DAIKOFCW 9CrMo

FCAW

CREEP RESISTING STEELS
9CrMo

DESCRIPTION

Rutile all position flux cored wire for 9Cr creep resisting alloy for elevated temperature service

Rod wire designed for 9% Cr 1% Mo alloyed steels and steels for pressurized hydrogen service, particularly in oil refineries prolonged elevated temperature service up to about 650°C, especially in oil refineries (piping, heat exchangers, pressure vessels, boiler superheater). Designed for high strength and improved corrosion resistance in superheated steam, hot hydrogen gas and high sulphur crude oils where higher performance than 5% chromium, 0.5% molybdenum steels is required.

SPECIFICATIONS

EN ISO 17634-B	T55T1-1C/M-9C1M	**AWS A5.29**	E81T1-B8
Shielding	M21, C1	**Positions**	PA, PB, PC, PD, PE, PF, PG
Current	DC+	**Packaging Type**	BS300 spool

ASME QUALIFICATIONS

F-No (QW432)	6
A-No (QW442)	5

CHEM. COMP. %	DEFAULT
C	0.06
Mn	0.8
Ni	0.3
Cr	9
P	0.01
S	0.01
Mo	1
Si	0.3
Cu	0.05

MECHANICAL PROPERTIES	MIN. PER STANDARD	PRODUCT
Tensile strength R_m MPa	550	630
Yield strength $R_{p0.2}$ MPa	460	550
Elongation A (L_0=5d_0) %	17	22
Impact Charpy ISO-V	-	40J @ -20°C
Impact Charpy ISO-V	-	-

WELDING PARAMETERS	1.2 mm	1.6 mm
Ampere	100A - 300A	160A - 420A
Voltage	16V - 28V	31V - 35V
Packaging	Ø 1,2÷1,6mm	Ø 1,2÷1,6mm
Packaging Type	BS300 spool	BS300 spool

DAIKO

9CrMo

DESCRIPTION

APPLICATION

Designed for high-temperature applications, 9CrMo offers a reasonable degree of corrosion resistance in superheated steam, hot hydrogen gas, and high-sulfur crude oil, surpassing the performance of 5% Cr-0.5% Mo steels. It is particularly suitable for welding heat-treatable steels, quenched and subsequently tempered. Ideal for piping and components resistant to caustic embrittlement, it maintains its effectiveness up to service temperatures of 600 °C. It is primarily used for **boiler superheater piping, heat exchangers, pipelines** and **pressure vessels in oil refineries and power plants**.

ALLOY TYPE

9%Cr-1%Mo martensitic alloy for elevated temperature service.

MICROSTRUCTURE

In the PWHT condition the microstructure consists of tempered bainite.

MATERIALS

EN W.Nr.: X12CrMo 9 1 (1.7386), X7CrMo 9 1 (1.7388), GS-12CrMo 10 1 (1.7389)
ASTM: A387 gr. 9, A335 gr. 9, A234 gr. WP9 (fittings), A199 gr. T9, A213 gr. T9, A182 gr. F9, A336 gr. F9, A217 gr. C12

WELDING & PWHT

Given the hardness of the material in its deposited state (up to 450 HV) and the poor fracture resistance of the martensitic microstructure, preheating and a minimum interpass temperature of 200 °C are required to prevent hydrogen-induced cracking. By using well-controlled electrodes, the weld metal can maintain hydrogen levels below 5 ml/100 g. For TIG welds and particularly for root TIG passes, preheating below 150 °C may be acceptable. During the welding process, transformation might not complete between 200-350 °C; hence, partial cooling to about 150 °C is recommended before direct transfer to post weld heat treatment (PWHT), followed by non-destructive examinations (NDE). If PWHT is performed after full cooling and NDE, the preheat temperature must be adequately maintained according to thickness, to facilitate hydrogen dispersion. This precaution is less critical for solid wire TIG and MAG processes. PWHT for weld tempering is usually performed between 705-780 °C (as indicated, for example, by ASME B31.3 between 705-760 °C). The minimum recommended holding time is two hours. For castings, the minimum recommended PWHT temperature is slightly lower, with the possibility of dropping to 670 °C.