



DAIKOWS 410NiMo



FERRITIC - MARTENSITIC STAINLESS
STEEL
410NiMo

DESCRIPTION

NiMo solid wire for 12% Cr martensitic stainless steels

Wire rod formulated for welding type 410NiMo martensitic stainless steels. 410NiMo is a high strength >760MPa martensitic stainless steel with better resistance to corrosion, hydro-cavitation, sulphide-induced SCC, and good sub-zero toughness compared to standard 410 steels. Weld metal of this type overmatches the strength of equivalent base material. The 410NiMo consumables are also used for overlaying mild and C-Mn steels. Applications include turbines, valve bodies, high pressure piping, offshore, power generation.

SPECIFICATIONS

ISO 14343-A	S 13 4	AWS A5.9	ER410NiMo
DIN	-	Werkstoff Number	-
Certifications	-	Shielding	DAIKOFLUX 493-W
Positions	PA, PB, PC	Current	DC/AC

ASME QUALIFICATIONS

F-No (QW432)	6	FERRITE	-	PREN	13.85	HARDNESS	300HV
A-No (QW442)	-						

CHEM. COMP. %

	DEFAULT
C	0.02
Mn	0.45
Ni	4.5
Cr	12.2
P	0.02
S	0.02
Mo	0.5
Si	0.35
Cu	0.01

MECHANICAL PROPERTIES

	MIN	VARIANT
Tensile strength R _m MPa	750	880
Yield strength R _{p0.2} MPa	500	740
Elongation A (L ₀ =5d ₀) %	15	20
Impact Charpy ISO-V	-	50J
Impact Charpy ISO-V	-	-

WELDING PARAMETERS

	2.4 mm
Ampere	250A - 420A
Voltage	28V - 32V
Packaging	Ø 2,0÷4,0mm
Packaging Type	K415 spool and drums.

ANTI-WEAR CHARACTERISTICS

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

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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.





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DESCRIPTION

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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 MR0175 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.

