G-TECH 2209

SMAW

DUPLEX - SUPERDUPLEX
2209

DESCRIPTION

Rutile-basic coated electrode for Duplex 22%Cr stainless steels

These alloys are finding widening application in the offshore oil/gas, chemical and petro-chemical process industries for their good resistance to stress corrosion cracking and pitting corrosion with typical pitting resistance equivalent number (PREN) of 35-36. Its rutile-basic coating ensures an excellent combination of welding performance in all positions, except for vertical down, and a high resistance to cracking providing smooth arc transfer. The weld metal poses a high tensile and yield strength and shows a “duplex” microstructures consisting of an austenite-ferrite matrix.

SPECIFICATIONS

EN ISO 3581-A	E 22 9 3 N L R 12	**AWS A5.4**	E2209-16
Shielding	-	**Positions**	PA, PB, PC, PD, PE, PF
Current	DC+, AC	**Packaging Type**	Carton box

ASME QUALIFICATIONS

F-No (QW432)	5
A-No (QW442)	-

FERRITE

% 25-50

PREN

35.95

CHEM. COMP. %

	DEFAULT
C	0.03
Mn	1.05
Ni	9.5
Cr	23
N	0.17
P	0.015
S	0.01
Mo	3.1
Si	0.9
Cu	0.05

MECHANICAL PROPERTIES

	MIN. PER STANDARD	PRODUCT
Tensile strength R_m MPa	550	690
Yield strength $R_{p0.2}$ MPa	450	550
Elongation A (L_0=5d_0) %	20	25
Impact Charpy ISO-V	-	80J @ 20°C
Impact Charpy ISO-V	-	-

WELDING PARAMETERS

	2.5 mm	3.2 mm	4.0 mm
Ampere	50A - 80A	70A - 110A	100A - 160A
Voltage	-	-	-
Packaging	56 pcs/kg	30 pcs/kg	19 pcs/kg
Packaging Type	Carton box	Carton box	Carton box

NOTES

Pcs/kg is indicative, actual number may vary ± 5%.

DAIKO

2209

DESCRIPTION

APPLICATION

The 2209 subfamily is used in pipes, plates, fittings, and forgings made from duplex stainless steel. This type of steel has a microstructure composed of about 50% austenite with a ferritic matrix. This composition, together with the general level of alloying, ensures superior strength compared to conventional austenitic steels, such as type 316L. It also offers excellent corrosion resistance in a wide range of environments, along with notable resistance to chloride-induced stress corrosion cracking (CSCC) and pitting attack in chlorinated environments, such as seawater. These characteristics make the alloys particularly appreciated in offshore applications in the oil, gas, chemical, and petrochemical sectors, including piping systems, flow lines, risers, and manifolds.

ALLOY TYPE

22%Cr standard ferritic-austenitic duplex stainless steels.

MICROSTRUCTURE

Multipass welds in the as-welded condition contain about 25-50% ferrite depending on dilution and heat input/cooling rate conditions.

MATERIALS

EN W.Nr.: 1.4462 (X2CrNiMoN22-5-3), 1.4362 (X2CrNiN23-4)
ASTM: A182 Gr F51, A890 Gr 4A (cast)
UNS: S31803, S32205, S32101, S32304, S32001, J92205
PROPRIETARY: SAF2205, SAF 2304 (Sandvik), Uranus® 45N, 35N (Industeel), A903 (voestalpine), Cronifer 2205LCN (VDM), Maresist F51 (Schmidt + Clemens), SM22Cr (Nippon Steel Corporation), LDX 2101 (Outokumpu)

WELDING & PWHT

Generally, preheating is not necessary for welding. It is advisable to maintain a maximum interpass temperature of 150 °C. The heat input should be between 1.0 and 2.5 kJ/mm, depending on the material thickness; however, some codes limit the value to a maximum of 1.75 or 2.0 kJ/mm. Although welds on duplex stainless steels are almost always left as-welded, solution treatment is generally required for major repairs on castings. Studies and experience have shown that a water quench treatment at 1120 °C for 3-6 hours, with or without a cooling step at 1060 °C before quenching, imparts excellent metallurgical properties.