IPCO 1200SA

Austenitic stainless steel belt

12-2020

Belt grade characteristics

The IPCO 1200SA belt grade is an austenitic stainless steel and is characterised by:

- Good static strength
- Very good fatigue strength
- Very good corrosion resistance
- Good wear resistance
- Very good repairability

IPCO 1200SA is a high corrosion resistant steel with good wear resistance. This makes it the universal choice for food and chemical industries (cooling, freezing and drying processes). Another advantage is that it is easy to repair.

Chemical composition (typical), %

C	Si	Mn	Cr	Ni
0.1	0.8	1.0	17	7

Standards

EN	1.4310
AISI	301

Forms of supply

The belts are, as standard, delivered in a specially selected cold rolled temper finish and have well-rounded edges. If required practically any surface finish can be supplied. Perforated belts are also available.

The belts are levelled and straightened to obtain optimal flatness and straightness. The belts can be supplied in open lengths, with the ends prepared for welding on site, or in endless condition with a welded joint.

For tracking, the belts can be provided with V-ropes, either rubber or in the form of a specially designed steel spiral. If required, the product side of the belt can be fitted with retai-ning strips to keep the conveyed material on the belt or with transverse flights to prevent material from sliding backwards when the belt is steeply inclined.

Different tolerance grades are available to ensure that the best belt can be selected from an economic point of view.

Recommendation and advice are available from your local IPCO office.

Mechanical properties

Static strength at 20 °C (68 °F), typical values

Position	Yield strength $R_{p0.2}$		Tensile strength R_m		Elongation A (%)	Weld factor $R_{m\,weld}/R_m$	Hardness HV5
	MPa	ksi	MPa	ksi			
Parent material	980	142	1 200	174	28		380
Transverse weld (not heat treated)	630	91	880	128	18	0.73	*

*See figure 1 on page 2.

At high temperatures, typical values

Temperature		Yield strength $R_{p0.2}$		Tensile strength R_m		Elongation A (%)
°C	°F	MPa	ksi	MPa	ksi	
100	212	910	132	1 020	148	16
200	392	820	119	950	138	8
300	572	720	104	930	135	7
400	752	690	100	890	129	10

At about 450 °C (840 °F) chromium carbide precipitates, resulting in deteriorating mechanical properties and corrosion resistance.

Hence the following recommendation: If an operation temperature of or above 400 °C (750 °F) is considered, your local IPCO office should be contacted for technical assistance.

Impact properties

Austenitic stainless steels have excellent mechanical properties at low temperatures. The impact energy is enough at -80 °C (-110 °F) for a safe operation. The transition temperature (transition from ductile to brittle fracture) is lower than -200 °C (-330 °F).

Dynamic strength

The fatigue limit is defined as the reverse bending stress at which 50% of the test specimen withstand a minimum of 2×10^6 load cycles. These values refer to 20 °C (68 °F), a normal dry atmosphere and standard prepared specimen. The fatigue limit for the parent material is approximately ± 470 MPa (68 ksi).

Physical properties

Density, ρ, at 20 °C (68 °F)
7 930 kg/m³, 0.287 lb/in³

Modulus of elasticity, E, at 20 °C (68 °F)
182 000 MPa (26 400 ksi)

Thermal conductivity, λ

Temp	°C	20	100	200	300	400
	°F	68	212	392	572	752
	W/mK	15	16	17	18	19
	Btu/ft h °F	8.5	9.3	9.8	10.3	11.0

Specific heat capacity, C_p

Temp	°C	20	100	200	300	400
	°F	68	212	392	572	752
	kJ/kgK	0.50	0.50	0.52	0.54	0.58
	Btu/lb °F	0.12	0.12	0.12	0.13	0.14

Thermal expansion, α

Temp	°C	20 – 100	20 – 200	20 – 300	20 – 400
	°F	68 – 212	68 – 392	68 – 572	68 – 752
	10^{-6}/ °C	17.7	18.0	18.3	18.6
	10^{-6}/ °F	9.8	10.0	10.2	10.3

Resistivity, ρ at 20 °C (68 °F)
0.8 μΩm

Magnetic properties

Remanence, B_r	0.05 Wb/m²
Coercive force, H_c	8 000 A/m
Max relative permeability, m_p	5

Due to relative low thermal conductivity and high thermal expansion for austenitic stainless steels the temperature must be kept constant over the whole width of the belt. Only minor temperature differences can be allowed. As the steel is cold rolled, recovery takes place at elevated temperatures.

Corrosion resistance

General corrosion
IPCO 1200SA shows a very good corrosion resistance in rural and mild industrial atmosphere and coastal atmosphere.

It has good resistance to:
- Organic acids as citric, lactic and acetic acids in high concentrations and moderate temperatures, tartaric acid at relative high concentrations and high temperatures, and formic acid at low concentrations and moderate temperatures.
- Inorganic acids as boric, nitric, phosphoric and sulphurous acids at moderate concentrations and temperatures.
- Salts as sulphates, sulphides and sulphites.

IPCO 1200SA is not suitable to use in any concentration of hydrochloric acid or in sulphuric acid of most concentrations, especially in combination with elevated temperatures.

Pitting and crevice corrosion
The steel may be sensitive to pitting, even in solutions of a relative low chloride content. When in continuous operation at room temperature, IPCO 1200SA has good resistance to pitting providing that the belt is kept clean. To achieve even better resistance to pitting than IPCO 1200SA, IPCO 1000SA, which has a molybdenum content, is recommended.

Stress corrosion cracking
Stress corrosion cracking, although occurring relatively infrequently, can be a cause of failure in stainless steels. It occurs at temperature above about 70 °C (160 °F), if the steel is subjected to tensile stresses and comes into contact with certain solutions, particularly those containing chlorides.

Intergranular corrosion
In austenitic stainless steels chromium carbide precipitation takes place during heat treatment in the temperature range of 450 – 900 °C (840 – 1650 °F). Lowered chromium content in the matrix impairs the corrosion resistance.

Hardness HV

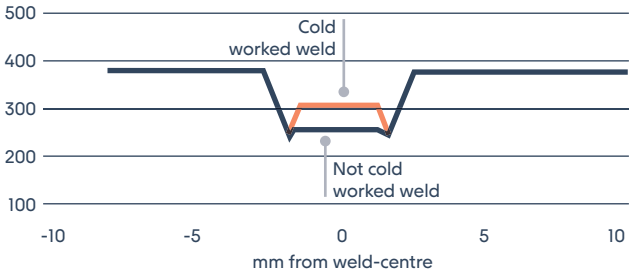

Figure 1. Example of hardness across the weld with and without cold working.

Welding

Joints with good strength and toughness can be formed in IPCO 1200SA. A suitable fusion welding method is gas-shielded arc welding, with the TIG method as first choice.

Since the material has low thermal conductivity and high thermal expansion, welding should be carried out with a low heat input, to avoid distortion. Rapid cooling is required to prevent carbide precipitation in the heat-affected zone.

Welding is normally performed without welding wire. In case of using wire, wire type should be IPCO 1200SA (AWS A5.9 ER 308 LSi). In order to increase the flatness and strength of the weld, cold working is recommended.

Further information concerning method and equipment etc. required can be obtained from your local IPCO office.