

IPCO 1500SAF

Super duplex stainless steel

Belt grade characteristics

IPCO 1500SAF is a high alloy super duplex stainless steel. For service in very high corrosive environments, characterised by:

- Excellent corrosion resistance
- Good static strength
- Good fatigue strength
- Fair wear resistance
- Fair weldability

IPCO 1500SAF is a high corrosion resistance steel with very good reparability. This makes it suitable for chemical processes which ordinary steel can not stand.

Chemical composition (Typical), %

C	Si	Mn	Cr	Ni	Mo	N
0.02	<0.8	<1.2	25	7	4	0.27

Standards

EN	1.4410
ASTM	UNS S32750

Forms of supply

The belts are, as standard, delivered in a cold rolled condition with a mill finish 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 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.

Mechanical properties

Static strength

Standard strength at room temperature, typical values

Position	Yield strength		Tensile strength		Elongation A5 (%)	Weld factor R_m/R_m	Hardness HV5
	MPa	ksi	MPa	ksi			
Parent material	1 300	189	1 500	232	6	0.65	385
Transverse weld	920	133	980	167	6		

Limitation: Operations above 250 °C (480 °F) is not recommended for IPCO 1500SAF. Contact your local IPCO office for technical assistance.

Impact properties

IPCO 1500SAF has good impact strength and is suitable for operations down to -50 °C (-58 °F).

Dynamic strength

The fatigue limit is defined as the reverse bending stress at which 50% of the test specimens 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 ± 480 MPa (63 ksi).

Physical properties

Density, ρ , at 20 °C (68 °F)

7 800 kg/m³, 0.28 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
	°F	68	212	392	572
W/mK		14	15	16	18
Btu/ft h °F		8	9	9	10

Specific heat capacity, C_p

Temp	°C	20	100	200	300
	°F	68	212	392	572
kJ/kgK		0.48	0.50	0.53	0.55
Btu/lb °F		0.12	0.12	0.13	0.13

Thermal expansion, α

Temp	°C	20–100	20–200	20–300
	°F	68–212	68–392	68–572
10 ⁻⁶ /°C		13.5	14	14
10 ⁻⁶ /°F		7.5	7.5	8

Resistivity, ρ at 20 °C (68 °F)

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

Magnetic properties

Remanence, B_r	0.125 Wb/m ²
Coercive force, H_c	1 420 A/m
Max relative permeability, μ_r	52

IPCO 1500SAF has a thermal expansion close to carbon steel which makes it less sensitive to temperature differences in the belts. As the steel is cold rolled, recovery takes place at elevated temperatures.

Corrosion resistance

Uniform corrosion

Uniform corrosion occurs when all, or at least a large section of the passive layer on the surface is dissolved. This typically occurs in acids or in hot alkaline solutions.

IPCO 1500SAF is a steel grade that is highly alloyed of the elements chromium, molybdenum and nitrogen which provides enhanced reinforcement of the passive layer of the surface.

Pitting and crevice corrosion

Chloride ions in a neutral or acidic environment promotes local breakdown of the passive layer. As a result, pitting and crevice corrosion can propagate at a high rate, causing corrosion failure in a short time.

Resistance to pitting and crevice corrosion increases with an increasing content of chromium, molybdenum and nitrogen in the steel grade. Consequently, 1500 SAF has a very high resistance to pitting and crevice attacks. To make a rough ranking of different stainless steels the PRE (Pitting Resistance Equivalent) formula is used, $PRE = \%Cr + 3.3 \times \%Mo + 16 \times \%N$. IPCO 1500SAF has a PRE of 43, in comparison IPCO 1400SAF has a PRE of 35 and IPCO 1000SA has a PRE of 24.

Stress corrosion cracking

Stress corrosion cracking (SCC) is a brittle failure mode caused by the combined effect of mechanical stress in a corrosive environment and normally at elevated temperature. SCC is often initiated by a localized corrosion attack (pitting or crevice attack). Standard austenitic stainless steels containing less amount of molybdenum are more sensitive to SCC than other types of stainless steels.

IPCO 1500SAF has an excellent resistance to stress corrosion cracking due to its high alloy of chromium, molybdenum and nitrogen and its duplex microstructure of the austenite and ferrite where the ferrite phase is the continuous phase.

Intergranular corrosion

IPCO 1500SAF has a very low carbon content which minimizes the risk of carbide precipitation and thereby a high resistance to carbide related intergranular corrosion.

Welding

The weldability of IPCO 1500SAF is good. Suitable welding method is TIG. Preheating or post heat treatment is not necessary. Matching welding wire of type IPCO 1500SAF is recommended.

Hardness HV

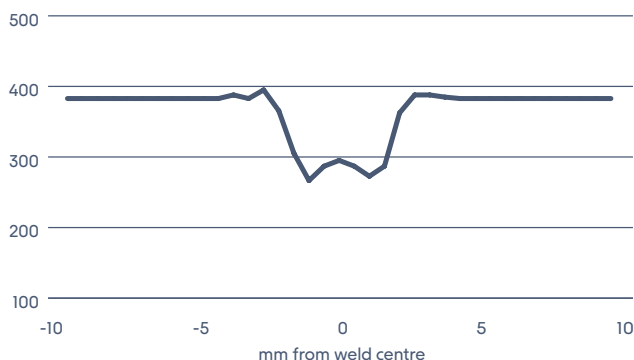


Figure 1. Example of hardness profile across a transverse weld in a IPCO 1500SAF belt.