Alleima® 20C compressor valve steel
Strip steel
Datasheet

Alleima® 20C is a hardened and tempered carbon steel characterized by:

- High strength
- High fatigue strength under bending and impact stress
- Low level of non-metallic inclusions
- Good wear resistance

Compressor valve steel in Alleima® 20C has excellent surface finish, good dimensional tolerances and good flatness.

Standards

- ASTM: 1095
- W.Nr.: 1.1274
- SS: 1870

Chemical composition (nominal)

Chemical composition (nominal) %

C	Si
1.00	0.3

Applications

Valve production

Valves made from Alleima® 20C compressor valve steel should be produced with fatigue properties in mind, in order to make full use of the excellent material properties.

Valve types:

- Flapper valves
- Reed valves
- Check valves

Forms of supply

Datasheet last updated 5/9/2025 6:38:02 AM (supersedes all previous editions)

Strip steel is supplied in labelled coils, or on labelled plastic spools, depending on weight and size. The label details the steel grade, heat, lot and coil number, and nominal size, allowing full material traceability. Material is protected against rust with oil.

Coils are wrapped in paper and packed in wooden cases. For overseas shipment, coils are also sealed in a plastic bag containing silica gel. Net and gross weights are marked on the case. Customized properties, dimensions and tolerances can be supplied on request.

Thickness

Alleima® 20C comprevalve steel is supplied in standard thicknesses in accordance with the table.

Thickness		Tolerance, ±	
mm	in.	mm	in.
0.152	0.006	0.005	0.00020
0.203	0.008	0.006	0.00024
0.254	0.010	0.007	0.00028
0.305	0.012	0.007	0.00028
0.381	0.015	0.008	0.00035
0.406	0.016	0.012	0.00047
0.457	0.018	0.012	0.00047
0.508	0.020	0.014	0.00055
0.559	0.022	0.020	0.00079
0.600	0.0236	0.020	0.00079
0.635	0.025	0.023	0.00091
0.762	0.030	0.023	0.00091
0.800	0.0315	0.027	0.00106
0.889	0.035	0.027	0.00106
1.000	0.0394	0.034	0.00134

Width

Strip in standard thicknesses is stocked in widths up to 350 mm (13.8 in.), ready for slitting to the required width.

Finishes

Edges

Edges are slit and deburred. Shaved edges can be supplied on request.

Flatness

Maximum out-of-flatness across and along the strip is 0.20% of the nominal strip width.

Surfaces

Material is delivered bright, fine polished.

Surface roughness

Maximum surface roughness values, cut-off 0.25 mm (.0098 inch), are shown in the table.

Thickness		R_a		R_{max}	
mm	**in.**	**µm**	**µin.**	**µm**	**µin.**
<0.508	<0.020	0.13	5.2	1.5	60
>0.508	>0.020	0.25	10.0	2.5	100

Surface defects

A small number of surface defects, such as pits and roll marks, with a depth or height of 2 µm (80 µin.) maximum is allowed for thicknesses up to 0.508 mm (0.020 in.) and 3 µm (120 µin.) maximum for thicker material. The maximum scratch depth allowed is as follows:

Thickness		Max. allowed depth	
mm	**in.**	**µm**	**µin.**
<0.203	<0.008	0.5	20
>0.203-<0.508	>0.008-<0.020	0.8	32
>0.508	>0.020	1.0	40

Straightness

Out-of-straightness is defined as the maximum deviation from a straight-edge of a specified length. The following values apply:

Strip width		Max. allowed deviation	
mm	**in.**	**mm/m**	**in./3 feet**
>8-<20	>0.315-<0.787	2.0	0.072
>20-<50	>0.787-<1.969	1.5	0.054
>50-<125	>1.969-<4.921	1.25	0.045
>125	>4.921	1.0	0.036

Mechanical properties

At 20°C (68°F)

Thickness		Tensile strength	
mm	**in.**	**MPa**	**ksi**
<0.125	<0.005	2100	305
0.125-<0.175	0.005-<0.007	2050	297

0.175-<0.225	0.007-<0.009	2000	290
0.225-<0.275	0.009-<0.011	1950	283
0.275-<0.375	0.011-<0.015	1900	276
0.375-<0.425	0.015-<0.017	1850	268
0.425-<0.475	0.017-<0.019	1800	261
0.475-<0.625	0.019-<0.025	1750	254
0.625-<0.825	0.025-<0.033	1700	247
0.825-<1.000	0.033-<0.039	1650	239

The proof strength ($R_{p0.2}$) is approximately 90% of the tensile strength (R_m). The manufacturing tolerance for tensile strength is ±80 MPa (±11.6 ksi.)

Fatigue strength

Alleima® 20C compressor valve steel has been used in the compressor industry for many years. The steel is tailored for applications requiring high fatigue strength. The fatigue strength depends on the surface and edge treatment of the material. The values presented are from none tumbled material with a smooth edge.

Reversed bending fatigue (mean stress = 0)

The fatigue strength of Alleima® 20C compressor valve steel in reversed bending is ±680 MPa (±99 ksi) at a failure probability of 5%. The value is valid for a strip thickness of 0.381 mm (.015 inch).

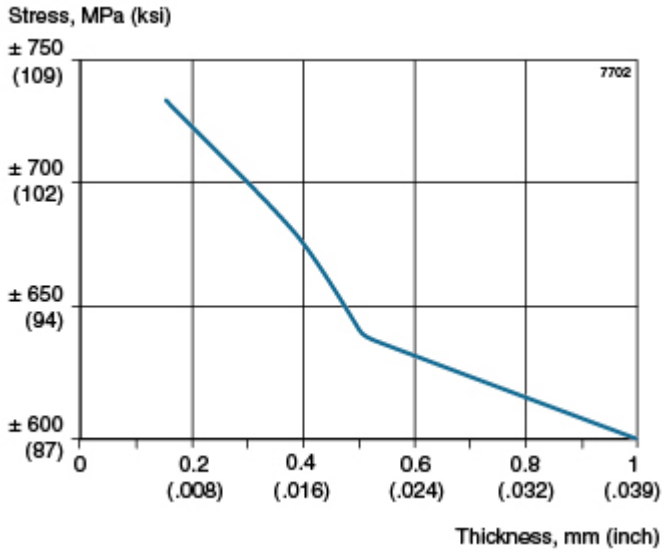
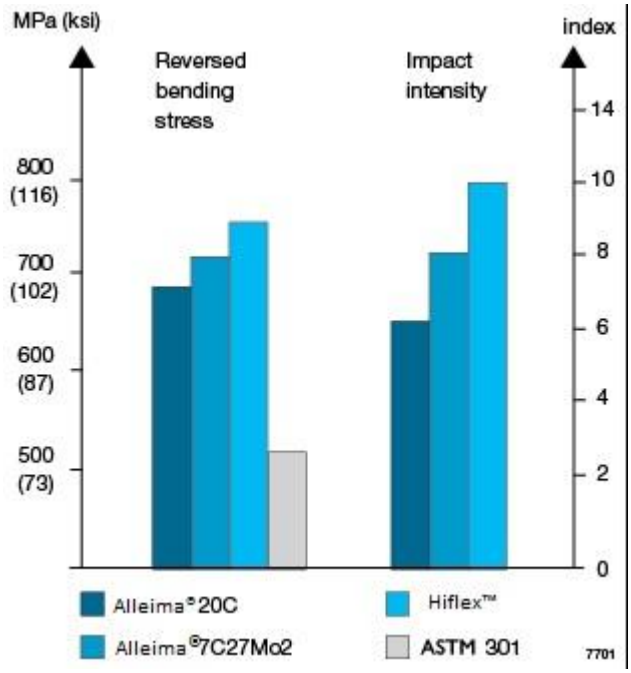


Figure 1. Reversed bending fatigue strength at a failure rate of 5%, as a function of the strip thickness in nominal tensile strengths.

Fluctuating bending fatigue (minimum stress = 0)

Fluctuating bending fatigue strength for Alleima® 20C compressor valve steel has been calculated from reversed bending values. Goodmans formula gives 499±499 MPa (ksi). Gerbers formula gives 608±608 MPa. The value is valid for a strip thickness of 0.381 mm (.015 in.).



Physical properties

Density, 7.8 g/cm^3, 0.28 lb/in^3

Thermal conductivity	
At 20°C, W/(m °C)	49
At 68°F, Btu/(ft h °F)	28

Specific heat capacity	
Mean value for 50-100°C, J/(kg °C)	460
Mean value for 120-210°F, Btu/(lb °F)	0.11

Thermal expansion, mean values in temperature ranges (x 10^{-6})

Temperature		Temperature	
°C	**Per °C**	**°F**	**Per °F**
30-100	10.5	86-200	5.5
30-200	11.5	86-400	6.5
30-300	12.5	86-600	7.0

Modulus of elasticity, static properties at 20°C (68°F)	
MPa	210000
ksi	30500

Disclaimer:

Recommendations are for guidance only, and the suitability of a material for a specific application can be confirmed only when we know the actual service conditions. Continuous development may necessitate changes in technical data without notice. This datasheet is only valid for Alleima materials.

Datasheet last updated 5/9/2025 6:38:02 AM (supersedes all previous editions)