



HOBART[®]

TRI-MARK

Low Alloy Product Catalog



**YOUR FIRST CALL FOR
LOW ALLOY WELDING PRODUCTS**

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HISTORY OF

HOBART BROTHERS



After 90 years in the business, Hobart Brothers is Welding. And Welding is Hobart Brothers.

Much has changed in industry since 1920; Hobart was there every step of the way. You might even say the company did more than simply keep up with new technologies and processes.

It helped forge them.

Hobart has become a world leader in the field. Today you can find the broadest selection of filler metals in the United States. **HOBART**® & **TRI-MARK**® are well known brands of Hobart Brothers.

Training and expertise are key products of Hobart as well.

Such a respectable past can only be built by knowledgeable people. That's why, whether you have a question on technique, materials or applications, you know who to call. **1-800-532-2618**

The company who touched off that first spark over 90 years ago.

Hobart Brothers has served major metal fabrication markets as a top-quality manufacturer of flux-cored and metal-cored wires for over 25 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," Hobart Brothers 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.





WHAT IS LOW ALLOY?

Typically:

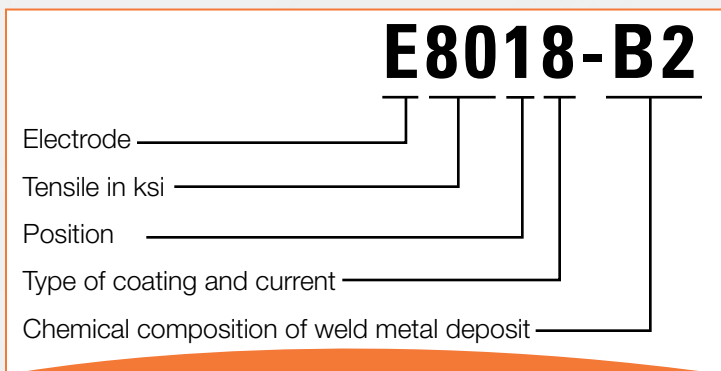
- 80,000 psi ultimate tensile strength and greater
- Addition of certain alloying elements such as Nickel, Molybdenum, Manganese, Chromium, etc. for specific applications and performance

WHY & WHERE TO USE LOW ALLOY

- Higher strength based materials
- Chemistry/chemical requirements
 Chrome-Moly, Nickel, etc.
- Application requirements
 High strength
 Heat/Corrosion Applications
 Heat treating cycles – PWHT
 Weathering Steels



How AWS classifies low alloy covered electrodes (AWS A5.5)



Types of Coating & Current

AWS	DIGIT	TYPE OF COATING	WELDING CURRENT
6010	0	cellulose sodium	DCEP
6011	1	cellulose potassium	AC or DCEP
6022	2	titania sodium	AC or DCEN
6013	3	titania potassium	AC or DCEP or DCEN
7014	4	iron powder titania	AC or DCEP or DCEN
7018	8	iron powder low hydrogen	AC or DCEP

DCEP-Direct Current Electrode Positive
 DCEN-Direct Current Electrode Negative
 AC-Alternating Current

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Chemical Composition of Weld Metal Deposit

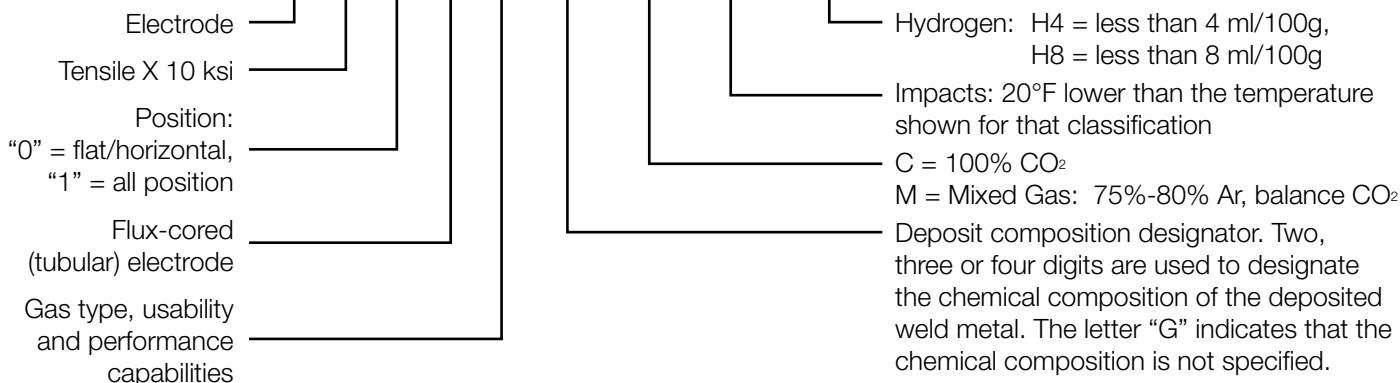
AWS	Suffix	C	Mn	Si	Ni	Cr	Mo	V	P	S	Cu	Al	Nb	N
E7018	A1	.12	.90*	.80	—	—	.40-.65	—	.03	.03				
E8018	B2L	.05	.90	.80	—	1.00-1.50	.40-.65	—	.03	.03				
E8018	B2	.05-.12	.90	.80	—	1.00-1.50	.40-.65	—	.03	.03				
E9018	B3L	.05	.90	.80*	—	2.00-2.50	.90-1.20	—	.03	.03				
E9018	B3	.05-.12	.90	.80*	—	2.00-2.50	.90-1.20	—	.03	.03				
E8018	B6	.05-.10	1.0	.90	.40	4.0-6.0	.45-.65	—	.03	.03				
E8018	B8	.05-.10	1.0	.90	.40	8.0-10.5	.85-1.20	—	.03	.03				
E9015	B9	.08-.13	1.20	.30	8.0	8.0-10.5	.85-1.20	.15-.30	.01	.01	.25	.04	.02-.10	.02-.07
E8018	C1	.12	1.25	.80*	2.00-2.75	—	—	—	.03	.03				
E8018	C2	.12	1.25	.80*	3.00-3.75	—	—	—	.03	.03				
E8018	C3	.12	.40-1.25	.80	.80-1.10	.15	.35	.05	.03	.03				
E10018	D2	.15	1.65-2.00	.80*	.90	—	.25-.45	—	.03	.03				
EXXX	G**	—	1.00 Min	.80 Min	.50 Min	.20 Min	.20 Min	.10 Min	.03	.03	.20			
E9018	M	.10	.60-1.25	.80	1.40-1.80	.15	.35	.05	.030	.030				
E10018M	M	.10	.60-1.25	.80	1.40-1.80	.15	.35	.05	.030	.030				
E11018M	M	.10	1.30-1.80	.60	1.25-2.50	.40	.25-.50	.05	.030	.030				
E12018	M	.10	1.30-2.25	.60	1.75-2.50	.30-1.50	.30-.55	.05	.030	.030				
E7010	P1	.20	1.20	.60	1.00	.30	.50	.10	.030	.030				
E8010	P1	.20	1.20	.60	1.00	.30	.50	.10	.030	.030				

* Amount depends on electrode classification. Single values indicate maximum

** All G classifications have the same chemical minimum requirements

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

E 8 1 T 1-XC/MJ H8



LOW ALLOY FLUX CORED DESIGNATOR CHART

Carbon-Molybdenum Weld Metal

E81T1-A1C .12% Max Carbon, .40 - .65% Molybdenum, 80ksi

Chromium-Molybdenum Weld Metal

E80T1-B2C 1.00 - 1.50% Chromium, .40 - .65% Molybdenum
 E81T1-B2C/M 1.00 - 1.50% Chromium, .40 - .65% Molybdenum
 E90T1-B3C 2.00 - 2.50% Chromium, .90 - 1.20% Molybdenum
 E90T5-B3M 2.00 - 2.50% Chromium, .90 - 1.20% Molybdenum
 E91T1-B3C/M 2.00 - 2.50% Chromium, .90 - 1.20% Molybdenum
 E81T1-B6C/M 4.00 - 6.00% Chromium, .45 - .65% Molybdenum
 E91T1-B9M 8.00 - 10.50% Chromium, .85 - 1.20% Molybdenum, .15 - .30% Vanadium

Nickel Weld Metal

E80T1-Ni1C/M .80 - 1.20% Nickel, 80ksi
 E81T1-Ni1C/M .80 - 1.20% Nickel, 80ksi
 E81T1-Ni2C/M 1.75 - 2.25% Nickel, 80ksi
 E91T1-Ni2C 1.75 - 2.25% Nickel, 90ksi

Manganese-Molybdenum Weld Metal

E100T5-D2C 1.60 - 2.25% Manganese, .25 - .55% Molybdenum, 100ksi

Manganese-Nickel-Molybdenum Weld Metal

E81T1-K2C/M .50 - 1.75% Manganese, 1.00 - 2.00% Nickel, .35% Max. Molybdenum, 80ksi
 E90T1-K2C .50 - 1.75% Manganese, 1.00 - 2.00% Nickel, .35% Max. Molybdenum, 90ksi
 E90T5-K2C .50 - 1.75% Manganese, 1.00 - 2.00% Nickel, .35% Max. Molybdenum, 90ksi
 E91T1-K2C/M .50 - 1.75% Manganese, 1.00 - 2.00% Nickel, .35% Max. Molybdenum, 90ksi
 E100T1-K3C .75 - 2.25% Manganese, 1.20 - 2.60% Nickel, .25 - .65% Molybdenum, 100ksi
 E110T1-K3C .75 - 2.25% Manganese, 1.20 - 2.60% Nickel, .25 - .65% Molybdenum, 110ksi
 E110T5-K3M .75 - 2.25% Manganese, 1.20 - 2.60% Nickel, .25 - .65% Molybdenum, 110ksi
 E111T1-K3C .75 - 2.25% Manganese, 1.20 - 2.60% Nickel, .25 - .65% Molybdenum, 110ksi
 E120T5-K4C 1.20 - 2.25% Manganese, 1.75 - 2.60% Nickel, .20 - .65% Molybdenum, .20 - .60% Chromium, 120ksi

Weld Metal for Weathering Steels

E81T1-W2C Addition of Copper for Weathering Steels

General Classification

E101T1-GM .50 - 1.75% Manganese, 1.00 - 2.00% Nickel, .35% Max. Molybdenum, 100ksi

A1

Description

Carbon-Molybdenum filler metal with .5% Moly to increase the strength of the weld metal, especially at elevated temperatures. This filler metal keeps its tensile strength after post-weld heat treatment (PWHT) applications.

Typical Applications

Boiler and Pressure Vessel, Piping, Power Plant, Carbon-Molybdenum base materials such as A161, A204, A302 Gr. A, and A335-P1 Pipe.



Key of Symbols



SMAW - Shielded Metal Arc Welding ("Stick") Product



FCAW - Flux Cored Arc Welding Product - Gas Shielded ("Flux-Cored")



GMAW - Gas Metal Arc Welding - Metal Cored Product, Gas Shielded ("Metal-Cored")

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Stick **HOBALLOY® 7018A1 / HOBART®**

AWS E7018-A1 H4R

For pressure vessel applications, the Hoballoy 7018A1 is an outstanding choice. When welding .50% molybdenum steel and other low alloy steels, the Hoballoy 7018A1 offers resistance to moisture reabsorption. This important feature helps prevent hydrogen cracking and aids in the elimination of starting porosity.

Typical applications:

- construction and maintenance of boilers
- piping
- tubing

Typical weld metal properties (Chem Pad):

C	Mn	Si	P	S	Mo
.03	.83	.32	.01	.01	.49

Typical mechanical properties (stress relieve 1 hour @ 1150°F):

Tensile Strength (psi)	87,000 (599 MPa)
Yield Strength (psi)	72,000 (496 MPa)
Elongation % in 2"	26%

Typical Charpy V-notch impact values

Not required

Available diameter and recommended operating ranges:

3/32"	(2.4 mm)	70-110 amps
1/8"	(3.2 mm)	90-160 amps
5/32"	(4.0 mm)	130-220 amps

Type of current: DCEP or AC

Approvals and conformance:

- AWS A5.5, E7018-A1 H4R
- ASME SFA 5.5, F-4, A-2, E7018-A1
- ABS E7018-A1

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FC **TM-811A1 / TRI-MARK®**

TM-811A1 deposits weld metal with .50% 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 .50% 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



LOW ALLOY APPLICATIONS **K2**



K2 / **K3** / **K4**

Description

Manganese-Nickel-Molybdenum filler metals designed to weld higher strength steels such as HY80, HY100.

K3 increasing amounts of Nickel and Manganese

K4 Addition of .20- .60 Chrome

Typical Applications

Crane manufacturing, Heavy Equipment, Earthmoving, Offshore Oil Structures, Shipbuilding Fabrication, Steels including HY80, HY100, ASTM A710, and A514.



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TM-881K2 / TRI-MARK

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 cfm

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	Ni
80% Ar/20% CO ₂	.08	1.11	.26	.009	.019	.01	1.46
100% CO ₂	.05	.81	.14	.008	.015	.02	1.64

Mechanical Properties:

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

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FabCO 81K2-C / HOBART

FabCO 81K2-C is an all-position low alloy flux-cored wire. This high performance 100% CO₂ electrode is characterized by a flat bead profile, smooth stable arc and low spatter even when welded out of position. The exceptional mechanical properties and low diffusible hydrogen makes this product well suited for the shipbuilding and offshore oil construction market.

Specifications:

E81T1-K2CJ H8 per AWS A5.29/A5.29M, ASME SFA 5.29, E81T1-K2CJ H8, ABS 100% CO₂ 3Y, 3YSA

Shielding Gas:

100% CO₂

Welding Positions:

Vertical, Overhead, Flat, Horizontal

Standard Diameter:

.045", 1/16"

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Ni
100% CO ₂	.07	1.13	.27	.015	.014	1.67

Typical Mechanical Properties(As Welded):

Tensile Strength	87,000 psi (600 MPa)
Yield Strength	78,000 psi (538 MPa)
Elongation % in 2"	27%

Typical Charpy V-notch impact values (SR):

CVN @ -40°F: 91 ft-lbs

Typical Applications:

Offshore & Shipbuilding



FC TM-91K2 / TRI-MARK®

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 cfm
- 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

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FC TM-991K2 / TRI-MARK®

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 cfm
- 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:	92,000 psi	101,800 psi
Yield Strength:	80,000 psi	93,400 psi
Elongation:	27%	24%
CVN @ 0°F:	85 ft-lbs	70 ft-lbs

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FC TM-95K2 / TRI-MARK®

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.



TM-101 / TRI-MARK®

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.

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TM-101K3 / TRI-MARK®

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.

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TM-111K3 / TRI-MARK®

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 cfm

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.



FC **TM-1101K3-C / TRI-MARK®**

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 cfm

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.

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FC **TM-1101K3-M / TRI-MARK®**

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 cfm

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.

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FC **FabCO-110K3-M / HOBART®**

FabCo 110K3-M is a gas-shielded tubular wire, which is specially designed for welding of high strength low alloy steels in offshore structure fabrication. Quenched and tempered steels, such as Grade N25 or Dillimax 690, usually require tensile strength above 115 ksi and -40°F Charpy Impact properties. This product can consistently meet those requirements in all welding positions. FabCO 110K3-M uses 75% Ar/25% CO₂ mixed gas and offers high productivity along with good welder appeal.

Specifications:

AWS A5.29, E111T1-K3MJ H4, ASME SFA 5.29, E111T1-K3MJ H4
ABS 75% Ar/25% CO₂ E111T1-K3MJ H4

Shielding Gas:

75% Ar/25% CO₂

Welding Positions:

All positions

Applications:

Offshore structural fabrication, quenched and tempered steels.

Standard Diameters: .045

Type Of Current:

DCEP

Typical Weld Metal Properties* (Chem Pad):

	C	Mn	Si	P	S	Cr	Ni	Mo
75% Ar/25% CO ₂	.05	2.04	.26	.007	.014	.12	1.84	.37

Typical Charpy V-Notch Impact Values* (AW):

Avg. at -20°F (-29°C) 32 ft-lbs (43 Joules)

Mechanical Properties:

	75% Ar/25% CO ₂
Tensile Strength	128,000 psi (883 MPa)
Yield Strength	124,000 psi (854 MPa)
Elongation % in 2"	15%

FC **TM-115 / TRI-MARK®**

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 cfm

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	.04	.62	.014	.012	.41	1.84

Mechanical Properties:

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

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FC **FabCO 115 / HOBART®**

FabCO 115 is a high-strength, flux-cored wire that is comparable to a low alloy E11018M electrode but with higher deposition rates. It is used primarily for welding A514, A517, HY100 and similar quenched and tempered high-strength, low alloy steels, producing a low hydrogen deposit with basic slag which helps to minimize cracking. FabCO 115 has high impact values at low temperatures and provides you with a modified globular metal transfer. For use with 100% CO₂ shielding gas only.

Specifications:

E110T5-K4C, A5.29, E110T5-K4C per AWS A5.29, ASME SFA 5.29

Shielding Gas:

100% CO₂

Welding Positions:

Flat and horizontal

Standard Diameter:

.045"

Type Of Current:

DCEP

Typical Weld Metal Properties*(Chem Pad):

	C	Mn	Si	P	S	Cr	Ni	Mo
100% CO ₂	.04	1.50	.41	.012	.014	.42	2.37	.42

Mechanical Properties

	100% CO ₂
Tensile Strength	126,000 psi (869 MPa)
Yield Strength	102,000 psi (701 MPa)
Elongation % in 2"	18%

Typical Charpy V-Notch Impact Values*(AW):

	100% CO ₂
Avg. at -60°F (-51°C)	48 ft-lbs (65 Joules)

Applications:

Mining equipment, earthmoving equipment and off-the-road vehicles.

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FC **TM-125K4 / TRI-MARK®**

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 cfm

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.





METALLOY 90 / TRI-MARK®

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 cfm

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.

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METALLOY 100 / TRI-MARK®

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 cfm

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

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METALLOY 110 / TRI-MARK®

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 cfm

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:	119,900 psi
Yield Strength:	109,200 psi
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.



SMAW ("Stick")



FCAW ("Flux-Cored")



GMAW ("Metal-Cored")





M

Description

Military similar electrodes designed for welding high strength steels such as HY80, HY100, A514 (T1).

Typical Applications

Designed for welding HY-80, HY-90, and HY-100 steels, forgings castings, pressure vessels.



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HOBALLOY® 9018M / HOBART®

AWS E9018-M H4R

Hoballoy 9018M is an outstanding electrode that's designed for applications requiring tensile strengths of at least 90,000 psi. An ideal choice for conditions of high heat and humidity, Hoballoy 9018M has a specially formulated coating that reduces moisture pick-up, which helps to minimize hydrogen cracking and starting porosity.

Typical applications:

- joining HY-90 steel
- joining HY-80 steel
- joining T-1 steel
- joining other high-tensile steels

Typical weld metal properties (Chem Pad):

C	Mn	Si	P	S	Ni	Cr	Mo	V
.05	1.06	.22	.011	.010	1.55	.08	.29	.01

Typical mechanical properties (AW):

Tensile Strength (psi)	96,000 (665 MPa)
Yield Strength (psi)	83,000 (575 MPa)
Elongation % in 2"	26%

Typical Charpy V-notch impact values (AW):

Avg. at -60°F (-51°C) 65 ft-lbs (88 Joules)

Available diameter and recommended operating ranges:

3/32"	(2.4 mm)	70-110 amps
1/8"	(3.2 mm)	90-160 amps
5/32"	(4.0 mm)	130-220 amps
3/16"	(4.8 mm)	200-300 amps
1/4"	(6.4 mm)	300-400 amps

Type of current: DCEP or AC

Approvals and conformance:

- AWS A5.5, E9018-M H4R
- ASME SFA 5.5, E9018-M H4R
- ABS E9018-M



Stick **HOBALLOY® 10018M / HOBART®**

AWS E10018-M H4R

Designed for welding low alloy, high-strength steels, the Hoballoy 10018M provides good ductility and excellent notch toughness. Its good arc characteristics, easy slag removal, and low spatter and smoke combine for operator appeal. And it's also ideal in high heat and humidity because of its moisture-resistant coating, which also helps to prevent hydrogen cracking and starting porosity.

Typical applications:

- reinforcing steel
- HY-80, HY-90, T-1, AR and other high-tensile steels

Typical weld metal properties (Chem Pad):

C	Mn	P	S	Si	Cr	Ni	Mo	V
.07	1.44	.012	.007	.40	.04	1.89	.38	.01

Typical mechanical properties (AW):

Tensile Strength (psi)	108,000 (947 MPa)
Yield Strength (psi)	100,000 (687 MPa)
Elongation % in 2"	23%

Typical Charpy V-notch impact values (AW):

Avg. at -60°F (-51°C)	56 ft-lbs (76 Joules)
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Available diameter and recommended operating ranges:

3/32"	(2.4 mm)	70-110 amps
1/8"	(3.2 mm)	90-160 amps
5/32"	(4.0 mm)	130-220 amps

Type of current: DCEP

Approvals and conformance:

- AWS A5.5, E10018-M H4R
- ASME SFA5.5, F-4, A-12

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Stick **HOBALLOY® 11018M / HOBART®**

AWS E11018-M H4R

Designed for military applications and other projects that require weld joints with tensile strengths of at least 110,000 psi, Hoballoy 11018M offers a wide range of welding advantages that will improve your welding productivity – good arc characteristics, excellent puddle control with good wetting action and tie-in, and easy slag removal. Ideal for conditions of high heat and humidity, it features a special coating that's designed to reduce moisture pick-up, helping to minimize hydrogen cracking and starting porosity. Hoballoy 11018M also offers good ductility, good crack resistance and high notch toughness even at temperatures as low as -60°F.

Typical applications:

- low alloy steels including HY-80, HY-90 and T-1

Typical weld metal properties (Chem Pad):

C	Mn	Si	Ni	P	S	Mo	Cr	V
.04	1.54	.34	1.90	.011	.013	.33	.19	<.01

Typical mechanical properties (AW):

Tensile Strength (psi)	112,000 (771 MPa)
Yield Strength (psi)	102,000 (703 MPa)
Elongation % in 2"	22%

Typical Charpy V-notch impact values (AW):

Avg. at -60°F (-51°C)	54 ft-lbs (74 Joules)
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Available diameter and recommended operating ranges:

3/32"	(2.4 mm)	75-115 amps
1/8"	(3.2 mm)	90-160 amps
5/32"	(4.0 mm)	130-220 amps
3/16"	(4.8 mm)	200-300 amps
1/4"	(6.4 mm)	300-400 amps

Type of current: DCEP or AC

Approvals and conformance:

- AWS A5.5, E11018-M H4R
- ASME SFA 5.5, F-4, A-10, E11018-M
- ABS E11018M
- MIL-E-222001, (1/8)

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Stick **HOBALLOY® 12018M / HOBART®**

AWS E12018-M H4R

Hoballoy 12018M is designed for welding high tensile steels requiring weld joints with tensile strengths of at least 120,000 psi. It offers a wide variety of welding advantages that include: good arc characteristics, ductility, crack-resistance, easy slag removal, and low spatter and smoke. Hoballoy 12018M also works extremely well under conditions of high heat and humidity because its special coating is designed to reduce moisture pick-up, which also helps to keep hydrogen cracking and starting porosity to a minimum.

Typical applications:

- low alloy steels
- forgings
- castings
- plate and pressure vessels

Typical weld metal properties (Chem Pad):

C	Mn	Si	P	S	Ni	Mo	Cr	V
.04	1.70	.39	.01	.009	1.81	.37	.63	<.01

Typical mechanical properties (AW):

Tensile Strength (psi)	134,000 (926 MPa)
Yield Strength (psi)	120,000 (825 MPa)
Elongation % in 2"	18%

Typical Charpy V-notch impact values (AW):

Avg. at -60°F (-51°C)	36 ft-lbs (49 Joules)
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Available diameter and recommended operating ranges:

1/8"	(3.2 mm)	90-160 amps
5/32"	(4.0 mm)	130-220 amps
3/16"	(4.8 mm)	200-300 amps
1/4"	(6.4 mm)	300-400 amps

Type of current: DCEP or AC

Approvals and conformance:

- AWS A5.5, E12018-M H4R
- ASME SFA 5.5, F-4, A-12, E12018-M H4R
- ABS E12018M





B

Description

- B2** 1.25% Chrome - .5% Molybdenum for high temperature service.
- B3** 2.25% Chrome - 1.0% Molybdenum for high temperature service applications
- B6** 4-6% Chrome - .50% Molybdenum for high temperature service applications
- B8** 8-10.50% Chrome - 1.0% Molybdenum for high temperature service applications
- B9** 8-10.50% Chrome - 1.0% Molybdenum for high temperature service applications

Typical Applications

- B2** Used for welding P11 Chrome-Moly pipe.
- B3** Typically used for welding P21 and P22 Chrome-Moly pipe
- B6** Used for welding 5% Chrome .50 Moly pipe and steels.
- B8** Used for welding P91 and P92 Chrome-Moly pipe.
- B9** Used for welding P91 and P92 Chrome-Moly pipe.



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HOBALLOY® 8018B2 / HOBART®

AWS E8018-B2 H4R

Hoballoy 8018B2 is an outstanding electrode for welding higher strength steels requiring tensile strengths of 80,000 lbs. or more. Ideal for welding in conditions of high heat or humidity, it features a specially formulated coating that's designed to reduce moisture pick-up and thus help keep hydrogen cracking and starting porosity to a minimum.

Typical applications:

- fabrication and maintenance of boilers and associated piping
- steels such as 1-1/4 Cr-1/2 Mo and 1/2 Cr-1/2 Mo

Typical weld metal properties (Chem Pad):

C	Mn	Si	P	S	Cr	Mo
.07	.73	.61	.010	.010	1.33	.55

Typical mechanical properties (stress relieve 1 hour @ 1275°F):

Tensile Strength (psi)	103,000 (710 MPa)
Yield Strength (psi)	90,000 (621 MPa)
Elongation % in 2"	25%

Typical Charpy V-notch impact values

Not required

Available diameter and recommended operating ranges:

3/32"	(2.4 mm)	70-110 amps
1/8"	(3.2 mm)	90-160 amps
5/32"	(4.0 mm)	130-220 amps
3/16"	(4.8 mm)	200-300 amps

Type of current: DCEP or AC

Approvals and conformances:

- AWS A5.5, E8018-B2 H4R
- ASME SFA 5.5, F-4, A-3, E8018-B2
- ABS E8018-B2



Stick **HOBALLOY® 8018B2L / HOBART®**

AWS E8018-B2L H4R/E7018-B2L H4R
Hoballoy 8018B2L is an outstanding electrode for welding higher strength steels requiring tensile strengths of 80,000 lbs. or more. Low carbon levels reduce the possibility of cracking in the weldment. It offers good arc characteristics and excellent notch toughness. Plus, Hoballoy 8018B2L features a specially formulated coating that reduces moisture pick-up, making it ideal for welding in conditions of high heat and humidity and helps to minimize hydrogen cracking and starting porosity.

- Typical applications:**
- fabrication and maintenance of boilers and associated piping
 - steels such as 1-1/4 Cr-1/2 Mo and 1/2 Cr-1/2 Mo

Typical weld metal properties (Chem Pad):

C	Mn	Si	P	S	Cr	Mo
.03	.58	.53	.012	.010	1.35	.59

Typical mechanical properties (stress relieve 1 hour @ 1275°F):
Tensile Strength (psi) 90,000 (624 MPa)
Yield Strength (psi) 76,000 (521 MPa)
Elongation % in 2" 24%

Typical Charpy V-notch impact values
Not required

Available diameter and recommended operating ranges:

3/32"	(2.4 mm)	70-110 amps
1/8"	(3.2 mm)	90-160 amps
5/32"	(4.0 mm)	130-220 amps
3/16"	(4.8 mm)	200-300 amps
1/4"	(6.4 mm)	300-400 amps

Type of current: DCEP or AC

Approvals and conformance:

- AWS A5.5-81, E8018-B2L H4R
- AWS A5.5, E7018-B2L H4R
- ASME SFA 5.5, F-4, A-3, E8018-B2L
- ABS E8018-B2L

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Stick **HOBALLOY® 9018B3 / HOBART®**

AWS E9018-B3 H4R
Hobart's Hoballoy 9018B3 is an outstanding electrode that's designed for welding higher strength steel applications. It offers better corrosion resistance than carbon electrodes and features a special coating that's formulated to reduce moisture pick-up, helping to minimize hydrogen cracking and starting porosity.

- Typical applications:**
- chrome-moly pipes
 - castings
 - forgings
 - boiler work

Typical weld metal properties (Chem Pad):

C	Mn	Si	P	S	Cr	Mo
.10	.69	.50	.01	.01	2.35	1.06

Typical mechanical properties (stress relieve 1 hour @ 1275°F):
Tensile Strength (psi) 125,000 (865 MPa)
Yield Strength (psi) 111,000 (765 MPa)
Elongation % in 2" 18%

Typical Charpy V-notch impact values
Not required

Available diameter and recommended operating ranges:

3/32"	(2.4 mm)	70-110 amps
1/8"	(3.2 mm)	90-160 amps
5/32"	(4.0 mm)	130-220 amps
3/16"	(4.8 mm)	200-300 amps

Type of current: DCEP or AC

Approvals and conformance:

- AWS A5.5, E9018-B3 H4R
- ASME SFA 5.5, F-4, A-4, E9018-B3 H4R
- ABS E9018-B3

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Stick **HOBALLOY® 9018B3L / HOBART®**

AWS E9018-B3L H4R/E8018-B3L H4R
Hoballoy 9018B3L is an outstanding electrode for welding higher-strength piping where cracking is a problem. It features a coating that's specially formulated to reduce moisture pick-up, which makes it ideal for conditions of high heat and humidity and for minimizing hydrogen cracking and starting porosity.

- Typical applications:**
- chrome-moly pipes
 - boiler work

Typical weld metal properties (Chem Pad):

C	Mn	Si	P	S	Cr	Mo
.04	.65	.48	.01	.01	2.33	1.10

Typical mechanical properties (stress relieve 1 hour @ 1275°F):
Tensile Strength (psi) 104,000 (719 MPa)
Yield Strength (psi) 89,000 (616 MPa)
Elongation % in 2" 20%

Typical Charpy V-notch impact values
Not required

Available diameter and recommended operating ranges:

3/32"	(2.4 mm)	70-110 amps
1/8"	(3.2 mm)	90-160 amps
5/32"	(4.0 mm)	130-220 amps
3/16"	(4.8 mm)	200-300 amps

Type of current: DCEP or AC

Approvals and conformance:

- AWS A5.5-81, E9018-B3L H4R
- AWS A5.5-96, E8018-B3L H4R
- ASME SFA 5.5, F-4, A-4, E9018-B3L
- ABS E9018-B3L

HOBALLOY® 8018B6 / HOBART®

AWS E8018-B6 H4R

The Hoballoy 8018B6 is the right choice for 5% Cr, 1/2% Mo steels and other chromium-molybdenum steels in severe service conditions. Its special coating reduces moisture pick-up, minimizing hydrogen cracking and starting porosity. Plus, it offers excellent arc characteristics for a stable, easy-to-control arc and its quick slag removal means faster clean-up time.

Typical applications:

- petrochemical and petroleum industries
- tubes and tube sheets
- plate steels
- high pressure hydrogen service

Typical weld metal properties (Chem Pad):

C	Mn	P	S	Si	Cr	Ni	Mo
.06	.60	.01	.01	.23	4.60	.10	.46

Typical mechanical properties (stress relieve 1 hour @ 1375°F):

Tensile Strength (psi) 89,000 (614 MPa)
Yield Strength (psi) 73,000 (505 MPa)
Elongation % in 2" 23%

Typical Charpy V-notch impact values

Not required

Available diameter and recommended operating ranges:

3/32"	(2.4 mm)	70-110 amps
1/8"	(3.2 mm)	90-160 amps
5/32"	(4.0 mm)	130-210 amps
3/16"	(4.8 mm)	200-290 amps

Type of current: DCEP

Approvals and conformance:

- AWS A5.5, E8018-B6 H4R
- ABS E8018-B6
- ASME SFA 5.5 F-4, A-4

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HOBALLOY® 8018B8 / HOBART®

AWS E8018-B8 H4R

Whenever you face severe service conditions, the Hoballoy 8018B8 is the perfect electrode choice. Designed for joining creep-resistant, high chromium (9% Cr) alloys of similar composition, its iron powder low-hydrogen coating reduces moisture pick-up and helps to minimize hydrogen cracking and starting porosity. It also offers a stable, easy-to-control arc and improved bead appearance.

Typical applications

- Petrochemical and petroleum industries
- Tubes, tube sheets and plate steels for high pressure hydrogen service
- 9% Cr and 1% Mo steels

Typical weld metal properties (Chem Pad):

C	Mn	P	S	Si	Cr	Ni	Mo
.05	.74	.02	.008	.31	8.97	.09	.94

Typical mechanical properties (stress relieve 1 hour @ 1375°F):

Tensile Strength (psi) 100,000 (689 MPa)
Yield Strength (psi) 79,000 (547 MPa)
Elongation % in 2" 23%

Typical Charpy V-notch impact values

Not required

Available diameter and recommended operating ranges:

3/32"	(2.4 mm)	70-110 amps
1/8"	(3.2 mm)	90-160 amps
5/32"	(4.0 mm)	130-210 amps

Type of current: DCEP

Approvals and conformance:

- AWS A5.5, E8018-B8 H4R
- ABS E8018-B8
- ASME SFA 5.5 F-4, A-5

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HOBALLOY® 9015B9 / HOBART®

AWS E9015-B9 H4R

The improved creep resistance of the Hoballoy 9015B9 makes it an outstanding electrode for power generation and high temperature service applications. It features low moisture reabsorption that prevents starting porosity and offers resistance to hydrogen-induced cracking. Plus, it's quick and easy slag removal makes clean-up faster than ever.

Typical applications:

- petrochemical and petroleum industries
- high temperature service applications
- tubes, tube sheets
- pipe and plate steels
- 9% Cr - 1% Mo-V steels

Typical weld metal properties (Chem Pad):

C	Mn	P	S	Si	Cu	Cr	V	Ni	Mo	Al	Nb	N
.09	.41	.01	.01	.20	.14	8.50	.18	.57	.91	.01	.03	.04

Typical mechanical properties (stress relieve 1 hour @ 1375°F):

Tensile Strength (psi) 105,000 (724 MPa)
Yield Strength (psi) 90,000 (620 MPa)
Elongation % in 2" 21%

Typical Charpy V-notch impact values

Not required

Available diameter and recommended operating ranges:

3/32"	(2.4 mm)	70-100 amps
1/8"	(3.2 mm)	90-140 amps
5/32"	(4.0 mm)	120-210 amps
3/16"	(4.8 mm)	200-300 amps

Approvals and conformance:

- AWS A5.5, E9015-B9 H4R
- ASME SFA5.5, F-4, A-5





TM-81B2 / TRI-MARK®

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

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TM-811B2 / TRI-MARK®

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 cfm

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:	96,000 psi**	110,600 psi**
Yield Strength:	84,000 psi	99,600 psi
Elongation:	23%	19%
CVN:	not required	not required

* Determined with 100% CO₂ shielding gas.

** Stress relieved 1 hr. @ 1275°F.

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METALLOY 80B2 / TRI-MARK®

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.

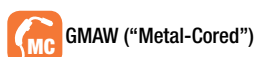
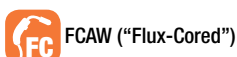
Undiluted Weld Metal Chemistry:

	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.





TM-91B3 / TRI-MARK®

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

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TM-911B3 / TRI-MARK®

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:	100,000 psi	109,000 psi*
Yield Strength:	86,000 psi	86,000 psi
Elongation:	20%	18 %
CVN:	not required	not required

* Stress relieved 1 hr. @ 1275°F.

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TM-95B3 / TRI-MARK®

TM-95B3 has been designed to match the chemistry for 2-1/4% chromium – 1% molybdenum steels. The wire uses a basic slag which greatly improves mechanical properties. This is proven by providing an impact property of 45 ft-lbs at -20°F for a chrome-moly product! In addition, the weld produces low hydrogen weld deposits (<4ml/100g). TM-95B3 is recommended for the welding of 2-1/4% chromium – 1% molybdenum steel specifically ASTM A387, Grade 21 and 22, which are typically used in applications where creep resistance is required at elevated temperatures. TM-95B3 is designed to provide temper embrittlement resistance by providing an X-bar factor less than 15. The wire is recommended for single or multiple pass

welding at a flat or horizontal position with a 75-80% Ar/bal CO₂ shielding gas.

Specifications:

E90T5M-B3 H4 per AWS A5.29, ASME SFA 5.29, T5-B3M (E90T5-B3M)

Shielding Gas:

75-80% Ar/bal CO₂, 35-50 cfh

Welding Positions:

Flat and horizontal

Standard Diameters:

1/16"

Characteristics:

- Excellent low temperature toughness and stress-relieved impact toughness
- Low hydrogen weld metal – H4.
- Excellent for welding 2.25 Cr – 1.0 Mo steels.
- X-bar value less than 15

Undiluted Weld Metal Chemistry:

C	Mn	Si	P	S	Mo	Ni	Cr	Sn	Sb	As
.08	1.09	.28	.007	.010	.91	.38	2.30	.01	<.0010	<.0003

Mechanical Properties:

Tensile Strength	98,100 psi (675 MPa)
Yield Strength	82,300 psi (566 MPa)
Elongation	21.0%
CVN @ -23°F (-30.6°C)	50.4 ft-lbs (68.3 Joules)



FC **TM-B6 / TRI-MARK®**

TM-B6 is designed for welding 5% Chromium – .50% Molybdenum steels which are used in high temperature and pressure applications in the power generation and petroleum industries. The chemistry allows for matching of the base materials to keep the properties even after pre-weld and post-weld heat treat cycles. Designed for 75% Argon – 25% CO₂ shielding gas, this all position gas shielded flux cored wire offers low spatter with X-Ray quality welds.

Specifications:

E81T1-B6C per AWS A5.29, ASME SFA 5.29

Shielding Gas:

100% CO₂, 35-50 C.F.H.

Welding Positions:

All positions

Standard Diameters:

.045"

Characteristics:

- Fast freezing slag for out-of-position welding.
- Low spatter level.
- X-ray quality weld.

Undiluted Weld Metal Chemistry:

C	Mn	Si	P	S	Cr	Ni	Mo
.05	.29	.36	.007	.011	4.45	.05	.48

Mechanical Properties:

Tensile Strength	94,000 psi (868 MPa)
Yield Strength	80,000 psi (772 MPa)
Elongation	19.0%

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FC **TM-B9 / TRI-MARK®**

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.

Undiluted Weld Metal Chemistry:

	C	Mn	Si	P	S	Cr	Ni	Mo	Nb	V	N
75% Ar/25% CO ₂	.12	.06	.15	.013	.008	9.0	.7	1.0	.03	.21	.04

Specifications:

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

Shielding Gas:

75% Ar/25% CO₂, 35-50 C.F.H.

Welding Positions:

All positions

Standard Diameters:

.045"

Characteristics:

- Fast freezing slag for out-of-position welding.
- Low spatter level.
- X-ray quality weld.

Mechanical Properties:

Tensile Strength	126,000 psi (868 MPa)
Yield Strength	112,000 psi (772 MPa)
Elongation	15%
CVN@+71°F	22 ft-lbs (29.8 Joules)

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C1 / C2 / C3

Description

- C1** Addition of 2 - 2.75% Nickel to improve impact notch toughness.
- C2** Addition of 3 - 3.75% Nickel to improve impact notch toughness.
- C3** Addition of .8 - 1.10% Nickel to improve impact notch toughness.

Typical Applications

- C1** Shipbuilding, Piping, Storage Tanks.
- C2** Shipbuilding, Piping, Storage Tanks, Abrasion Resistant Plate, A514(T1) steels.
- C3** 80,000 psi tensile strength steels, Abrasion Resistant Plate, A514(T1) steels.



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HOBALLOY® 8018C1 / HOBART®

AWS E8018-C1 H4

Hoballoy 8018C1 is a high-quality electrode that's designed for applications of 2% nickel deposits and the welding of nickel-bearing steels for low temperature applications where toughness of the weld metal is important. It provides good puddle control, excellent wetting action and tie-in and offers good arc characteristics as well as excellent notch toughness (65 ft.-lbs. at -75°F) and easy slag removal. Hoballoy 8018C1 is also great for welding in conditions of high heat or humidity as it features a specially-formulated coating that's designed to minimize hydrogen cracking and starting porosity.

Typical applications:

- shipbuilding
- piping
- tanks used in the storage of gases

Typical weld metal properties (Chem Pad):

C	Mn	Si	P	S	Ni
.04	1.01	.26	.01	.01	2.57

Typical mechanical properties (stress relieve 1 hour @ 1150°F):

Tensile Strength (psi)	95,000 (656 MPa)
Yield Strength (psi)	84,000 (581 MPa)
Elongation % in 2"	27%

Typical Charpy V-notch impact values (SR):

Avg. at -75°F (-59°C)	76 ft.-lbs (103 Joules)
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Available diameter and recommended operating ranges:

3/32"	(2.4 mm)	70-110 amps
1/8"	(3.2 mm)	90-160 amps
5/32"	(4.0 mm)	130-220 amps
3/16"	(4.8 mm)	200-300 amps

Type of current: DCEP or AC

Approvals and conformances:

- AWS A5.5, E8018-C1 H4
- ASME SFA 5.5, F-4, A-10, E8018-C1 H4
- ABS E8018-C1



Stick **HOBALLOY® 8018C2 / HOBART®**

AWS E8018-C2 H4

Hoballoy 8018C2 is an outstanding electrode for low temperature applications requiring tensile strengths greater than 80,000 psi and for welding 2% to 4% nickel steels. It features a special formulated coating designed to minimize hydrogen cracking and starting porosity.

Typical applications:

- shipbuilding
- piping and gas storage tanks
- AR and T-1 steel welding

Typical Weld metal properties (Chem Pad):

C	Mn	P	S	Si	Ni
.04	.90	.02	.01	.36	3.44

Typical mechanical properties

(stress relieve 1 hour @ 1150°F):

Tensile Strength (psi) 100,000 (693 MPa)
 Yield Strength (psi) 86,000 (591 MPa)
 Elongation % in 2" 23%

Typical Charpy V-notch impact values (SR):

Avg. at -100°F (-73°C) 48 ft-lbs (66 Joules)

Available diameter and

recommended operating ranges:

3/32"	(2.4 mm)	70-110 amps
1/8"	(3.2 mm)	90-160 amps
5/32"	(4.0 mm)	130-220 amps
1/4"	(6.4 mm)	300-400 amps

Type of current: DCEP

Approvals and conformance:

- AWS A5.5, E8018-C2 H4
- ASME SFA5.5, F-4, A-10, E8018-C2 H4
- ABS E8018-C2

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Stick **HOBALLOY® 8018C3 / HOBART®**

AWS E8018-C3 H4

Hoballoy 8018C3 electrodes are designed for high tensile steels requiring 1% nickel weld deposits.

Typical applications:

- commercial using 80,000 tensile steels
- military using 80,000 tensile steels
- welding of AR and T-1 steels

Typical weld metal properties (Chem Pad):

C	Mn	Si	P	S	Ni	Cr	Mo	V
.02	.84	.16	.01	.01	.84	.01	.09	.01

Typical mechanical properties (AW):

Tensile Strength (psi) 80,000 (554 MPa)
 Yield Strength (psi) 68,000 (470 MPa)
 Elongation % in 2" 27%

Typical Charpy V-notch impact values (AW):

Avg. at -40°F (-40°C) 128 ft-lbs (174 Joules)

Available diameter and

recommended operating ranges:

3/32"	(2.4 mm)	70-110 amps
1/8"	(3.2 mm)	90-160 amps
5/32"	(4.0 mm)	130-220 amps
3/16"	(4.8 mm)	200-300 amps

Type of current: DCEP or AC

Approvals and conformance:

- AWS A5.5, E8018-C3 H4
- ASME SFA 5.5, F-4, A-10, E8018-C3 H4
- MIL-E-22200/1 (1/8, 5/32)
- ABS E8018-C3

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Description

Ni1 1% Nickel alloyed to increase strength and improved impact notch toughness. Can also be used to weld weathering steels but will not immediately color match.

Ni2 Addition of 2% Nickel to improve impact notch toughness.

Typical Applications

Ni1 Heavy equipment, Earthmoving, Petro-chemical, Weathering Steels.

Ni2 Heavy equipment, Earthmoving, Shipbuilding, Offshore Oil Rigs, HSLA Steels.



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TM-81N1 / TRI-MARK®

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 cfm

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:	91,000 psi	98,700 psi
Yield Strength:	76,000 psi	83,500 psi
Elongation:	25%	24%
CVN @ -20°F:	52 ft-lbs	46 ft-lbs



FC **TM-811N1 / TRI-MARK®**

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% CO₂E81T1-Ni1 H8,
90% Ar/10% CO₂E81T-Ni1M H8

Shielding Gas:
100% CO₂, 75% Ar/25% CO₂, 35-50 cfm

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	89,000 psi
Yield Strength:	75,000 psi	78,000 psi
Elongation:	28%	23%
CVN @ -40°F:	38 ft-lbs	54 ft-lbs

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FC **Formula XL-8Ni1 / HOBART®**

Formula XL-8Ni1 is an all-position tubular wire that is designed for welding medium carbon and low alloy steels. Specifically formulated to produce a high-quality, X-ray clear weld deposit that is flat to slightly convex in contour. Formula XL-8Ni1 provides you with good wet-in capabilities along with high impact values at low temperatures, and it allows you to weld over rust, mill scale and some primers without the need for pre-cleaning. Plus, with low spatter levels and easy slag removal, clean-up is kept to a minimum.

Specifications:
E81T1-Ni1MJ H8 per AWS A5.29, ASME SFA 5.29, E81T1-Ni1 MJ H8 75% Ar/25% CO₂ 3SA, 3YSA H10

Shielding Gas:
75% Ar/25% CO₂

Welding Positions:
All positions

Standard Diameter:
.045", 1/16"

Typical Weld Metal Properties*(Chem Pad):

	C	Mn	Si	P	S	Ni
100% CO ₂	.08	1.35	.40	.014	.011	1.06

Characteristics:

- 1% nickel weld deposit
- Excellent impact properties
- Can be used with 75-80%Ar/bal CO₂ shielding gas

Typical Mechanical Properties* (Aged 48 Hrs @ 220°F):

Tensile Strength	96,300 psi (664 MPa)
Yield Strength	86,500 psi (597 MPa)
Elongation % in 2"	24.5%

Typical Charpy V-Notch Impact Values*(Aw):

Avg. at -20°F (-29°C)	93.3 ft-lbs
Avg. at -40°F (-40°C)	85.3 ft-lbs
Avg. at -60°F (-51°C)	63.3 ft-lb

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FC **TM-811N2 / TRI-MARK®**

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:	85,000 psi	99,000 psi
Yield Strength:	72,000 psi	90,000 psi
Elongation:	25%	20%
CVN @ -40°F:	23 ft-lbs	27 ft-lbs



TM-911N2 / TRI-MARK®

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.

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METALLOY 80N1/

TRI-MARK®

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:	90,000 psi	85,900 psi
Yield Strength:	77,600 psi	74,000 psi
Elongation:	26%	25%
CVN @ -50°F:	46 ft-lbs	56 ft-lbs

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METALLOY

VANTAGE™ Ni1 / TRI-MARK®

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 (65 Joules)	—
CVN @ -50°F (-46°C):	44 ft-lbs (60 Joules)	49 ft-lbs





TM-105D2 / TRI-MARK®

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	Mo
100% CO ₂	.11	2.00	.55	.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

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METALLOY 80D2 / TRI-MARK®

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:	105,000 psi	106,000 psi
Yield Strength:	97,000 psi	98,400 psi
Elongation:	20%	22.5%
CVN @ -20°F:	48 ft-lbs	52 ft-lbs

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METALLOY VANTAGE™ D2 / TRI-MARK®

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 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:

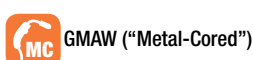
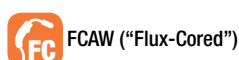
- Weld toe lines are almost completely free of silicon deposits.
- Exceptionally clean weld beads with minimal silicon islands.
- Higher deposition rates and travel speeds compared to solid wire.
- Better wetting compared to solid wire.
- Single or multiple pass welding.

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 (68 Joules)	45 ft-lbs (61 Joules)



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Description

Addition of .5% copper to weld weathering steels and where rapid color matching is required.

Typical Applications

Weathering Steels such as ASTM A242, A588, and A709 Gr. 50.



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TM-811W / TRI-MARK®

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:

E81TI-W2C H8 per AWS A5.29, ASME SFA 5.29

Shielding Gas:

100% CO₂, 35-50 cfm

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.



COMPARATIVE INDEX OF LOW ALLOY ELECTRODES			
AWS Class	HOBART	ESAB	LINCOLN
E7018-A1	Hoballoy 7018A1	Atom Arc 7018-Mo	Excalibur 7018-A1 MR
E8018-B2	Hoballoy 8018-B2	Atom Arc 8018-CM	
E7018-B2L/E8018-B2L	Hoballoy 8018-B2L	Atom Arc 7018-B2L	
E8018-B6	Hoballoy 8018B6	Atom Arc 8018-B6	
E8018-B8	Hoballoy 8018B8	Atom Arc 8018-B8	
E8018-C1	Hoballoy 8018C1	Atom Arc 8018-C1	Excalibur 8018-C1 MR
E8018-C2	Hoballoy 8018C2	Atom Arc 8018-N	
E8018-C3	Hoballoy 8018C3	Atom Arc 8018	Excalibur 8018-C3 MR
E9015-B9	Hoballoy 9015B9	Atom Arc 9015-B9	
E9018-B3	Hoballoy 9018B3	Atom Arc 9018-CM	
E8018-B3L/E9018-B3L	Hoballoy 9018B3L	Atom Arc 8018-B3L	
E9018M	Hoballoy 9018M	Atom Arc 9018	Excalibur 9018M MR
E10018-D2	Hoballoy 10018D2	Atom Arc 10018-MM	
E10018M	Hoballoy 10018M	Atom Arc 10018	
E11018M	Hoballoy 11018M	Atom Arc T	Excalibur 11018M MR
E12018M	Hoballoy 12018M	Atom Arc 12018	

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APPROVALS, SPECIFICATIONS, CLASSIFICATIONS				
All filler metals listed conform to the specifications listed in each section. Because some agencies do not specifically approve particular types, please be careful to note whether or not the heading for each section indicates specific approval.				
Product	AWS/ASME	ABS	Lloyd's	CWB
HOBALLOY 7018A1	E7018-A1	E7018-A1	-	-
HOBALLOY 8018B2	E8018-B2	E8018-B2	-	-
HOBALLOY 8018B2L	E8018-B2L	E8018-B2L	-	-
HOBALLOY 8018B6	E8018-B6	E8018-B6	-	-
HOBALLOY 8018B8	E8018-B8	E8018-B8	-	-
HOBALLOY 8018C1	E8018-C1	E8018-C1	-	-
HOBALLOY 8018C2	E8018-C2	E8018-C2	-	-
HOBALLOY 8018C3	E8018-C3	E8018-C3	-	-
HOBALLOY 9015B9	E9015-B9	-	-	-
HOBALLOY 9018B3	E9018-B3	E9018-B3	-	-
HOBALLOY 9018B3L	E9018-B3L	E9018-B3L	-	-
HOBALLOY 9018M	E9018-M	E9018-M	-	-
HOBALLOY 10018D2	E10018-D2	E10018-D2	-	-
HOBALLOY 10018M	E10018-M	E10018-M	-	-
HOBALLOY 11018M	E11018-M	E11018-M	-	-
HOBALLOY 12018M	E12018-M	E12018-M	-	-



SMAW ("Stick")



FCAW ("Flux-Cored")



GMAW ("Metal-Cored")



COMPARITIVE INDEX OF FLUX-CORED LOW ALLOW WIRES				
Tri-Mark	AWS Classification	Select Arc	Lincoln	ESAB
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
TM-91B3	E90T1-B3C	Select 91-B3		Dual Shield 98 CM
TM-911B3	E91T1-B3C/M H4	Select 910-B3		Dual Shield 9000 B3
TM-B6	E81T1-B6C	Select 810-B6		Dual Shield B6
TM-B9	E91T1-B9M	Select 810-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
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		
FabCO 81K2-C	E81T1-K2CJ H8	Select 812-K2	Outershield 81K2-H	Dual Shield II 81K2
TM-881K2	E81T1-K2MJ H8 E81T1-K2CJ H8	Select 812-K2	Outershield 81K2-H	Dual Shield II 81K2
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
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	Select 111-K3-M		Dual Shield II 110
FabCO 110K3-M	E111T1-K3MJ H4	Select 111-K3-M		Dual Shield II 110
TM-115	E110T5-K3C H4	Select 115-K3		Dual Shield T-115
TM-125K4	E120T5-K4C H4	Select 125-K4		
TM-811W	E81T1-W2C H8	Select 810-W		Dual Shield 8100W

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PACKAGING OF HOBART/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)	Engaging Hole Off Center in. (m)
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)
60 lb. Coil	1,920 (871.7)	n/a	n/a	4" (.10)	12" (.30)	n/a	n/a	n/a
500 lb. X-PK	2,000 (907.4)	32-1/4" (.82 m) height, 20-3/8" (.52 m) diameter, no core						
750 lb. X-PK	3,000 (1361.1)	35" (.89 m) height, 23-3/8" (.59 m) diameter, no core						



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	P	S	Mo	Cr	Ni	V	Cu	Nb	
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	—	—	—	—	—	—	—	—	—	—	—	—	CO ₂
TM-91B3	E90T1-B3C	A5.29	106.0 ^{††}	93.0	19	—	.06	.64	.25	.010	.013	—	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-B6	E81T1-B6C	A5.29	94.0	80.0	19	—	.05	.29	.36	.007	.011	.48	4.45	.05	—	—	—	CO ₂
TM-B9	E91T1-B9M	A5.29	126.0	112.0	15	—	.12	.06	.15	.013	.008	1.0	9.0	.7	.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 @ -40°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
FabCO 81K2-C	E81T1-K2CJ H8	A5.29	87.0	78.0	27	91 @ -40°F	.07	1.13	.27	.015	.014	—	—	1.67	—	—	—	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
FabCO 110K3-M	E111T1-K3MJ H4	A5.29	128.0	124.0	15	32 @ -20°F	.05	2.04	.26	.007	.014	.37	.12	1.84	—	—	—	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
FabCO 115	E110T5-K4C	A5.29	126.0	102.0	18	48 @ -60°F	.04	1.50	.41	.012	.014	.42	2.37	.42	—	—	—	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.

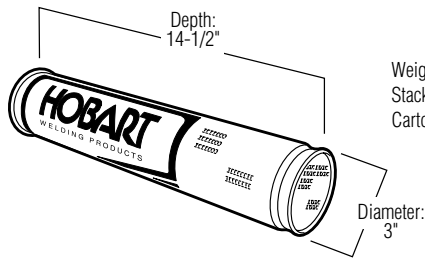
LOW ALLOY LOW ALLOY LOW ALLOY LOW ALLOY LOW ALLOY LOW ALLOY LOW ALLOY

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
3/32"	Flat	450	180	30	350-600	26-37

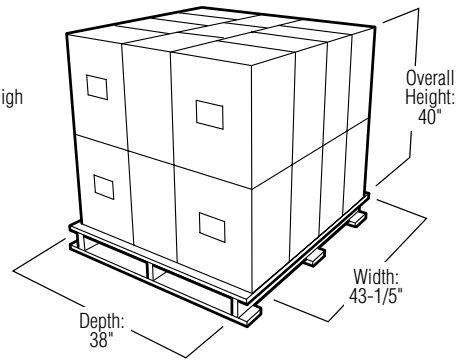
* Drop voltage approximately 1 volt when using argon/CO₂ mixtures.

10 lb. Can

- Hermetically-sealed cans keep electrodes protected and ready to use when opened.
- Easy open pull-tab with plastic lid to protect product after opening

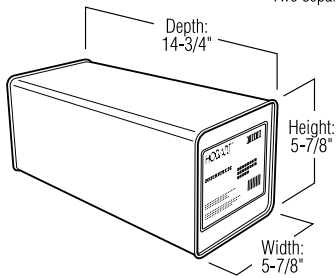


Weight: 1,320 pounds net, 1,465 gross
 Stacking sequence: 3 wide, 4 deep & 2 high
 Cartons per pallet: 24 cans

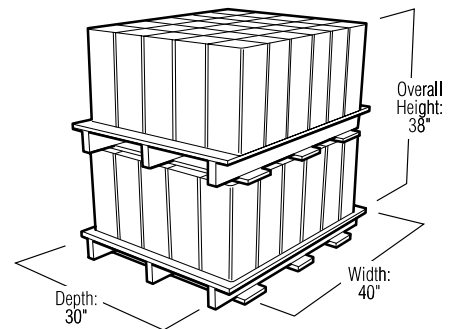


50 lb. Can 14\" length

- Hermetically-sealed cans keep electrodes protected and ready to use when opened
- Pull-tab for safe, trouble-free opening
- Two separate pallets for convenient handling

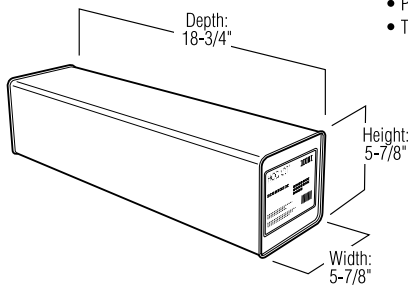


Weight: 3,000 pounds net, 3,150 gross
 Stacking sequence: 5 wide, 6 deep & 2 high
 Cans per pallet: 60 cans

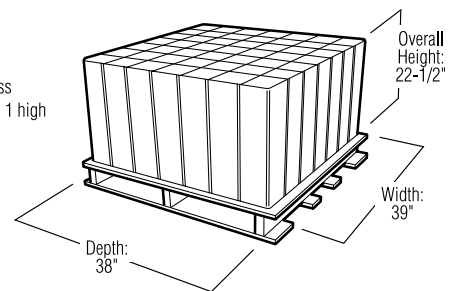


50 lb. Can 18\" length

- Hermetically-sealed cans keep electrodes protected and ready to use when opened
- Pull-tab for safe, trouble-free opening
- Two separate pallets for convenient handling

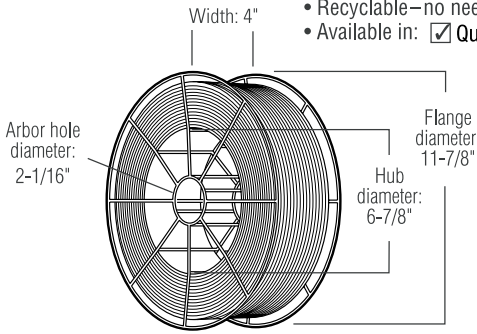


Weight: 2,450 pounds net, 2,540 gross
 Stacking sequence: 7 wide, 7 deep & 1 high
 Cans per pallet: 49 cans

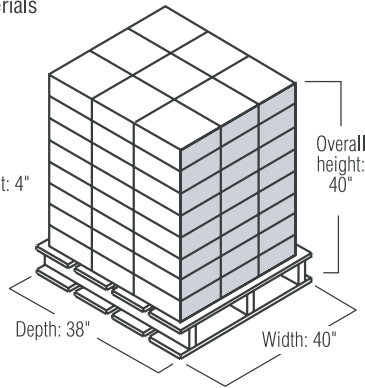
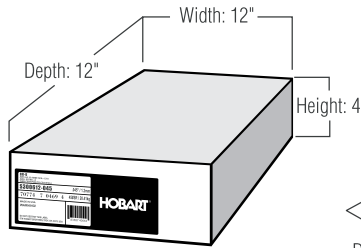


33 lb. & 45 lb. Steel Reels™

- Uses standard spool hub—no special adapters required
- Durable—designed to withstand most kinds of everyday wear and tear
- Recyclable—no need to separate from other steel scrap materials
- Available in: Quantum Arc



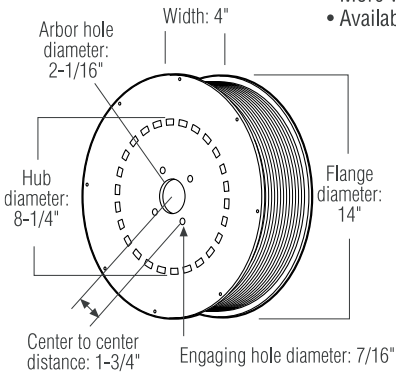
Steel Reel weight (empty): 1.1 lbs.



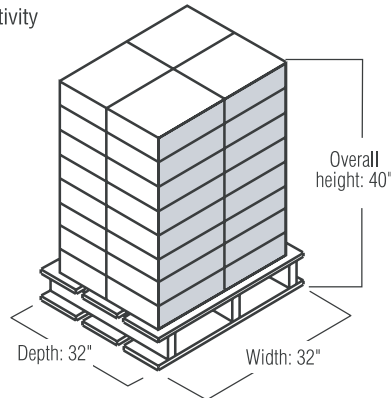
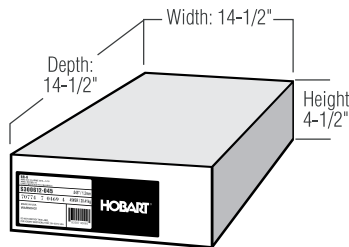
Weight: 33-lb. Steel Reel—2,376 lbs.
45-lb. Steel Reel—3,240 lbs.
Stacking sequence: 3 wide, 3 deep, 8 high
Spoils per pallet: 72

60 lb. Fiber Spool

- Convenient, easy to changeover
- Simplicity reduces changeover time, increases productivity
- More wire on spool means fewer changeovers
- Available in: Quantum Arc QCL



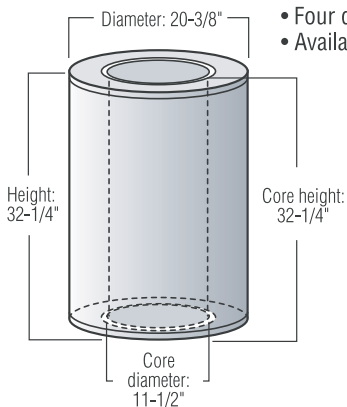
Spool weight (empty): 3 lbs.



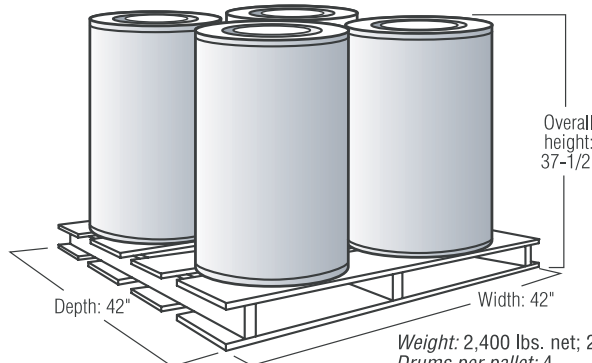
Weight: 1,920 lbs. net; 2,115 lbs., gross (est.)
Stacking sequence: 2 wide, 2 deep, 8 high
Spoils per pallet: 32

600 lb. ROBOPAK®

- Tangle-free feeding, no wire flip
- Compact drum to reduce floor-space requirements
- ROBOPAK 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
- Available in: Quantum Arc QCL



Drum weight (empty): 19 lbs.



Weight: 2,400 lbs. net; 2,519 lbs., gross
Drums per pallet: 4



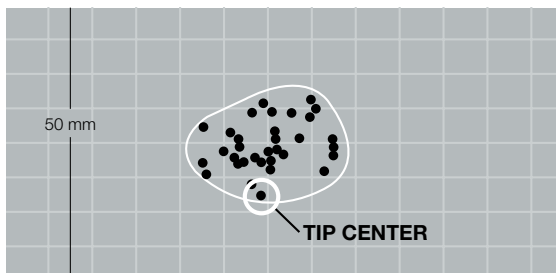
Inside view of wire in X-Pak drum

- 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 = $\pm 15\text{MM}$

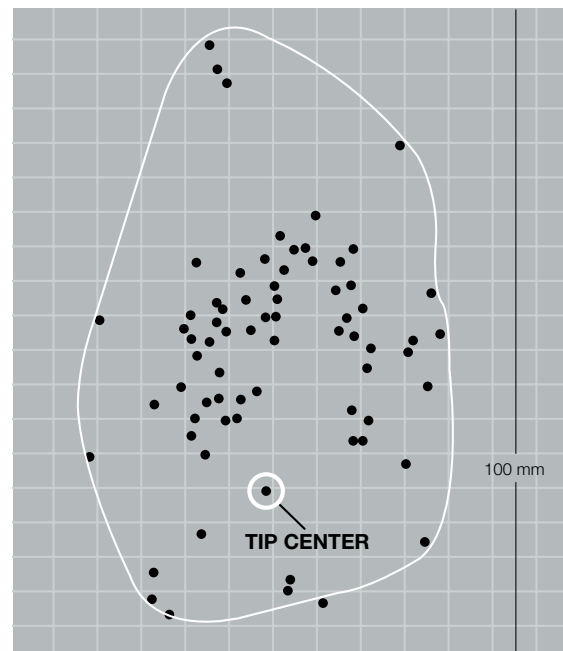


Test Description:

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.

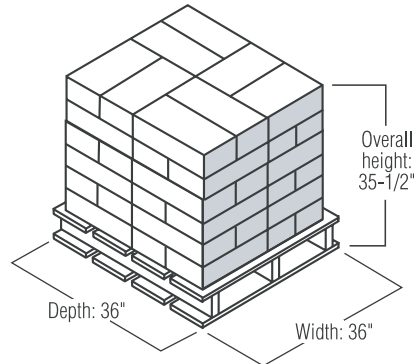
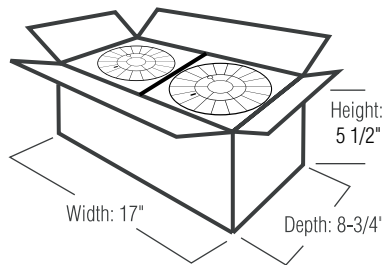
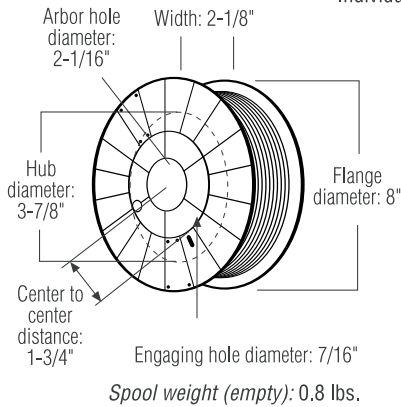
COMPETITIVE DRUMS

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



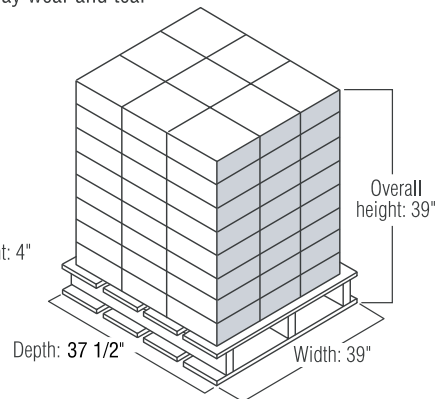
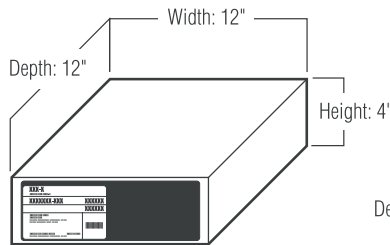
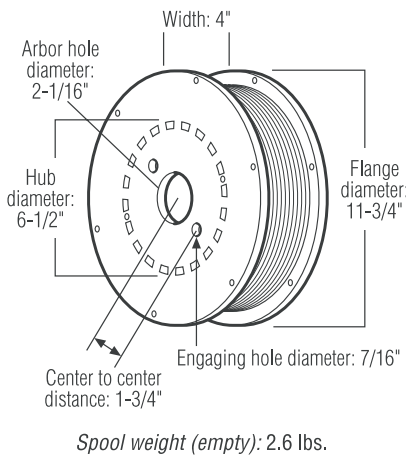
10 lb. Plastic Spool

- 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



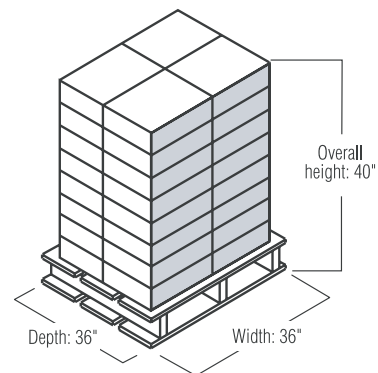
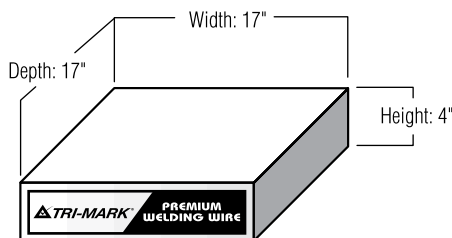
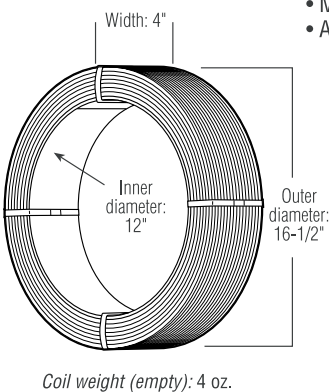
33 lb. Fiber Spool

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



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



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