



**HYUNDAI**  
W E L D I N G

Rev. 00

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# **S-7016.H**

COVERED ARC WELDING ELECTRODE  
FOR 490MPa CLASS HIGH TENSILE STEEL

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***HYUNDAI WELDING CO., LTD.***



## ❖ **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**

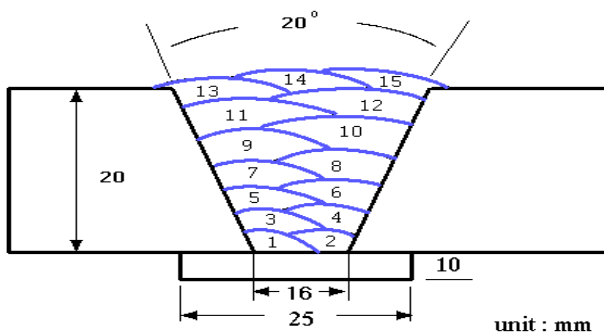
1. Dry the electrodes at 300~350℃ for 30~60 minutes before use.
2. Keep the arc as short as possible, and avoid large width weaving.
3. Adopt back step method or strike the arc on a small steel plate prepared for this particular purpose to prevent blowholes at the arc starting.
4. Use the wind screen against strong wind.



## Mechanical Properties & Chemical Compositions of All Weld Metal

### ❖ Welding Conditions

Method by AWS Spec.



Diameter (mm) : 4.0mm x 400

Amp./ Volt. : 170 / 23~ 24

Interpass Temp.(°C) : 80 ~ 130

Polarity : AC

[ Joint Preparation & Layer Details ]

### ❖ Mechanical Property of All Weld Metal

| Consumable | Tensile test |          |        | CVN Impact Test (Joule) |
|------------|--------------|----------|--------|-------------------------|
|            | YS (MPa)     | TS (MPa) | EL (%) |                         |
| S-7016.H   | 508          | 606      | 25.4   | - 30°C<br>80            |
| AWS Spec.  | ≥ 400        | ≥ 490    | ≥ 22   | ≥ 27 at -30°C           |

### ❖ 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 |

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.



## **Weldability & Welding Efficiency Test**

### ❖ **Weldability**

| Item \ Division                  | 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) | Amp. (A)           | Welding speed (mm/min) | Position |
| S-7016.H<br>(4.0mm x 400) | ASTM A36      | 300 X 100 X12  | 170                | 200                    | Flat     |

### ❖ **Results of Deposition Efficiency Test**

| Consumable              | Deposition efficiency(%) |               |
|-------------------------|--------------------------|---------------|
|                         | For electrode            | For core wire |
| S-7016.H (4.0 mm x 400) | 63 ~ 66                  | 96 ~ 100      |

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## Diffusible Hydrogen Content

### ❖ *Welding Conditions*

|                    |             |                         |           |
|--------------------|-------------|-------------------------|-----------|
| consumable         | : S-7016.H  | Amp.(A) / Volts(V)      | : 170Amp. |
| Diameter(mm)       | : 4.0 x 400 | Stick-Out(mm)           | : 20~ 25  |
| Flow Rate(ℓ /min.) | : -         | Welding Speed           | : 60 CPM  |
| Welding Position   | : 1G        | Current Type & Polarity | : AC      |

### ❖ *Hydrogen Analysis Using Gas Chromatography Method*

|                         |              |                    |                |
|-------------------------|--------------|--------------------|----------------|
| Hydrogen Evolution Time | : 72 hrs     | Analysis Temp.     | : 25 °C        |
| Evolution Temp.         | : 25 °C      | Exposure Condition | : 80%RH- 25 °C |
| Barometric Pressure     | : 780 mm- Hg |                    |                |

### ❖ *Result (ml/100g Weld Metal)*

| X1  | X2  | X3  | X4  |
|-----|-----|-----|-----|
| 6.9 | 7.5 | 7.0 | 7.4 |

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



## Size Available and recommended Current & Approval

### ❖ Sizes Available and Recommended Current

| Diameter (mm)                               |                              | 2.6        | 3.2         | 4.0          | 5.0          | 6.0          |
|---|------------------------------|------------|-------------|--------------|--------------|--------------|
| Length (mm)                                 |                              | 350        | 350         | 400          | 400          | 450          |
| Recommended current range ( AC or DC+ Amp.) | Flat position                | 55<br>~ 85 | 90<br>~ 130 | 130<br>~ 180 | 180<br>~ 240 | 250<br>~ 310 |
|   | Vertical & Overhead position | 50<br>~ 80 | 80<br>~ 120 | 110<br>~ 170 | 150<br>~ 200 | -            |

### ❖ Authorized Approval Details

| Classification | Dia. (mm)    | Welding position | Grade          |             |             |      |       |       |             |
|----------------|--------------|------------------|----------------|-------------|-------------|------|-------|-------|-------------|
|                |              |                  | KR             | ABS         | LR          | BV   | DNV   | GL    | NK          |
| AWS            |              |                  |                |             |             |      |       |       |             |
| E7016          | 2.6<br>~ 5.0 | All              | 3H10,<br>3YH10 | 3H10,<br>3Y | 3,<br>3YH15 | 3YHH | 3YH10 | 3YH10 | KMW<br>53HH |
|                | 6.0          | Flat             |                |             |             |      |       |       |             |

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