

# **S – 2209.16**

SHIELDED METAL ARC WELDING CONSUMABLE  
FOR WELDING OF DUPLEX STAINLESS STEEL

2020.12

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**HYUNDAI WELDING CO., LTD.**



## ❖ Specification

<b>AWS A5.4</b>	E2209-16
<b>JIS Z 3221</b>	ES2209-16
<b>EN ISO 3851-A</b>	E 22 9 3 N L

## ❖ Applications

Welding of UNS S31803, S32205  
(Independent water power plant)

## ❖ Characteristics on Usage

1. Weld metal has 30~60% ferrite contents
2. Due to the high chromium contents, corrosion resistance is excellent in most environments(chloride environment)
3. Superior pitting resistance(PREN  $\geq$ 34)

## ❖ Type of Current

AC or DC+

## ❖ Packing

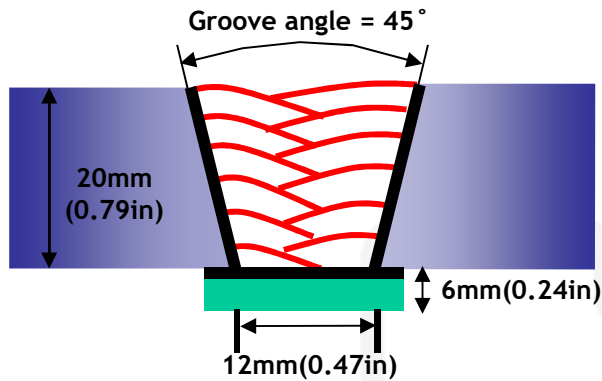
<b>Packet</b>	2.5kg(5.5lbs)
<b>Carton</b>	2.5kg(5.5lbs) X 4 : 10kg(22lbs)



## Mechanical Properties & Chemical Composition of All Weld Metal

### ❖ Welding Conditions

Method by AWS Spec.



Diameter	: 4.0mm(5/32in)
Amp./ Volt.	: 140/25
Travel speed	: 13~18(Cm/min)
Pre-Heat	: R.T .
Interpass Temp.	: 150±15°C(302±59°F)
Position	: Flat
Polarity	: AC or DC+

[ Joint Preparation & Layer Details ]

### ❖ Mechanical Properties of All weld metal

Consumable	Tensile Test		CVN Impact Test Joule(ft·lbs)	
	TS MPa (lbs/in <sup>2</sup> )	El(%)	-20°C(-4°F)	-50°C(-58°F)
S-2209.16	830(120,000)	28.0	50(37)	45(33)
AWS A5.4 E2209-XX	≥690(100,000)	≥ 20	Not Specified	

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

Consumable	Chemical Composition (%)										PREN
	C	Si	Mn	P	S	Ni	Cr	Mo	Cu	N2	
S-2209.16	0.029	0.78	1.03	0.028	0.012	9.2	23.1	3.1	0.093	0.12	35.3
AWS A5.4 E2209-XX	≤0.04	≤1.0	0.5 ~2.0	≤0.04	≤0.03	8.5 ~10.5	21.5 ~23.5	2.5 ~3.5	≤0.75	0.08 ~0.20	-

(PRE=Cr+3.3xMo+16xN)

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## Mechanical Properties & Chemical Composition of All Weld Metal

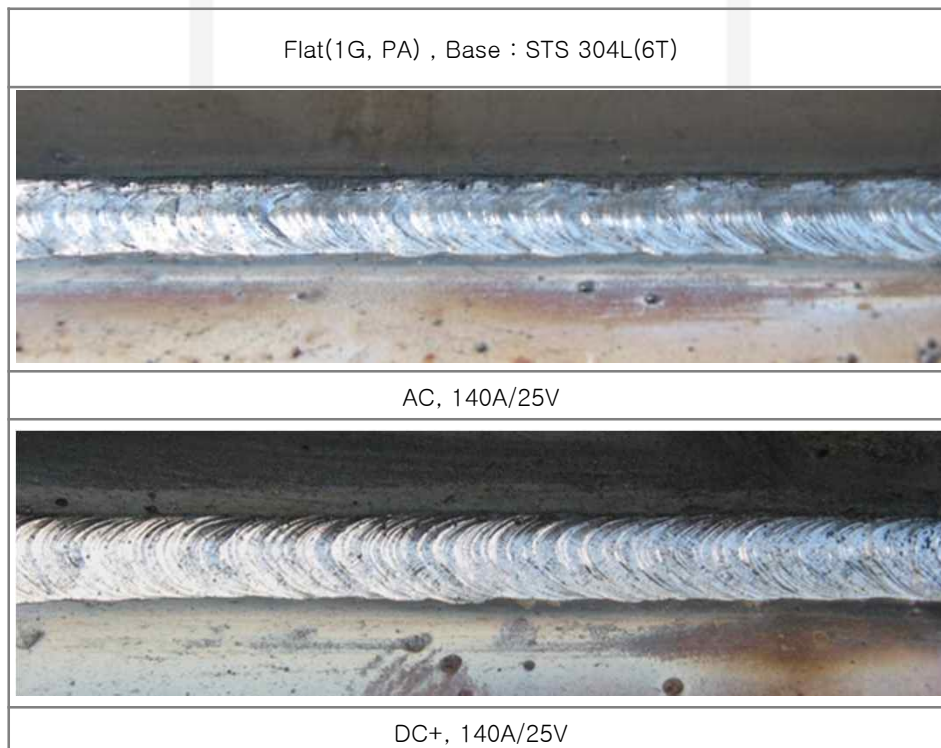
### ❖ δ – Ferrite No.

Consumable	Diagram			
	Schaeffler	Delong	WRC(1992)	FERITSCOPE MP-30 (FISCHER)
S-2209.16	60.2	35.5	58.5	40~42

### ❖ Radiographic test

Consumable	Specification	Accepted	Rejected
S-2209.16	ASME SEC II Part.C	○	

### ❖ Bead Appearance



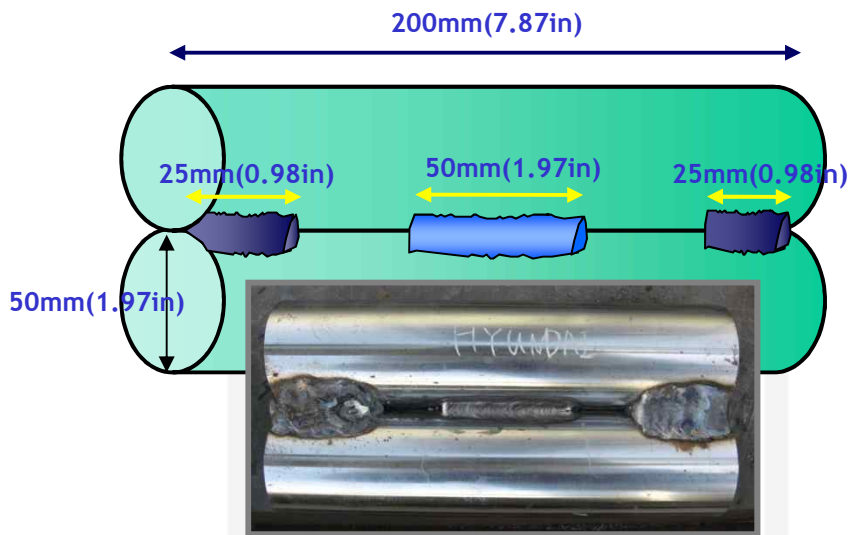
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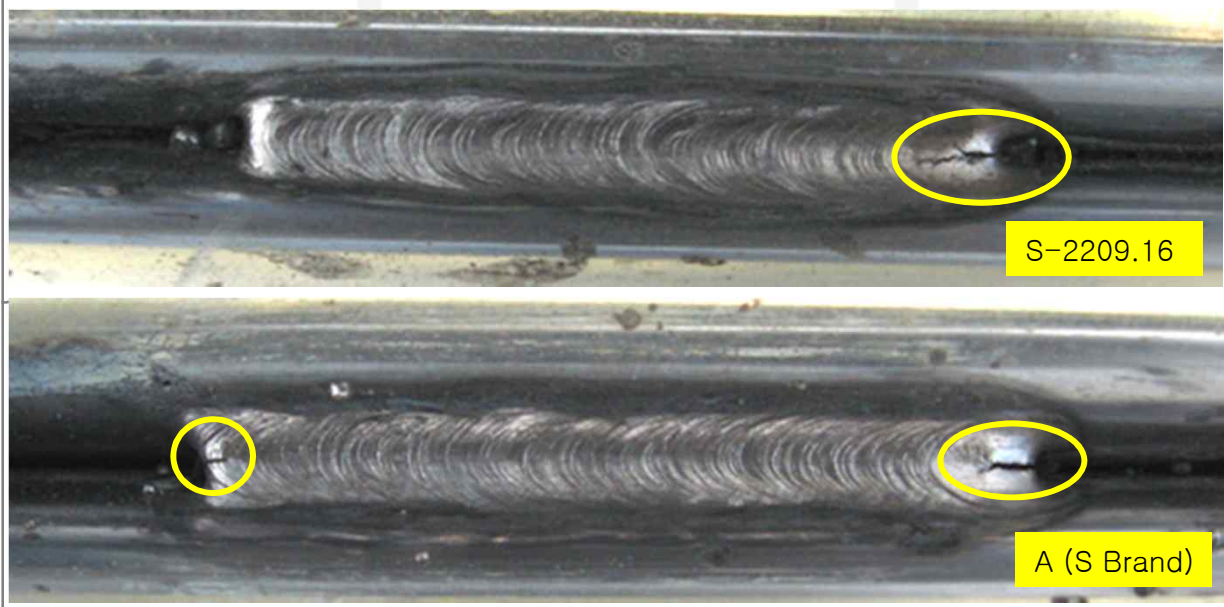
## Mechanical Properties & Chemical Composition of All Weld Metal

### ❖ Bar Type Cracking test

Test Condition [Spec.: KS B 0860] , Bar : S45C 50 φ ,Current : AC 120A



Bead appearance



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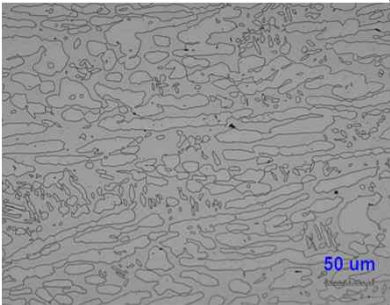
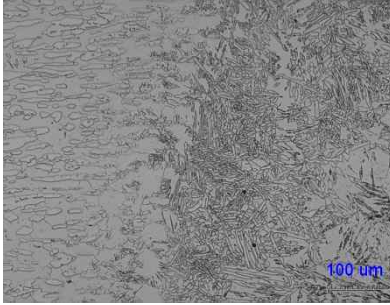
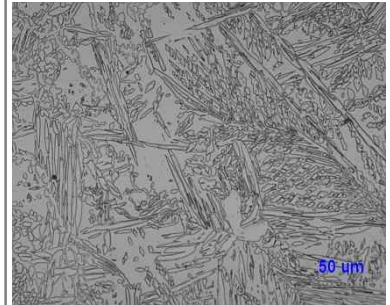


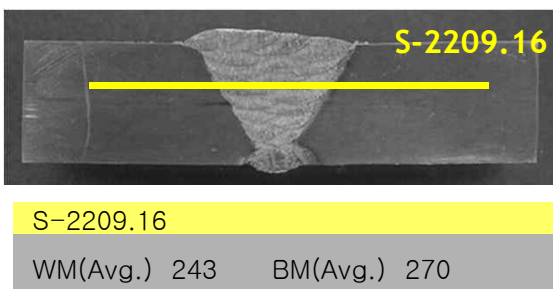
## Mechanical Properties & Chemical Composition of All Weld Metal

### ❖ Pitting Corrosion test(ASTM A48G Method A)

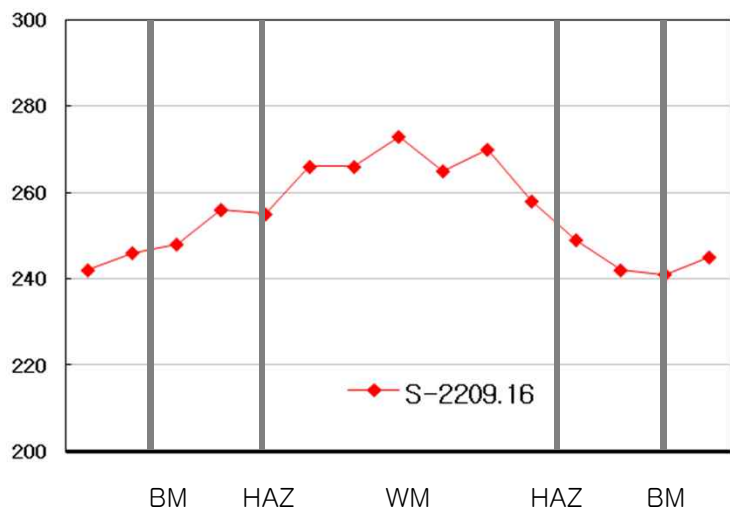
consumable	weight (g)		Weight loss (g)	Remark (Pitting O/X)
	Before	After		
S-2209.16	95.7401	95.7399	0.0002	No Pitting.

### ❖ Micro Structure and Vickers Hardness Test

Consumable	Base Metal	HAZ	Weld Metal
S-2209.16			



Hv : 10kg load



※ BM : Base Metal    HAZ : Heat Affect Zone    WM : Weld Metal

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