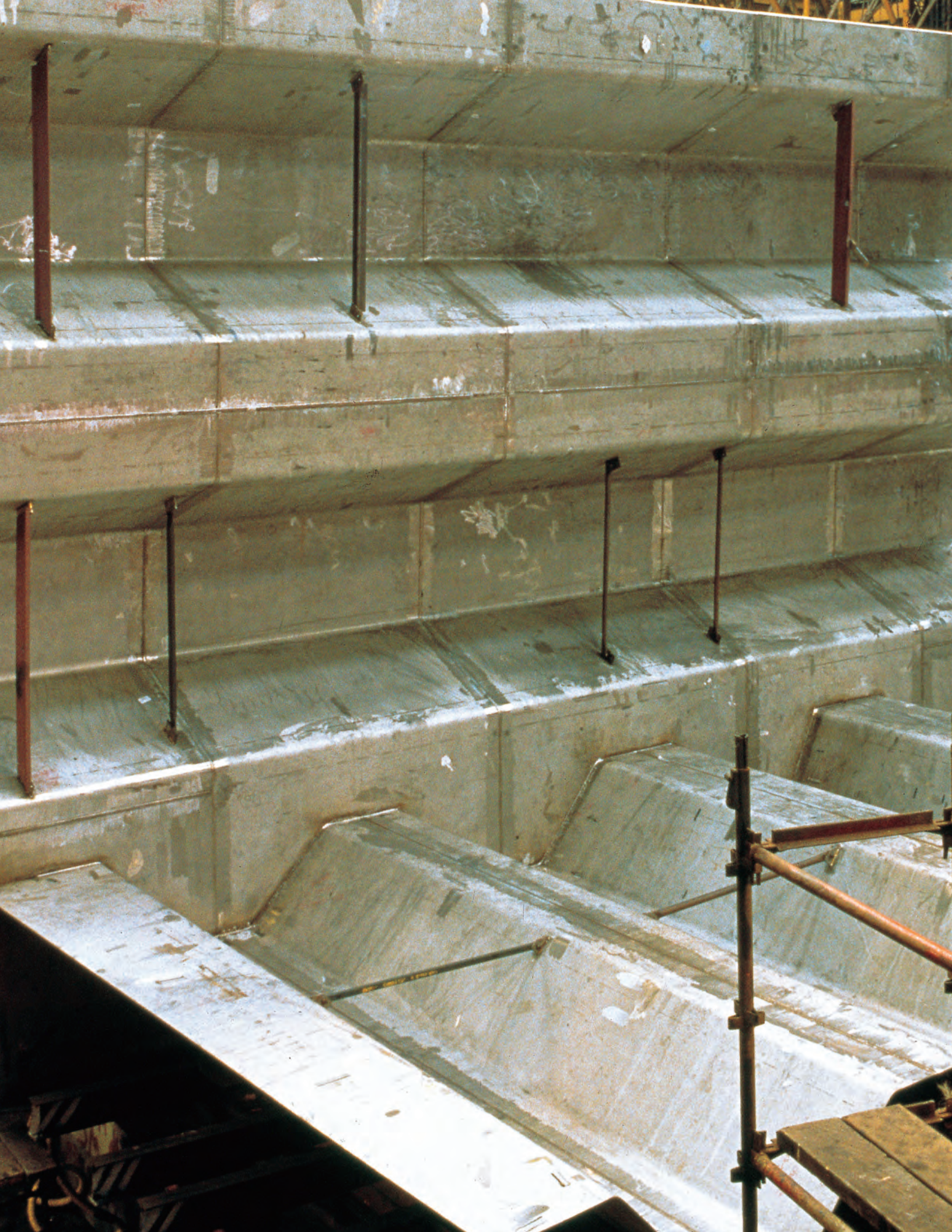
Kobelco Flux Cored Wires

for easy and high efficiency welding in every field

KOBELCO WELDING OF AMERICA INC.



Kobelco Welding of America

Kobelco Welding of America, Inc., (KWAI) was established in Houston, Texas in 1990, as a wholesale company owned by Kobe Steel USA Holdings for marketing Kobelco welding consumables in North America and Latin America.

Since KWAI launched its business, it has worked closely with all its customers through quality services both in sales activities and technical support. Because of its outstanding business attitude, KWAI has earned rapid growth led by its excellent reputation and the distributor's sales network expansion nationwide. Today, more than 300 distributors are stocking Kobelco welding wires, mostly flux-cored wires, supplied from KWAI. In particular, KWAI's stainless steel flux-cored wires have earned the largest market share, 40%, in the North American market.

KWAI will pursue customer satisfaction, through the activities based on the business slogan QTQ (Quality products, Technical support and Quick delivery), targeting a higher market share. KWAI expanded its sales network by opening the Cincinnati Distribution Center (1993), the Salt Lake City Distribution Center (1996), the Chicago Distribution Center (1999), the Philadelphia Distribution Center (2002) and the Birmingham, AL Center (2006).

High efficiency and low costs

Welding efficiency consists of both deposition rate and deposition efficiency. The deposition rate is the amount of weld metal which is deposited on the base metal in a certain time. Higher deposition rates enable faster welding and thus realizes a reduction of the unit labor cost. Flux cored wires (FCW) have much higher deposition rates than covered electrodes (CE) or solid wires (SW) as can be seen in Figures 1 and 2.

Deposition efficiency is the ratio of deposited metal

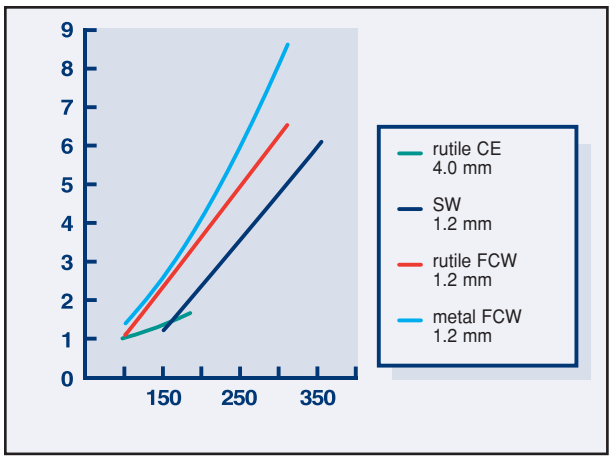


Fig. 1 Deposition rates (kg/h) for different mildsteel consumables at different currents (A)

weight to the weight of filler metal consumed. This results in advantages of the welding process, also the reduction of the amount of wire necessary for welding and the reduction of cleaning work is very beneficial. This proves the economical advantages of Kobelco FCW. In Figure 3 a comparison of welding costs between a flux cored wire (FCW), solid wire (SW) and a covered electrode (CE) are indicated.

When compared to using covered electrodes or standard MIG/MAG solid wires, Kobelco rutile flux cored wires are remarkably much faster, this point being most noticeable in the application for vertical up and overhead welding. This is mainly due to the fact

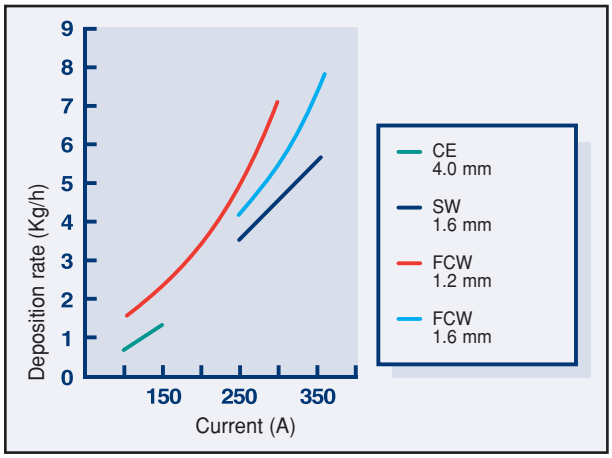


Fig. 2 Deposition rates (kg/h) for different stainless steel consumables at different currents (A)

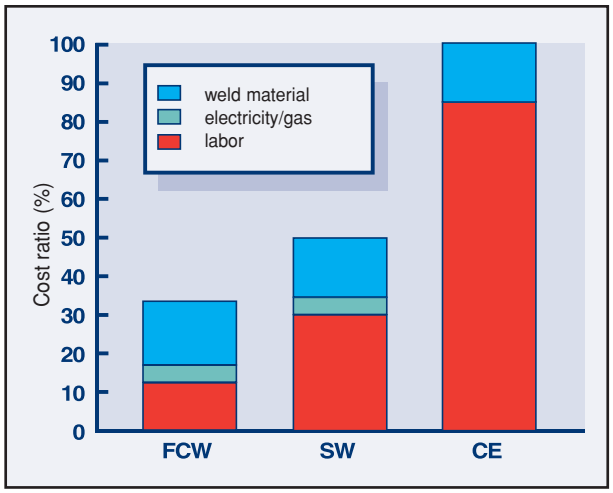


Fig. 3 Welding cost ratios of different types of consumables welding in vertical up position

that spray arc occurs at around 150 Amperes for 1.2mm diameter rutile flux cored wires and higher amperage can be applied in all positions.

As with all Kobelco flux cored wires higher current density (A/mm^2) can be utilized, which gives higher deposition rates, something which cannot be achieved by using solid wires.

Welding with Kobelco Flux Cored Wires*

To obtain high quality welded structures conforming to specifications and the purpose of design, welding work must be carried out in accordance with safe procedures for manufacturing. Before the actual welding starts, the applied shielding gas, parameters and welding method must be determined. Also the welding environment sometimes requires preventative measures.

Shielding gases

A shielding gas is necessary for protecting the molten pool from the adverse effects of nitrogen and oxygen from the surrounding air. The proper gas composition is important for the bead appearance, weldability and the mechanical properties of the weld metal.

Welding parameters

The adjustment of the appropriate welding current and voltage is very important. Welding current and voltage influence the arc stability, bead appearance, undercut, penetration, spatter, etc. A proper welding current depends on type and size of wire and welding position.

**When manufacturing stainless steel flux cored electrodes, most alloying elements are permitted to be added to the core of the wire. When performing Positive Material Identification (PMI) testing, the test must be performed on the all weld deposit. PMI testing on the wire itself will only result in the chemistry of the sheath.*

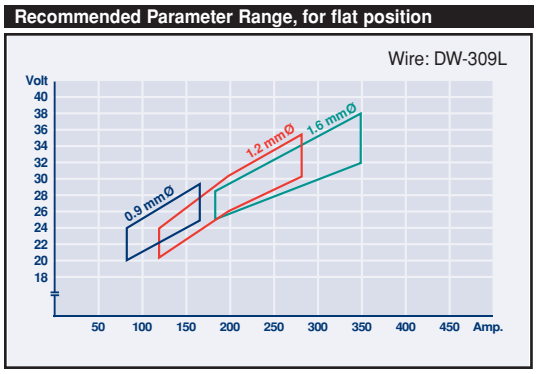


Fig. 4 Applicable range for welding parameters for different diameters

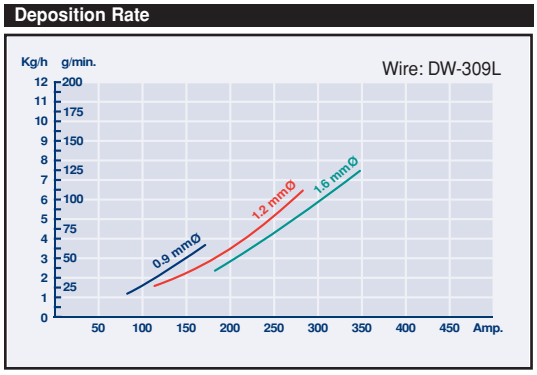


Fig. 5 Deposition rates for different diameters and current

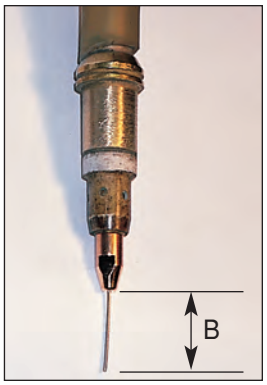


Fig. 6 Electrode extensiont (B)

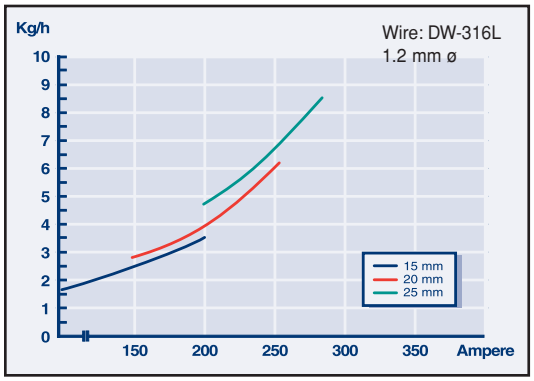


Fig. 7 The effect of electrode extension on deposition rate

Figure 4 shows applicable range for welding parameters. As can be seen in Figure 5, deposition rate is influenced by parameters. During welding the arc voltage must be kept constant. Increased arc voltage can affect the weld soundness. Suitable voltage depends on the type of wire being used.

Wire stick-out and deposition rate

As can be seen in Figure 6, the electrode extension (B) is the distance between the contact tip and the end of the electrode.

Electrode extension influences arc stability, penetration, bead appearance and deposition rates.

Deposition rate can be increased by welding with a longer wire electrode extension. This is achieved by utilizing the effect of current density (A/mm^2) and resistance heating in the wire. The wall thickness of Kobelco FCW is quite thin, thus its cross sectional area is small, resulting in a high current density in the wire. It is this higher current density which results in a faster melting rate for the wire, resulting in a higher deposition rate. Figure 7 clearly shows this effect of electrode extension and deposition rate.

Preheat and interpass temperature

In order to prevent problems, preheating and interpass temperature may have to be controlled. The degree of control will depend on the type of FCW, the type and thickness of base material and the ambient temperature.

Heat input

In order to reach desired impact value levels, the heat input may have to be controlled depending on the type of FCW and the type and thickness of the base material.

Welding speed

Welding speed governs weld penetration, weld bead appearance, sensitivity to porosity and the leg length and throat thickness of the weld.

Welding technique and torch angle

Gas shielded arc welding allows for both forehand and backhand welding. For welding mild steel FCW, forehand welding is mostly preferred during horizontal fillet welding and cap pass welding. Although it offers shallower penetration it achieves flatter weld bead surfaces. Backhand welding is better for welding inside a groove. Beads are more convex but this technique has the benefit of deeper penetration.

For welding stainless FCW, backhand welding brings the best results, with good penetration and a flat bead. As the torch angle becomes too big, forehand welding with stainless FCW is not preferred as it tends to generate spatter.

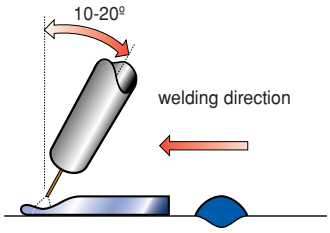


Fig. 8 Forehand welding mild steel FCW

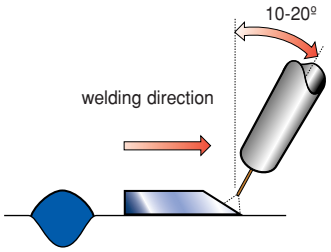
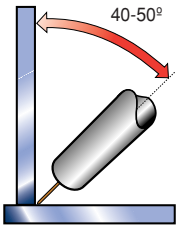
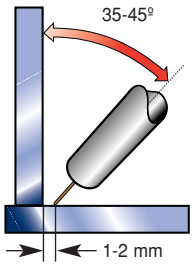


Fig. 9 Backhand welding mild steel FCW

Figures 10-12 show correct torch angles for horizontal fillets with the torch perpendicular to the welding direction. The torch angle is dependent on the kind of pass sequence to be applied. More passes will result in larger throat thickness and leg lengths. The leg length may be controlled by the welding speed or the amperes, voltage and stick-out being applied.

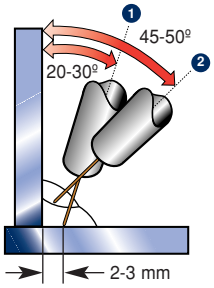


Leg length < 5 mm



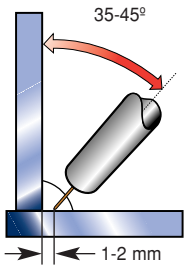
Leg length > 5 mm

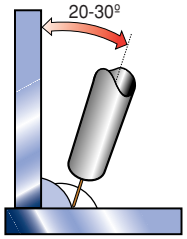
Fig. 10 A single pass fillet weld



2-pass welding with a leg length 8-12 mm

Fig. 11 A two pass fillet weld





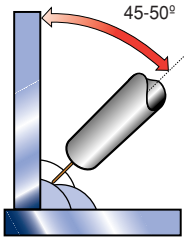


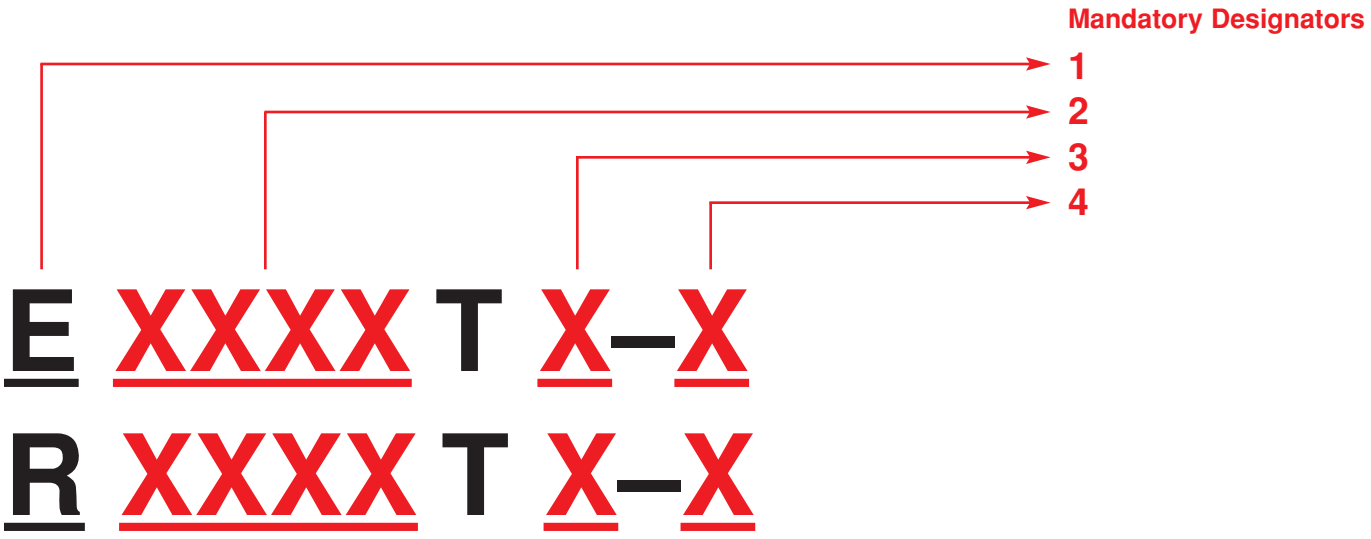
Fig. 12 Multi pass welding of a leg length of 12 mm or more

Protection in welding

When welding, welders should wear suitable protective clothing and eye protection. Ventilation and/or fume extraction must be sufficient so as to keep fume concentrations within safe limits.

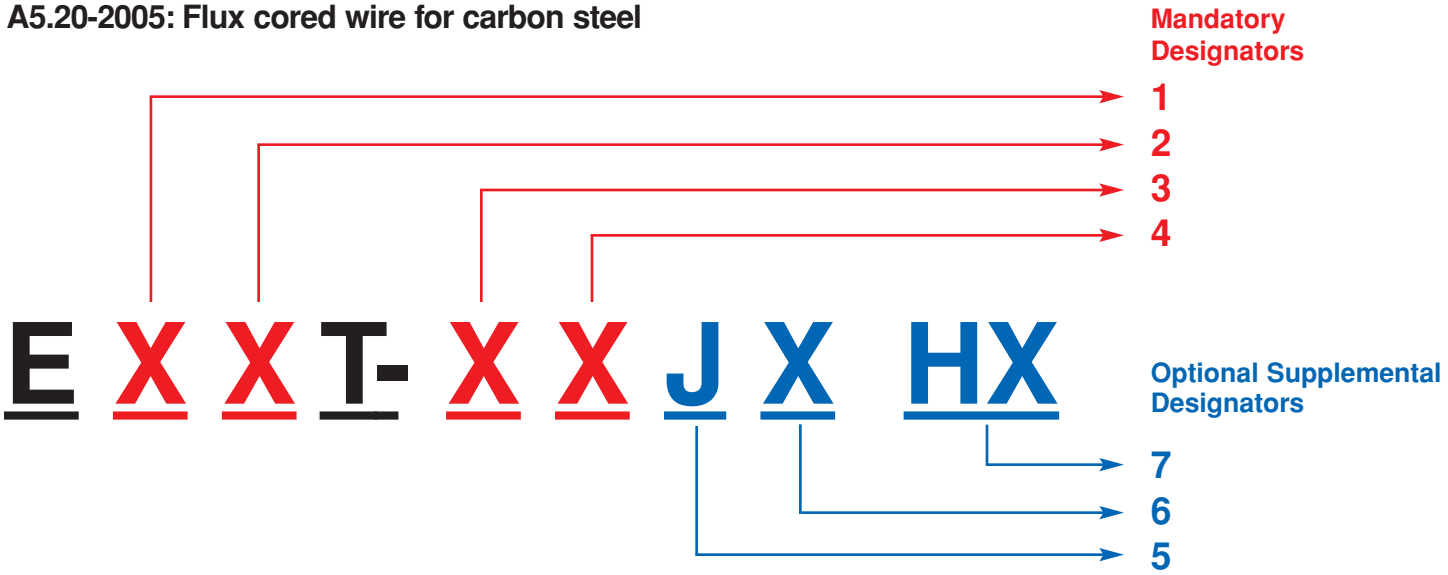
AWS Classification System

A5.22-1995: Flux cored wire for stainless steel



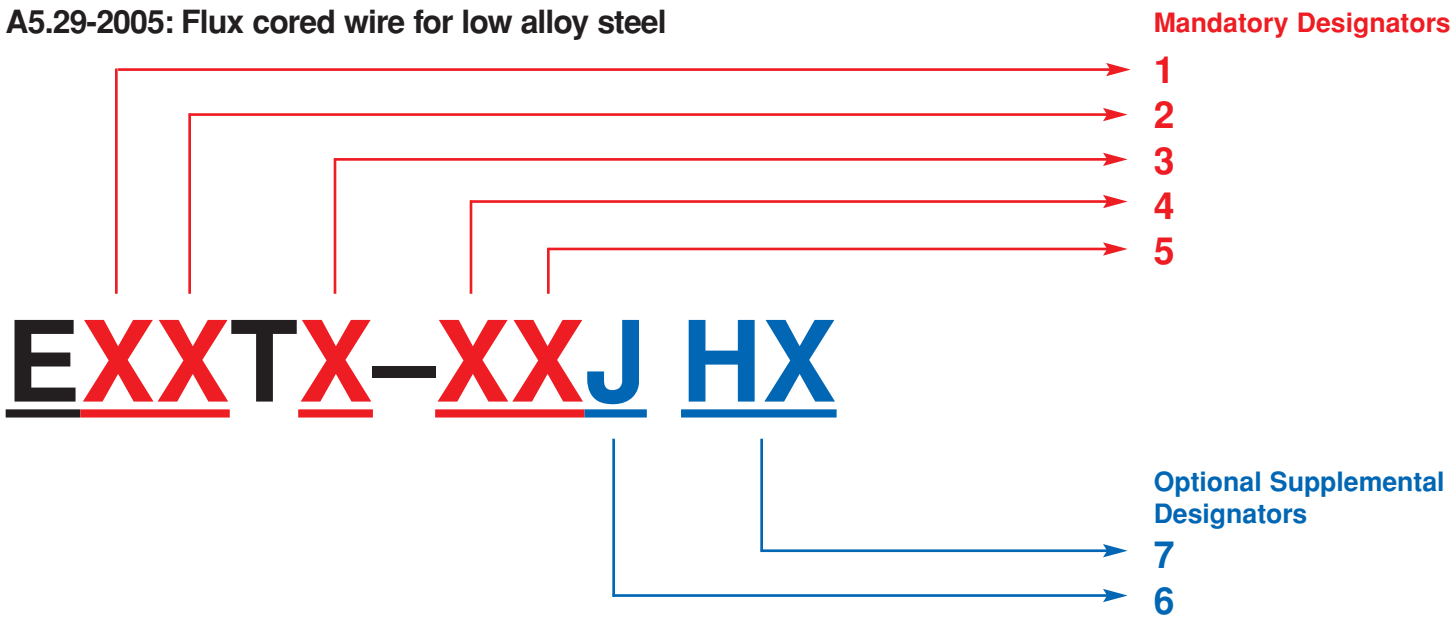
1. Designator for welding electrode “E” or welding rod “R”.
2. Designates composition of weld metal.
3. Designator (0 or 1) indicates welding position. “0” is for flat and horizontal only and “1” is for all position.
4. Designates the shielding gas to be employed. A “1” designates 100% CO_2 shielding gas. A “4” designates a (75%-80% Ar-balanced CO_2) shielding gas. A “5” designates 100% Ar shielding gas for GTAW.

A5.20-2005: Flux cored wire for carbon steel



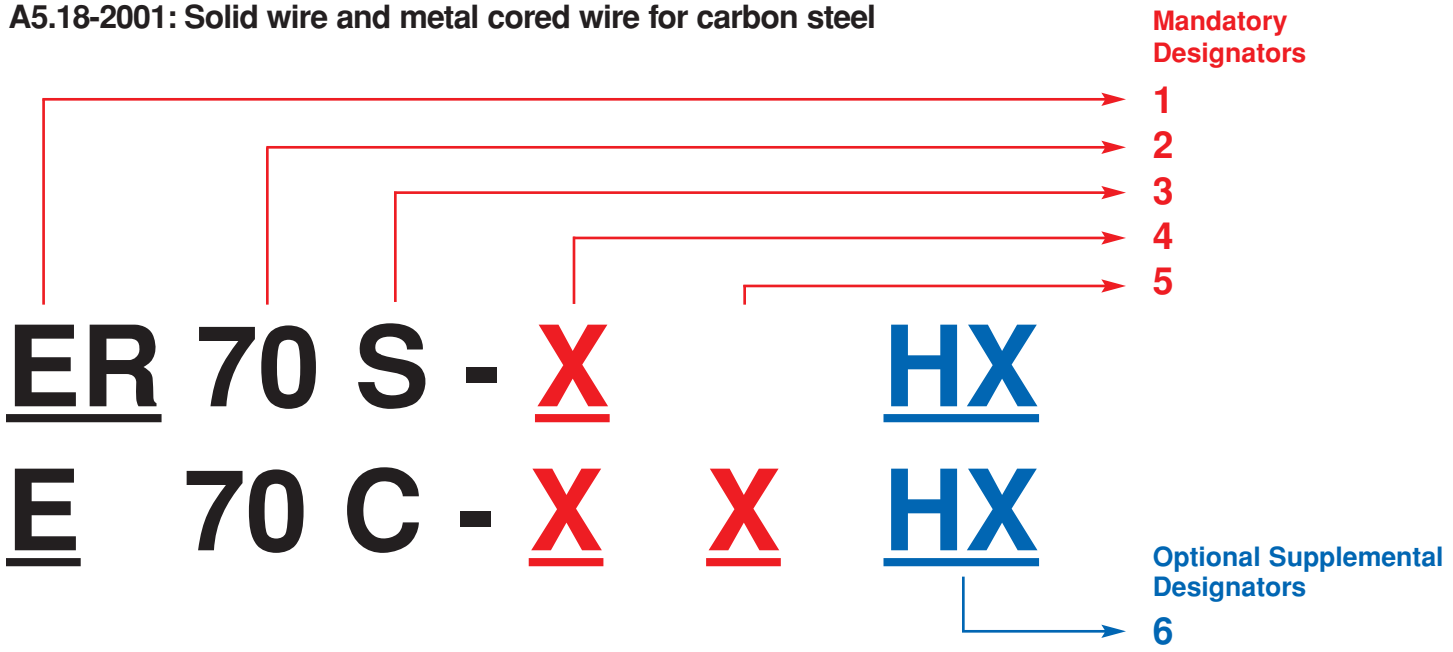
1. Designator indicates minimum tensile strength when multiplied by 10,000 psi.
2. Designator (0 or 1) indicates welding position. “0” is for flat and horizontal only and “1” is for all position.
3. Usability designator number from 1 to 14 or letter “G”.
4. Designator indicates applicable shielding gas. “C” indicates that elecrode was classified using 100% CO_2 shielding gas. “M” indicates that electrode was classified using 75-80% Ar-balanced CO_2 shielding gas. Also no designation stands for welding wire without external gas shielding.
5. “J” designates that the electrode meets the requirement for improved toughness and will deposit weld metal with at least 20 ft-lbs at -40° F.
6. The letter “D” or “Q” indicates the wire meets supplemental mechanical property requirements done with either fast cooling rate procedures or slow cooling rate procedures.
7. Designator for diffusible hydrogen content (H4 or H8 or H16).

A5.29-2005: Flux cored wire for low alloy steel



1. Designator indicates minimum tensile strength when multiplied by 10,000 psi.
2. Designator (0 or 1) indicates welding position. “0” is for flat and horizontal only and “1” is for all position.
3. Usability designator number from 1, 4, 5, 6, 7, 8 or 11 or letter “G”.
4. Designator for chemical composition of weld metal (two, three or four digits or letter “G”).
5. Designator indicates applicable shielding gas. “C” indicates that the electrode was classified using 100% CO_2 shielding gas. “M” indicates that the electrode was classified using 75-80% Ar-balanced CO_2 shielding gas. Also no designation stands for welding wire without external gas shielding.
6. “J” designates that the electrode meets the requirements for improved toughness and will deposit weld metal with at least 20 ft-lbs at a test temperature of 20° F lower than the temperature shown for that classification.
7. Designator for diffusible hydrogen content (H4 or H8 or H16).

A5.18-2001: Solid wire and metal cored wire for carbon steel



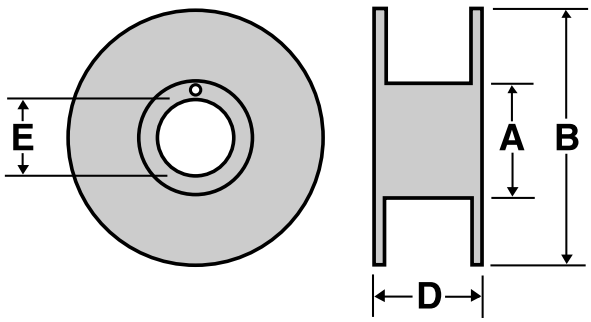
1. Designates use as either “ER” for electrode rod (solid wire) or “E” for electrode rod (metal cored wire).
2. Designator indicates minimum tensile strength of 70,000 psi.
3. Designates whether the wire is solid wire “S” or metal cored/composite wire “C”.
4. Designator for chemical composition of weld metal (2, 3, 4, 6, 7, or letter “G” or “GX”).
5. Designator indicates applicable shielding gas. “C” implies that the electrode was classified using 100% CO_2 shielding gas and “M” indicates that the electrode was classified using 75-80% Ar-balanced CO_2 shielding gas.
6. Designator for diffusible hydrogen content (H4 or H8 or H16).

Unit Length of Welding Wire (feet of wire/lbs spool)

Diameter (in.)		0.035	0.045	0.052	1/16
Mild steel	Flux cored wire (Frontiarc-711)	–	201	148	113
	Metal cored wire (MX-A70C6)	–	192	139	106
	Solid wire (MG-51T)	301	168	–	–
Stainless steel	Flux cored wire (DW-308LP)	374	199	–	114

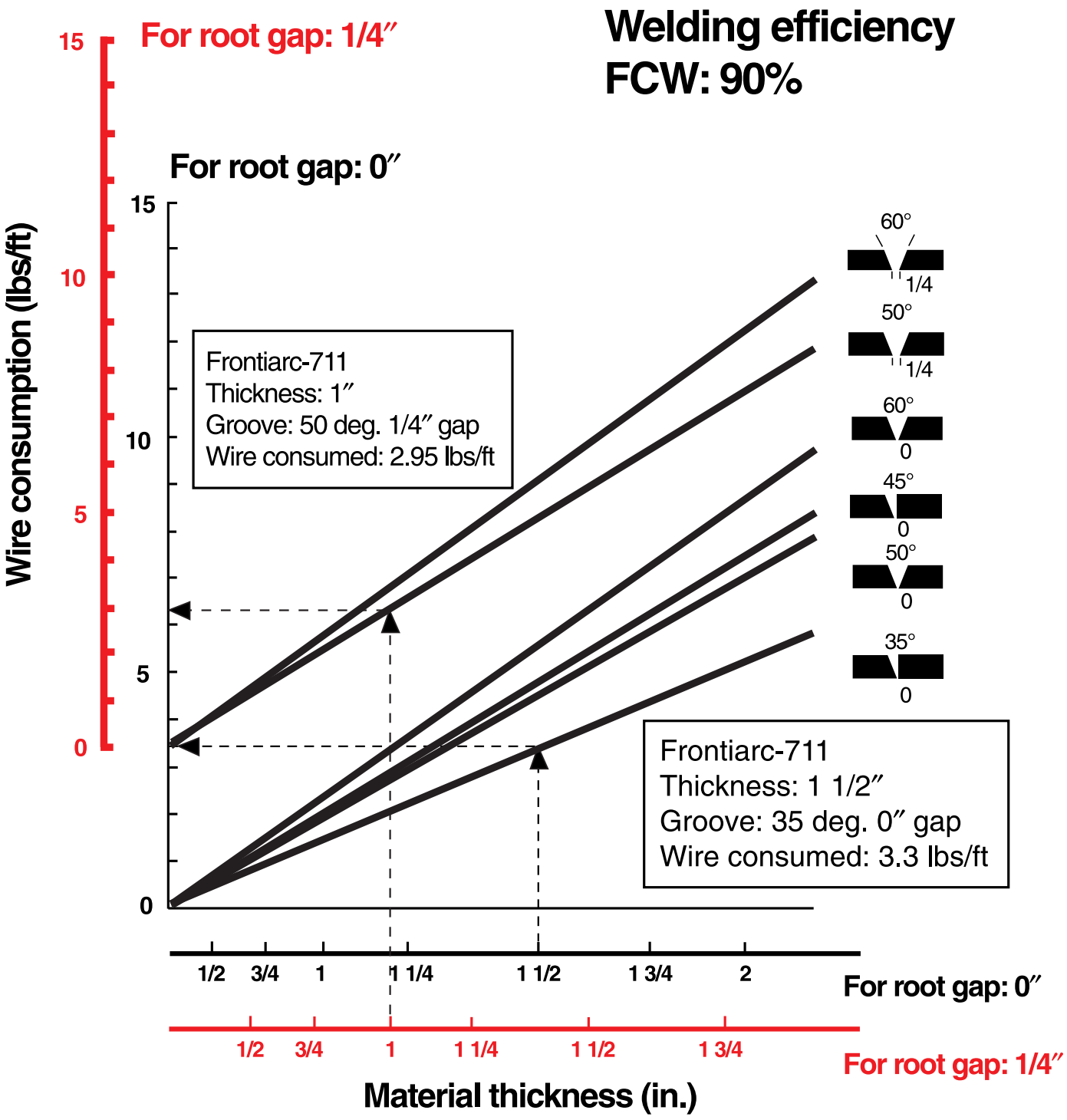
Dimension of spool and drum

		FCW		Solid wire	
Spool	28 lbs	A	7.56″	A	–
		B	11.02″	B	–
		D	4.06″	D	–
		E	2.05″	E	–
	44 lbs	A	5.51″	A	6.14″
		B	11.02″	B	10.63″
		D	4.06″	D	4.06″
		E	2.05″	E	2.05″
Drum	550 lbs 660 lbs	20.07″ dia. x 32.28″ height			



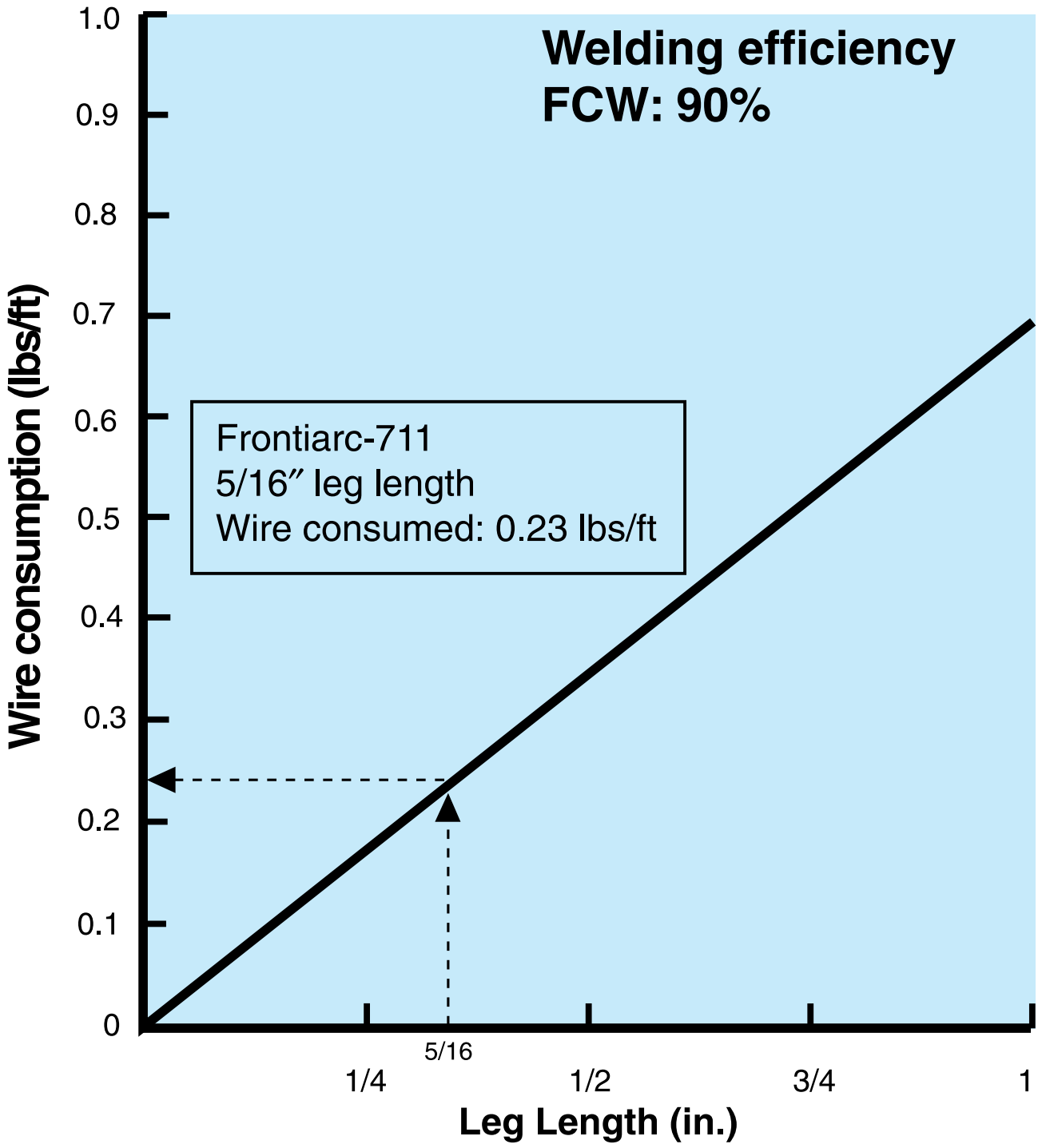
Guideline of consumption of wire

Butt welding



Guideline of consumption of wire

Fillet welding



Stainless Steel Flux Cored Wire

DW Stainless Series

Welding materials compared with	Merits of DW Stainless Series wire
Covered electrode (SMAW)	• High efficiency • Less spattering • Good bead appearance • Good slag removability
TIG Rod (GTAW)	• High efficiency
MIG wire (GMAW)	• Less voltage sensitive • Good bead appearance • Less spattering • Easy to make multi-pass • Higher deposition rate welding (no oxidized surface) • CO_2 gas (lower gas cost)

Wire Size (in.)	Approx. Wire Feed Speed (in./min.)	Current DC-EP* (amp)	Arc Voltage** (volt)	Deposition Rate (lbs/hr)
0.035	180	80	23-25	2.2
	205	90	23-25	2.5
	250	100	24-26	3.0
	280	110	25-27	3.3
	330	120	25-28	3.9
	375	130	27-29	4.5
	460	140	28-30	5.5
	550	150	29-31	6.6
0.045	210	140	24-26	5.0
	275	160	25-27	6.0
	330	180	26-28	6.7
	380	200	27-29	8.0
	440	220	28-30	9.3
	545	240	28-31	10.6
	615	260	30-33	12.0
	680	280	31-33	13.5
	780	300	31-33	15.0
1/16	155	200	28-30	6.5
	195	220	29-31	8.0
	230	240	29-31	8.5
	260	260	31-33	9.3
	290	280	31-33	11.0
	330	300	31-34	12.0
	360	320	32-35	13.5
	420	350	33-35	16.0

Tables shown are approximate values that will vary with welding conditions. Blue shaded areas represent optimum welding conditions.
*DC: Electrode Positive **Arc voltage is measured at the wire feeder.

Voltages shown are for 100% CO_2 shielding gas.
For 75% Ar + 25% CO_2 use two (2) volts less than shown.
The use of gas blends with more than 75-80% Argon is not recommended.

Wire Size (in.)	Wire Extension from contact tip to work (in.)	Cup Size (in.)	Shielding Gas flow rate* (cubic ft/hr)
0.035	1/2	1/2-5/8	35-45
0.045	5/8-3/4	5/8	40-50
1/16	3/4-1	5/8-3/4	40-50

*Gas flow is measured at gas cup (orifice) with wire in position.

DW-G Stainless Series

Features	Merit of usage of DWG wires
Excellent arc transfer in lower amperage	DW-G 0.045” can be used instead of 0.035” FCW, solid wire and covered electrode.
Higher deposition rate	Unique wire structure assures 10-15% higher deposition than regular FCW.
Failure-free arc ignition	Re-ignition without clipping off wire end.
Versatility	Applicable shielding gas: 100% CO_2 or 75-80% Ar-balanced CO_2.

Suggested Operating Ranges

Wire feed speed (in./min.)	Welding Current (amp)	Voltage (volt)	Wire extension from tip to work
140	85	18-21	1/2
180	105	19-22	
220	130	22-25	
260	140	24-27	
300	165	26-29	5/8-3/4
340	175	27-31	
380	185	28-32	
420	195	28-33	
460	205	28-34	
500	215	28-34	

Applied base metal thickness (minimum)

Butt Joint	Horizontal Fillet	Lap Joint
16 gauge	14 gauge	16 gauge

TG-X flux cored TIG rod

Plate Thickness: T (in.)	1/8–3/16	1/4–11/16	≥3/8
Root Gap G (in.)	5/64	3/32	7/64
Current (DC-EN): amp	80-90	90-105	90-110

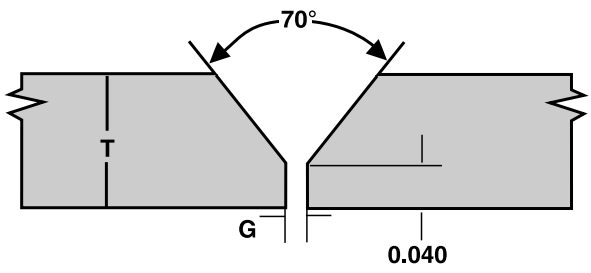


Fig.1 Groove shape

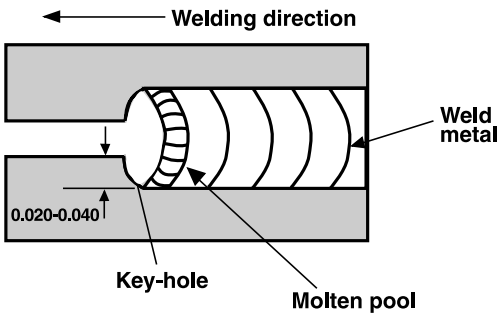
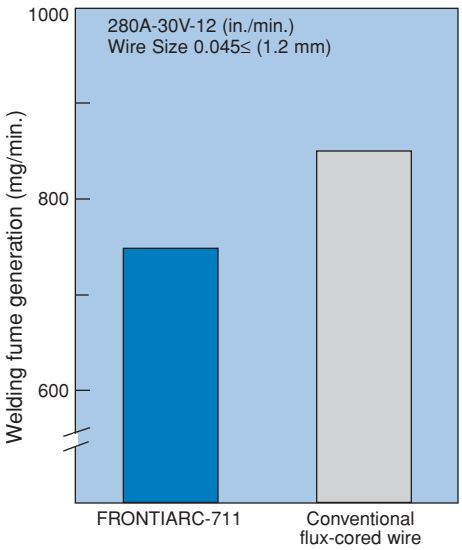


Fig. 2 Formation of key-hole

Carbon Steel Flux Cored Wire

Welding Fume Generation Rate



Recommended Welding Conditions and Deposition Rates

Wire Size (in.)	Wire Feed Speed (in./min.)	Current DC-EP* (amp)	Arc Voltage** (volt)	Deposition Rate (lbs/hr)	Wire Extension from contact to tip (in.)	Cup Size (in.)	Shielding Gas Flow Rate*** (cubic ft/hr)
0.045	140	120	23-26	4.0	3/4	5/8	40-50
	180	140	24-27	5.0			
	200	160	25-28	6.0			
	245	180	26-29	7.0			
	290	200	27-30	8.0			
	330	220	27-30	9.0			
	380	240	28-30	10.0			
	400	250	28-30	10.5			
0.052	120	140	24-27	3.5	3/4	5/8	40-50
	130	150	24-27	4.0			
	175	180	24-27	5.5			
	215	210	25-28	7.0			
	265	240	26-28	8.5			
	300	260	27-29	9.5	1		
	315	270	27-29	10.0			
	395	300	29-31	11.5			
1/16	100	180	24-27	4.5	3/4	5/8-3/4****	40-50
	120	200	25-28	5.5			
	165	240	25-28	7.0			
	190	260	26-29	8.0	1		
	215	280	28-30	9.0			
	250	300	29-31	10.0			
	300	340	30-32	11.5			

Table shown is approximate values that will vary with changes in welding conditions.
*DC-Electrode positive **Arc voltage is measured at the wire feeder.
***Gas flow is measured at gas cup (orifice) with wire in position.
****When utilizing amperage above 300 use 3/4 in. dia. or larger cup size.
Voltage shown is for 100% CO_2 shielding gas. For 75% Argon +25% CO_2 use two (2) volts less than shown.

Carbon Steel Metal Cored Wire

Wire size (in.)	Wire feeding speed (in./min.)	Current* (A)	Voltage** (V)	Deposition rate (lbs./hr.)
0.045	300	200	28-31	7.5
	375	240	29-33	9.5
	435	280	30-34	11.0
	530	320	32-36	13.5
0.052	250	230	27-29	8.5
	300	270	28-32	10.5
	400	320	30-34	14.0
	460	370	31-36	16.0
1/16	165	260	27-29	7.5
	245	320	28-33	11.5
	350	380	29-35	17.0
	415	440	30-36	20.0

* DC-Electrode positive

** Shielding gas: 75% Argon +25% CO_2. Arc voltage is measured at the wire feeder.

Wire Size (in.)	Wire extension from tip to work (in.)	Cup size (in.)	Shielding Gas Flow Rate* (cubic ft/hr)
0.045	5/8-3/4	5/8	40-50
0.052	3/4-1	5/8	40-50
1/16	3/4-1	5/8-3/4	40-50

* Gas flow is measured at gas cup (orifice) with wire in position.

Carbon Steel Solid Wire

MG-51T

Wire Size (in.)	Wire Feed Speed (in.)	Current* (amp)	Voltage** (volt)	Deposition Rate (lbs/hr)	Deposition Efficiency (%)
0.035	75	60	16-17	1.2	95-96
	110	80	17-18	1.8	
	150	100	18-19	2.4	
	190	120	19-20	3.0	
	235	140	20-21	3.7	
0.045	105	100	19-21	3.0	94-95
	125	120	20-21	3.5	
	155	140	21-22	4.4	
	190	160	22-23	5.4	
	225	180	23-24	6.4	
	260	200	24-25	7.4	
	300	220	26-27	8.5	
	335	240	28-29	9.5	
	370	260	30-31	10.5	
	415	280	31-32	11.8	
	455	300	32-33	12.9	

* DC-Electrode positive

** Voltage shown is 100%CO_2 use. For 75%Ar-25%CO_2 use two volts less than shown.
Table shown is approximate values that will vary with welding conditions.
Shaded areas represent optimum welding conditions.

Wire Size (in.)	Wire extension from tip to work (in.)	Cup size (in.)	Shielding Gas Flow Rate* (cubic ft/hr)
0.035	3/8-5/8	5/8	40-50
0.045	5/8-3/4	5/8	40-50

* Gas flow is measured at gas cup (orifice) with wire in position.

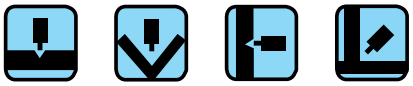
PREMIARC

DW-308L

AWS A5.22-95 E308LT0-1/4
Diameters: 0.045″, 1/16″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80% Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni
0.028	1.45	0.54	19.39	9.91

Tensile Strength: 78.9 ksi, Yield Strength: 61.2 ksi
Elongation: 42%



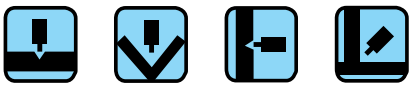
PREMIARC

DW-308

AWS A5.22-95 E308T0-1/4
Diameters: 0.045″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni
0.042	1.44	0.52	19.79	9.56

Tensile Strength: 86.7 ksi, Yield Strength: 56.8 ksi
Elongation: 40%



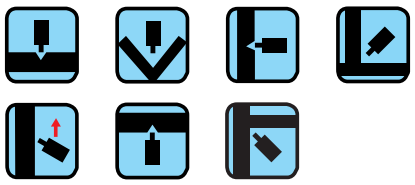
PREMIARC

DW-308LP

AWS A5.22-95 E308LT1-1/4
Diameters: 0.035″, 0.045″, 1/16″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80% Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni
0.021	1.40	0.53	19.12	10.07

Tensile Strength: 77.9 ksi, Yield Strength: 59.1 ksi
Elongation: 42%



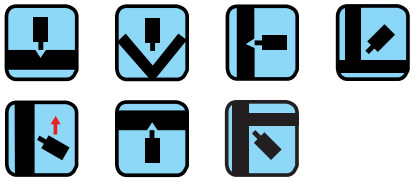
PREMIARC

DW-308P

AWS A5.22-95 E308T1-1/4
Diameters: 0.045″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80% Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni
0.055	1.25	0.57	19.38	9.53

Tensile Strength: 83.4 ksi, Yield Strength: 54.6 ksi
Elongation: 42%



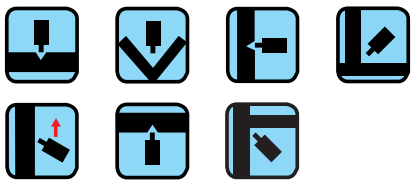
PREMIARC

DW-308LH

AWS A5.22-95 E308LT1-1/4
Diameters: 0.045″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80% Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni	Bi
0.020	1.25	0.46	18.93	9.68	<0.001

Tensile Strength: 80.0 ksi
Elongation: 41%



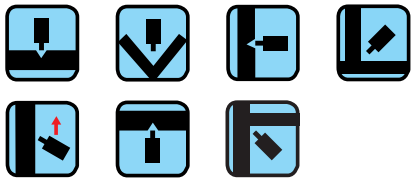
PREMIARC

DW-308H

AWS A5.22-95 E308HT1-1/4
Diameters: 0.045″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80% Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni	Bi
0.063	1.27	0.26	18.55	9.59	<0.001

Tensile Strength: 82.0 ksi, Yield Strength: 56.6 ksi
Elongation: 42%



PREMIARC

DW-309L

AWS A5.22-95 E309LT0-1/4
Diameters: 0.045″, 1/16″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80% Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni
0.027	1.23	0.51	23.95	12.66

Tensile Strength: 81.2 ksi, Yield Strength: 60.9 ksi
Elongation: 34%

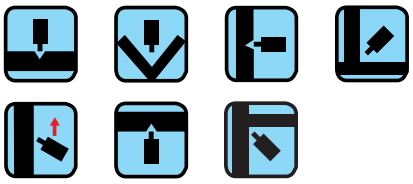
PREMIARC

DW-309LP

AWS A5.22-95 E309LT1-1/4
Diameters: 0.035″, 0.045″, 1/16″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni
0.021	1.20	0.42	23.24	12.59

Tensile Strength: 79.2 ksi, Yield Strength: 59.1 ksi
Elongation: 42%



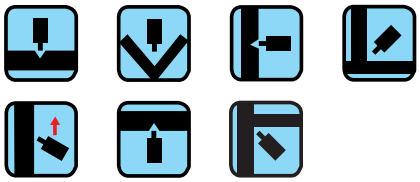
PREMIARC

DW-309LH

AWS A5.22-95 E309LT1-1/4
Diameters: 0.045″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni	Bi
0.033	1.32	0.51	24.34	12.59	<0.001

Tensile Strength: 83.0 ksi
Elongation: 35%



PREMIARC

DW-309LMo

AWS A5.22-95 E309LMoT0-1/4
Diameters: 0.045″, 1/16″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni	Mo
0.026	1.16	0.61	23.21	12.67	2.26

Tensile Strength: 105.8 ksi, Yield Strength: 71.3 ksi
Elongation: 33%

PREMIARC

DW-310

AWS A5.22-95 E310T0-1/4
Diameters: 0.045″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni	Bi
0.180	2.10	0.58	25.50	20.36	<0.001

Tensile Strength: 92.4 ksi, Yield Strength: 63.0 ksi
Elongation: 34%

PREMIARC

DW-312

AWS A5.22-95 E312T0-1
Diameters: 0.045″, 1/16″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni
0.110	1.88	0.68	28.64	10.27

Tensile Strength: 113.3 ksi, Yield Strength: 79.1 ksi
Elongation: 24%

PREMIARC

DW-316L

AWS A5.22-95 E316LT0-1/4
Diameters: 0.045″, 1/16″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni	Mo
0.027	1.35	0.49	18.94	12.02	2.21

Tensile Strength: 81.8 ksi, Yield Strength: 57.5 ksi
Elongation: 37%

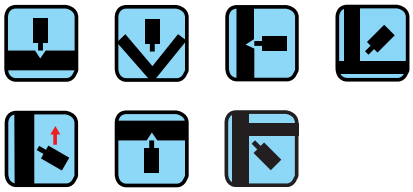
PREMIARC

DW-316LP

AWS A5.22-95 E316LT1-1/4
Diameters: 0.035″, 0.045″, 1/16″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni	Mo
0.021	1.38	0.59	18.55	12.32	2.64

Tensile Strength: 81.5 ksi, Yield Strength: 60.2 ksi
Elongation: 36%



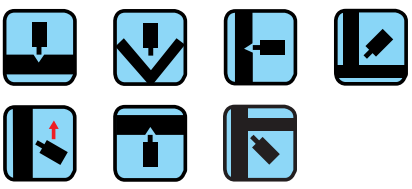
PREMIARC

DW-316LH

AWS A5.22-95 E316LT1-1/4
Diameters: 0.045″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni	Mo	Bi
0.020	1.38	0.48	18.64	12.13	2.39	<0.001

Tensile Strength: 80.0 ksi
Elongation: 40%



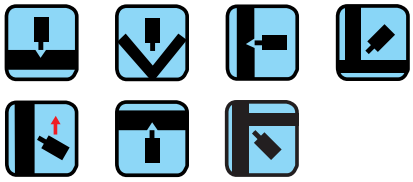
PREMIARC

DW-316H

AWS A5.22-95 E316T1-1/4
Diameters: 0.045″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni	Mo	Bi
0.060	1.51	0.56	19.05	11.65	2.28	<0.001

Tensile Strength: 84.0 ksi
Elongation: 43%



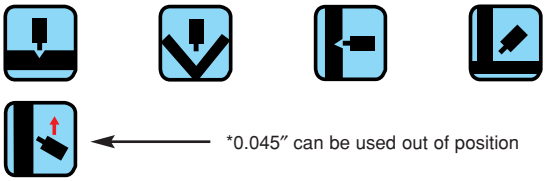
PREMIARC

DW-317L

AWS A5.22-95 E317LT0-1/4
Diameters: 0.045″*, 1/16″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni	Mo
0.024	1.03	0.43	18.95	12.74	3.24

Tensile Strength: 88.6 ksi, Yield Strength: 59.7 ksi
Elongation: 36%



*0.045″ can be used out of position

PREMIARC

DW-347

AWS A5.22-95 E347T0-1/4
Diameters: 0.045″, 1/16″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni	Nb
0.026	1.48	0.41	18.66	10.46	0.58

Tensile Strength: 81.4 ksi, Yield Strength: 62.3 ksi
Elongation: 37%, Impact: 58 ft-lbs (32° F AW)

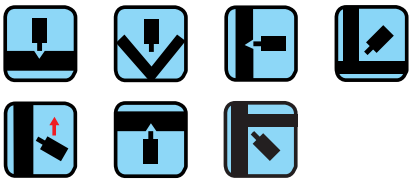
PREMIARC

DW-347H

AWS A5.22-95 E347T1-1/4
Diameters: 0.045″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni	Nb	Bi
0.050	1.65	0.47	19.17	9.65	0.70	<0.001

Tensile Strength: 94.0 ksi
Elongation: 38%



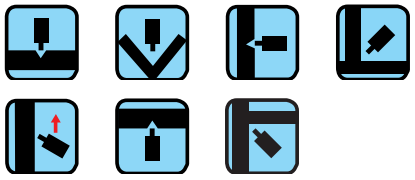
PREMIARC

DW-2101

Diameters: 0.045″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni	Mo	N
0.025	1.41	0.64	24.60	8.30	0.01	0.13

Tensile Strength: 109.0 ksi, Yield Strength: 85.6 ksi
Elongation: 29%, Impact: 28 ft-lbs (-40°F AW)



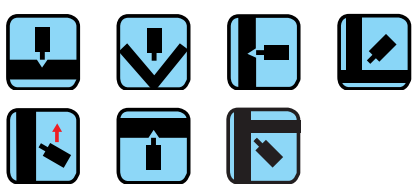
PREMIARC

DW-2209

AWS A5.22-95 E2209T1-1/4
Diameters: 0.045″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni	Mo	N
0.022	0.81	0.57	22.80	9.38	3.29	0.13

Tensile Strength: 118.0 ksi, Yield Strength: 93.1 ksi
Elongation: 31%, Impact: 44 ft-lbs (-40°F AW)



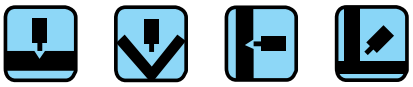
PREMIARC

DW-G308L for gauge material

AWS A5.22-95 E308LT0-1/4
Diameters: 0.045″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni
0.030	1.25	0.62	19.30	9.70

Tensile Strength: 79.9 ksi, Yield Strength: 54.3 ksi
Elongation: 43%



PREMIARC

DW-G309L for gauge material

AWS A5.22-95 E309LT0-1/4
Diameters: 0.045″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni
0.030	1.21	0.68	24.10	12.51

Tensile Strength: 82.8 ksi, Yield Strength: 65.0 ksi
Elongation: 37%

PREMIARC

DW-G316L for gauge material

AWS A5.22-95 E316LT0-1/4
Diameters: 0.045″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Ni	Mo
0.30	1.24	0.61	18.81	12.2	2.32

Tensile Strength: 81.5 ksi, Yield Strength: 60.2 ksi
Elongation: 36%

TG-X Series
Flux Cored Tig Rod

(For root pass in pipe jointing)

PREMIARC

TG-X308L

AWS A5.22-95 R308LT1-5
Diameters: 2.2mm/0.087″ Packaging: 11 Lbs
Shielding Gas: 100% Ar
No back purge necessary
Chemical Analysis:

C	Mn	Si	Cr	Ni
0.018	1.66	0.80	19.62	10.31

Tensile Strength: 92.8 ksi, Yield Strength: 65.3 ksi
Elongation: 47%, Impact: 94 ft-lbs (32° F AW)

PREMIARC

TG-X309L

AWS A5.22-95 R309LT1-5
Diameters: 2.2mm/0.087″ Packaging: 11 Lbs
Shielding Gas: 100% Ar
No back purge necessary
Chemical Analysis:

C	Mn	Si	Cr	Ni
0.017	1.52	0.81	24.26	12.62

Tensile Strength: 98.6 ksi, Yield Strength: 76.9 ksi
Elongation: 32%, Impact: 80 ft-lbs (32° F AW)

PREMIARC

TG-X316L

AWS A5.22-95 R316LT1-5
Diameters: 2.2mm/0.087″ Packaging: 11 Lbs
Shielding Gas: 100% Ar
No back purge necessary
Chemical Analysis:

C	Mn	Si	Cr	Ni	Mo
0.016	1.55	0.87	18.89	12.47	2.32

Tensile Strength: 87.0 ksi, Yield Strength: 63.8 ksi
Elongation: 38%, Impact: 88 ft-lbs (32° F AW)

PREMIARC

TG-X347

AWS A5.22-95 R347T1-5
Diameters: 2.2mm/0.087″ Packaging: 11 Lbs
Shielding Gas: 100% Ar
No back purge necessary
Chemical Analysis:

C	Mn	Si	Cr	Ni	Nb
0.020	1.60	0.80	19.90	10.20	0.68

Tensile Strength: 91.4 ksi, Yield Strength: 66.7 ksi
Elongation: 48% Impact: 94 ft-lbs (32° F AW)

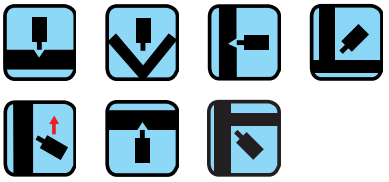
Carbon Steel Flux Cored Wire

Frontiarc-711

AWS A5.20-05 E71T-1C/1M, E71T-12C/12M H8
Diameters: 0.045″, 0.052″, 1/16″
Spool Size: 28 Lbs, 44 Lbs, 55 Lbs
Drum: 550 Lbs
Shielding Gas: 100% CO_2 or 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	P	S
0.040	1.32	0.56	0.012	0.009

Tensile Strength: 85.6 ksi, Yield Strength: 75.8 ksi
Elongation: 31%, Impact: 54 ft-lbs (-20° F AW)



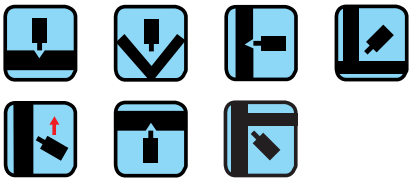
FAMILIARC

DW-50

AWS A5.20-05 E71T-1C/1M, E71T-9C/9M H8
Diameters: 0.045″, 0.052″, 1/16″
Spool Size: 11 Lbs, 28 Lbs, 44 Lbs,
Drum: 550 Lbs
Shielding Gas: 100% CO_2 or 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	P	S
0.050	1.52	0.71	0.011	0.009

Tensile Strength: 89.1 ksi, Yield Strength: 81.3 ksi
Elongation: 28%, Impact: 43 ft-lbs (-20° F AW)
Designed with fast freezing slag system



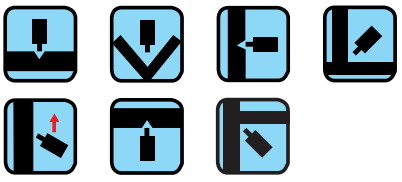
FAMILIARC

DW-50S **for FEMA 353 and AWS D1.8**

AWS A5.20-05 E71T-1C/1M, E71T-9C/9M H8
Diameters: 0.045″, 1/16″
Spool Size: 44 Lbs,
Shielding Gas: 100% CO_2 or 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	P	S
0.043	1.55	0.77	0.010	0.011

Tensile Strength: 92.0 ksi, Yield Strength: 83.0 ksi
Elongation: 27%, Impact: 77 ft-lbs (-20° F AW)
Designed with fast freezing slag system



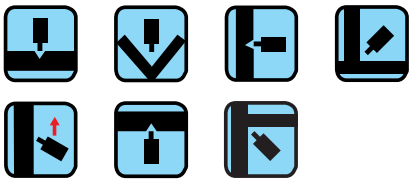
FAMILIARC

DW-A55ESR

AWS A5.20-05 E71T-12MJ
Diameters: 0.045″, 1/16″
Spool Size: 44 Lbs
Shielding Gas: 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	P	S	Ni
0.050	1.36	0.47	0.011	0.007	0.43

Tensile Strength: 85.4 ksi, Yield Strength: 75.9 ksi
Elongation: 29%, Impact: 104 ft-lbs (-40° F AW)
Excellent impact strength even after PWHT.



FAMILIARC

MX-A200

AWS A5.20-05 E70T-1M
Diameters: 0.045″, 0.052″, 1/16″
Spool Size: 44 Lbs
Drum: 550 Lbs
Shielding Gas: 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	P	S
0.050	1.52	0.56	0.010	0.009

Tensile Strength: 88.5 ksi, Yield Strength: 78.3 ksi
Elongation: 29%, Impact: 50 ft-lbs (0° F AW)
Designed to weld through inorganic primer coated plate.

FAMILIARC

MX-200

AWS A5.20-05 E70T-1C
Diameters: 0.045″, 0.052″, 1/16″
Spool Size: 44 Lbs
Shielding Gas: 100%CO_2
Chemical Analysis:

C	Mn	Si	P	S
0.060	1.35	0.50	0.011	0.010

Tensile Strength: 83.8 ksi, Yield Strength: 76.6 ksi
Elongation: 29%, Impact: 45 ft-lbs (0° F AW)
Designed to weld through inorganic primer coated plate.

Carbon Steel Metal Cored Wire

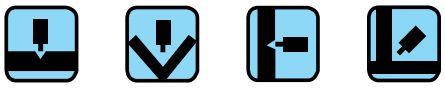
FAMILIARC

MX-A70C6 (Less silicate Islands Type)

AWS A5.18-01 E70C-6M H4
Diameters: 0.045″, 0.052″, 1/16″
Spool Size: 44 Lbs,
Drum: 550 Lbs
Shielding Gas: 75-95% Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	P	S
0.060	1.63	0.79	0.011	0.009

Tensile Strength: 86.9 ksi, Yield Strength: 67.0 ksi
Elongation: 28%, Impact: 51 ft-lbs (-20° F AW)



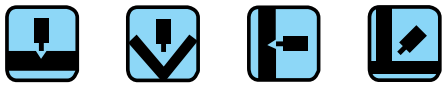
FAMILIARC

MX-A70C6LF (Low Fume Type)

AWS A5.18-01 E70C-6M H4
Diameters: 0.045″, 0.052″, 1/16″
Spool Size: 44 Lbs,
Drum: 550 Lbs
Shielding Gas: 75-95% Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	P	S
0.034	1.70	0.85	0.008	0.010

Tensile Strength: 80.0 ksi, Yield Strength: 65.0 ksi
Elongation: 31%, Impact: 64 ft-lbs (-20° F AW)



Low Alloy Steel Flux Cored Wire

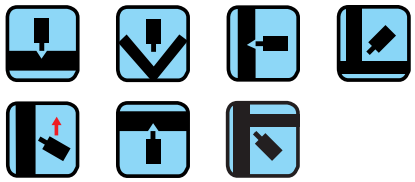
TRUSTARC

DW-81B2

AWS A5.29-05 E81T1-B2C/B2M
Diameters: 0.045″, 1/16″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Mo	P	S
0.060	0.57	0.62	1.27	0.50	0.008	0.010

Tensile Strength: 96.0 ksi, Yield Strength: 84.0 ksi
Elongation: 26%



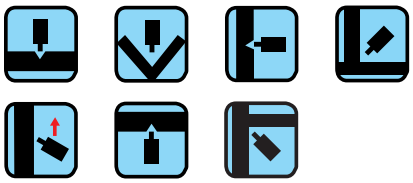
TRUSTARC

DW-91B3

AWS A5.29-05 E91T1-B3C/B3M
Diameters: 0.045″, 1/16″
Spool Size: 28 Lbs
Shielding Gas: 100% CO_2 or 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	Cr	Mo	P	S
0.060	0.60	0.60	2.21	0.97	0.009	0.012

Tensile Strength: 102.0 ksi, Yield Strength: 88.0 ksi
Elongation: 26%



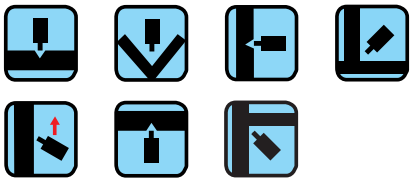
TRUSTARC

DW-A81Ni1

AWS A5.29-05 E81T1-Ni1MJ
Diameters: 0.045″
Spool Size: 28 Lbs
Shielding Gas: 75-80%Ar/bal. CO_2
Chemical Analysis:

C	Mn	Si	P	S	Ni
0.050	1.26	0.32	0.006	0.006	0.95

Tensile Strength: 84.4 ksi, Yield Strength: 75.0 ksi
Elongation: 29%, Impact: 105 ft-lbs (-76°F AW)
Excellent strength even after PWHT



Carbon Steel Solid Wire

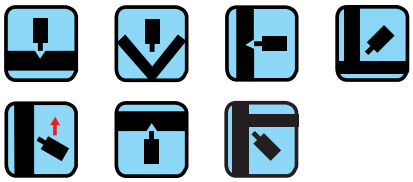
FAMILIARC

MG-51T

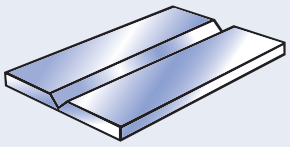
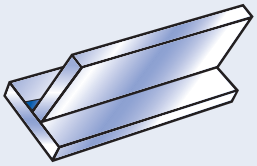
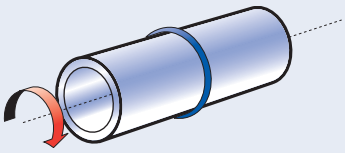
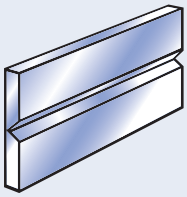
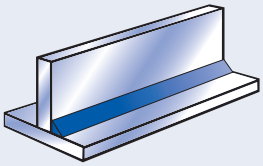
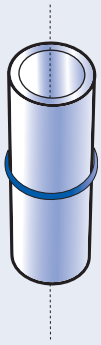
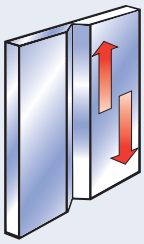
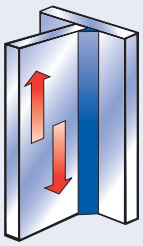
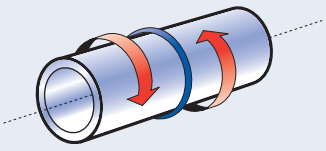
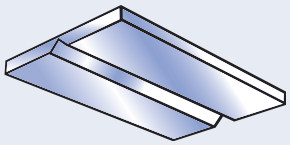
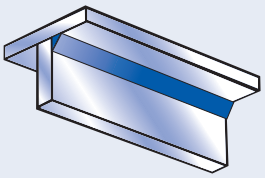
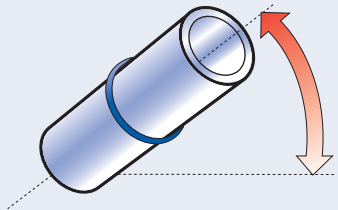
AWS A5.18-01 ER70S-6
Diameters: 0.035″, 0.045″
Spool Size: 44 Lbs
Drum: 660 Lbs
Shielding Gas: 100% CO_2 or 75-80%Ar/bal. CO_2
Chemical Analysis of rod wire:

C	Mn	Si	P	S	Cu
0.100	1.56	0.88	0.011	0.012	0.17

Tensile Strength: 86.0 ksi, Yield Strength: 73.0 ksi
Elongation: 31%



Welding positions

Butt welds	Fillet welds	Pipe welds
 AWS: 1G	 AWS: 1F	 AWS: 1G
 AWS: 2G	 AWS: 2F	 AWS: 2G
 AWS: 3G	 AWS: 3F	 AWS: 5G
 AWS: 4G	 AWS: 4F	 AWS: 6G

Available Approvals

Product Name	Shielding Gas	AWS	CWB	ABS	LR	DNV
DW-308L	$Ar+CO_2$	X	X	–	–	X
DW-308L	CO_2	X	X	X	X	X
DW-308LP	$Ar+CO_2$	X	X	–	–	–
DW-308LP	CO_2	X	X	X	X	X
DW-308	$Ar+CO_2$	X	X	–	–	–
DW-308	CO_2	X	X	X	–	–
DW-308P	$Ar+CO_2$	X	–	–	–	–
DW-308P	CO_2	X	–	–	–	–
DW-308H	$Ar+CO_2$	X	X	–	–	–
DW-308H	CO_2	X	X	–	–	–
DW-309L	$Ar+CO_2$	X	X	–	X	–
DW-309L	CO_2	X	X	X	X	X
DW-309LP	$Ar+CO_2$	X	X	–	X	X
DW-309LP	CO_2	X	X	–	X	X
DW-309LMo	$Ar+CO_2$	X	X	–	–	–
DW-309LMo	CO_2	X	X	–	–	–
DW-310	$Ar+CO_2$	X	X	–	–	–
DW-310	CO_2	X	X	–	–	–
DW-312	CO_2	X	X	–	–	–
DW-316L	$Ar+CO_2$	X	X	–	X	X
DW-316L	CO_2	X	X	X	X	X
DW-316LP	$Ar+CO_2$	X	X	–	X	X
DW-316LP	CO_2	X	X	–	–	X
DW-317L	$Ar+CO_2$	X	X	–	–	–
DW-317L	CO_2	X	X	–	X	X
DW-347	$Ar+CO_2$	X	X	–	–	–
DW-347	CO_2	X	X	–	–	–
DW-2209	$Ar+CO_2$	X	X	–	–	–
DW-2209	CO_2	X	X	–	–	–
DW-G308L	CO_2/$Ar+CO_2$	X	X	–	–	–
DW-G309L	CO_2/$Ar+CO_2$	X	X	–	–	–
DW-G316L	CO_2/$Ar+CO_2$	X	X	–	–	–
TG-X308L	Ar	X	–	–	–	–
TG-X309L	Ar	X	–	–	–	–
TG-X316L	Ar	X	–	–	–	–
TG-X347	Ar	X	–	–	–	–
Frontiarc-711	$Ar+CO_2$	X	–	X	–	–
Frontiarc-711	CO_2	X	–	X	–	–
DW-50	$Ar+CO_2$	X	X	X	X	X
DW-50	CO_2	X	X	X	X	X
DW-A55ESR	$Ar+CO_2$	X	X	X	–	–
MX-A70C6	$Ar+CO_2$	X	X	–	–	–
MX-A70C6LF	$Ar+CO_2$	X	X	–	–	–
MX-A200	$Ar+CO_2$	X	–	X	X	X
MX-200	CO_2	X	–	X	X	X
DW-81B2	$Ar+CO_2$	X	X	–	–	–
DW-81B2	CO_2	X	X	–	X	–
DW-91B3	$Ar+CO_2$	X	X	–	–	–
DW-91B3	CO_2	X	X	–	–	–
DW-A81Ni1	$Ar+CO_2$	X	X	X	X	X
MG-51T	$Ar+CO_2$	X	–	–	–	–
MG-51T	CO_2	X	–	–	–	–

AWS: American Welding Society
CWB: Canadian Welding Bureau
ABS: American Bureau of Shipping
LR: Lloyd's Register of Shipping

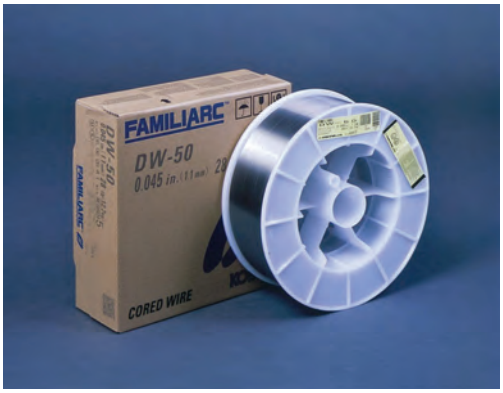
KOBELCO WELDING OF AMERICA INC.

PREMIARC™

Stainless Steel Flux Cored Wire

FAMILIARC™

Carbon Steel Flux Cored Wire



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Low Alloy Steel Flux Cored Wire

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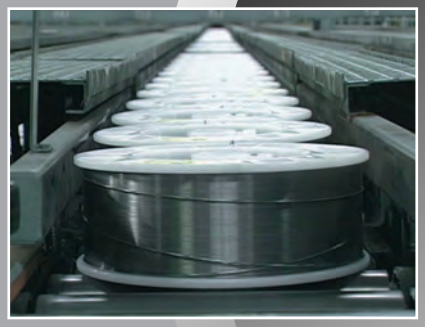

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