

## Classifications

<b>EN ISO 21952-A</b>	<b>AWS A5.28 / SFA-5.28</b>
W Z CrMo 9 1	ER90S-B91

## Characteristics and typical fields of application

Thermanit MTS 3 LNi is a solid filler rod designed for manual gas tungsten arc welding. The 9Cr-1Mo-VNb type weld metal exhibits a fully tempered martensitic microstructure with favorable mechanical properties in post weld heat treated condition. The range of application covers joint welding of similar alloyed creep strength enhanced ferritic steels like ASTM grade 91 tube, pipe, plate, forgings and castings, used in the thermal power and petrochemical industry.

The chemical composition is optimized in order to provide a high creep resistant and ductile weld metal after post weld heat treatment along with low level of trace elements. Thanks to the restricted Mn+Ni content of less than 1.0 wt. % the  $A_{c1}$  temperature is certainly above 790 °C.

## Base materials

Similar alloyed creep resistant steels and castings like  
 1.4903 X10CrMoVNb9-1, 1.4955 GX12CrMoVNbN9-1  
 ASTM Grade 91, T91, P91, F91, FP91, WP91, C12A  
 10Cr9Mo1VNbN  
 STPA28, STBA28

## Typical analysis

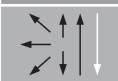
	C	Si	Mn	Cr	Ni	Mo	V	Nb
wt.-%	0.1	0.3	0.7	9.0	< 0.3	1.0	0.2	0.06

Structure: tempered martensite

## 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
s	660 (≥ 540)	780 (≥ 620)	20 (≥ 17)	170 (≥ 47)
s tempered (760 °C / 2 h)				

## Operating data

	Polarity	DC -	Dimension mm
	Shielding gas (EN ISO 14175)	I1	2.0 × 1000
	Rod marking	+ ER90S-B91 / W 9C1MV	2.4 × 1000
			3.2 × 1000

Preheat and interpass temperature should be controlled between 200 and 350 °C. 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 0.5 h for thin section tube welds and at least 2 h for thicker sections. 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. Keeping a temperature above the dew point or storage in humidity controlled atmosphere is highly recommended bridging the gap between welding and final post weld heat treatment.

Previous rod marking: + ER90S-B9 / W 9C1MV

## Approvals

CE