

# SC-81BF

FLUX CORED ARC WELDING CONSUMABLE  
FOR WELDING OF 550MPa CLASS HIGH TENSILE STEEL

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**HYUNDAI WELDING CO., LTD.**



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## ❖ Specification

**AWS A5.36**

E81T1-C1A4-Ni1

E81T1-M21A4-Ni1

**EN ISO 17632-A**

T 46 4 1Ni P C1 1 H5

T 46 4 1Ni P M21 1 H5

## ❖ Applications

All position welding of ship hulls, vehicles, bridges, chemical plant machinery and other metal fabrication

## ❖ Characteristics on Usage

SC-81BF is an all position flux cored wire designed for 100% CO<sub>2</sub> shielding gas or Ar-20~25% CO<sub>2</sub> shielding gas. You can get smooth arc, and low spatter, good weldability. The weld metal impact values at -40°C (-40°F) is excellent and has good bead appearance, slag covering is uniform and easy to remove.

## ❖ Note on Usage

1. Proper preheating(50~150 °C (150~302 °F)) and interpass 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. Use 100% CO<sub>2</sub> or Ar+20~25% CO<sub>2</sub> gas.

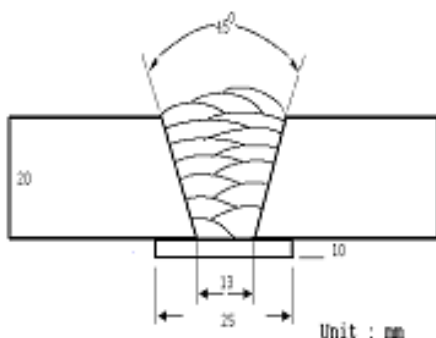


**SC-81BF**

## Mechanical Properties & Chemical Composition of All Weld Metal

### ❖ Welding Conditions

Method by AWS Spec.



[ Joint Preparation & Layer Details ]

|                     |                                                |
|---------------------|------------------------------------------------|
| Welding Position    | : 1G(PA)                                       |
| Diameter            | : 1.2mm(0.045in)                               |
| Shielding Gas       | : 100%CO <sub>2</sub><br>Ar+20%CO <sub>2</sub> |
| Amp./ Volt.         | : 270~280 / 29~31                              |
| Stick-Out           | : 20~25mm (0.79~0.98in)                        |
| Pre-Heat(°C)        | : R.T .                                        |
| Interpass Temp.(°C) | : 150±15 (302±59 °F)                           |

### ❖ Mechanical Properties of all weld metal

| Consumable                       | Shield gas            | Tensile Test                    |                                  |       | CVN Impact Test<br>J(ft·lbs) |
|----------------------------------|-----------------------|---------------------------------|----------------------------------|-------|------------------------------|
|                                  |                       | YS<br>MPa(lbs/in <sup>2</sup> ) | TS<br>MPa((lbs/in <sup>2</sup> ) | EL(%) | -40°C (-40°F)                |
| SC-81BF                          | 100% CO <sub>2</sub>  | 505 (73,000)                    | 560 (81,000)                     | 31.0  | 95(70)                       |
|                                  | Ar+20%CO <sub>2</sub> | 580 (84,000)                    | 640 (93,000)                     | 28.5  | 105(77)                      |
| AWS A5.36<br>E81T1-C1(M21)A4-Ni1 |                       | ≥ 470<br>(68,200)               | 550~690<br>(79,800~100,000)      | ≥ 19  | ≥ 27(20)<br>at -40°C (-40°F) |

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

| Consumable                       | Shield gas            | C      | Si     | Mn     | P      | S      | Ni      | B     |
|----------------------------------|-----------------------|--------|--------|--------|--------|--------|---------|-------|
| SC-81BF                          | 100% CO <sub>2</sub>  | 0.040  | 0.38   | 0.98   | 0.007  | 0.005  | 0.85    | 0.004 |
|                                  | Ar+20%CO <sub>2</sub> | 0.045  | 0.50   | 1.15   | 0.007  | 0.005  | 0.83    | 0.004 |
| AWS A5.36<br>E81T1-C1(M21)A4-Ni1 |                       | ≤ 0.12 | ≤ 0.80 | ≤ 1.75 | ≤ 0.03 | ≤ 0.03 | 0.8~1.1 | —     |

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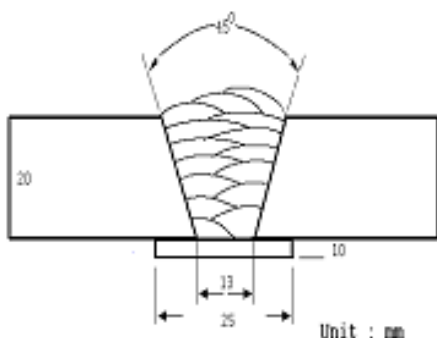


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## Mechanical Properties & Chemical Composition of All Weld Metal

### ❖ Welding Conditions

Method by AWS Spec.



[ Joint Preparation & Layer Details ]

|                    |                                                |
|--------------------|------------------------------------------------|
| Welding Position   | : 1G(PA)                                       |
| Diameter           | : 1.6mm(1/16 in)                               |
| Shielding Gas      | : 100%CO <sub>2</sub><br>Ar+20%CO <sub>2</sub> |
| Amp./ Volt.        | : 320~330 /30~32                               |
| Stick-Out          | : 20~25mm (0.79~0.98in)                        |
| Pre-Heat(℃)        | : R.T .                                        |
| Interpass Temp.(℃) | : 150±15 (302±59 ℃)                            |

### ❖ Mechanical Properties of all weld metal

| Consumable                       | Shield gas            | Tensile Test                    |                                  |       | CVN Impact Test<br>J(ft·lbs) |
|----------------------------------|-----------------------|---------------------------------|----------------------------------|-------|------------------------------|
|                                  |                       | YS<br>MPa(lbs/in <sup>2</sup> ) | TS<br>MPa((lbs/in <sup>2</sup> ) | EL(%) | -40℃ (-40°F)                 |
| SC-81BF                          | 100% CO <sub>2</sub>  | 510 (74,000)                    | 570 (83,000)                     | 30.0  | 90(66)                       |
|                                  | Ar+20%CO <sub>2</sub> | 590 (86,000)                    | 650 (94,000)                     | 27.5  | 100(74)                      |
| AWS A5.36<br>E81T1-C1(M21)A4-Ni1 |                       | ≥470<br>(68,200)                | 550~690<br>(79,800~100,000)      | ≥ 19  | ≥27(20)<br>at -40℃ (-40°F)   |

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

| Consumable                       | Shield gas            | C     | Si    | Mn    | P     | S     | Ni      | B     |
|----------------------------------|-----------------------|-------|-------|-------|-------|-------|---------|-------|
| SC-81BF                          | 100% CO <sub>2</sub>  | 0.040 | 0.40  | 1.00  | 0.007 | 0.005 | 0.86    | 0.004 |
|                                  | Ar+20%CO <sub>2</sub> | 0.045 | 0.51  | 1.16  | 0.007 | 0.005 | 0.85    | 0.004 |
| AWS A5.36<br>E81T1-C1(M21)A4-Ni1 |                       | ≤0.12 | ≤0.80 | ≤1.75 | ≤0.03 | ≤0.03 | 0.8~1.1 | -     |

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## Welding Efficiency

### ❖ Deposition Rate & Efficiency

| Consumable<br>(size) | Shield<br>Gas             | Welding<br>Conditions |              | Wire Feed<br>Speed<br>m/min<br>(in/min) | Deposition<br>Efficiency(%)                                                          | Deposition<br>Rate<br>kg/hr(lb/hr)                                           |
|----------------------|---------------------------|-----------------------|--------------|-----------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
|                      |                           | Amp.<br>(A)           | Volt.<br>(V) |                                         |                                                                                      |                                                                              |
| 1.2mm<br>(0.045in)   | 100%CO <sub>2</sub>       | 200                   | 25           | 10.2(400)                               | 86~88                                                                                | 3.0(6.6)                                                                     |
|                      |                           | 250                   | 27           | 13.3(525)                               | 87~88                                                                                | 4.0(8.8)                                                                     |
|                      |                           | 300                   | 31           | 15.3(600)                               | 88~89                                                                                | 5.5(12.1)                                                                    |
|                      | Ar+<br>20%CO <sub>2</sub> | 200                   | 26           | 10.2(400)                               | 87~89                                                                                | 3.0(6.6)                                                                     |
|                      |                           | 250                   | 28           | 13.3(525)                               | 88~89                                                                                | 4.1(9.0)                                                                     |
|                      |                           | 300                   | 32           | 15.3(600)                               | 88~90                                                                                | 5.6(12.3)                                                                    |
| 1.6mm<br>(1/16 in)   | 100%CO <sub>2</sub>       | 280                   | 30           | 6.4 (250)                               | 85~87                                                                                | 3.8(8.4)                                                                     |
|                      |                           | 330                   | 32           | 7.6 (300)                               | 85~88                                                                                | 4.4(9.7)                                                                     |
|                      |                           | 350                   | 33           | 8.1 (320)                               | 86~88                                                                                | 5.3(11.7)                                                                    |
|                      | Ar+<br>20%CO <sub>2</sub> | 280                   | 31           | 6.4 (250)                               | 86~88                                                                                | 3.9(8.6)                                                                     |
|                      |                           | 330                   | 33           | 7.6 (300)                               | 86~89                                                                                | 4.5(9.9)                                                                     |
|                      |                           | 350                   | 34           | 8.1 (320)                               | 87~89                                                                                | 5.4(11.9)                                                                    |
| Remark               |                           |                       |              | -                                       | Deposition<br>efficiency<br>=(Deposited metal<br>weight/<br>Wire weight<br>used)×100 | Deposition rate<br>=(Deposited<br>metal weight/<br>Welding time,<br>min.)×60 |

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## Diffusible Hydrogen Content

### ❖ Welding Conditions

|                    |                                                |                    |                              |
|--------------------|------------------------------------------------|--------------------|------------------------------|
| Diameter(mm)       | : 1.6mm(1/16in)                                | Amps(A) / Volts(V) | : 310A / 29~30V              |
| Shielding Gas      | : 100%CO <sub>2</sub><br>Ar+20%CO <sub>2</sub> | Stick-Out(mm)      | : 20mm(0.79in)               |
| Flow Rate(ℓ /min.) | : 20                                           | Welding Speed      | : 35 cm/min<br>(13.8 in/min) |
| Welding Position   | : 1G(PA)                                       | Current Polarity   | : DC(+)                      |

### ❖ Diffusible Hydrogen Test Using Gas Chromatography Method

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

### ❖ Result(ml/100g Weld Metal)

| Shield gas             | X1  | X2  | X3  | X4  | Avg. |
|------------------------|-----|-----|-----|-----|------|
| Ar+20% CO <sub>2</sub> | 3.6 | 3.8 | 3.8 | 3.9 | 3.8  |
| 100%CO <sub>2</sub>    | 3.1 | 3.2 | 3.3 | 3.3 | 3.2  |

**Average Diffusible Hydrogen Content 3.8 ml / 100g Weld Metal(Ar+20%CO<sub>2</sub>)**

**Average Diffusible Hydrogen Content 3.2 ml / 100g Weld Metal(100%CO<sub>2</sub>)**

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**SC-81BF****❖ Proper Current Range**

| Consumable         | Shielding Gas                                | Welding Position | Current     |
|--------------------|----------------------------------------------|------------------|-------------|
| 1.2mm<br>(0.045in) | 100%CO <sub>2</sub><br>Ar+20%CO <sub>2</sub> | Flat             | 140~300 Amp |
|                    |                                              | V-up<br>Overhead | 140~260 Amp |
|                    |                                              | V-down           | 140~300 Amp |
| 1.6mm<br>(1/16 in) | 100%CO <sub>2</sub><br>Ar+20%CO <sub>2</sub> | Flat             | 180~350 Amp |
|                    |                                              | V-up<br>Overhead | 180~310 Amp |
|                    |                                              | V-down           | 180~350 Amp |

**❖ F No. & A No.**

| F-No. | A-No. |
|-------|-------|
| 6     | 10    |

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