

**Classifications**

<b>EN ISO 21952-A</b>	<b>AWS A5.28 / SFA-5.28</b>
W CrMoWV 12 Si	ER90S-G (ER90S-B9(mod.))

**Characteristics and typical fields of application**

TIG rod and wire of type W CrMoWV 12 Si / ER90S-G for manual and mechanised gas tungsten arc welding. The 11Cr-1Mo-0.5W-V type weld metal exhibits a fully tempered martensitic microstructure with favorable mechanical properties in post weld heat treated condition and after quench and temper treatment. The range of application covers joint welding of similar alloyed creep strength enhanced ferritic steels like X20CrMoW12-1 tube, pipe, forgings and castings, used in the thermal power industry. Thermanit MTS 4 is approved for long-term service at temperatures up to 650 °C.

The chemical composition is optimized in order to provide a high creep resistant and ductile weld metal after post weld heat treatment.

**Base materials**

Similar alloyed creep resistant steels and castings like

1.4922 X20CrMoV11-1 (T550 Extra), 1.4935 X20CrMoWV12-1, 1.4923 X22CrMoV12-1, 1.4926 X21CrMoV12-1, 1.4913 X19CrMoNbVN 11-1 (T560 Extra), 1.4931 GX23CrMoV12-1

**Typical analysis**

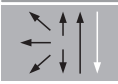
	C	Si	Mn	Cr	Ni	Mo	W	V
wt.-%	0.20	0.3	0.6	11.0	0.4	1.0	0.5	0.3

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

Condition	Yield strength $R_{p0.2}$	Tensile strength $R_m$	Elongation A ( $L_0=5d_0$ )	Impact energy ISO-V KV J
	MPa	MPa	%	20 °C
T	620 ( $\geq 550$ )	780 ( $\geq 690$ )	18 ( $\geq 15$ )	60 ( $\geq 35$ )

T: tempered (760 °C / 4 h)

**Operating data**

	<b>Polarity</b>	DC -	<b>Dimension mm</b>
	<b>Shielding gas (EN ISO 14175)</b>	I1	1.2
	<b>Rod marking</b>	+ W CrMoWV12Si / 1.4937	2.0 × 1000
			2.4 × 1000

Preheat and interpass temperature should be controlled between 250 and 350 °C (martensitic welding). In order to optimize impact energy, a multi-layer welding technique that ensures small layer thickness and low heat input is recommended. After welding the weld seam must be cooled below 100 °C in order to complete the martensitic transformation prior to PWHT which is typically carried out between 750 and 770 °C for at least 2 h. The un-tempered martensitic microstructure is very sensitive to cold and stress corrosion cracking. Residual welding and external stresses must be reduced to a minimum. Any exposure to moisture must be avoided in the as welded condition. Cooling down to 80 °C after welding and holding for at least 2 h is highly recommended for restrained components, bridging the gap between welding and final post weld heat treatment.

**Approvals**

TÜV (01083, 08087), DB (42.132.61), CE