Industeel

ArcelorMittal

CromElso™ 92

Chromium-Molybdenum Steel

Special alloy (9Cr2W0.5Mo0.2V) steel for high temperature creep service

CromElso™ 92 is an alloyed martensitic CrMoVNb steel designed for high temperature creep resistance up to about 620°C (1150F). **CromElso™ 92** is manufactured via the electric arc furnace (EAF) with dephosphorisation, ladle refining and vacuum degassing to provide reproducible, clean and homogeneous steel.

CromElso™ 92 steel ensures enhanced weldability for pipe, boiler and pressure vessel fabrication. Use of special steel making practices jointly with a good balance of chemical elements as well as controlled ratios of compositional elements permit to guarantee the adequate martensitic structure of **CromElso™ 92.** Impact toughness properties in heat affected zone and high creep resistance properties are also improved.

CromElso™ 92 is available in plate with thicknesses up to 75 mm. This steel is particularly suitable for supercritical steam piping for enhanced thermodynamical efficiency in energy generation processes, for heavy section components in thermal power plants. It is also considered for pressure vessels in refining and nuclear applications.

Properties

Standards

CromElso™ 92 is compliant with:

- ASTM/ASME A/SA-1017 gr92 (UNS K92460)
- ASME Code Case 2179 (UNS K92460)

For other standard compliancy, please consult.
Multiple certifications are possible on request.

Tensile properties

Guaranteed transverse tensile properties at room temperature. *(Measured on every plates):*

Standard	Plate thickness (mm)	Yield Strength (MPa)	Ultimate Tensile Strength (MPa)	Minimum Elongation (%)
A/SA-1017 gr92		≥ 440	620-840	20

Chemical composition

Ladle analysis – Expressed in weight percent (wt%) as per above standards

C	S	P	Si	Mn	Cr	W	Mo	V	Nb	N	Al
0.10	0.002	0.018	0.3	0.4	9.00	1.9	0.40	0.2	0.08	0.05	0.015

The chemistry is specially balanced to combine good welding and fabrication properties as well as optimised mechanical properties and creep strength.
This is tempered fully martensitic steel with a combination of composition and microstructure that contributes to the creep resistance.

Specific guarantees

Creep resistance is the driving engineering property for choosing 9%Cr Creep Strength Enhanced Ferritic (CSEF) steel. It is provided by a finely tuned chemical analysis linked to a stringent control of the heat treatments. Creep properties of **CromElso™ 92** are achieved by complex and multiscale microstructural features.

Typical strength of **CromElso™ 92** is generally targeted on the high-end when creep resistance is required. The balanced low carbon martensite possesses sufficient toughness: for as-delivered conditions transverse Charpy-V impact strength values at -20°C can reach about 100 J.

Welding

Consumables used for the welding of **CromElso™ 92** shall comply with the following standards.

	SMAW	GMAW	FCAW	SAW (Wire + Flux)
AWS	SFA5.5 E 9015-B91	SFA 5.28 ER 90S-B9 (Mo)	SFA 5.29 E 90C-B9-H4	SFA5.23 F9 RZ EG-G-M4
EN	EN ISO 3590-A ECrMoWV12 B 4 2 H5	EN ISO 21952-A G CrMoWV12 Si	EN ISO 17643-A T 69T15 1G 9C1MV	EN ISO 24596-A S S Z CrMoWVNb 9 0.5 1.5 FB + EN ISO 14174 S A FB 1 55 DC H4

Please contact your favorite filler materials supplier for corresponding references.

Delivery conditions

Plates

CromElso™ 92 can be be produced in thicknesses from 5 mm and up to 75 mm (3/16" up to 3").
Maximum plate weight: 20 tons per unit.

Prefabrication

By special agreement, prefabricated pieces can be delivered according to drawings. The following operations can be performed: beveling, bending, rolling of shell to radius, cutting to shape, fabrication of stiffeners and annular plates, pre-welding. *(Non exhaustive list, please consult)*

XCarb®

On request, **CromElso™ 92** plates can be delivered with **XCarb®** certificate that guarantees steels with a low carbon footprint, made through the electric arc furnace using recycled scrap and renewable electricity. Product carbon footprint is third-party verified.

Applications

CromElso™ 92 is suitable for superheated/supercritical steam piping of power and co-generation plants. As it is a plate material, it allows for fabricating larger pipes than the usual seamless materials. It is also very suitable to fabricate the pipe support systems.
Furthermore, it is a potential candidate material for vessel fabrication in some nuclear facilities. It's very low molybdenum and nickel contents compared to standard austenitic stainless steels or other 9%Cr steels make it less prone to activation under irradiation.

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