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

ISO 17634-B	T55T1-1C/M-9C1M	AWS A5.29	E81T1-B8
DIN	-	Werkstoff Number	-
Certifications	-	Shielding	M21, C1
Positions	PA, PB, PC, PD, PE, PF, PG	Current	DC+

ASME QUALIFICATIONS

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

FERRITE

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PREN

-

HARDNESS

-

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	VARIANT
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 elevated temperature applications, this alloy offers a commendable level of corrosion resistance in demanding environments like superheated steam, hot hydrogen gas, and high-Sulphur crude oils. It surpasses the performance of 5%Cr-0.5%Mo steels, making it the preferred choice when elevated performance is essential. Well-suited for welding heat-treatable, quenched, and subsequently tempered steels, as well as for tubes resistant to caustic embrittlement, this alloy proves its versatility in a range of applications. It confidently handles working temperatures up to 600°C. Primarily deployed in oil refineries and power plants, this alloy excels in critical components such as boiler superheater tubing, heat exchangers, piping, and pressure vessels. Its reliability and superior performance make it an optimal solution for high-temperature and corrosive environments in these industrial settings

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

Due to the inherent hardness observed in the as-deposited state, reaching values of up to 450HV, and the relatively diminished fracture resistance characteristic of the martensitic 9CrMo microstructure, it is imperative to implement a preheat and maintain a minimum interpass temperature of 200°C to prevent hydrogen-induced cracking. Ensuring electrodes are meticulously controlled and handled is crucial to achieve weld metal with hydrogen levels below 5ml/100g. In the context of TIG root runs or all-TIG welds, consideration may be given to a lower preheat of 150°C. During welding, complete transformation within the working range of 200-350°C may not be achieved. Therefore, partial cooling to around 150°C is recommended before direct transfer to Post-Weld Heat Treatment (PWHT), followed by Non-Destructive Examination (NDE). If PWHT is intended after complete cool-out and NDE, maintaining the preheat temperature for a specified duration, according to thickness, is advisable to promote effective hydrogen dispersal. Notably, this precaution holds less significance for TIG and solid wire MAG processes. PWHT to temper the weldment typically falls within the range of 705-780°C, as outlined in ASME B31.3 (e.g., 705-760°C). The minimum recommended holding time for this process is two hours. For castings, the suggested minimum PWHT temperature is lower, with specified temperatures as low as 670°C.

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