

Classifications

EN ISO 3580-A

E CrMoWV12 B 4 2 H5

Characteristics and typical fields of application

BÖHLER FOX 20 MW is a core wire alloyed covered electrode with basic coating for shielded metal 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. BÖHLER FOX 20 MW is approved for long-term service under creep condition 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. Its basic coating guarantees low level of diffusible hydrogen in the weld metal.

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.-%	0.18	0.3	0.7	11.0	0.55	0.9	0.5	0.25


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	580 (≥ 550)	780 (≥ 690)	18 (≥ 15)	45 (≥ 34)
QT	590 (≥ 550)	790 (≥ 690)	18 (≥ 15)	45 (≥ 34)

T: tempered (760 °C / 4 h)

QT: quenched and tempered (1050 °C / 0.5 h / oil + 760 °C / 2 h)

Operating data

	Polarity	DC +	Dimension mm	Current A
	Electrode identification	FOX 20 MW E CrMoWV12 B	2.5 × 250	60 – 80
	Redrying	300 - 350 °C / 2 h	3.2 × 350	90 – 120
			4.0 × 350	110 – 140
5.0 × 450	150 – 180			

Preheat and interpass temperature should be controlled between 250 and 350 °C (martensitic welding) or 400 and 500 °C (austenitic welding), respectively. Root passes should principally be welded in the martensitic range. In order to optimize impact energy a 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 commonly carried out between 740 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. PWHT of cast components might require lower holding temperature of around 730 °C but extended holding time of ≥ 8 h.

Approvals

TÜV (01082.), KTA 1408.1 (8088), CE