



# 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

ISO 3581-A	E 22 9 3 N L R 12	AWS A5.4	E2209-16
DIN	-	Werkstoff Number	-
Certifications	-	Shielding	-
Positions	PA, PB, PC, PD, PE, PF	Current	DC+, AC

ASME QUALIFICATIONS	FERRITE	PREN	HARDNESS
F-No (QW432)	5	% 25-50	35.95
A-No (QW442)	-		-

CHEM. COMP. %	DEFAULT	MECHANICAL PROPERTIES	MIN	VARIANT
C	0.03	Tensile strength R <sub>m</sub> MPa	550	690
Mn	1.05	Yield strength R <sub>p0.2</sub> MPa	450	550
Ni	9.5	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	20	25
Cr	23	Impact Charpy ISO-V	-	80J @ 20°C
N	0.17	Impact Charpy ISO-V	-	-
P	0.015			
S	0.01			
Mo	3.1			
Si	0.9			
Cu	0.05			

  

WELDING PARAMETERS	2.5 mm	3.2 mm	4 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

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The information in this datasheet is the result of detailed research and is considered accurate as of the publication date. However, we cannot guarantee its complete accuracy, and it is subject to change without notice. Actual results may vary due to many factors like welding procedures, material composition, temperature conditions, bevel configuration, and specific manufacturing techniques. We accept no liability for any errors or omissions in this datasheet. For the most current information, please visit [www.daikowelding.com](http://www.daikowelding.com).





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## APPLICATION

Duplex stainless steel pipes, plates, fittings, and forgings exhibit a microstructure comprising approximately equal parts of austenite and a ferrite matrix. This composition, in tandem with a general alloying level, imparts notable characteristics. These alloys exhibit high strength compared to standard austenitic steels like type 316L, ensuring robustness in various applications. Their corrosion resistance extends across diverse environments, making them well-suited for challenging conditions. Notably, they demonstrate elevated resistance to chloride-induced stress corrosion cracking (CSCC) and pitting attacks in chloride-rich environments, such as seawater. In the offshore oil/gas, chemical, and petrochemical process industries, these alloys find expanding applications, encompassing pipework systems, flowlines, risers, manifolds, and more. Additionally, the filler metal derived from these alloys is utilized for welding stainless structures requiring exceptionally high strength.

## 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

Preheating is typically considered unnecessary in welding processes, and adherence to a maximum interpass temperature of 150°C is recommended. The acceptable range for heat input falls within 1.0-2.5 kJ/mm, contingent on material thickness, though certain codes impose more stringent limits, often capping it at 1.75 or 2.0 kJ/mm. While welds in wrought duplex stainless steels are commonly left in the as-welded condition, substantial repairs to castings are typically specified in the solution-treated state. Experience in the field has consistently demonstrated favorable material properties when employing a treatment regimen involving exposure to 1120°C for 3-6 hours, followed by a water quenching process. In some instances, incorporating an additional cooling step to 1060°C before quenching has shown promising results in further enhancing the structural characteristics and overall performance of the welded components.

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