

# Metal Cored Wires & Fluxes for (Composite Electrodes)

## Principles of Operation

The submerged arc welding process introduced in the early 1930's was originally developed to weld longitudinal seams in large pipe. The process was developed to provide high quality weld metal deposits by shielding the arc and the molten weld puddle from the contaminating effects of the air through the melting of a blanket of granular flux.

### Sub Arc Advantages

- High deposition and travel speed
- High quality welds
- Minimal arc visibility
- Easily automated
- Good weld bead shapes and toe lines
- Excellent chemical and mechanical properties

**The submerged arc process is widely used in heavy plate fabrication. This includes the welding of:**

- Structural – bridge, building, and structure manufacturing
- Pipe – both longitudinal seams and circumferential welds
- Vessels and tanks for pressure storage use
- Heavy machine components
- Railcar manufacturing
- Heavy construction/mining/crane

Welded metal thickness ranges from a minimum of 1/16" (1.6mm) up to unlimited for single pass welds and unlimited metal thickness on multi-pass welds using the proper joint preparation and electrode flux combination.

### Benefits of Metal Core Wire vs. Solid Wire

- Increased deposition rates, typically 15-30% higher (See Table 1)
- Increased travel speeds
- Higher wire burnoff rates
- Higher quality weld deposits
- A wider broader shaped penetration and fusion pattern
- Greater tolerance to gaps, poor fit up, and burn through
- Easily modified for special applications

Similar to welding with gas shielded metal core, in most submerged arc applications, the maximum productivity and quality benefits are realized when stepping up one wire diameter from the current solid wire size.

## Deposition Rate % Increases with Metal Core versus Solid Wire

Diameter	Amperage (DCEP)	Voltage	Approx Wire Feed Speed IPM		Deposition Rate Lbs/hr (Kg/hr)		Deposition Rate % Increase
			Metalloy	Solid	Metalloy	Solid	
5/64" (2.0mm)	200	29	71	63	4.9 (2.2)	4.8 (2.2)	2.08
	250	30	89	80	6.5 (2.9)	6.3 (2.8)	3.17
	300	31	115	96	8.4 (3.8)	8.1 (3.7)	3.70
	350	32	154	114	11.0 (4.9)	9.4 (4.3)	17.02
	400	33	190	137	13.7 (6.2)	11.3 (5.1)	21.24
	450	34	233	167	16.6 (7.5)	13.6 (6.2)	22.06
3/32" (2.4mm)	500	36	284	199	20.5 (9.3)	16.0 (7.3)	28.13
	300	29	85	70	8.7 (3.9)	8.1 (3.7)	7.4
	350	30	105	80	10.7 (4.9)	9.2 (4.2)	16.3
	400	30	125	89	12.9 (5.9)	10.6 (4.8)	21.7
	450	32	150	103	15.4 (7.0)	12.6 (5.7)	22.2
	500	37	175	121	17.8 (8.1)	14.8 (6.7)	20.2
1/8" (3.2mm)	550	37	210	139	21.1 (9.6)	16.6 (7.5)	27.1
	600	38	240	156	24.3 (11.0)	18.9 (8.6)	28.6
	450	31	76	60	12.1 (5.5)	11.8 (5.4)	2.5
	500	32	87	68	14.7 (6.7)	13.1 (5.9)	12.2
	550	32	100	75	17.3 (7.8)	14.5 (6.6)	19.3
	600	35	116	80	20.0 (9.1)	15.6 (7.1)	28.2
5/32" (4.0mm)	650	36	135	86	23.0 (10.4)	17.6 (8.0)	30.7
	700	37	153	94	25.7 (11.7)	19.3 (8.7)	33.2
	400	30	45	37	11.2 (5.1)	10.9 (4.9)	2.7
	500	33	58	47	15.5 (7.0)	14.0 (6.4)	10.7
	600	35	69	55	19.5 (8.8)	17.2 (7.8)	13.4
	700	38	90	64	23.8 (10.5)	19.6 (8.9)	21.4
900	40	113	75	29.8 (13.5)	23.5 (10.7)	26.8	
	42	143	88	38.7 (17.6)	28.2 (12.8)	37.2	

Table 1

