Alleima® HighN50-A
Bar
Datasheet

Alleima® HighN50-A is a high-strength austenitic z-phase stainless steel with high N-content.

The yield/proof strength is almost doubled, and the corrosion resistance is superior compared to the standard 304/316 type austenites.

This combination of strength and corrosion resistance is found only within this material group.

Grade characteristics

Very high

- Yield/proof and ultimate tensile strength
- Resistance to abrasion, erosion and cavitation erosion

High

- Resistance to chloride and sulfide stress cracking

Non-magnetic

- Also after further processing, such as cold working

Material designations

- ASTM : Type XM-19, annealed
- UNS: S20910

Product standards

- ASTM A-479 / ASME SA-479
- ASTM A-276 / ASME SA-276
- NACE MR0175 / ISO 15156-3
- NACE MR0103 / ISO 17945-1
- ISO 14067:2018 (CO2e)

Chemical composition and mechanical properties only

- ASTM A-182 / ASME SA-182

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Approvals

- DNV approved manufacturer, D 75-180 mm (3-7.08")
- Accepted for food contact material according to the US Food and Drug administration

Climate change impact

Carbon footprint / CO2e data (kg/ton) and Life Cycle Assessment report is available for these products in the range of D 75-305 mm (3-12").

Material Test Certificate

- According to EN 10204/3.1

Chemical composition (nominal)

Chemical composition (nominal) %

C	Si	Mn	P	S	Cr	Ni	Mo	N	Nb	V
0.030	0.30	5.0	<0.035	<0.001	21.5	12.0	2.1	0.35	0.20	0.20

The PRE number for Alleima® HighN50-A is 34.

Applications

- Oil & Gas downhole / sour service
- Marine pumps, valves, masts, tie downs, fixtures and fittings
- Food processing equipment
- Process industry equipment
- Pulp and paper industry - valves and fittings
- Hydrogen equipment

Units

Metric units apply. Imperial for reference.

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Forms of supply

Dimensions and finishes

Alleima® HighN50-A is available through production order. The size range comprises 20-305mm (0.78-12”). Other dimensions may be possible on request. Solid round bar is supplied in solution annealed, quenched and peel-turned condition.

Lengths

Bars can be delivered in random lengths of 3-7.5 m (9.8-24.6 ft.), depending on diameter.

Tolerances

Metric (mm)		Imperial (in.)	
Diameter	**Tolerance**	**Diameter**	**Tolerance**
≤25	0/+0.23	≤0.98	0/+0.009
>25-28	0/+0.25	>0.98-1.10	0/+0.010
>28-31.5:	0/+0.28	>1.10-1.24	0/+0.011
>31.5-34.5	0/+0.30	>1.24-1.36	0/+0.012
>34.5-38	0/+0.35	>1.36-1.50	0/+0.014
>38-50	0/+0.40	>1.50-1.97	0/+0.016
>50-63	0/+0.80	>1.97-2.48	0/+0.031
>63-90	0/+1.20	>2.48-3.54	0/+0.047
>90-115	0/+1.60	>3.54-4.53	0/+0.063
>115-200	0/+2.00	>4.53-7.87	0/+0.079
>200-305	0/+2.50	>7.87-13.78	0/+0.098
		>13.78-12.00	0/+0.118

These tolerances fulfill ASTM A-484 (Hot finished round bars)

Straightness

Height of arch, typical values			
Diameter, mm	**mm/m**	**Diameter, in.**	**in./ft**
25-70 (75)	1	0.79-2.76	0.06” / 5 ft.
>75	2	>2.95	0.12” / 5 ft.

Surface condition

Diameter			
Metric (mm)	**Imperial (in.)**	**Condition**	**Typical finish (Ra)**
≤200	≤7.87	Burnished	1 µm
>200-305	>7.87-12.00	Peel turned	2 µm

Manufacturing

All products are made at the Alleima Tube AB integrated production facility in Sandviken, Sweden. From raw materials, melting, hot working, heat treatment to finishing and testing.

Heat treatment

Solution annealing at 1090°C (1994°F) followed by water quenching.

Mechanical properties

Tensile strength at 20°C (68°F)

The following values apply to bar material in the solution annealed and quenched condition.

Proof/Yield strength	Ultimate tensile strength
$R_{p0.2}$ min.	**R_m min.**
380 MPa	690 MPa
55 Ksi	100 Ksi

Elongation: ≥35%

1 MPa = 1 N/mm 2
a) $R_{p0.2}$ and $R_{p1.0}$ correspond to 0.2% offset and 1.0% offset yield strength respectively.
b) Based on L0 = 5.65√S, where L0 is the original gauge length and S0 the original cross-sectional area.

Impact strength

Typical

Temperature	Value
Room Temp.	236 J / 174 ft.lb
-60°C / -76 °F	168 J / 124 ft.lb
-196°C / -320.8 °F	56 J / 41 ft.lb

Hardness

Max. 35HRC / Max. 293 HBW

Relative permeability

Typical: 1.0024µ at 200 Oer (Room temp)

Machining

General

Machining is an expression used for a number of subtractive manufacturing methods. Mainly turning, milling, drilling. But also other operations like cutting, boring, grinding, reaming and tapping. For solid bars the initial operations primarily are cutting and external turning to prepare a blank for component manufacturing.

Stainless steels

Materials within the ISO-M material area can be challenging to machine. The materials vary a lot within the ISO-M group, but in general presents difficult chip control, high cutting forces and tool wear. In order to get as efficient function and tool life as possible, dedicated cutting tools and strategies to be used.

Getting started

To get it right, the first thing is to know the material to be machined. As the material properties are input to the selection of start values.

- ISO material group
- Condition/heat treatment
- Actual hardness of the material lot

Consult your cutting tool supplier for start recommendations, since the choice of cutting tools and machine tool set the direction for which start values to use.

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