IPCO 1100C

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), %

<table>
<thead>
<tr>
<th>Element</th>
<th>C</th>
<th>Si</th>
<th>Mn</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.65</td>
<td>0.25</td>
<td>0.65</td>
<td>0.20</td>
</tr>
</tbody>
</table>

Standards
EN 1.1235
AISI 1065

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

<table>
<thead>
<tr>
<th>Position</th>
<th>Yield strength</th>
<th>Tensile strength</th>
<th>Elongation</th>
<th>Weld factor</th>
<th>Hardness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rp0.2 (MPa, ksi)</td>
<td>Rm (MPa, ksi)</td>
<td>A (%)</td>
<td>Rm weld /Rm</td>
<td>Vickers,</td>
</tr>
<tr>
<td>Parent material</td>
<td>1 200</td>
<td>1 300</td>
<td>10</td>
<td>4</td>
<td>400</td>
</tr>
<tr>
<td>Transverse weld (heat treated)</td>
<td>800</td>
<td>1 000</td>
<td>4</td>
<td>0.77</td>
<td>*</td>
</tr>
</tbody>
</table>

*See figure 1 on page 2.

At high temperatures, typical values

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Yield strength Rm,2 (MPa, ksi)</th>
<th>Tensile strength Rm (MPa, ksi)</th>
<th>Elongation A (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 °C (212 °F)</td>
<td>1 050 152</td>
<td>1 260 182</td>
<td>7</td>
</tr>
<tr>
<td>200 °C (392 °F)</td>
<td>950 138</td>
<td>1 260 181</td>
<td>8</td>
</tr>
<tr>
<td>300 °C (572 °F)</td>
<td>850 123</td>
<td>1 130 164</td>
<td>20</td>
</tr>
<tr>
<td>400 °C (752 °F)</td>
<td>840 121</td>
<td></td>
<td>20</td>
</tr>
</tbody>
</table>

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 2 106 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, at 20 °C (68 °F)
7.9 kg/dm³, 0.29 lb/in³

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

Thermal conductivity, λ

<table>
<thead>
<tr>
<th>Temperature °C</th>
<th>λ W/mK °C</th>
<th>Temperature °C</th>
<th>λ Btu/ft h °F</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>38</td>
<td>68</td>
<td>22</td>
</tr>
<tr>
<td>100</td>
<td>38</td>
<td>200</td>
<td>22</td>
</tr>
<tr>
<td>200</td>
<td>38</td>
<td>400</td>
<td>22</td>
</tr>
<tr>
<td>300</td>
<td>38</td>
<td>600</td>
<td>23</td>
</tr>
<tr>
<td>400</td>
<td>38</td>
<td>800</td>
<td>22</td>
</tr>
</tbody>
</table>

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

Magnetic properties

- Remanence, Br: 1.5 Wb/m²
- Coercive force, Hc: 1 500 A/m
- Max relative permeability, μr: 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 CrO₄²⁻ and NO₃⁻ 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.

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