HYUNDAI WELDING

Rev. 01

S-86LTH

COVERED ARC WELDING ELECTRODE
FOR HIGH TENSILE STEEL(550MPa)
AND LOW TEMPERATURE SERVICE STEEL

HYUNDAI WELDING CO., LTD.

S-86LTH

❖ Specification

AWS A5.5 E8016-G

❖ Applications

Single or multi pass welding for various low temperature service steel such as offshore sector, LPG storage tank, and heat exchanger etc.

❖ Characteristics on Usage

S-86LTH is a basic and low hydrogen type electrode for all position welding. It provide excellent notch toughness at low temperature down to -60℃(-76°F) and good usability in AC/DCEP welding.

❖ Note on Usage

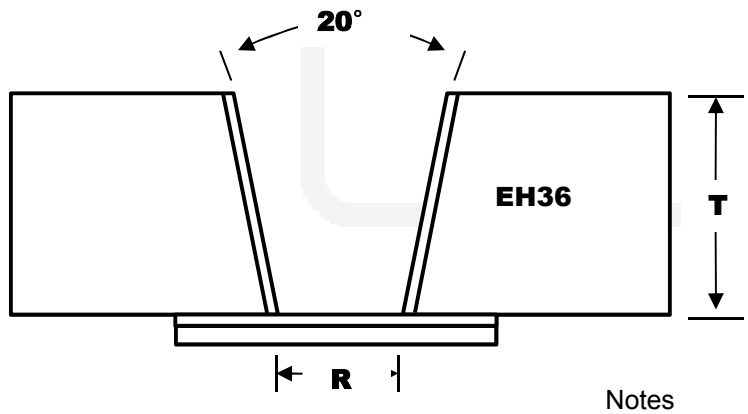
1. Dry the electrodes at 350~400℃ (662~752°F) for 30~60 minutes before use.
2. Keep the arc as short as possible, and avoid large width weaving.
3. Adopt back step method or strike the arc on a small steel plate prepared for this particular purpose to prevent blow-hole at the arc starting.
4. Use the wind screen against strong wind.

Mechanical properties & Chemical compositions of Deposited metal

❖ Welding Conditions

Measurement method	:	AWS A5.5
Diameter, mm(in)	:	3.2(1/8) , 4.0(5/32)
Welding position	:	Flat (1G-PA)
Welding Current	:	3.2mm(1/8in) = 140Amp, AC, 12passes - 6 layers 4 0mm(5/32in) = 180Amp, AC, 16passes - 8 layers
Interpass Temp. ℃(°F)	:	105~175 (221~347)
Test plate	:	EH36 (groove shape as below)

❖ Groove configuration



Notes

: 3.2mm ; T=13mm, R=13mm

: 4.0mm ; T=20mm, R=16mm

Mechanical properties & Chemical compositions of Deposited metal

❖ Mechanical properties of deposited metal in as-welded condition

Size mm(in)	Tensile Test Results			CVN Impact Test J (ft·lbs)	
	YS MPa (ksi)	TS MPa (ksi)	EL (%)	-45℃(-49°F)	-60℃(-76°F)
3.2(1/8)	521(76)	600(87)	28.0	143(106)	125(92)
4.0(5/32)	532(77)	604(88)	29.6	130(96)	105(77)
AWS Spec.	≥ 460(67)	≥ 550(80)	≥ 19	Not specified	

❖ Mechanical properties of deposited metal after PWHT condition (625℃ X 8hr)

Size mm(in)	Tensile Test Results			CVN Impact Test J (ft·lbs)	
	YS MPa (ksi)	TS MPa (ksi)	EL (%)	-45℃(-49°F)	-60℃(-76°F)
3.2(1/8)	502(73)	571(83)	31.4	137(101)	123(91)
4.0(5/32)	470(68)	561(81)	30.8	127(94)	83(61)
AWS Spec.	≥ 460(67)	≥ 550(80)	≥ 19	Not specified	

❖ Chemical compositions of deposited metal (wt%)

Size mm(in)	C	Si	Mn	P	S	Ni	Ti	B
3.2(1/8)	0.05	0.28	1.50	0.009	0.001	0.91	0.017	0.0028
4.0(5/32)	0.05	0.29	1.49	0.010	0.002	0.91	0.022	0.0030
AWS Spec.	-	≥0.80*	≥1.00*	≤ 0.03	≤ 0.03	≥0.50*	-	-

* In order to meet the alloy requirement of the "G" group, the undiluted weld metal shall have the minimum of at least one of the elements least on this table.

Absorbed Moisture contents

❖ Test Conditions

Measurement method : AWS A4.4

Diameter, mm(in) : 3.2(1/8) , 4.0(5/32)

Exposed environment : 30℃(86°F) and 80% Relative humidity (RH)

Exposed Time : 3~12 hours **(* AWS requirement is period of not less then 9 hours)**

Analysis method : Infrared Detector

Limit of moisture content : As-Received or Reconditioned (≤0.2%) / As-Exposed (Not specified)

❖ Test result

Size mm(in)	Absorbed moisture contents (wt%)				
	As-received	3hr	6hr	9hr	12hr
3.2(1/8)	0.08	0.022	0.29	0.58	0.64
4.0(5/32)	0.05	0.023	0.27	0.32	0.47

Size mm(in)	Variations of moisture contents (wt%) at Re-drying 350℃(662°F) X 1 hr				
	As-received	3hr	6hr	9hr	12hr
3.2(1/8)	0.08	0.05	0.07	0.08	0.10
4.0(5/32)	0.05	0.06	0.07	0.07	0.09

Diffusible Hydrogen Content

❖ Test Conditions

Diameter, mm(in)	: 3.2(1/8) , 4.0(5/32)
Exposed environment	: 30℃(86°F) and 80% Relative humidity (RH)
Exposed time	: 3~12 hours
Re-drying conditions	: 350℃(662°F) X 1hr / 400℃(752°F) X 1hr
Welding current	: 3.2mm(1/8in) = 140Amp, AC 4 0mm(5/32in) = 180Amp, AC
Test method	AWS A4.3 (Gas chromatography method)

❖ Test result

Size mm(in)	Variations of Hydrogen contents (ml/100g) Re-drying 350℃(662°F) X 1hr				
	As-received	3hr	6hr	9hr	12hr
3.2(1/8)	3.43	4.33	4.21	4.58	3.60
4.0(5/32)	3.30	3.58	3.60	4.60	4.25

Size mm(in)	Variations of Hydrogen contents (ml/100g) Re-drying 400℃(752°F) X 1hr				
	As-received	3hr	6hr	9hr	12hr
3.2(1/8)	3.43	2.65	2.77	2.93	3.22
4.0(5/32)	3.30	2.79	2.24	3.09	3.35

Weldability & Deposition Efficiency

❖ Weldability

Welding / Position / Item	Flat (1G-PA)	V-Up (3G-PF)
Arc stability	Good	Excellent
Melting rate	Excellent	Excellent
Deposition rate	Excellent	Excellent
Resistance of spatter occurrence	Excellent	Good
Bead appearance	Excellent	Excellent
Slag detachability	Good	Good

❖ Test Conditions of Deposition Efficiency

Consumable	Base Metal		Welding conditions		
	Specification	Dimension mm(in)	Amp. (A)	Welding speed (mm/min)	Position
S-86.LTH (4.0 x 400 mm) (5/32 x 16 in)	ASTM A36	300 X 100 X12 (12 X 3.9 X 0.5)	160 (AC/DC+)	155	1G-PA

❖ Results of Deposition Efficiency

Consumable	Current & Polarity	Deposition efficiency(%)	
		For electrode	For core wire
S-86LTH 4.0 x 400 mm (5/32 x 16 in)	AC	66 ~ 70	98 ~ 105
	DC+	65 ~ 69	95 ~ 102

Optimum Welding Condition

❖Available sizes and Recommended Current

Diameter, mm(in)		2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length, mm(in)		350(14)	350(14)	400(16)	400(16)
Recommended current range (AC or DC+)	Flat (1G-PA)	60 ~90	90 ~140	130 ~190	180 ~250
	3G (PF) & 4G,5G (PE)	50 ~80	80 ~120	120 ~170	150 ~200

Notice

This test report is made for giving general information, and it's not meaning guarantee.
Test results are changeable by several welding
- parameter including base materials