

## Guideline for Welding Stainless Steel with GFW Wires

### ● Characteristics

GFW wires are electrodes consisting of a stainless steel sheath and flux consisting with mineral and metal powder. They provide good arc stability, produce welds with beautiful bead appearance, and enable joining and overlay welding of stainless steel with ease and at high efficiency.

#### <Wire diameter and power source>

0.8 mm, 0.9 mm, 1.2 mm, and 1.6 mm of wire diameter are available. Constant potential DC power source such as MAG and MIG power source is applicable. It is noted that pulsed power source is not suitable for FCA welding.

#### <Deposition rate and efficiency>

As shown in Fig.1, deposition rate is high and the deposition efficiency is as high as 90%. Therefore, GFW wires provide higher efficiency in joint and overlay welding compared with SMAW.

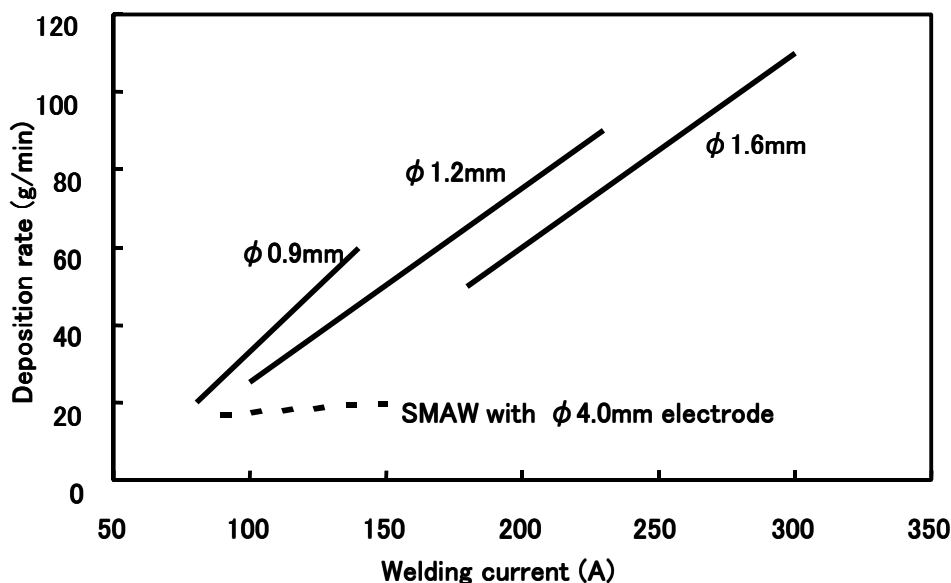


Fig.1 Welding current and deposition rate

#### <Shielding gas>

Recommended shielding gas is CO<sub>2</sub> or Ar-20%CO<sub>2</sub> (more than 20%CO<sub>2</sub>). Please refer to the page of each brand.

When CO<sub>2</sub> is used as shielding gas, metal transfer becomes globular and provides deep penetration and good wettability to the sidewall of weld pool, which minimize the weld defects such as the lack of fusion or slag inclusions. Moreover air cooled light torch is available in long time welding operation. On the other hand, Ar-20%CO<sub>2</sub> shielding provides metal transfer like spray arc, provides less spatter than CO<sub>2</sub> shielding.

<Welding positions>

Welding in flat position, horizontal position, and vertical position is possible. However, the 1.6 mm wire is limited to flat or horizontal welding. For positional welding, AP series wires are preferable. Please see “GFW AP Series”.

<Welding conditions>

As shown in Fig.2, because of a wide range of welding currents and voltages, it is easy to set up welding conditions and can apply various thickness plate.

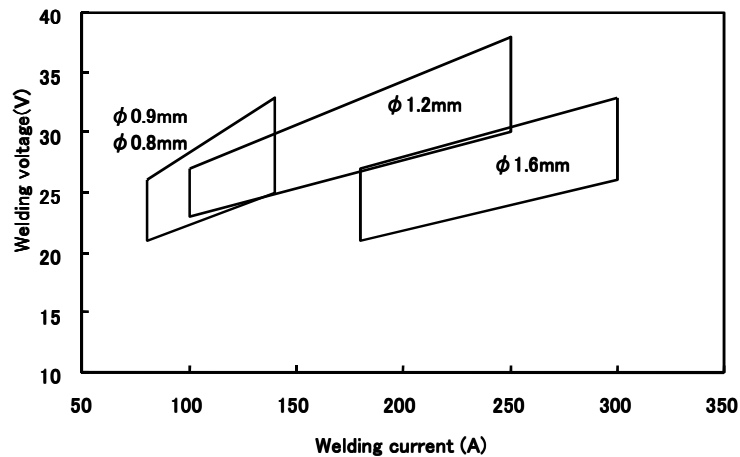


Fig.2 Recommended welding conditions

<Bead appearance>

As GFW wire produces a smooth weld with thin and easy removable slag, there is little post weld cleaning required. Multi-pass welding is easy and there are minimal defects such as porosity, slag inclusions or lack of fusion.

<Standard packing style and unit weight>

Spool	12.5 kg (1.2mm and 1.6 mm) 5.0 kg (0.8mm and 0.9 mm)
Pail-pack	150 kg (1.2mm)

#### ●Notes on Usage

##### <Torch positioning>

To control weld pool properly and promote defect free sidewall fusion, trailing torch is preferable. In horizontal fillet welding, please refer the torch positioning shown in Fig.3.

##### <Overlay welding>

In overlay welding with GFW wire on carbon steel, welding parameters varies dilution rate of weld metal with base metal, as shown in Fig.4 and Fig.5. Generally speaking, properties of Type309, frequently used for 1st layer of overlay welding, weld metal overlayed on carbon steel is affected by dilution rate, excess dilution provides hot cracking or hardening by martensite formation, too little dilution results only slag inclusion or lack of fusion but embrittlement of weld metal in severe PWHT condition. So, set up welding parameters which provide 20~30% dilution rate. Dilution rate is varied with torch position, keep constant welding parameter and torch position to keep constant dilution.

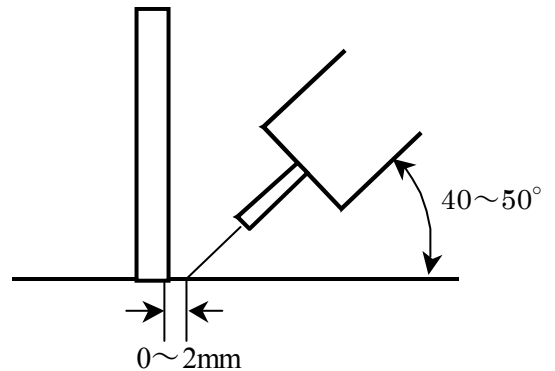
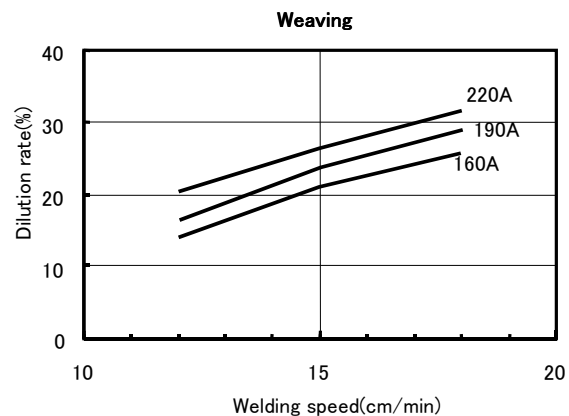
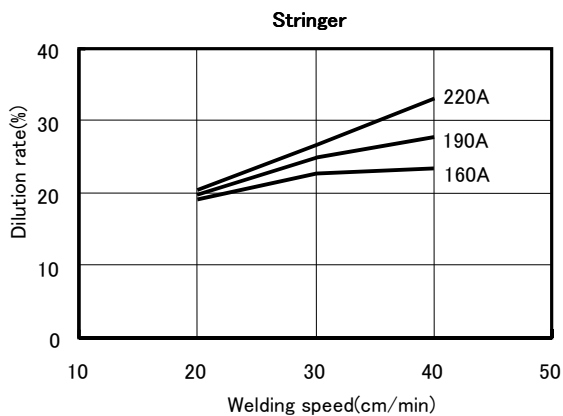


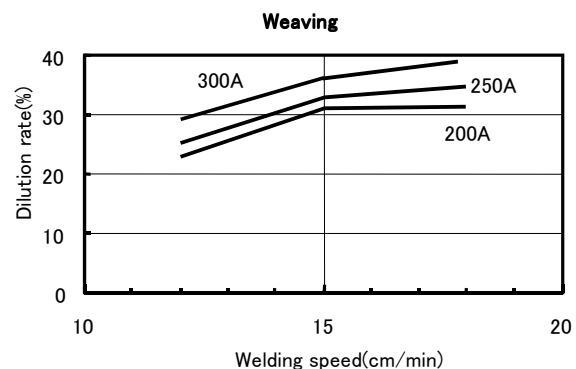
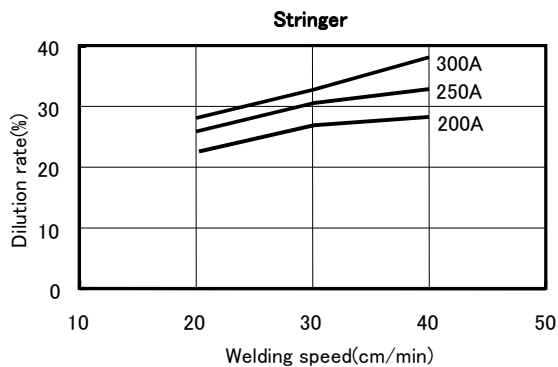
Fig.3 Torch positioning in horizontal fillet welding



Wire position : tow of previous bead

Oscillate width : 10mm, Oscillate cycle : 0.75Hz

Fig. 4 Variation of dilution rate with welding parameters (wire diameter : 1.2mm)



Wire position : tow of previous bead

Oscillate width : 10mm, Oscillate cycle : 0.75Hz

Fig. 5 Variation of dilution rate with welding parameters (wire diameter : 1.6mm)

#### <Groove>

Keep dry and remove scale, rust and organic such as oil, greases and paints from groove before welding. Also, do not apply the spatter-guard on welding groove.

#### <Shielding gas>

Too little or excess flow rate of shielding gas cause weld defects such as blowholes. Control the flow rate of shielding gas at 20 to 25L/min for 1.6 mm and 1.2 mm diameter and 15 to 20L/min for 0.9 mm and 0.8 mm diameter. Wind decreases shielding effect and permits nitrogen mixing in molten pool. So it is afraid of hot cracking or other defects such as blowholes in weld metal. Provide a proper protection measure against the wind in windy condition.

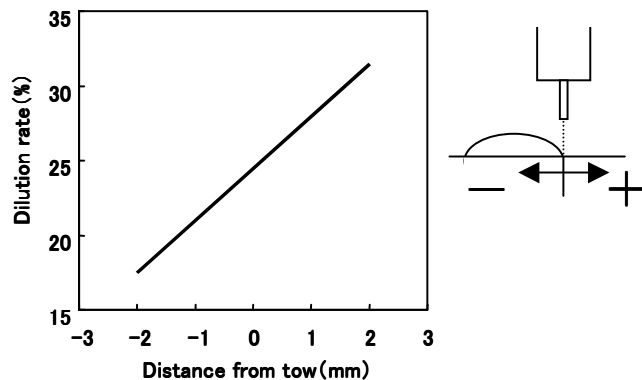


Fig.6 Variation of dilution rate with torch position

#### <Fume>

Because of higher deposition rate, GFW wires generate more fumes than covered electrodes do. For this reason, wear a dust respirator and use enough ventilation to keep fumes away from breathing zone.

Before using, read and understand the safety data sheet (SDS) for the wire to be used.

#### <Storage>

GFW wires do not adsorb moisture as much as covered electrodes do. However, storage for a long time in hot and humid environment or dew condensation on the wire surface caused weld defects such as blowhole. Keep the wire storage situation in dry condition.