

# IPCO 1200SAPP

## Austenitic stainless steel belt

### Belt grade characteristics

The IPCO 1200SAPP 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 1200SAPP is a high corrosion resistant steel with good wear resistance, making it ideally suited to the solidification of melted polymer materials, e.g. in powder paint production. 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

### Mechanical properties

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

Position	Yield strength		Tensile strength		Elongation A (%)	Weld factor $R_{m\text{ weld}}/R_m$	Hardness HV5
	$R_{p0.2}$		$R_m$				
	MPa	ksi	MPa	ksi			
Parent material	980	142	1 200	174	20		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

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

### Forms of supply

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

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

Belts can be supplied with rubber V-ropes for tracking purposes.

Recommendation and advice are available from your local IPCO office.

Therefore, if an operating temperature of 400 °C (750 °F) is anticipated, please contact your local IPCO office for technical advice.

#### 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  $2 \times 10^6$  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  $\pm 470$  MPa (68 ksi).

## Physical properties

### Density, $\rho$ , at 20 °C (68 °F)

7 930 kg/m<sup>3</sup> (0.287 lb/in<sup>3</sup>)

### Modulus of elasticity, E, at 20 °C (68 °F)

182 000 MPa (26 400 ksi)

### Thermal conductivity, $\lambda$

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, $\alpha$

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

### Resistivity, $\rho$ at 20 °C (68 °F)

0.8  $\mu\Omega\text{m}$

### Magnetic properties

Remanence, $B_r$	0.05 Wb/m <sup>2</sup>
Coercive force, $H_c$	8 000 A/m
Max relative permeability, $m_p$	5

Due to relatively 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 1200SAPP 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.

Data given in this document are nominal values and are not guaranteed. Information relating to material, specifications, properties and/or performance is intended as guidance on determining suitability, and may be subject to change without notice.

IPCO 1200SAPP is not suitable for 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 1200SAPP has good resistance to pitting providing that the belt is kept clean. To achieve even better resistance to pitting than IPCO 1200SAPP, IPCO 1000SAPP, 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 temperatures above about 70 °C (160 °F), if the steel is subjected to tensile stresses and encounters 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

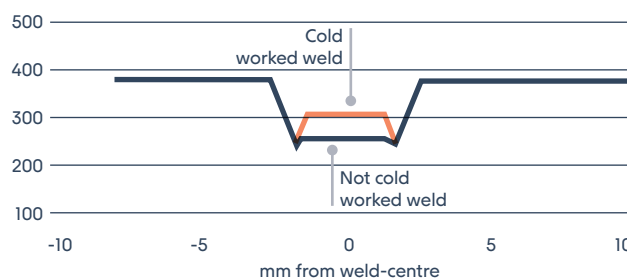


Figure 1. Example of hardness across the weld with and without cold working.

## Welding

Joints with good strength and toughness can be formed in IPCO 1200SAPP. 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 1200SAPP (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.