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Metal Type Flux-Cored Wire for Ar-CO₂ Gas Shield Arc Welding

“MXA-70C6”

 **KOBE STEEL, LTD.**

WELDING COMPANY

Metal Type Flux-Cored Wire for Ar-CO₂ Gas Shield Arc Welding

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MXA-70C6 is metal type flux-cored wire electrode for single pass and multi pass welding of mild steel and 490N/mm² class high tensile steel with Ar-CO₂ mixture shielding gas.

MXA-70C6 wire electrode has many characteristics shown below.

- 1) **Higher deposition rate** than a solid wire.
- 2) **Lower transition current** which change from spray transfer to globular transfer.
- 3) Slag generation is same as a solid wire.
- 4) **Flat bead** profile in horizontal fillet welding.
- 5) Good bead appearance.



1. Wire specification

Table1 Specifications of wire

Typical applications	-Mild Steels and low-alloy steels -Multi-pass and single-pass applications
Polarity of power supply	DC-EP
Applicable classification	AWS A5.18/ ASME SFA 5.18 E70C-6M (CWB CSA W48-01 E492T-6M H4)
Applicable size	0.045in.(1.1mm), 0.052in.(1.3mm), 1/16in.(1.6 mm)
Applicable unit quantity	44lbs(20kg Spool), 440lbs(250kg Drum)

2. Properties of undiluted deposited metal

Tensile properties, toughness property and its chemistry of undiluted deposited metal with 90%Ar-10%CO₂ are shown in Table2 and Table3 respectively, which were obtained by testing in accordance with AWS specification A5.18 (Refer to "Appendix on page 6 for other option of shielding gas).

Table2 Typical mechanical properties of undiluted deposited metal

Diameter inch (mm)	0.2%P.S psi (MPa)	T.S psi (MPa)	EI %	Impact value ft-lbs (J)		
				-40°F	-20°F	0°F
0.045 (1.1)	67,010 (462)	86,880 (599)	28	39 (53)	47 (64)	56 (76)
0.052 (1.1)	64,830 (447)	83,830 (578)	30	47 (64)	62 (84)	64 (86)
1/16 (1.6)	64,980 (448)	86,590 (597)	27	46 (62)	57 (77)	66 (90)

*The values in parenthesis conform to SI unit.

Table3 Typical Chemical composition of deposited metal (%)

Diameter inch (mm)	C	Mn	Si	P	S
0.045 (1.2)	0.06	1.63	0.79	0.011	0.009
0.052 (1.4)	0.06	1.63	0.79	0.011	0.009
1/16 (1.6)	0.06	1.54	0.79	0.011	0.007

3. Diffusible hydrogen content

The diffusible hydrogen content tested in accordance with AWS A.4.3 is shown Table4.

Table4 Typical diffusible hydrogen content in weld metal

Diameter inch (mm)	Diffusible hydrogen content ml/100g depo				Ave.
	N=1	N=2	N=3	N=4	
0.045 (1.1)	2.9	3.2	3.4	3.0	3.1
0.052 (1.3)	2.3	2.2	3.0	2.8	2.6
1/16 (1.6)	3.3	3.0	2.6	3.1	3.0

*Welding position: Flat. Welding condition: 270A(0.045in.), 300A(0.052in.), 340A(1/16in.)

Shielding gas: 90%Ar-10%CO₂

4. Fume emission rate (0.045in. 1/16in.)

The fume emission rate with both gases was investigated according to the condition shown Table5.

Table5 Typical fume emission rate mg/min

Diameter inch (mm)	Welding current (A)				
	200	250	300	350	400
0.045 (1.1)	413	644	555	-	-
1/16 (1.6)	-	-	656	1125	1472

*Welding position: Flat. Wire-stick out: 1in.(25mm). Shielding gas: 90%Ar-10%CO₂

5. Deposition rate

Fig.1 shows the deposition rate of MXA-70C6.

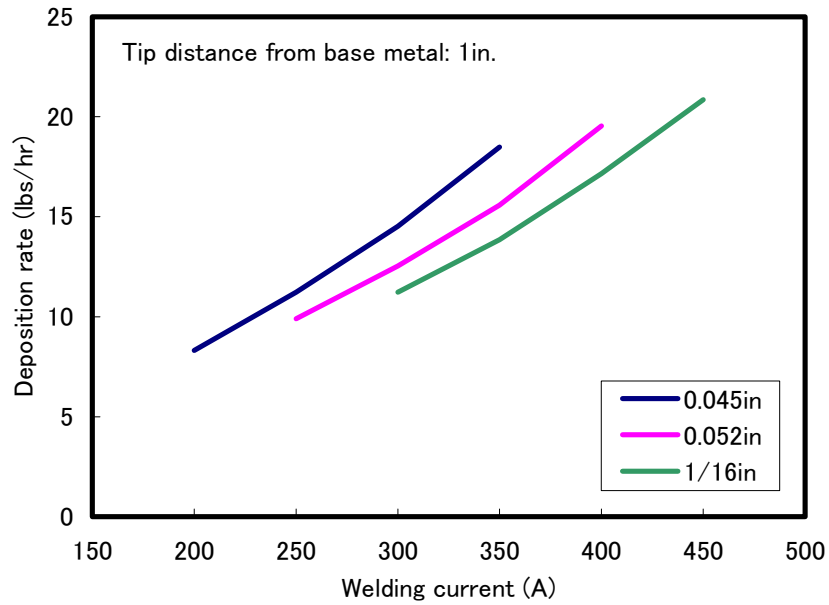


Fig.1 Deposition rate

6. Usage

Table6 Welding position and proper range of welding current (A)

Size of wire inch (mm)	0.045 (1.1)	0.052 (1.3)	1/16 (1.6)
Welding position			
Flat	150 - 350	200 - 450	250 - 500
Vertical downward	180 - 300	220 - 320	250 - 350
Horizontal	150 - 300	220 - 400	250 - 450
Horizontal fillet	150 - 300	220 - 400	250 - 450

7. Recommended welding conditions

Table7 Welding position and proper range of welding current

Wire Size inch (mm)	Wire Feeding Speed in/min	Current A (DC-EP)	Voltage V	Deposition Rate lbs/hr	Wire Stick Out in
0.045	245	150	27-30	6.0	5/8-3/4
	300	200	30-33	7.5	
	375	240	31-35	9.5	
	435	280	32-38	11.0	
	530	320	34-38	13.5	
	620	360	35-39	15.5	
0.052	225	200	27-30	7.5	3/4-1
	250	230	29-31	8.5	
	300	270	29-34	10.5	
	400	320	30-35	14.0	
	460	370	31-36	16.0	
	545	420	32-37	19.0	
1/16	165	260	28-30	7.5	3/4-1
	245	320	29-34	11.5	
	350	380	30-36	17.0	
	415	440	31-37	20.0	
	490	500	32-38	24.0	

*Shielding gas: 75%Ar+25%CO₂, arc voltage is measured at the wire feeder. Gas flow rate: 40-50 CFH

Appendix

Influence of Ar Gas Component in Shielding Gas on Mechanical Properties

A1. Mechanical properties of all-weld-metal

TableA1 shows the welding conditions. TableA2 shows the mechanical properties of all-weld-metal. TableA3 shows the chemical composition.

TableA1 Welding conditions

Wire dia.	0.045in.	0.052in.	1/16in.
Welding method/Welding position	Semi-automatic welding/Flat		
Welding current/Arc voltage	270A/33V	300A/33V	340A/33V
Preheat temp.	Room temp.		
Interpass temp.	300±25°F (150±14°C)		
Wire stick-out	3/4in.(20mm)		
Shielding gas	75%Ar-25%CO ₂ ,90%Ar-10%CO ₂ 53CFH(25L/min)		
Polarity of current	DC-EP		
Pass sequence	12 passes - 6 layers		
Testing plate	Equivalent of ASTM A36		

TableA2 Mechanical properties of all-weld-metal

Wire size inch (mm)	Shielding gas	Yield point psi (MPa)	Tensile strength psi (MPa)	Elongation %	Charpy absorbed energy ft-lbf (J)	
					-20°F	0°F
0.045 (1.1)	75%Ar-25%CO ₂	72,370 (499)	87,890 (606)	29	41 (56)	56 (76)
	90%Ar-10%CO ₂	75,420 (520)	91,080 (628)	26	45 (60)	59 (80)
0.052 (1.3)	75%Ar-25%CO ₂	70,630 (487)	86,730 (598)	30	55 (74)	67 (91)
	90%Ar-10%CO ₂	74,550 (514)	89,340 (616)	27	48 (65)	58 (78)
1/16 (1.6)	75%Ar-25%CO ₂	68,890 (475)	83,110 (573)	29	61 (83)	83 (112)
	90%Ar-10%CO ₂	72,660 (501)	86,440 (596)	27	60 (81)	67 (91)

TableA3 Chemical composition (wt.%)

Wire size inch (mm)	Shielding gas	C	Mn	Si	P	S
0.045 (1.1)	75%Ar-25%CO ₂	0.06	1.66	0.85	0.016	0.008
	90%Ar-10%CO ₂	0.05	1.74	0.88	0.016	0.009
0.052 (1.3)	75%Ar-25%CO ₂	0.06	1.55	0.78	0.016	0.010
	90%Ar-10%CO ₂	0.05	1.73	0.84	0.016	0.010
1/16 (1.6)	75%Ar-25%CO ₂	0.06	1.53	0.75	0.015	0.007
	90%Ar-10%CO ₂	0.06	1.58	0.79	0.011	0.008