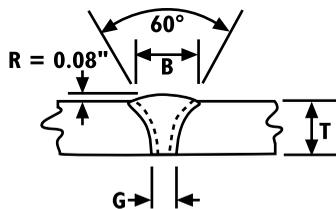


...welded two sides

If root of top weld is chipped or flame gouged and welded, add 0.07 lb. to steel deposited (equivalent to approx. 0.13 lb. of wires).



"V" GROOVE BUTT JOINT



Size of fillet L (in inches)	Steel deposited per linear foot of weld (lbs.)	Pounds of wires required per linear foot of weld (approx.)		
		Stick* (SMAW)	Flux-Cored (FCAW)	Solid (GMAW)
1/8	0.027	.049	.034	.03
3/16	0.063	.114	.079	.07
1/4	0.106	.193	.133	.118
5/16	0.166	.302	.208	.184
3/8	0.239	.434	.298	.265
1/2	0.425	.773	.531	.472
5/8	0.663	1.205	.829	.737
3/4	0.955	1.736	1.194	1.061
1	1.698	3.087	2.123	1.890

Joint dimensions (in inches)			Steel deposited per linear foot of weld (lbs.)		Pounds of wires required per linear foot of weld (approx.)	
Metal Thick T	Bead Width B	Root Open G	Without reinforcement	With reinforcement (R**=0.08")	Without reinforcement	With reinforcement (R**=0.08")
3/16	3/8	0	—	0.088	—	0.16
		1/16	0.020	0.109	0.04	0.20
1/4	7/16	1/16	0.027	0.129	0.05	0.23
		3/32	0.039	0.143	0.07	0.26
5/16	1/2	1/16	0.033	0.153	0.06	0.27
		3/32	0.050	0.170	0.09	0.30
1/8	1/4	0	—	0.119	—	0.21
		1/32	0.013	0.132	0.03	0.24
3/16	3/8	1/32	0.020	0.199	0.04	0.36
		1/16	0.040	0.218	0.07	0.39
1/4	7/16	1/16	0.053	0.261	0.10	0.47
		3/32	0.080	0.288	0.14	0.53

Joint dimensions (in inches)			Steel deposited per linear foot of weld (lbs.)		Pounds of wires required per linear foot of weld (approx.)	
Metal Thick T	Bead Width B	Root Open G	Without reinforcement	With reinforcement (R**=0.08")	Without reinforcement	With reinforcement (R**=0.08")
1/4	0.207	1/16	0.085	0.143	0.15	0.25
5/16	0.311	3/32	0.173	0.258	0.31	0.46
3/8	0.414	1/8	0.282	0.394	0.50	0.70
1/2	0.558	1/8	0.489	0.641	0.87	1.15
5/8	0.702	1/8	0.753	0.942	1.35	1.68
3/4	0.847	1/8	1.088	1.320	1.94	2.35
1	1.138	1/8	1.930	2.240	3.45	4.00

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*Includes scrap end and spatter loss. **R=Height of reinforcement.

INCHES PER POUND OF WIRE

Wire Diameter Inches (mm)	Flux-Cored, in/lb	Product Metal-Cored & Sub Arc, in/lb	Self-Shielded, in/lb
.030 (0.8 mm)	4,960	—	5,910
.035 (0.9 mm)	3,650	3,750	4,350
.045 (1.2 mm)	2,210	2,550	2,500
.052 (1.4 mm)	1,930	1,800	—
1/16 (1.6 mm)	1,160	1,300	1,300
5/64 (2.0 mm)	730	850	925
3/32 (2.4 mm)	520	590	615
7/64 (2.8 mm)	440	—	550
.120 (3.0 mm)	—	—	420
1/8 (3.2 mm)	350	320	—
5/32 (4.0 mm)	—	205	—

The inches per pound values may vary with each AWS class and wire type.

METRIC CONVERSION CHARTS

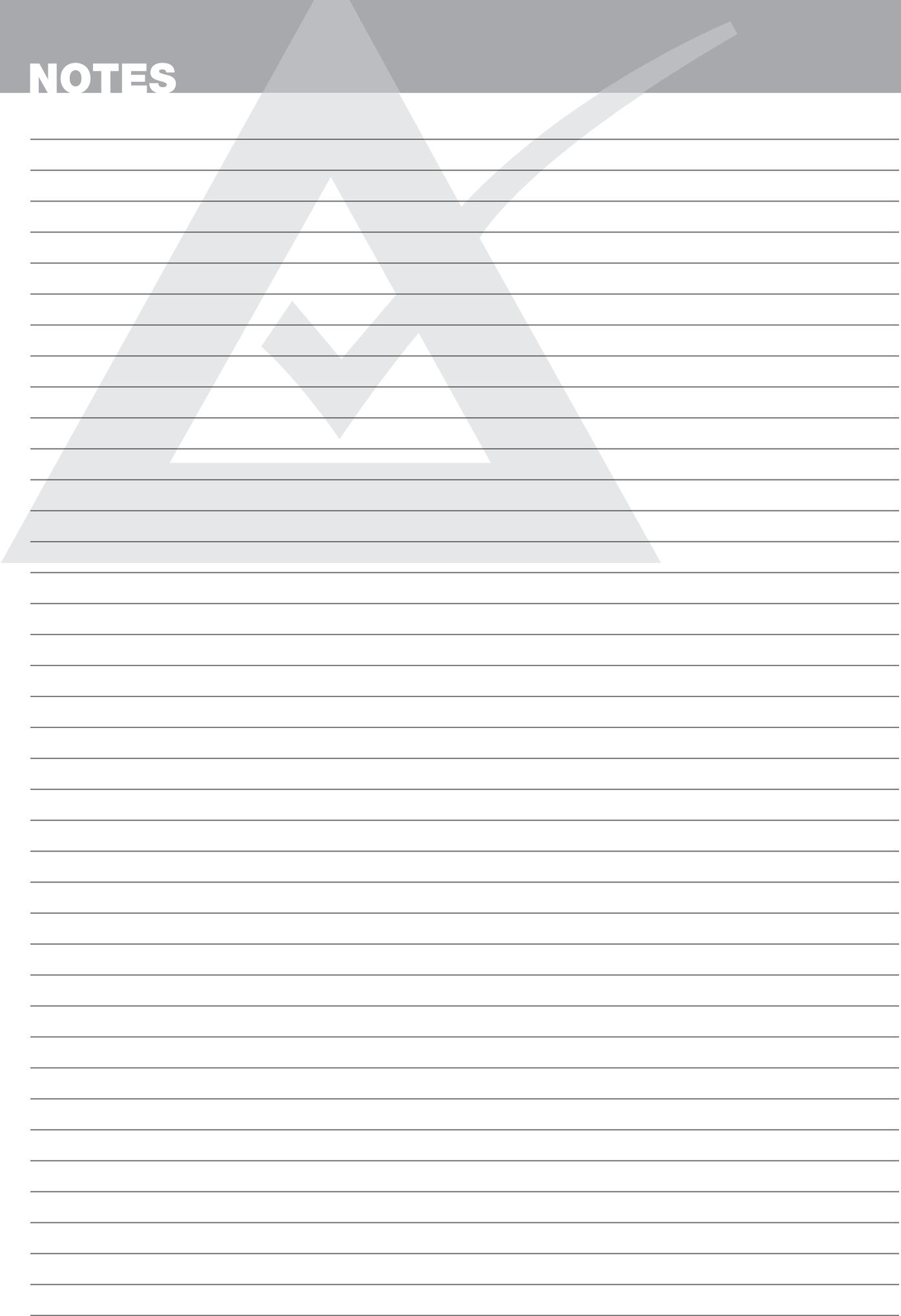
To Convert From	To	Multiply By
in	m	.0254
in	cm	2.54
in	mm	25.4
in ²	mm ²	645.2
mm ²	in ²	.00155
lb.	kg	.454
kg	lb.	2.2
ton (2,000 lbs.)	kg	907.2
kg	ton	.0011
metric ton (2,200 lbs.)	kg	998.8
kg	metric ton	.0010

To Convert From	To	Multiply By
lb./hr.	kg/hr.	.454
kg/hr.	lb./hr.	2.2
liters/min.	cu. ft./hr.	2.119
cu. ft./hr.	liters/min.	.4719
psi	kPa	6.895
kPa	psi	.145
MPa	psi	145
psi	MPa	.0069
ipm	mm/sec.	.423
ft. lbs.	Joule (J)	1.356
Joule (J)	ft. lbs.	.737

Wire Diameters	Approximate Equivalents in mm for Standard AWS Wire Diameters											
in	.024	.030	.035	.045	.052	1/16	5/64	3/32	7/64	1/8	5/32	
mm	.6	.8	.9	1.2	1.4	1.6	2.0	2.4	2.8	3.2	4.0	

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NOTES



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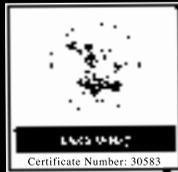
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