HYUNDAI WELDING

Rev. 06

S-7018.1H

COVERED ARC WELDING ELECTRODE
FOR HIGHLY EFFICIENT WELDING
AND EXTRA LOW-HYDROGEN CONTENT

2021.05

HYUNDAI WELDING CO., LTD.

S-7018.1H

❖ Specification

AWS A5.1	**E7018-1 H4R**
JIS Z 3211	**E4918 H5**
EN ISO 2560-A	**E42 4 B 3 2 H5**

❖ Applications

Structures using 490MPa class high tensile steel, such as bridges, building, rolling stock and low temperature used for structures.

❖ Characteristics on Usage

S-7018.1H is an iron powder low hydrogen type electrode. Its coating contains much iron powder, which increasing working efficiency. Its usability is good with direct current applications and extra low-hydrogen electrode. (HDM < 4㎖/100g) .

❖ 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 blowholes at the arc starting.

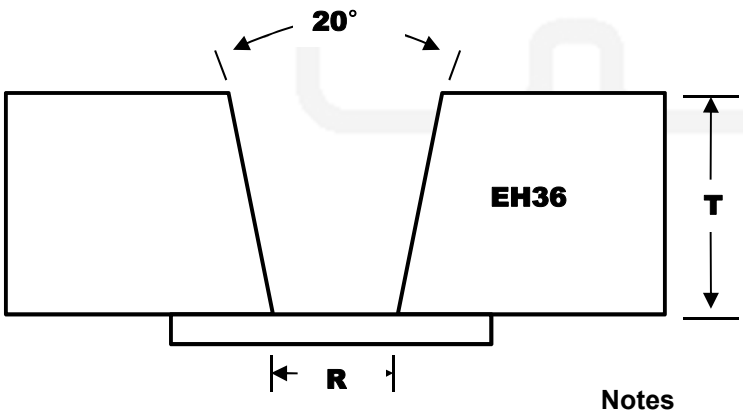
4. Use the wind screen against strong wind.

Mechanical properties & Chemical compositions of Deposited metal

❖ Welding Conditions

Measurement method	:	AWS A5.1
Diameter	:	3.2mm(1/8in) , 4.0mm(5/32in). 5.0mm(3/16in)
Welding position	:	Flat (1G-PA)
Welding Polarity	:	AC or DC+
Welding Current	:	3.2mm(1/8in) = 130~140Amp, 12passes – 6 layers 4 0mm(5/32in) = 170~180Amp, 16passes – 8 layers 5.0mm(3/16in) = 200~220Amp, 14passes – 6layres
Interpass Temp.	:	105~175℃ (221~347°F)
Test plate	:	EH36 (groove shape as below)

❖ Groove configuration



Notes

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

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

: 5.0mm ; T=20mm, R=19mm

Mechanical Properties & Chemical Compositions of All Weld Metal

❖ Mechanical properties of deposited metal in as-welded condition

Welding Polarity	Size mm(in)	Tensile Test Results			CVN Impact Test J (ft·lbs)
		YS MPa (lbs/in^2)	YS MPa (lbs/in^2)	EL (%)	-45℃(-49°F)
AC	3.2(1/8)	512(74,200)	574(83,200)	31.6	143(106)
	4.0(5/32)	534(77,400)	585(84,800)	30.0	128(94)
	5.0(3/16)	489(70,900)	562(81,500)	32.8	116(86)
AWS Spec.		≥ 400(58,000)	≥ 490(71,000)	≥ 22	≥ 27(20)

❖ Chemical compositions of deposited metal (wt%)

Welding Polarity	Size mm(in)	C	Si	Mn	P	S
AC	3.2(1/8)	0.06	0.39	1.25	0.012	0.006
	4.0(5/32)	0.06	0.42	1.31	0.014	0.007
	5.0(3/16)	0.07	0.39	1.28	0.013	0.004
AWS Spec.		≤0.15	≤0.75	≤1.60	≤0.035	≤0.035

Mechanical Properties & Chemical Compositions of All Weld Metal

❖ Mechanical properties of deposited metal in as-welded condition

Welding Polarity	Size mm(in)	Tensile Test Results			CVN Impact Test J (ft·lbs)
		YS MPa (lbs/in^2)	YS MPa (lbs/in^2)	EL (%)	-45℃(-49°F)
DCEP	3.2(1/8)	500(72,500)	557(80,800)	31.7	120(88)
	4.0(5/32)	502(72,800)	562(81,500)	30.4	127(93)
	5.0(3/16)	491(71,200)	542(78,600)	31.4	105(77)
AWS Spec.		≥ 400(58,000)	≥ 490(71,000)	≥ 22	≥ 27(20)

❖ Chemical compositions of deposited metal (wt%)

Welding Polarity	Size mm(in)	C	Si	Mn	P	S	Ni
DCEP	3.2(1/8)	0.06	0.40	1.21	0.014	0.008	0.225
	4.0(5/32)	0.06	0.43	1.24	0.011	0.008	0.238
	5.0(3/16)	0.06	0.36	1.19	0.013	0.007	0.220
AWS Spec.		≤0.15	≤0.75	≤1.60	≤0.035	≤0.035	≤0.305

Absorbed Moisture contents & Diffusible Hydrogen Content

❖ Absorbed Moisture contents

Measurement method : AWS A4.4

Diameter : 4.0mm(5/32in)

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 "E7018-1" : As-Received or Reconditioned (≤0.6%) / As-Exposed (N.S)

"E7018-1 H4R" : As-Received or Reconditioned (≤0.3%) / As-Exposed (≤0.4%)

Absorbed moisture contents (wt%)				
As-received	2hr	4hr	6hr	9hr
0.070	0.090	0.095	0.104	0.100

❖ Diffusible Hydrogen Content

Diameter : 4.0mm(5/32in)

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

Exposed time : 3~9 hours

Re-drying conditions : 350℃ X 1hr (662°F X 1hr)

Welding current : 170~180Amp, AC or DC+

Test method AWS A4.3 (Gas chromatography method)

Welding Polarity	Diffusible hydrogen content (ml/100g)				
	X1	X2	X3	X4	Ave.
AC	2.48	2.66	3.01	2.83	2.74
DCEP	3.06	2.55	2.24	2.49	2.59

Weldability & Welding Efficiency

❖ Weldability

Division 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-7018.1H (4.0 x 400 mm) (5/32 x 16 in)	ASTM A36	300 X 100 X12 (12 X 3.9 X 0.5)	170 (DC+)	200	1G-PA

❖ Results of Deposition Efficiency Test

Consumable	Deposition efficiency(%)	
	For electrode	For core wire
S-7018.1H 4.0 x 400 mm (5/32 x 16 in)	65 ~ 70	120 ~ 125

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/DC+ Amp.)	Flat (1G-PA)	60 ~90	90 ~140	130 ~190	180 ~240	250 ~300
	3G (PF) & 4G,5G (PE)	50 ~90	80 ~120	120 ~170	150 ~200	-

❖ Authorized Approval Details

Classification	Dia. mm(in)	Welding position	Grade				
AWS			ABS	LR	BV	DNV GL	CWB
E7018-1	2.6(3/32) ~ 5.0(3/16	All	4YH5	4YH5	4YHHH	4YH5	CSA W48-06 E4918-1 H4