

Classifications

EN ISO 17633-A	EN ISO 17633-B	AWS A5.22 / SFA-5.22
T Z 19 12 3 L P M21 (C1) 1	TS 316L-F M21 (C1) 1	E316LT1-4(1)

Characteristics and typical fields of application

Rutile flux-cored wire of T 19 12 3 L P / E316LT1 type with controlled weld metal ferrite content (3 – 6 FN measured with Fischer FeriteScope). Particularly for good cryogenic toughness and lateral expansion down to –196°C as specified for LNG applications. Also fulfills AWS A5.22 / SFA-5.22 E316LT1-4J and E316LT1-1J. The fast freezing slag offers excellent weldability and slag control in all positions. Easy handling and high deposition rate result in high productivity with excellent welding performance and very low spatter formation. Increased travel speeds as well as good slag removal with little demand for cleaning and pickling provide considerable savings in time and money. The wide arc ensures even penetration and side-wall fusion to prevent lack of fusion. Suitable for service temperatures from –196°C to 350°C. The scaling temperature is approximately 850°C in air.

Base materials

1.4401 X5CrNiMo17-12-2, 1.4404 X2CrNiMo17-12-2, 1.4409 GX2CrNiMo19-11-2, 1.4429 X2CrNiMo17-12-3 1.4432 X2CrNiMo17-12-3, 1.4435 X2CrNiMo18-14-3, 1.4436 X3CrNiMo17-12-3, 1.4571 X6CrNiMoTi17-12-2 1.4580 X6CrNiMoNb17-12-2, 1.4583 X10CrNiMoNb18-12
UNS S31600, S31603, S31635, S31640, S31653
AISI 316L, 316Ti, 316Cb

Typical analysis

	C	Si	Mn	Cr	Ni	Mo	FN
wt.-%	0.03	0.7	1.4	18.1	12.5	2.1	2 – 4

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

Condition	Yield strength	Tensile strength	Elongation A	Impact energy ISO-V KV J		Lateral expansion
	$R_{p0.2}$	R_m	$(L_0=5d_0)$			mm
	MPa	MPa	%	20°C	–196°C	–196°C
u	430 (≥ 320)	560 (≥ 510)	39 (≥ 30)	65	35 (≥ 32)	0,50 (≥0.38)

u untreated, as-welded – shielding gas M21(Ar + 18% CO₂)

Operating data

	Polarity	DC +	Dimension mm
	Shielding gas (EN ISO 14175)	M21, (C1)	1.2

Welding with standard GMAW power source with DC+ polarity. No pulsing needed. Backhand (drag) technique preferred with a work angle of approximately 80°. Ar + 15 – 25% CO₂ as shielding gas offers the best weldability. 100% CO₂ can be also used, but the voltage should be increased by 2 V. Suitable gas flow rate is 15 – 18 l/min. The heat input should not exceed 2.0 kJ/mm, the interpass temperature be limited to max. 150°C and the wire stick-out 15 – 20 mm. Post-weld heat treatment generally not needed. In special cases, solution annealing can be performed at 1050°C followed by water quenching.

Approvals

TÜV (12823), DNV GL (M21), RINA (M21), LR (M21), CE