

Classifications

EN ISO 17633-A	EN ISO 17633-B	AWS A5.22 / SFA-5.22
T 13 4 M M12 2	TS 410NiMo-M M12 1	EC410NiMo (mod.)

Characteristics and typical fields of application

Metal-cored wire of T 13 4 M / EC410NiMo type for welding of 13Cr-4Ni soft-martensitic stainless steels such as 1.4313 / UNS S41500. Applications are for instance turbine components in the hydropower industry. Easy handling and high deposition rate result in high productivity with excellent welding performance and very low spatter formation. The wire shows good wetting behavior and results in a smooth surface. The wide arc ensures even penetration and side-wall fusion to prevent lack of fusion. Additionally, precise alloy adjustment ensures very good weld metal impact toughness after heat treatment. The diffusible hydrogen content is extra low with maximum 3 ml / 100 g to prevent cold cracking.

Base materials

1.4313 X3CrNiMo13-4, 1.4317 GX4CrNi13-4, 1.4407 GX5CrNiMo13-4, 1.4414 GX4CrNiMo13-4
ACI Grade CA 6 NM, UNS S41500, J91540

Typical analysis

	C	Si	Mn	Cr	Ni	Mo
wt.-%	0.023	0.7	0.9	12.0	4.6	0.6

Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength	Tensile strength	Elongation A	Impact energy ISO-V KV J		
	R _{p0.2}	R _m	(L ₀ =5d ₀)	20°C	0°C	-20°C
	MPa	MPa	%			
a	760 (≥ 500)	900 (≥ 760)	16 (≥ 15)	65		60 (≥ 47)
a1	730	860	17	60		50 (≥ 47)
a2	635	845	23		80	

a annealed, 600°C for 2 h / furnace cooling to 300°C followed by air cooling – shielding gas M12 (Ar + 2.5% CO₂)

a1 annealed, 580°C for 8 h / furnace cooling to 300°C followed by air cooling – shielding gas M12 (Ar + 2.5% CO₂)

a2 annealed, 620°C for 6 h / furnace cooling to 300°C followed by air cooling – shielding gas M12 (Ar + 2.5% CO₂)

Operating data

	Polarity	DC +	Dimension mm
	Shielding gas (EN ISO 14175)	M12	1.2
			1.6

Welding with conventional or pulsed power sources using DC+ polarity, but pulsed arc may be advantageous and especially when welding out of position. Forehand (pushing) technique preferred with a work angle of approximately 80°. Ar + 2.5 % CO₂ as shielding gas offers the best weldability. The gas flow should be 15 – 18 l/min and the wire stick-out 15 – 20 mm. When welding out of position, the metal-cored wires are similar to solid wires and pulsed arc welding is recommended. Recommended preheating and interpass temperatures in case of heavy wall thickness are 100 – 160°C. The heat input should not exceed 1.5 kJ/mm. Tempering performed at 580 – 620°C.

Approvals

TÜV (12880), LR (M21, supplementary list), CE