

# **SC-110MAG**

FLUX CORED ARC WELDING CONSUMABLES  
for WELDING of MILD & 800MPa  
CLASS EXTRA HIGH TENSILE STEEL

2020.10



## ❖ Specification

<b>AWS A5.29</b>	E111T1-GM
<b>(AWS A5.29M)</b>	E761T1-GM)
<b>EN ISO 18276-A</b>	T 69 4 ZMn2NiMo P M21 1 H5

## ❖ Applications

Single and multi pass welding of high strength low alloy steel, such as HT-80 class steels.

## ❖ Characteristics on Usage

SC-110MAG is a titania type flux cored wire for all position welding with Ar+20%CO<sub>2</sub> shielding gas

## ❖ Note on Usage

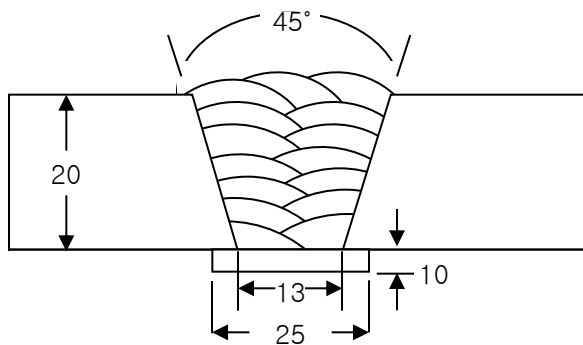
1. Proper preheating(50~180℃)(122~356°F) and inter pass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
2. One-side welding defects such as hot cracking may occur with wrong welding parameter such as high welding speed.
3. Use Ar+20%CO<sub>2</sub> gas.



## Mechanical Properties & Chemical Composition of All Weld Metal

### ❖ Welding Conditions

Method by AWS A5.29



Unit : mm  
[ Joint Preparation & Layer Details ]

<b>Welding Position</b>	: 1G(PA)
<b>Diameter</b>	: 1.0mm (0.039in)
<b>Shielding Gas</b>	: Ar+20%CO <sub>2</sub>
<b>Flow Rate</b>	: 20 ℓ /min
<b>Amp./ Volt.</b>	: 230~240A / 28~29V
<b>Stick-Out</b>	: 20~25mm (0.79~0.98in)
<b>Pre-Heat</b>	: Refer to 'Recommended
<b>Interpass Temp.</b>	: Preheating & Inter pass'
<b>Polarity</b>	: DC(+)

### ❖ Mechanical Properties of the weld metal

Consumable	Tensile Test			CVN Impact Test J(ft · lbs)
SC-110MAG	YS MPa (lbs/in <sup>2</sup> )	TS MPa (lbs/in <sup>2</sup> )	EL (%)	-40℃ (-40°F)
	748 (108,500)	792 (114,800)	22.2	76 (56)
AWS A5.29 E111T1-GM	≥ 680 (98,000)	760~900 (110,000~ 130,000)	≥ 15	Not Specified

### ❖ Chemical Analysis of the weld metal(wt%)

	C	Si	Mn <sup>a</sup>	P	S	Ni <sup>a</sup>	Cr <sup>a</sup>	Mo <sup>a</sup>	V <sup>a</sup>
SC-110MAG	0.062	0.32	1.86	0.004	0.002	2.36	0.02	0.27	0.01
AWS A5.29	-	≤1.00	≥0.50	≤0.030	≤0.030	≥0.50	≥0.30	≥0.20	≥0.10

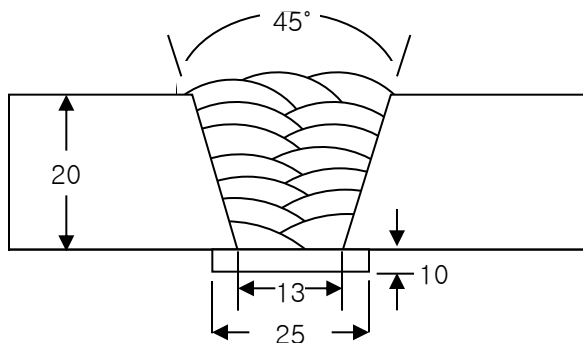
\*a: The electrode shall have not less than the minimum specified for one or more



## Mechanical Properties & Chemical Composition of All Weld Metal

### ❖ Welding Conditions

Method by AWS A5.29



Unit : mm  
[ Joint Preparation & Layer Details ]

<b>Welding Position</b>	: 1G(PA)
<b>Diameter</b>	: 1.2mm (0.045in)
<b>Shielding Gas</b>	: Ar+20%CO <sub>2</sub>
<b>Flow Rate</b>	: 20 ℓ /min
<b>Amp./ Volt.</b>	: 270~280A / 29~30V
<b>Stick-Out</b>	: 20~25mm (0.79~0.98in)
<b>Pre-Heat</b>	: Refer to 'Recommended
<b>Interpass Temp.</b>	: Preheating & Inter pass'
<b>Polarity</b>	: DC(+)

### ❖ Mechanical Properties of the weld metal

Consumable	Tensile Test			CVN Impact Test J(ft · lbs)
SC-110MAG	YS MPa (lbs/in <sup>2</sup> )	TS MPa (lbs/in <sup>2</sup> )	EL (%)	-40℃ (-40°F)
	799 (115,900)	832 (120,600)	19.6	67 (49)
<b>AWS A5.29 E111T1-GM</b>	≥ 680 (98,000)	760~900 (110,000~ 130,000)	≥ 15	<b>Not Specified</b>

### ❖ Chemical Analysis of the weld metal(wt%)

	C	Si	Mn <sup>a</sup>	P	S	Ni <sup>a</sup>	Cr <sup>a</sup>	Mo <sup>a</sup>	V <sup>a</sup>
SC-110MAG	0.059	0.34	1.81	0.004	0.003	2.35	0.02	0.27	0.01
AWS A5.29	—	≤1.00	≥0.50	≤0.030	≤0.030	≥0.50	≥0.30	≥0.20	≥0.10

\*a: The electrode shall have not less than the minimum specified for one or more



## Diffusible Hydrogen Content

### ❖ Welding Conditions

Diameter	: 1.2mm (0.045in)	Amps(A) / Volts(V)	: 240A / 26V
Shielding Gas	: Ar+20%CO <sub>2</sub>	Stick-Out	: 20~25mm (0.79~0.98in)
Flow Rate	: 20 ℓ /min	Welding Speed	: 30 cm/min (12 in/min)
Welding Position	: 1G (PA)	Current Type & Polarity	: DC(+)

### ❖ Hydrogen Analysis Using Gas Chromatograph Method

Hydrogen Evolution Time	: 72 hrs
Evolution Temp.	: 45 °C (113°F)
Barometric Pressure	: 780 mm-Hg

### ❖ Result(ml/100g Weld Metal)

X1	X2	X3	X4
2.6	2.9	2.7	3.0

**Average Hydrogen Content** **2.8 ml / 100g Weld Metal**

## Recommended Preheating & Inter pass Temp

Thickness of plate (mm, in)	Preheating Temp(°C, °F)
< 10 (0.39)	> 20 (68)
> 10~20 (0.39~0.79)	> 65 (149)
> 20~40 (0.79~1.57)	> 110 (230)
> 40 (1.57)	> 150 (302)

❖ The purpose of this guide is to avoid cold cracking (by AWS D 1.1/D1.1M:2010, ANNEX I)

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.



## Welding Efficiency

### ❖ Deposition Rate & Efficiency

Consumable (size)	Welding Conditions		Wire Feed Speed m/min (in/min)	Deposition Efficiency %	Deposition Rate kg/hr(lb/hr)
	Amp.(A)	Volt.(V)			
SC-110MAG  1.0mm (0.039in)	140	20	10.8 (430)	83~87	2.0 (4.4)
	190	24	14.0 (550)	85~88	3.5 (7.7)
	240	28	17.3 (680)	86~88	4.2 (9.3)
SC-110MAG  1.2mm (0.045in)	170	21	9.2 (360)	84~88	2.2 (4.8)
	220	25	10.8 (430)	86~88	3.8 (8.4)
	270	29	14.0 (550)	86~89	4.7 (10.3)
Remark				Deposition efficiency =(Deposited metal weight/ Wire weight used)×100	Deposition rate =(Deposited metal weight/ Welding time,min.)×60

\* Shielding Gas : Ar+20%CO<sub>2</sub>



## Proper Welding Condition

### ❖ Welding Conditions

Consumables	Shielding Gas	Welding Position	Wire Dia.	
			1.0mm (0.039in)	1.2mm (0.045in)
SC-110MAG	Ar+20%CO <sub>2</sub>	F & H-F	120~240	140~270
		V-up, OH	120~200	140~240
		V-down	160~240	180~270

### ❖ F No & A No

F No	A No
6	10

### **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*