HYUNDAI WELDING

Rev. 02

S-7016.H

COVERED ARC WELDING ELECTRODE
FOR 490MPa CLASS HIGH TENSILE STEEL

HYUNDAI WELDING CO., LTD.

S-7016.H

❖ Specification

AWS A5.1	E7016
JIS Z3211	E4916
EN ISO 2560-A	E42 3 B 1 2

❖ Applications

Structures using 490MPa class high tensile steel, bridges, buildings, ship, high pressure vessels, rolling stock and off-shore structures.

❖ Characteristics on Usage

S-7016.H is the most widely used low hydrogen type electrode for all positions welding of 490MPa class high tensile steel.
X-ray performance and mechanical properties of weld metal are excellent.
The usability such as arc smoothness, slag detachability and bead appearance are good and easy to weld in all position.

❖ Note on Usage

1. Dry the electrodes at 300~350℃ (572~662°F) for 30~60 minutes before use.

2. Keep the arc as short as possible, and avoid large width weaving.

3. Adopt back step method or strike the arc on a small steel plate prepared for this particular purpose to prevent blowholes at the arc starting.

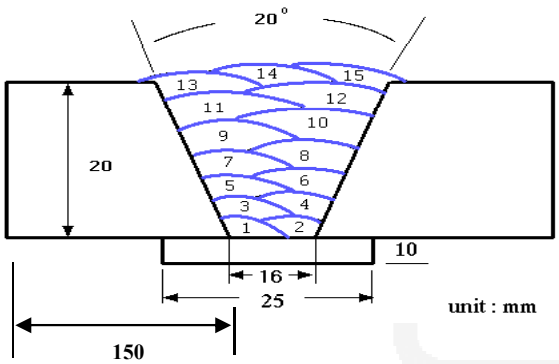
4. Use the wind screen against strong wind.

Mechanical Properties & Chemical Compositions of All Weld Metal

❖ Welding Conditions

Measurement method	:	AWS A5.1
Diameter mm(in)	:	4.0 X 400(5/32 X 16)
Welding position	:	Flat (1G-PA)
Welding Polarity	:	AC
Pass & Layers	:	15Passes - 7Layer
Interpass Temp. ℃(°F)	:	105~175 (221~347)
Test plate	:	ASTM A36 (groove shape as below)

❖ Groove configuration



[Joint Preparation & Layer Details]

Notes:

- Groove angle : 20º+5º
- plate thickness : 20mmt
- Root opening : 16mm
- Test plate width : 150mm (min. 125)
- Test plate Length : 300mm (min. 250)

[Welding parameters]

size (mm)	Welding position	Polarity	Pass	condition		Speed (cm/min)	Heat-Input (kJ/cm)	Interpass temperature (℃)
				Current (A)	Voltage (V)			
4.0* 400	1G (PA)	AC	1	160	24	15.5	14.2	27
			2	160	24	15.2	15.2	47
			3	170	25	16.4	15.5	110
			4	170	25	16.8	15.2	112
			5	170	25	16.0	15.9	110
			6	170	25	16.3	15.6	107
			7	170	25	16.9	15.0	105
			8	170	25	16.3	15.6	110
			9	170	25	16.0	15.9	118
			10	170	25	16.8	15.2	114
			11	170	25	16.2	15.7	111
			12	170	25	15.9	16.0	105
			13	170	25	16.3	15.6	107
			14	170	25	15.5	16.5	110
			15	170	25	15.8	16.1	108

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Mechanical Properties & Chemical Compositions of All Weld Metal

❖ Mechanical Property of All Weld Metal

Consumable	Tensile test			CVN Impact Test J (ft·lbs)
	YS MPa (ksi)	TS MPa (ksi)	EL (%)	-30℃(-22°F)
S-7016.H	508(74)	606(88)	25.4	80(59)
AWS Spec.	≥ 400(58)	≥ 490(71)	≥ 22	≥ 27(20)

❖ Chemical Composition of All Weld Metal(wt%)

Consumable	Chemical Composition (%)				
	C	Si	Mn	P	S
S-7016.H	0.09	0.33	1.23	0.01	0.005
AWS Spec.	≤0.15	≤0.75	≤1.60	≤0.035	≤0.035

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Weldability & Welding Efficiency Test

❖ Weldability

Division / Item	Flat position	Vertical position
Arc stability	Good	Good
Melting rate	Excellent	Excellent
Deposition rate	Excellent	Excellent
Resistance of spatter occurrence	Excellent	Excellent
Bead appearance	Good	Good
The others	Good	Good

❖ Test Conditions of Deposition Efficiency

Consumable	Base Metal		Welding conditions		
	Specification	Dimension, mm(in)	Amp. (A)	Welding speed (mm/min)	Position
S-7016.H (4.0 x 400 mm) (5/32 x 16 in)	ASTM A36	300 X 100 X12 (12 X 3.9 X 0.5)	170	200	Flat

❖ Results of Deposition Efficiency Test

Consumable	Deposition efficiency(%)	
	For electrode	For core wire
S-7016.H 4.0mm(5/32in)	63 ~ 66	96 ~ 100

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Diffusible Hydrogen Content

❖ Welding Conditions

consumable	:	S-7016.H	Welding Position	:	1G
Diameter mm(in)	:	4.0 x 400(5/32 x 16)	Amp.(A) / Volts(V)	:	170~180Amp.
Re-drying conditions	:	350℃ X 1hr (662°F X 1hr)	Current Type & Polarity	:	AC/DC+

❖ Hydrogen Analysis Using Gas Chromatography Method

Hydrogen Evolution Time	:	72 hrs	Analysis Temp.	:	25 ℃(77°F)
Evolution Temp.	:	25 ℃(77°F)	Exposure Condition	:	80%RH-30℃(86°F)
Barometric Pressure	:	780 mm-Hg			

❖ Result (㎖/100g Weld Metal)

X1	X2	X3	X4
6.9	7.5	7.0	7.4

Average Hydrogen Content 7.2 *㎖/100g Weld Metal*

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Size Available and recommended Current & Approval

❖Sizes Available and Reconnended Current

Diameter, mm(in)		2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length, mm(in)		350(14)	350(14)	400(16)	400(16)	450(18)
Recommended current range (AC or DC+ Amp.)	Flat position	55 ~85	90 ~130	130 ~180	180 ~240	250 ~310
	Vertical & Overhead position	50 ~80	80 ~120	110 ~170	150 ~200	–

❖ Authorized Approval Details

Classification	Dia. mm(in)	Welding position	Grade					
AWS			KR	ABS	LR	BV	DNV GL	NK
E7016	2.6(3/32) ~ 5.0(3/16)	All	3H10, 3YH10	3H10, 3Y	3, 3YH15	3YHH	3YH10	KMW 53HH
	6.0 (15/64)	Flat						

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