

Classifications

EN ISO 17633-A	EN ISO 17633-B	AWS A5.22 / SFA-5.22
T 23 12 L P M21 (C1) 1	TS 309L-F M21 (C1) 1	E309LT1-4(1)

Characteristics and typical fields of application

Rutile flux-cored wire of T 23 12 L P / E309LT1 type, primarily intended for surfacing low-alloyed steels and for dissimilar welds between mild steel and CrNi stainless steels. Ferrite measured with FeritScope MP30 14 – 22 FN. Corrosion resistance superior to T 19 9 L / E308L fillers. When used for overlay welding on mild steel a corrosion resistance equivalent to that of 1.4301 / 304 is obtained already in the first layer. The wide arc ensures even penetration and side-wall fusion to prevent lack of fusion. It is designed for all-round welding and can be used in all positions without changing the parameter settings. Due to the fast freezing rutile slag, the weldability is excellent also in the vertical-up and overhead positions. Very good slag detachability and almost no spatter formation. Suitable for service temperatures from –60°C to 300°C. The scaling temperature is approximately 1000°C in air. For flat and horizontal welding positions, FOXcore 309L-T0 DG may be preferred.

Base materials

Primarily used for surfacing (buffer layer) unalloyed or low-alloyed steels and when joining non-molybdenum-alloyed stainless steels to carbon steels. Joints between austenitic steels, austenitic and ferritic heat resistant steels with ferritic steels, pressure boiler steels, fine grained structural steels and ship building steels, etc.

Typical analysis

	C	Si	Mn	Cr	Ni	FN
wt.-%	0.03	0.7	1.4	23.0	12.5	12 – 23

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

Condition	Yield strength	Tensile strength R_m	Elongation A	Impact energy ISO-V KV J			Hardness
	$R_{p0.2}$	MPa	$(L_0=5d_0)$	20°C	-20°C	-60°C	
u	MPa	MPa	%				HB
	420 (≥ 320)	540 (≥ 520)	36 (≥ 30)	60	55	50 (≥ 32)	210

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

Operating data

	Polarity	DC +	Dimension mm
	Shielding gas (EN ISO 14175)	M21	0.9
			1.2
			1.6

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 offers the best weldability. 100% CO₂ can be also used, but the voltage should be increased by 2 V. Suitable gas flow rate is 16 – 25 l/min. Suggested heat input is max. 2.0 kJ/mm and wire stick-out 15 – 20 mm. For dissimilar welding, slight weaving is recommended for all welding positions. Post-weld heat treatment generally not needed. For constructions that include dissimilar welding of low-alloyed steels, a stress-relieving annealing stage may be advisable. Always consult the supplier of the parent material or seek other expert advice to ensure that the correct heat treatment process is carried out. Preheat and interpass temperatures as required by the base metal.

Approvals

TÜV (09115), DB (43.014.22), DNV GL, LR, RINA (M21), BV (Ø 1.2 mm), ABS, CCS (C1), CE