

# IPCO 1150SMD

Precipitation hardened, martensitic,  
stainless steel belt

## Belt grade characteristics

The IPCO 1150SMD belt grade is made of low carbon, martensitic, precipitation hardened stainless steel of type 15-7 PH and is characterised by:

- Very good static strength
- Very low thermal expansion coefficient
- Very good hardness
- Very good weldability
- Very good to polish

IPCO 1150SMD is a high strength steel with good mechanical properties. This, in combination with very low thermal expansion coefficient, makes it the ideal choice for all kinds of laminate belts.

### Chemical composition (typical), %

| C    | Si  | Mn  | Cr   | Ni  | Cu  | Ti  | Mo  |
|------|-----|-----|------|-----|-----|-----|-----|
| 0.04 | 1.5 | 0.5 | 14.0 | 7.0 | 0.7 | 0.3 | 0.8 |

### Standards

|      |             |
|------|-------------|
| EN   | No standard |
| AISI | No standard |

## Mechanical properties

### Static strength

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

| Position                           | Yield strength |     | Tensile strength |     | Elongation<br>A5 (%) | Weld factor<br>$R_m/R_m$ | Hardness<br>HV5 |
|------------------------------------|----------------|-----|------------------|-----|----------------------|--------------------------|-----------------|
|                                    | MPa            | ksi | MPa              | ksi |                      |                          |                 |
| Parent material                    | 950            | 138 | 1 100            | 160 | 20                   |                          | 350             |
| Transverse weld (not heat treated) | 900            | 130 | 1 040            | 151 |                      | 0.98                     | *               |

\*See figure on page 2.

### Mechanical Properties

IPCO 1150SMD should not be exposed for prolonged periods (a few hours) to temperatures exceeding 350 °C (660 °F). If an operation temperature of or above 350 °C (660 °F) is considered, please contact your local IPCO office for technical assistance.

### Impact Properties

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

## Forms of supply

The belts are, as standard, delivered in a heat-treated condition with a mill finish and have well rounded edges. Practically any surface finish can be supplied if required. 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 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.

### 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 +/- 430 MPa (62 ksi).

## Physical properties

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

7 740 kg/m<sup>3</sup>, 0.280 lb/in<sup>3</sup>

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

197 000 MPa (28 600 ksi)

### Thermal conductivity, $\lambda$

| 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, $\alpha$

| Temp                 | °C | 20–100 | 20–200 | 20–300 | 20–400 |
|----------------------|----|--------|--------|--------|--------|
|                      | °F | 68–212 | 68–392 | 68–572 | 68–752 |
| 10 <sup>-6</sup> /°C |    | 10.9   | 11.5   | 11.7   | 11.9   |
| 10 <sup>-6</sup> /°F |    | 6.1    | 6.4    | 6.5    | 6.6    |

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

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

### Magnetic properties

|                                    |                       |
|------------------------------------|-----------------------|
| Remanence, $B_r$                   | 0.8 Wb/m <sup>2</sup> |
| Coercive force, $H_c$              | 800 A/m               |
| Max relative permeability, $\mu_r$ | 480                   |

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

## Corrosion resistance

### General corrosion

IPCO 1150SMD shows a good corrosion resistance in rural and mild industrial 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.

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 1150SMD is not suitable for 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 1150SMD 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 excellent strength and toughness can be formed in IPCO 1150SMD. A suitable fusion welding method is gas-shielded arc welding, with the TIG method as first choice.

Welding wire should be of type IPCO 1650SM.

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

### Hardness HV

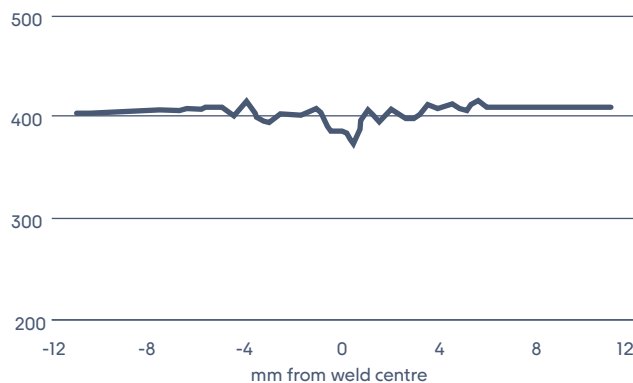


Figure 1 Example of hardness profile across a transverse weld in an IPCO 1150SMD belt.