



DAIKOFCW 410NiMo



FERRITIC - MARTENSITIC STAINLESS
STEEL
410NiMo

DESCRIPTION

Rutile all position flux cored wire

This rutile flux cored is designed for welding type 410NiMo martensitic stainless steels. The weld metal is a high strength >760MPa martensitic stainless steel with good resistance to corrosion, hydro-cavitation, sulphide-induced SCC, and good sub-zero toughness compared with standard 410 steels. Applications include turbines, valve bodies, high pressure piping, offshore, power generation. It is designed for use with either 100% CO2 or 75% Ar- 25% CO2. The wire shows good wetting behaviour and a finely rippled surface pattern.

SPECIFICATIONS

ISO	-	AWS A5.22	E410NiMoT1-1/4
DIN	-	Werkstoff Number	-
Certifications	-	Shielding	M21, C1
Positions	PA, PB, PC, PD, PE, PF, PG	Current	DC+

ASME QUALIFICATIONS

F-No (QW432)	6	FERRITE	-	PREN	13.58	HARDNESS	300HV
A-No (QW442)	-						

CHEM. COMP. %

	DEFAULT
C	0.03
Mn	0.7
Ni	4.5
Cr	11.6
P	0.02
S	0.005
Mo	0.6
Si	0.35

MECHANICAL PROPERTIES

	MIN	VARIANT
Tensile strength R _m MPa	760	870
Yield strength R _{p0.2} MPa	0	750
Elongation A (L ₀ =5d ₀) %	10	18
Impact Charpy ISO-V	-	47J
Impact Charpy ISO-V	-	-

WELDING PARAMETERS

	1.2 mm	1.6 mm
Ampere	120A - 290A	180A - 350A
Voltage	20V - 30V	30V - 34V
Packaging	Ø 1,2÷1,6mm	Ø 1,2÷1,6mm
Packaging Type	B5300 spool	B5300 spool

ANTI-WEAR CHARACTERISTICS

Adhesive wear	▲ ▲ ▲ ▲ ▲
Abrasive wear	▲ ▲ ▲ ▲ ▲
Impact	▲ ▲ ▲ ▲ ▲
Corrosion	▲ ▲ ▲ ▲ ▲
Heat	▲ ▲ ▲ ▲ ▲

V 01/2024



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.





410NiMo

DESCRIPTION

FERRITIC - MARTENSITIC STAINLESS
STEEL
410NiMo

APPLICATION

Martensitic stainless steel with high strength (>760MPa) exhibits superior resistance to corrosion, hydro-cavitation, sulphide-induced stress corrosion cracking (SCC), and commendable sub-zero toughness in comparison to plain 12%Cr steels (e.g., type 410/CA15). The weld metal of this variant significantly surpasses the strength of the equivalent parent material and demonstrates exceptional resistance to softening during post-weld heat treatment (PWHT). These attributes can be advantageous when welding martensitic precipitation-hardening alloys, provided the corrosion conditions align with the compatibility of lower alloy weld metal. An additional benefit is the feasibility of a single PWHT at 450-620°C for tempering. These consumables find application not only in welding but also in overlaying mild and C-Mn steels. The 13%Cr-4%Ni alloys, available in cast or forged forms, play a vital role in various components such as hydraulic turbines, valve bodies, pump bowls, compressor cones, impellers, and high-pressure pipes. These applications span across power generation, offshore oil, and the chemical and petrochemical industries.

ALLOY TYPE

12%Cr-4.5%Ni-0.5%Mo (410NiMo) soft martensitic alloy.

MICROSTRUCTURE

In the PWHT condition the microstructure consists of tempered martensite with some retained austenite.

MATERIALS

EN W.Nr.: 1.4313 (X3CrNiMo13-4).

ASTM: F6NM, CA6NM.

ANFOR: Z6 CND 1304-M.

UNS: S41500.

WELDING & PWHT

It is recommended to maintain a preheat-interpass temperature range of 100-200°C during welding to facilitate martensite transformation. Cooling the components to room temperature before Post Weld Heat Treatment (PWHT) is advised. Achieving a hardness level of <23HRC, as specified by NACE MRO175 for maximum resistance to sulphide-induced Stress Corrosion Cracking (SCC) in sour oil conditions, can be challenging. This is due to the inherent resistance of weld metal and Heat-Affected Zone (HAZ) to softening during PWHT. To address this, a double temper for 5-10 hours is deemed necessary. Common practice involves a two-step tempering process: 675°C/10h followed by 605°C/10h with an intermediate air cool to ambient temperature. Recent research suggests that optimizing the tempering process involves temperatures of 620°C ÷ 650°C, with intermediate air cooling to ambient or lower being an essential step. Another approach proposes elevating the first PWHT cycle for a full austenitization anneal at 770°C/2h before the final temper. It is noteworthy that distortion control may become more critical in this scenario. In the case of the Supercore 410NiMo flux-cored wire, reducing the hardness to 23HRC has proven challenging, regardless of the PWHT applied. When considering 410NiMo consumables for welding plain 12Cr martensitic stainless steels like type 410 or CA15, it is advisable not to exceed a PWHT temperature of about 650°C, unless a second temper at 590-620°C is applied.

