



DAIKOWS 9CrMo



CREEP RESISTING STEELS

9CrMo

DESCRIPTION

9%Cr-1%Mo solid wire for elevate temperature service

Submerged arc welding 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 24598-A	S CrMo9 FB	AWS A5.23	EB8
DIN	-	Werkstoff Number	-
Certifications	-	Shielding	DAIKOFLUX 982
Positions	PA, PB, PC	Current	DC/AC

ASME QUALIFICATIONS

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

FERRITE

-

PREN

-

HARDNESS

-

CHEM. COMP. %

	DEFAULT
C	0.07
Mn	0.5
Cr	9
P	0.01
S	0.01
Mo	1
Si	0.2
Cu	0.15

MECHANICAL PROPERTIES

	MIN	VARIANT
Tensile strength R _m MPa	590	680
Yield strength R _{p0.2} MPa	435	590
Elongation A (L ₀ =5d ₀) %	17	23
Impact Charpy ISO-V	47J @ 20°C	50J @ 20°C
Impact Charpy ISO-V	-	-

WELDING PARAMETERS

	2.4 mm	3.2 mm	4 mm
Ampere	350A - 450A	430A - 530A	480A - 580A
Voltage	27V - 31V	27V - 31V	27V - 31V
Packaging	Ø 2,0÷4,0mm	Ø 2,0÷4,0mm	Ø 2,0÷4,0mm
Packaging Type	K415 spool and drums. K415 spool and drums. K415 spool and drums.		

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The information in this datasheet is the result of detailed research and is considered accurate as of the publication date. However, we cannot guarantee its complete accuracy, and it is subject to change without notice. Actual results may vary due to many factors like welding procedures, material composition, temperature conditions, bevel configuration, and specific manufacturing techniques. We accept no liability for any errors or omissions in this datasheet. For the most current information, please visit www.daikowelding.com.





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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), G5-12CrMo 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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