

# **S-7016.LS**

COVERED ARC WELDING ELECTRODE  
FOR HIGH TENSILE STEEL(490MPa)  
AND LOW TEMPERATURE SERVICE STEEL

2023.04

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**HYUNDAI WELDING CO., LTD.**



## ❖ Specification

AWS A5.5	E7016-G H4R
EN ISO 2560-A	E 46 6 1Ni B 1 2
ZIS Z 3211	E4916-N1 AP L

## ❖ 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-7016.LS is a basic and low hydrogen type electrode for all position welding. It provide excellent notch toughness at low temperature down to  $-60^{\circ}\text{C}$  ( $-76^{\circ}\text{F}$ ) and CTOD properties at  $-10^{\circ}\text{C}$  ( $14^{\circ}\text{F}$ ) temperature..

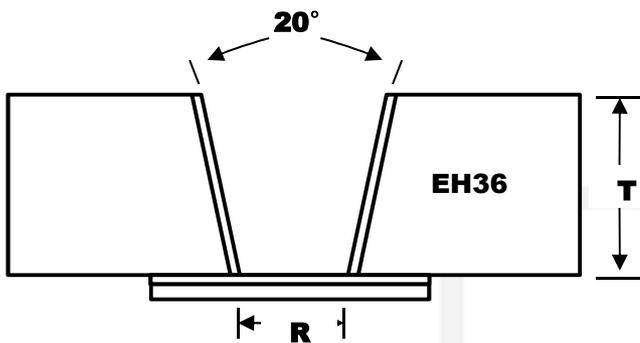
## ❖ Note on Usage

1. Dry the electrodes at  $350\sim 400^{\circ}\text{C}$  ( $662\sim 752^{\circ}\text{F}$ ) 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	: 4.0 X 400mm(5/32 X 16in)
Welding position	: Flat (1G-PA)
Welding Current	: 170Amp, AC
Pass & Layers	: 16passes – 8 layers
Interpass Temp.	: 105~175℃(221~347°F)
Test plate	: EH36 (groove shape as below)

#### Notes

: T=20mm, R=16mm

### ❖ Mechanical properties of deposited metal in as-welded condition

consumable	Tensile test			CVN Impact Test J (ft·lbs)	
	YS MPa (lbs/in <sup>2</sup> )	TS MPa (lbs/in <sup>2</sup> )	EL (%)	-45℃(-49°F)	-60℃(-76°F)
S-7016.LS	538(78,000)	589(86,000)	30.0	95(70)	73(54)
AWS Spec.	≥ 400(58,000)	≥ 490(71,000)	≥ 22	Not specified	

### ❖ Chemical compositions of deposited metal (wt%)

consumable	C	Si	Mn	P	S	Ni	Ti	B
S-7016.LS	0.06	0.30	0.98	0.013	0.008	0.80	0.023	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.

This information is provided solely for the purpose of confirming product conformance with applicable standards. The serviceability of a product or structure utilizing this type of information is and must be the sole responsibility of the builder/user. Many variables beyond the control of HYUNDAI WELDING CO., LTD. affect the results obtained in applying this type of information. These variables include, but are not limited to, welding procedure, shielding gas, plate chemistry and temperature, weldment design, fabrication methods and service requirements.



## Absorbed Moisture contents

### ❖ Test Conditions

Measurement method	: AWS A4.4
Diameter mm(in)	: 4.0 x 400(5/32 x 16)
Exposed environment	: 30°C(86°F) and 80% Relative humidity (RH)
Exposed Time	: 3~12 hours (* AWS requirement is period of not less than 9 hours)
Analysis method	: Infrared Detector
Limit of moisture content	: As-Received or Reconditioned (≤0.4%) / As-Exposed (Not specified)

### ❖ Test result

consumable	Absorbed moisture contents (wt%)				
	As-received	3hr	6hr	9hr	12hr
S-7016.LS	0.065	0.091	0.097	0.111	0.106

consumable	Variations of moisture contents (wt%) at Re-drying 350°C (662°F) X 1 hr				
	As-received	3hr	6hr	9hr	12hr
S-7016.LS	0.065	0.070	0.077	0.094	0.099



## Diffusible Hydrogen Content

### ❖ Welding Conditions

consumable	: S-7016.LS	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 (AWS A4.3)

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

### ❖ Result (ml/100g Weld Metal)

Polarity	X1	X2	X3	X4	Avg.
AC	3.44	3.61	3.75	3.66	3.62
DC+	3.64	3.42	3.46	3.86	3.60



## Weldability & Proper Welding conditions

### ❖ Weldability

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

### ❖ Available sizes and Recommended 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)	Welding position	Grade				
			ABS	LR	BV	DNV GL	KR
E7016-G	2.6 ~ 6.0	All (except V-Down)	3YH10,3Y (-60℃≥34J)	5Y40H15	3, 3YHH (-60℃≥34J)	5YH10	3H10, 3YH10 (-60℃≥34J)

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