

IPCO 1600SM

Martensitic stainless steel belt

Belt grade characteristics

The IPCO 1600SM belt grade is made of low carbon, martensitic, precipitation hardened, stainless steel is characterized by:

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

IPCO 1600SM is a high strength steel with excellent mechanical properties. This, in combination with good corrosion resistance, makes it the ideal choice for applications in very harsh conditions. Another advantage is that it is easy to repair.

Chemical composition (typical), %

C	Si	Mn	Cr	Ni	Mo
0.01	0.3	0.2	9.5	9.5	4.8

Standards

EN	1.6908
----	--------

Mechanical properties

Static strength

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

Position	Yield strength		Tensile strength		Elongation A ₅ (%)	Weld factor R _m /R _m	Hardness HV ₅
	MPa	ksi	MPa	ksi			
Parent material	1 570	228	1 600	232	8		480
Transverse weld (not heat treated)	950	138	1 080	157	4	0.68	*
Transverse weld (heat treated)	1 560	227	1 580	229	3	0.99	*

*See figure on page 2.

Standard strength at elevated temperature

Temperature		Yield strength		Tensile strength		Elongation A _{11.3} (%)
°C	°F	MPa	ksi	MPa	ksi	
100	212	1 430	208	1 450	210	4
200	392	1 340	195	1 360	197	5
300	572	1 280	186	1 310	190	5
400	752	1 170	170	1 190	173	6.5

An increase in mechanical strength (hardness) and brittleness can be noticed after long term use between 350–450 °C (660–840 °F). Hence the following recommendation: If an operation temperature of or above

Forms of supply

The belts are, as standard, delivered in a heat-treated condition with a mill finish and have well-rounded edges. Maximum width is limited to 600 mm.

The belts are leveled 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 retaining 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.

350 °C (660 °F) is considered, your local IPCO office should be contacted for technical assistance.

Impact properties

This belt grade is not recommended for use at low temperature, i.e. such as in freezing operations.

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 ± 640 MPa (93 ksi).

Physical properties

Density, ρ , at 20 °C (68 °F)

7 800 kg/m³, 0.282 lb/in³

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

200 000 MPa (29 000 ksi)

Thermal conductivity, λ

Temp	°C	20	100	200	300	400
	°F	68	212	392	572	752
	W/mK	15	16	18	19	20
	Btu/ft h °F	8.7	9.2	10.4	11	11.6

Specific heat capacity, C_p

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

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	10.9	11.5	11.7	11.9
	10 ⁻⁶ /°F	6.1	6.4	6.5	6.6

Resistivity, ρ at 20 °C (68 °F)

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

Magnetic properties

Remanence, B_r

Coercive force, H_c

Max relative permeability, μ_r

The thermal conductivity of precipitation hardened steel is comparable to austenitic stainless steels, but the thermal expansion is much lower. This makes the precipitation-hardened steel less sensitive to thermal strain and buckling caused by uneven temperature.

Corrosion resistance

General corrosion

IPCO 1600SM shows a good corrosion resistance in rural and mild industrial atmosphere and almost equal good when expose to coastal atmosphere. It has good resistance to:

- Organic acids, such as acetic acid, up to high concentrations and high temperatures and formic acid at low concentrations and high temperatures.
- Inorganic acids, e.g. sulphuric acid at low concentration and phosphoric and nitric acids at moderate concentration and temperatures.
- Ammonium hydroxide up to boiling point and sodium hydroxide at moderate concentrations and temperatures.

IPCO 1600SM is not suitable to use in any concentration of hydrochloric acid, or in phosphoric and nitric acids of high concentration and high temperature, and sulphuric acid of moderate and high concentration at 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 1600SM has good resistance to pitting providing that the belt is kept clean.

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.

Hydrogen embrittlement

Hydrogen embrittlement is a potential danger to all high strength martensitic steels whenever the reduction of hydrogen ions to atomic hydrogen occurs. If this is the case, contact your local IPCO office.

Welding

Joints with very good strength and toughness can be formed in IPCO 1600SM. A suitable fusion welding method is gas-shielded arc welding, with the TIG method as first choice.

Welding wire of type IPCO 1650SM should be used. Further information concerning method and equipment etc. required can be obtained from your local IPCO office.

Hardness HV

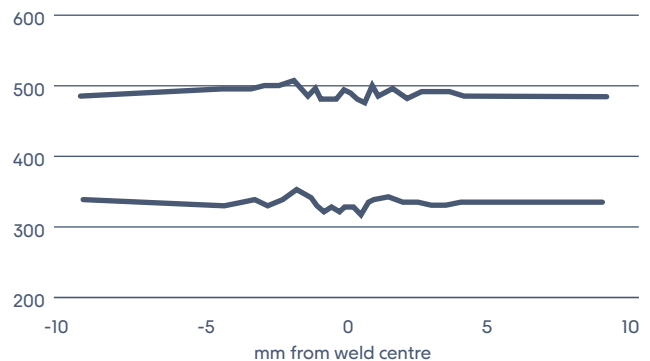


Figure 1. Example of hardness profile across a transverse weld, with and without heat-treatment in a IPCO 1600SM belt.

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.