IPCO 1100C

Hardened and tempered carbon steel belt

12-2020

Belt grade characteristics

The IPCO 1100C belt grade is made of hardened carbon steel and is characterised by:

- Good static strength
- Very good fatigue strength
- Very good thermal properties
- Excellent wear resistance
- Good repairability

IPCO 1100C is a carbon steel with a hard, smooth surface and a black oxide layer, which makes it suitable for any application with a low risk for corrosion. Very good thermal properties make it ideal for baking and for heating and drying of liquids, pastes and fine-grained products.

Chemical composition (typical), %

C	Si	Mn	Cr
0.65	0.25	0.65	0.20

Standards

EN	1.1235
AISI	1065

Forms of supply

The belts are delivered in a hardened and tempered con. dition 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 or riveting on site, or in endless condition with a welded joint.

For tracking, the belts can be provided with rubber V-ropes. 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.

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 Vickers, HV5
	MPa	ksi	MPa	ksi			
Parent material	1 200	174	1 300	188	10		400
Transverse weld (heat treated)	800	116	1 000	145	4	0.77	*

*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	1 050	152	1 260	182	7
200	392	950	138	1 250	181	8
300	572	850	123	1 130	164	20
400	752			840	121	20

IPCO 1100C should not be exposed for prolonged periods (a few hours) to temperatures exceeding 450 °C (840 °F). A reduction in strength due to carbide precipitation takes place at elevated temperatures and this process is also time related (a short time and high temperature give the same effect as long time and lower temperature). Hence the following recommendation: If an operation temperature of or above 350 °C (660 °F) is considered, your local IPCO office should be contacted for technical assistance.

Impact strength

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

Fatigue 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 ± 460 MPa (67 ksi).

Physical properties

Density ρ, at 20 °C (68 °F)
7 850 kg/dm^3, 0.29 lb/in^3

Modulus of elasticity at 20 °C (68 °F)
196 000 MPa (28 380 ksi)

Thermal conductivity, λ

Temperature °C	λ W/mK °C	Temperature °F	λ Btu/ft h °F
20	38	68	22
100	38	200	22
200	38	400	22
300	38	600	23
400	38	800	22

Specific heat capacity, C_p

Temperature °C	C_p kJ/kgK	Temperature °F	λ Btu/lb °F
0	0.46	68	0.11
100	0.50	200	0.12
200	0.52	400	0.12
300	0.55	600	0.13
400	0.60	800	0.14

Thermal expansion, a

Temperature °C	a × 10^{-6}/°C	Temperature °F	a × 10^{-6}/°F
20–100	10.4	68–200	5.8
20–200	11.3	68–400	6.3
20–300	11.9	68–600	6.6
20–400	12.8	68–800	7.1

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

Magnetic properties

Remanence, Br	1.5 Wb/m^2
Coercive force, H_c	1 500 A/m
Max relative permeability, μ_r	400

IPCO 1100C has high thermal conductivity and low thermal expansion, which makes it less sensitive to buckling and thermal strain caused by uneven temperatures.

Corrosion resistance

General corrosion
IPCO 1100C is, despite its oxide layer, susceptible to general corrosion in water solution, especially at low pH values. Increased temperature, flow rate, acidity and the presence of salts increase the corrosion rate. In neutral solutions, ions such as CrO_4^{-2} and NO_3 have an inhibiting effect.

Pitting and crevice corrosion
Pitting and crevice corrosion attacks can occur in chloride containing solutions at intermediate pH values, where the general corrosion rate is low.

Stress corrosion cracking
IPCO 1100C is not susceptible to stress corrosion cracking or intercrystalline corrosion attacks.

Hydrogen embrittlement
IPCO 1100C is susceptible to hydrogen embrittlement. If the materials exposed to possible sources of hydrogen embrittlement a special heat-treatment of the material is recommended. Contact your IPCO office for information.

Welding

Joints with very good strength and toughness can be formed in IPCO 1100C. A suitable fusion welding method is gas-shielded arc welding, with the TIG method as first choice.

A well-balanced heat-treatment must be performed in connection with the welding, to ensure the weld has good static and dynamic mechanical properties.

Welding wire should be of type IPCO 1300C (AWS SFE A5.18 ER 70S-6).

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

Hardness HV

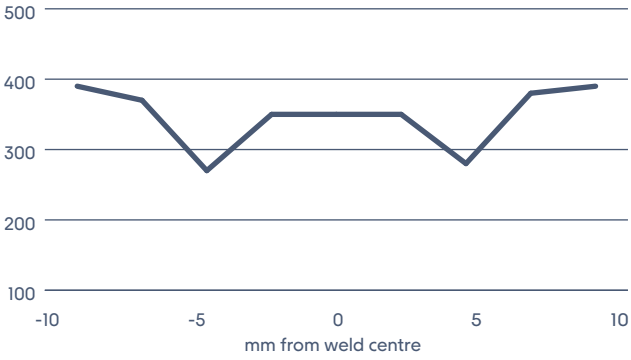

Figure 1. Example of hardness profile across an annealed transverse weld in a IPCO 1100C belt.