

MAGNA 395 AC-DC

Magna 395 is a special alloy engineered for the welding and repair of Duplex Stainless Steels. The deposits provided by Magna 395 are stress corrosion crack-resistant, resistant to general crevice and pitting corrosion and virtually immune to intergranular corrosion. Magna 395 also features good saltwater corrosion resistance in addition to high tensile strength and good weldability.

BACKGROUND

Duplex stainless steels' microstructures are part austenite and part ferrite. In wrought or cast duplex stainless steels, the microstructure is usually the result of heat treatment in the range 1900° to 2100°F (1037° to 1148°C))

As cast, they contain approximately 80%-plus ferrite, a small amount of austenite and intermetallic compounds of the "sigma" and/or "chi" phases. Under rapid cooling (e.g. water quench) from its heat treatment temperature, new intermetallic compound formation is prevented and a room temperature microstructure of between 40-60% ferrite and the balance being austenite is obtained.

Duplex stainless steels, during slow cooling or holding in the temperature range 1000° to 1700°F (537° to 926°C) undergo metallurgical damage known as "885°F (475°C) embrittlement". This is caused by precipitation of chromium-rich ferrite (alpha prime) within the iron-rich ferrite. Even properly heat-treated duplex stainless lose toughness below -50°C (-45°F) due to the ferrite phase undergoing a ductile-to-brittle fracture transition with declining temperature.

Therefore, duplex stainless steels generally have a useful service temperature of -50°F to 500°F (-45°C to 260°C). They are also often alloyed with nitrogen and molybdenum to improve pitting and crevice corrosion resistance.

ADVANTAGES OF DUPLEX S.S.

Duplex stainless steels combine some of the better features of austenitic and ferritic stainless steels, such as higher strength (usually more than twice the

yield strength) and dramatically better resistance to stress corrosion cracking in chloride solutions.

Due to these advantages, Duplex S.S. is extensively used in heat exchanger tubings, oil equipment tubing and piping, on off-shore platforms, gas wells, line pipe, cast pump and valve bodies and fittings used for handling seawater and sour gas or oil.

They are also used in the chemical processing industry since Duplex S.S. offers chloride pitting and crevice resistance as good as grade 317L stainless, coupled with better stress corrosion cracking than 304L or 316L stainless.

Magna 395 has been engineered to effectively weld and repair Duplex Stainless Steels rapidly and with weld integrity superior to virtually any other alloy for such specialised base metals.

Magna 395 will successfully weld and repair the following Duplex S.S. types:

Standard No.	DIN Abbreviation	
1.4417	X2 CrNiMoSi	19 5
1.4460	X3 CrNiMo	26 5
1.4462	X2 CrNiMoN	22 5
1.4463	GX6 CrNiMo	24 8 2
1.4582	X4 CrNiMoNb	25 7

plus the following UNS Specification Duplex S.S.:

S31200
S31500
S31803
S32900

MECHANICAL PROPERTIES:

Tensile Strength : 110,000 p.s.i. (75kg/mm²)
Yield Strength : 80,000 p.s.i. (55kg/mm²)
Elongation : 25%
Impact : 45 ft.-lbs. (60 joules)

APPLICATION

Magna 395 can be applied using either AC current or DC reverse polarity. Surfaces should be cleaned and properly degreased.

Weldability with Magna 395 is good and it is suggested adopting procedures that ensure an acceptable phase balance in both the weld metal and the Heat Affected Zone (HAZ). In general, higher heat input is recommended.

Pre-Heating, although not generally considered necessary, can assist in achieving the desired HAZ microstructure.

RECOMMENDED AMPERAGES:

Metric	Imperial	Gauge	Welding Machine Setting
2.4mm	3/32"	12	75-85 amps
3.2mm	1/8"	10	105-115 amps