Industeel

ArcelorMittal

SIRIUS™ 120

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SIRIUS™ 120 is a heat resistant NiCr alloy, its composition includes Nickel (37%), Chromium (25%), Iron (33%), and other elements contributing to its high temperature resistance.

SIRIUS™ 120 has a good resistance in carburizing and sulfurizing atmospheres associated to an excellent creep resistance, with a much better mechanical strength up to 1100°C (2010°F) than high temperature FeCrNi alloys like **SIRIUS™ 800.**
It is used in demanding high temperature applications like industrial furnaces, waste incineration plants, chemical industries such as polysilicon hydrochloration reactors.

PROPERTIES

STANDARDS

> DIN: 2.4854 NiFe33Cr25Co

> ASTM: B409 UNS N08120

CHEMICAL ANALYSIS - WEIGHT %

Typical values

C	Cr	Ni	Co	Mo	W	Mn	Si	Nb	N
0.05	25	37	< 3	0.25	< 2.5	0.7	0.6	0.6	0.2

PHYSICAL PROPERTIES

Density: 8.00 g/cm³

Interval temperature (°C)	Thermal expansion (α x10^{-6} K^{-1})	T °C (°F)	Resistivity (µΩ.cm)	Specific heat (J.kg^{-1}.K^{-1})	Young modulus E (GPa)	Shear modulus G (GPa)
0 - 100	14.3	20 (68)	105	467	198	76
0 - 200	14.9	200 (392)	112	500	188	70
0 - 400	15.8	400 (752)	116	530	172	65
0 - 600	16.4	600 (1112)	122	605	158	59
0 - 800	17.3	800 (1472)	124	655	142	53
0 - 1000	17.8	1000 (1832)	127	665	130	48

MECHANICAL PROPERTIES

Tensile properties

	Temperature		Y.S. 0.2%		UTS		Elongation	Grain size
	°C	°F	MPa	ksi	MPa	ksi	%	ASTM
ASTM B409	20	68	> 276	> 40	> 621	> 90	> 30	5 or coarser
Indicative values			350	51	720	104	53	4

At high temperature - Indicative values

	Temperature		Y.S. 0.2%		UTS		Elongation
	°C	°F	MPa	ksi	MPa	ksi	%
SIRIUS™ 120	20	68	300	44	700	102	47
	350	662	215	31	650	94	53
	550	1022	200	29	550	80	55
	750	1382	180	26	400	58	60
	950	1742	112	16	125	18	83
	1050	1922	54	8	68	10	85
SIRIUS™ 800H	20	68	230	33	550	80	48
	350	662	140	20	450	65	47
	550	1022	120	17	420	61	48
	750	1382	95	14	200	29	40
	950	1742	60	9	80	12	75
	1050	1922	30	4	50	7	100

CREEP RESISTANCE

Temperature		Stress for rupture (MPa)	
		10000h	
°C	°F	SIRIUS™ 120	SIRIUS™ 800H
600	1112	170	160
700	1292	105	69
800	1472	57	35
900	1652	23	13
1000	1832	7	4.5

STRUCTURE

SIRIUS™ 120 plates are supplied in the solution-annealed condition performed at a minimum temperature of 1177°C (2150°F). The alloy has a stable austenitic microstructure, with an average grain size of ASTM No. 5 or coarser.

IN SERVICE CONDITIONS

CORROSION RESISTANCE

SIRIUS™ 120 presents an excellent oxidation resistance in both static and dynamic high temperature conditions up to 1000-1100°C (1830-2010°F). This alloy is particularly resistant to carburization and sulfidation degradation phenomena.

PLATE PROCESSING

HOT FORMING

Depending on the equipment used, hot forming operations can be carried out in the range from 1200 to 850°C (2192 to 1562°F). Slightly oxidizing or neutral atmosphere are recommended during heat treatment. Sulfur compounds is strictly prohibited in the furnace atmosphere.

COLD FORMING

SIRIUS™ 120 has good ductility, it can be readily formed using all conventional methods (bending, shaping, deep drawing, drawing, wire drawing, etc...) with the help of heavy-duty lubricants.

HEAT TREATMENT

Softening is generally necessary after forming and can be obtained by annealing at a minimum temperature of 1177°C (2150°F).

WELDING

SIRIUS™ 120 can be welded by Gas Tungsten Arc Welding (GTAW), Gas Metal Arc Welding (GMAW) with 100% Argon shielding and Shielded Metal Arc Welding (SMAW).

Preheating and postwelding heat-treatments are generally not required. Welding heat input and maximum interpass temperature shall be minimized (< 1,5 kJ/mm (38 kJ/inch) and < 150 °C (300 °F)). String beads are recommended.

625 or 617 alloys are used: filler metal (EN ISO 18274 SNi6625 or SNi6617, ASME SFA 5.14 ERNiCrMo-3 or ERNiCrCoMo-1) and covered electrodes (EN ISO 14172 ENi6625 or ENi6617, ASME SFA 5.11 ENiCrMo-3 or ENiCrCoMo-1) are recommended.

PICKLING

Pickling is usually carried out by the following process:

Nitric-hydrofluoric bath	By volume
Nitric acid (HNO_3)	10 to 20%
Hydrofluoric acid (HF)	1.5 to 5%
Water	remainder

The immersion time is about 1 hour at 20°C (68°F) or 20 minutes at 50°C (122°F).

DECONTAMINATION - PASSIVATION

When the manufacturing operations have imbedded foreign ferrous of particles which must be removed, a decontamination - passivation treatment can be carried out in the following bath:

Nitric-hydrofluoric bath	By volume
36° B nitric acid (HNO_3)	20 to 25%
Water	remainder

The immersion time is 30 minutes at room temperature and can be reduced to 10 minutes at 50°C (122°F).

DELIVERY CONDITIONS

SIZE RANGE

	Hot rolled plates
Thickness	5 to 70 mm 3/16" to 2.8"
Width	Up to 2 200 mm Up to 87"
Length	Up to 8 000 mm Up to 26 ft

For other sizes, please consult.

APPLICATIONS

The main applications are:

- **> Heat treatment furnace parts**
- **> Waste incinerators**
- **> Polysilicon reactors**
- **> Chemical industry**

YOUR CONTACTS

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