G-TECH 12CrMoV

SMAW

CREEP RESISTING STEELS
12CrMoV

DESCRIPTION

Basic coated electrode for 12%Cr steel

Approved in long-term condition up to +650 °C service temperature. The deposit exhibits high creep rupture strength and good toughness properties under long term stresses. Preheating and interpass temperatures 400 – 450 °C (austenitic welding) or 250 – 300 °C (martensitic welding). Root passes should principally be welded in the martensitic range. Ease of slag removal reduces post-welding cleaning operations to a minimum.

SPECIFICATIONS

ISO 3580-A	E Cr Mo W V12 B 3 2 HS	AWS	-
DIN	-	Werkstoff Number	-
Certifications	-	Shielding	-
Positions	PA, PB, PC, PD, PE, PF	Current	DC+, AC

ASME QUALIFICATIONS

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

FERRITE

-

PREN

-

HARDNESS

-

CHEM. COMP. %

	DEFAULT
C	0.2
Mn	0.7
Ni	0.5
Cr	11
V	0.3
P	0.015
S	0.01
Mo	1
Si	0.25
W	0.5

MECHANICAL PROPERTIES

	MIN	VARIANT
Tensile strength R_m MPa	-	750
Yield strength $R_{p0.2}$ MPa	-	550
Elongation A (L_0=5d_0) %	-	24
Impact Charpy ISO-V	-	40J @ 20°C
Impact Charpy ISO-V	-	-

WELDING PARAMETERS

	2.5 mm	3.2 mm	4 mm	
Ampere	65A - 90A	90A - 130A	140A - 180A	190A -
Voltage	-	-	-	
Packaging	45 pcs/kg	21 pcs/kg	14 pcs/kg	10 p
Packaging Type	Carton box	Carton box	Carton box	Carto

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DESCRIPTION

APPLICATION

12%CrMoV steels play a pivotal role in applications demanding critical heat and superior resistance to creep, particularly in services that endure temperatures of at least 550°C. The heightened chromium composition imparts an exceptional level of resistance to both steam and fireside corrosion, surpassing the capabilities of 2-9%CrMo creep-resisting steels. These steels are versatile, available in both cast and wrought forms, and are integral components in high-pressure steam piping and headers, heat exchangers, as well as turbine components. Their significance is particularly pronounced in the power generation industry, where their robust characteristics contribute to enhanced performance and longevity. Additionally, these steels find occasional use in petrochemical applications, underlining their adaptability and reliability in a spectrum of demanding environments.

ALLOY TYPE

12%Cr creep resisting steel also with nominally 1%Mo-0.5%W-0.3%V. The matching base material is generically called X20.

MICROSTRUCTURE

In the PWHT condition the microstructure consists of tempered martensite.

MATERIALS

EN W.Nr.: X20CrMoV 12 1 (1.4935): G-X22CrMoV 12 1 (1.4931) cast..
ASTM: AISI Type 422.

WELDING & PWHT

The as-deposited weld metal consistently exhibits a room temperature hardness exceeding 500HV under diverse cooling conditions. EN 3580 mandates a preheat of 400°C with a maximum interpass temperature of 500°C. These temperatures extend beyond the austenite-martensite transformation range (Ms-Mf approximately 350-150°C). Recent procedures have shown advantages in adopting a preheat range of 200-350°C, effectively mitigating grain coarsening and facilitating some tempering of partially transformed multipass weld metal. Following welding, gradual cooling to 120°C (100-150°C) is imperative, accompanied by a holding time of 1-2 hours to facilitate transformation before initiating post-weld heat treatment (PWHT). If immediate PWHT is impractical, the transformation step should be succeeded by a postheat at around 350°C for 1-4 hours to release hydrogen before permitting cooling below 60°C. In this state, the hard weld zone is potentially susceptible to stress corrosion cracking (SCC), requiring a dry environment with minimal delay before PWHT. For production welds, the typical PWHT temperature range is 730-770°C, typically lasting a minimum of three hours, with variations based on thickness detailed in the appropriate application code.