Industeel

ArcelorMittal

CryElso™ 203
Cryogenic steel

Special low alloy Ni-steel for low temperature applications

CryElso™ 203 is a low-alloyed Ni steel, designed for low temperature applications and requiring a high level of toughness. Its high Charpy impact values at low temperature (-101°C) are combined with good tensile properties and mainly with an ultra low Nil-Ductility Temperature (Drop Weight Tests). The crack propagation resistance of the material is therefore excellent.

CryElso™ 203 is manufactured via the electric arc furnace (EAF) with dephosphoration, ladle refining and vacuum degassing to provide reproducible, clean and homogeneous steel.

The chemistry of **CryElso™ 203** has been carefully adapted to combine high mechanical properties and excellent weldability.
This material may be used in all applications requiring low temperature impact values such as:

- Compressors housings
- Nuclear waste containers
- Liquid gas storage tankers...

Properties

Standards

CryElso™ 203 is compliant with:

- ASTM / ASME A / SA-203 type D (UNS K31718)
- ASTM / ASME A / SA-203 type E (UNS K32018)
- ASTM / ASME A / SA-203 type F
- EN 10028-4 12Ni14 (1.5637)

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 (%)
EN 10028-4 12Ni14	≤ 30	≥ 355	490-640	22
	> 30	≥ 345		
A/SA 203 grE		≥ 275	485-620	21

CVN Impact Properties and NDT (Drop Weight Tests)

Specially designed for very low temperature impact values, **CryElso™ 203** gives impact energies above 100J in transverse orientation at -101°C. This toughness level is achieved also for the thickest plates (up to 450 mm).

The Nil-Ductility Transition Temperature (NDTT) has been determined using Drop Weight Test (i.e. Pellini) procedure in accordance with ASTM E208. Stress relieved testing coupon at 590°C during 5h45mn + air cooling provides NDTT at - 80°C.

Chemical composition

Ladle analysis - Expressed in weight percent (wt%)

C	Mn	Si	P	S	Ni	V
<0.15	<0.80	<0.35	<0.015	<0.002	3.25-3.75	≤0.05

Welding

For this grade, it is quite difficult for a weld metal to achieve both low temperature toughness (-101°C) as well as high tensile properties. Hence two kinds of filler materials can be used, homogeneous filler or Nickel-Base filler, depending on mechanical properties balance to be achieved.

	Classification of welding consummables	SMAW	GMAW	FCAW	SAW (Wire + Flux)
Homogeneous	AWS	SFA5.5: E 7018-C2L H4		SFA5.36: E 81 T15-M21A8-Ni3-H4	SFA5.23: F 7A15 E Ni3-Ni3
	EN	EN ISO 2560-A: E 42 6 3Ni B 3 2 H5		EN ISO 17632-A: T 46 6 3Ni M M21 1 H5	EN ISO 14171-A: S 42 8 FB S2Ni3 H5 EN ISO 14174: S A FB 1 55 AC H5
Ni alloy	AWS	SFA5.11: E NiCrMo-3	SFA5.14: ER NiCrMo-3	SFA5.34: E NiCrMo3 T1-4	SFA5.14: ER NiCrMo-3
	EN	EN ISO 14172: E Ni 6625	EN ISO 14172: S Ni 6625	EN ISO 12153: T Ni 6625 P M21 2	EN ISO 14172: S Ni 6625 EN ISO 14174: S A AF2 5643 AC H5

Delivery Conditions

Plates

CryElso™ 203 can be produced in thicknesses from 5 mm and up to 450 mm (3/16" up to 18").
Maximum plate weight: 20 tons per unit for continuous casting route and up to 80+ tons for ingot route.

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)*

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