Sanicro® 35
Bar
Datasheet

Sanicro®35 is a high alloy austenitic grade for service in demanding wet corrosive environments.

The grade is characterized by:

Excellent resistance to

- Pitting corrosion
- Crevice corrosion in chloride environments
- Chloride-induced stress corrosion cracking
- Hydrogen embrittlement

Good resistance to

- Hydrochloric acid environments
- Sulfuric acid and nitric acid

Very high

- Tensile strength
- Ductility

Broad service temperature range

Standards

- ASTM: B649
- UNS: N08935

Approvals and Certificates

- Boiler and Pressure Vessel Code, Section VIII, Division I and II.
- ASME Code case 2982-1
- EN 10204 certificate 3.1

Non Destructive Examination

- ASTM A388/A388M / API 6A PSL3

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Chemical composition (nominal)

Chemical composition (nominal) %

C	Si	Mn	P	S	Cr	Ni	Mo	Cu	N
≤0.030	≤0.5	0.8	≤0.030	≤0.020	27	35	6.5	0.2	0.3

Applications

Due to its extremely good pitting and crevice corrosion properties, Sanicro® 35 is particularly suitable for applications in seawater and other high chloride concentration conditions.

Sanicro® 35 also has a high resistance to general corrosion in acid environments, making it suitable for a variety of applications.

The excellent mechanical and corrosion properties make Sanicro®35 an economical choice in many applications, by reducing the life cycle cost of equipment.

Sanicro®35 bars are semi-finished products with defined properties that can be machined to various components (such as flanges, valves, fittings, couplings, rings and seals, shafts, bolts and nuts) in applications highlighted below:

- Oil&Gas drilling tools
- Waste heat recovery exchangers
- Evaporators
- Off-shore piping systems

Corrosion resistance

General corrosion

Sanicro®35 has Excellent corrosion resistance, for service in sea-water applications and other highly corrosive environments.
Service temperatures up to 450°C.

The general corrosion resistance of Sanicro®35 in acids and alkalines is better than that of Alloy 825 / Sanicro®825, SAF®2507 and Sanicro®28.

Sanicro®35 is a suitable alternative to Alloy 625 / Sanicro®625, in presence of ammonia and hydrochloric acid. If that material type is considered for service.

Pitting and crevice corrosion

The localized corrosion resistance of Sanicro®35 in chloride containing environment is superior to that of Alloy 825 / Sanicro®825, SAF®2507 and Sanicro®28. And on par or better compared to Alloy 625 / Sanicro®625.

One of the main advantages of Sanicro® 35 is that it has excellent resistance to pitting corrosion.

In natural seawater conditions at 30°C, the pitting corrosion resistance is excellent, and the crevice corrosion resistance is better than for Alloy 625 / Sanicro®625.

In chlorinated seawater Sanicro®35 is resistant to crevice corrosion at 45°C, and resistant to pitting corrosion at 80°C

The Pitting Resistance Equivalent Value with Nitrogen included, PREN: >52

Stress corrosion cracking

Sanicro®35 has excellent stress corrosion cracking resistance (chlorides, H2S) and does not suffer from SCC in a NACE MR 0175 / ISO 15156 Test Level VI environment.

The resistance to hydrogen embrittlement is also excellent.

Sour service

The Sanicro®35 resistance to cracking in the presence of H2S and chlorides is very high.

Refinery sour water service – static and flowing conditions.
Sanicro®35 performs very well, at least on par with Alloy 625 / Sanicro®625 and SAF®2507.

Offshore sour service

Compared to Alloy 625 / Sanicro®625, Sanicro®35 has overall better corrosion resistance in marine environments.

And compared Alloy 825 / Sanicro®825, Sanicro®35 has superior corrosion resistance in chloride environments.

Fabrication

Machining

Materials in this group of alloys (UNS N08935) are challenging to machine.

This is due to a number of properties, leading to high cutting forces,

severe wear and poor chip control.
Dedicated cutting tools and strategies to be used.
For details on tool geometries, tool grades and cutting data, the tool supplier should be able to support.

Forms of supply

Dimensions and finishes

Sanicro™35 bar steel is available in a large number of sizes. The standard size range for stock comprises 20-240 mm. Round bar is supplied in solution annealed and water quenched condition. The surface is peeled turned.

Lengths

Bars are delivered in random lengths of 3-7 m, depending on diameter.

Straightness

Diameter (mm)	Height of arch, mm/m (typical value)
20 - 70	1
> 70	2

Tolerances, mm-sizes

Diameter (mm)	Tolerances, mm
20-35	-0/+0.15
40-45	-0/+0.16
50-70	-0/+0.19
75-95	-0/+1.00
100-240	-0/+1.50

Surface conditions

Peeled: Ra max. 5 µm

Mechanical properties

The following figures apply to material in the solution annealed condition.

At 20°C (68°F)

Metric units

Proof strength	Tensile Strength	Elongation
$R_{p0.2}$[a]	R_m	A[b]
MPa	MPa	%
≥350	≥700	≥40

Imperial units

Proof strength	Tensile Strength	Elongation
$R_{p0.2}$[a]	R_m	A[b]
ksi	ksi	%
≥50	≥101	≥40

1 MPa = 1 N/mm^2
a) Rp0.2 correspond to 0.2% offset yield strength.
b) Based on $L_0 = 5.65 \cdot S_0$ where L_0 is the original gauge length and S_0 the original cross-section area.
c) Conversion from HBW. Reference ASTM E140

Impact strength

Typical values longitudinal direction

Temperature	Impact strength
+20°C (68°F)	240J (177 ft-lb)

-50°C (-58°F)	230J (170 ft-lb)
-196°C (-320.8°F)	170J (125 ft-lb)

Physical properties

Density: 8.1 g/cm^3, 0.29 lb/in^3

Thermal conductivity

Temperature, °C	W/(m °C)	Temperature, °F	Btu/(ft h °F)
20	10.0	68	6.0
100	12.0	200	7.0
200	13.5	400	8.0
300	15.5	600	9.0
400	17.0	800	10.0

Specific heat capacity

Temperature, °C	J/(kg °C)	Temperature, °F	Btu/(lb °F)
20	450	68	0.11
100	470	200	0.11
200	500	400	0.12
300	510	600	0.12
400	530	800	0.13

Thermal expansion

Metric units, x10^{-6}/°C

Temperature, °C	30-100	30-200	30-300	30-400
Sanicro® 35	14.0	14.5	15.0	15.5
Carbon steel	12.5	13.0	13.5	14.0
ASTM 316L	16.5	17.0	17.5	18.0

Imperial units, x10^{-6}/°F

Temperature, °C	86-200	86-400	86-600	86-800
Sanicro® 35	8.0	8.0	8.5	8.5
Carbon steel	7.0	7.0	7.5	8.0

ASTM 316L	9.5	9.5	10.0	10.0

Resistivity

Temperature, °C	µΩm	Temperature, °F	µΩinch
20	1.0	68	39

Modulus of elasticity, x10³

Temperature, °C	MPa	Temperature, °F	ksi
20	190	68	28.0
100	185	200	27.0
200	180	400	26.0
300	175	600	25.0
400	170	800	24.5

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