

# SPECIFICATIONS

IPCO steel belts are available in a choice of steel grades, sizes and tolerances to suit different applications.

## Manufacturing programme, general

IPCO has a long tradition of supplying steel belts for all types of industries and has led the way in developing and adapting the steel belt to fulfil specific application needs.

IPCO has a wide range of steel grades and dimensions, in a number of basic tolerances and surface finishes to ensure the optimum choice for each application.

The most commonly used steel belt grades and their properties are shown in the table below.

IPCO uses a very simple and easy to understand designation system for its steel belt grades where the figures indicate roughly the tensile strength in MPa\*) and the letters the type of steel and microstructure:

C = Carbon steel  
S = Stainless steel  
A = Austenitic microstructure  
M = Martensitic microstructure  
F = Ferritic

More detailed information and recommendations for each steel grade are available from separate data sheets. The dimension range for single belts of the different steel grades can be seen from the table below. \*)

1 MPa = 1 N/mm<sup>2</sup>

Grade	Thickness (mm)	Width - up to (mm)
1000SA	1.0/1.2	1 500
1200SA	0.4	200
1200SA	0.6	600
1200SA	0.8	1 200
1200SA	1.0	1 500
1200SA	1.2	2 000
1050SM	0.8	1 200
1050SM	1.0/1.2	1 500
1150SM	0.8	1 200
1150SM	1.0 to 3.5	1 500
1100SM	1.2/1.6	2 000
1100SM	2.0 to 3.5	1 500
1650SM	0.8	1 200
1650SM	1.0 to 3.5	1 500
1850SM	0.6	200 and 300
1100C	0.6/0.8	800
1100C	1.0 to 1.4	1 250
1100C	1.2/1.6	1 500
1320C	0.6/0.8	1 000
1320C	1.6	1 250
1600SM	0.4/0.6	600
1500SAF	1.0	1 500

## Dimensional tolerances

IPCO steel belts are classified into different tolerance grades to ensure that the best belt is selected from an economic point of view.

*Tolerances which are closer or in other respects deviate from the specified ones can normally be supplied by special agreement.*

### Thickness

The maximum deviation from the nominal belt thickness is  $\pm 8\%$ . A closer tolerance can be obtained by specifying the maximum variation of 0.1 mm.

The minimum variation which can regularly be obtained is 0.05 mm.

### Thickness – longitudinal and transversal welds

The permissible thickness deviation between the welded joint and the adjoining zone is normally  $+0/-0.10$  mm. If required,  $+0/-0.05$  mm can be achieved. The weld zone is normally ground over a width of 50 mm.

### Width

Single belts  
Carbon steels  $-0/+4$  mm.  
Stainless steels  $-1/+1$  mm.

However, there is normally a maximum variation of 1 mm within the same belt.

### Longitudinally welded belts

All longitudinally welded belts have a width tolerance of  $\pm 6$  mm with a maximum variation of 4 mm within the same belt.

However, it is possible to obtain a tolerance as close as  $\pm 2$  mm if required.

### Length

IPCO belts can be supplied in open lengths, with the ends prepared for riveting or welding on site, or endlessly welded.

### Open length

Normally an excess length of approximately 0.3 m is added to the ordered length.

This excess length is intended to facilitate handling of the belt during installation.

### Endless belts

For endless lengths the tolerance for all types of joints is  $\pm 50$  mm for belts up to 50 m long and  $\pm 100$  mm for longer belts.

IPCO grade Standards	AISI W Nr.	1000SA 316.00 1.4436	1200SA 301, 304 1.431	1050SM - -	1150SM 630.00 1.4542	1500SM - -	1650SM - -
Yield strength, Rp0.2, MPa	20 °C	910	980	1 000	1 110	1 420	1 580
	100 °C	870	910	940	1 100	1 270	1 440
	200 °C	800	820	960	1 010	1 150	1 350
	300 °C	700	720	970	-	1 070	1 290
Tensile strength, Rm, MPa	20 °C	970	1 200	1 080	1 150	1 500	1 600
	100 °C	890	1 020	990	1 120	1 360	1 450
	200 °C	810	950	990	1 100	1 290	1 360
	300 °C	790	930	1 000	-	1 210	1 310
Dynamic strength, MPa	20 °C	400	470	500	500	580	630
Weld factor transverse weld, Rm/Rm	20 °C	0.72	0.73	0.97	0.98	0.77	0.80
Hardness, HV	20 °C	320	380	340	380	460	480
Density, kg/m <sup>3</sup>	20 °C	8 000	7 930	7 730	7 740	7 800	7 740
Modulus of elasticity, GPa	20 °C	182	182	200	197	197	197
Thermal conductivity, W/mK	20 °C	15	15	20	15	16	15
	100 °C	16	16	21	16	17	16
	200 °C	17	17	22	18	19	18
	300 °C	19	18	24	19	20	19
Specific heat, kJ/kgK	20 °C	0.50	0.50	0.50	0.50	0.50	0.50
Thermal expansion, 1/Kx10 <sup>-6</sup>	20-100 °C	16.0	17.7	10.8	10.9	10.8	10.9
	20-200 °C	17.0	18.0	11.2	11.5	10.8	11.5
	20-300 °C	17.5	18.3	11.7	11.7	11.2	11.7
Resistivity, μΩm	20 °C	0.78	0.79	0.79	0.80	0.80	0.80

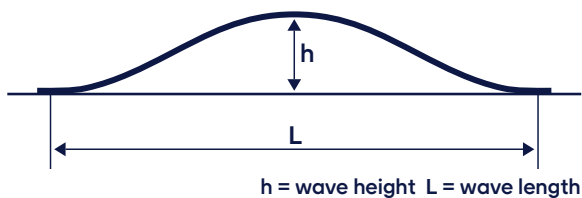
## Flatness

The maximum ratio h:L, measured without external tensions, is defined in the table below.

Ratio h:L	Class	h max. mm	Single belts	Longitudinally welded belts
1:350	F4	2	□	-
≤1:250	F3	3	■	■
≤1:200	F2	5	■	■
≤1:100	F1	10	-	■

□ Carbon steel grade, ■ All steel grades

Under tension in the conveyor the flatness is highly improved.



## Straightness

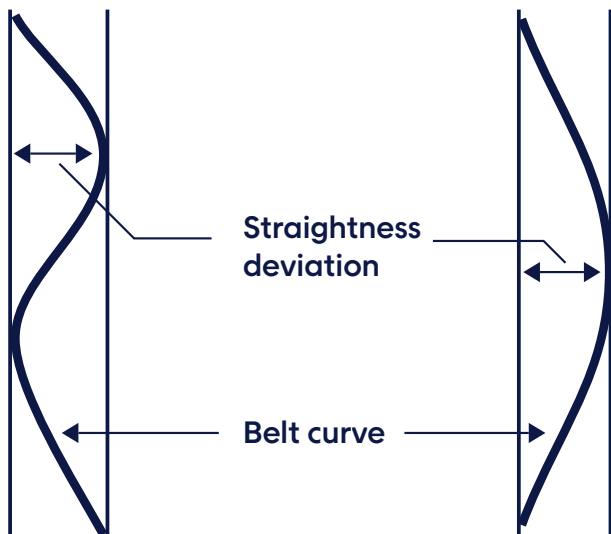
Straightness is measured as the deviation between the belt edge and an ideal straight line.

The straightness deviation of a belt expressed in mm is normally within 0.2 × the total length of the belt in m.

However, the straightness deviation is maximum 20 mm for belts shorter than 200 m. Belts which are 200 m or longer are subject to special agreement.

Class	Belt length	Condition 1	Condition 2
R1	<100 m	0.03% of belt length	-
R2	<100 m	0.02% of belt length	-
R3	100 - 200 m	20 mm for the total belt	Max. 5 mm deviation within 30 m
R4	>200 m	30 mm for the total belt	Max. 5 mm deviation within 30 m

IPCO grade	AISI W Nr.	1850SM 1065 1.1235	1100C 1065 1.1231	1300C -	1320C -	1600SM 1.6908	1500SAF 1.4410
Yield strength, Rp0.2, MPa	20 °C	1 450	1 100	1 200	1 250	1 570	1 300
	100 °C	-	950	980	1 140	1 430	-
	200 °C	-	950	950	1 140	1 340	-
	300 °C	-	770	890	1 080	1 280	-
Tensile strength, Rm, MPa	20 °C	1 800	1 200	1 280	1 340	1 600	1 500
	100 °C	-	1 150	1 220	1 260	1 450	-
	200 °C	-	1 140	1 210	1 290	1 360	-
	300 °C	-	1 100	1 170	1 230	1 310	-
Dynamic strength, MPa	20 °C	860	460	460	430	640	480
Weld factor transverse weld, Rm/Rm	20 °C	0.65	0.75	0.77	0.75	0.68	0.65
Hardness, HV	20 °C	530	380	400	360	480	385
Density, kg/m <sup>3</sup>	20 °C	7 700	7 850	7 850	7 810	7 800	7 800
Modulus of elasticity, GPa	20 °C	210	196	201	205	200	200
Thermal conductivity, W/mK	20 °C	24	39	38	34	15	14
	100 °C	-	39	39	36	16	15
	200 °C	-	39	39	37	18	16
	300 °C	-	39	40	37	19	18
Specific heat, kJ/kgK	20 °C	0.46	0.46	0.46	0.45	0.50	0.48
Thermal expansion, 1/Kx10 <sup>-6</sup>	20-100 °C	10.6	10.4	11.1	11.8	10.9	13.5
	20-200 °C	11.1	11.3	12.0	13.0	11.5	14.0
	20-300 °C	14.4	11.9	12.8	14.0	11.7	14.0
Resistivity, μΩm	20 °C	-	0.20	0.20	0.29	0.80	0.80



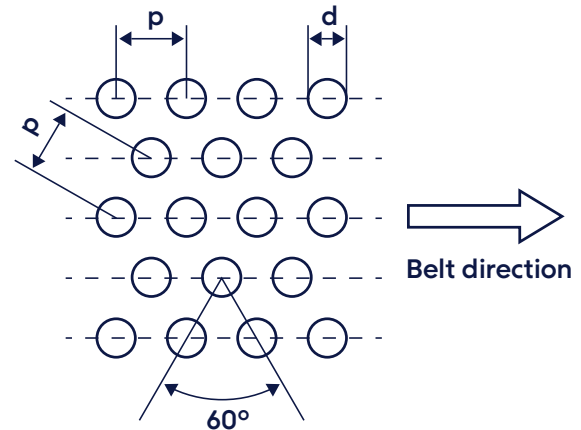
## Surface finishes

IPCO steel belts are as standard, delivered in cold rolled or ground finish with a surface roughness of  $Ra \leq 0.4 \mu\text{m}$ .

Special surfaces, such as ground to other roughness, polished, chrome plated, embossed or coated with fluoropolymers (PTFE/FEP), can be provided.

## Perforated belts

Round hole perforations with triangular pitches, as shown in the figure below, are standardized. The triangular base is parallel with the running direction of the belt.



Hole diameter, d, mm	Triangular pitch p, mm	Open area %
2.0	3.5	29.6
2.5	5.0	22.7
3.0	5.0	32.6
3.0	6.5	19.3
5.5	9.5	30.4

Special patterns and other types of holes are available on request.

## Limitations of perforation

Unperforated edges	
Normal	25 mm
Minimum	10 mm
Maximum	65 mm

Unperforated centre on longitudinally welded belts	
Normal	50 mm
Minimum	25 mm

Perforation length tolerance	
Belts ≤50 m long	±50 mm
Belts longer than	50 m ±100 mm

## Joints

### Welded transversal joints

IPCO belts can be delivered in open lengths with the ends prepared for welding on site. Belts longer than 50 m are normally delivered with an excess length for ease of handling during installation.

Angle of the welded joint:

- degrees to the edge of the belt for normal requirements.
- 80 degrees to the edge of the belt for special high tension requirements.
- Other weld angles can be supplied on request.

### Riveted joints

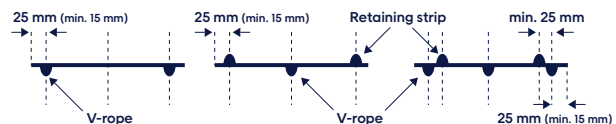
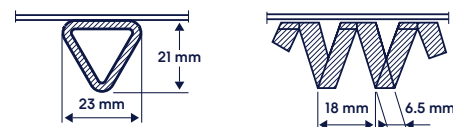
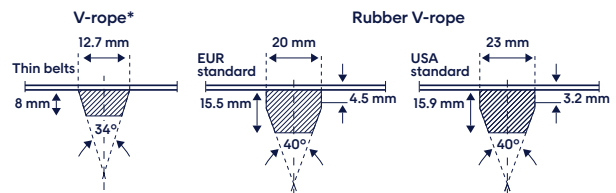
Belts of up to 2 400 mm wide, with a maximum thickness of 1.4 mm and a maximum length of 50 m, can normally be delivered with both ends ready for riveting on site. Longer belts can also be prepared for riveting but these are then normally delivered with an excess length for ease of handling during installation.

There are two types of riveted joints: Overlapped joints and butt strap joints. Overlapped joints are generally used. The butt strap joint is employed only when a flat joint is required.

## True-tracking belts

To ensure exact tracking, the belts can be provided with True-Tracking ropes – either in the form of bonded rubber V-ropes or, if rubber not can be used, spot welded spiral Vropes made of stainless steel. If required, the belts can also be fitted with side retaining strips (side dams) to keep the material on the belt. Tolerance between the two V-ropes and/or between the V-rope and the edge of the belt: Single belts, ±2 mm. Longitudinally welded belts, ±4 mm.

The minimum belt thickness for spiral V-ropes is 0.8 mm.



Grade	Normal hardness	Normal temp.	Note range
Nitrile	60 ° shore	+100 - -30 °C	Oil resistant
Natural rubber	60 ° shore	+80 - -45 °C	Not oil-resistant
Neoprene	70 ° shore	+80 - -40 °C	Oil resistant

Natural rubber is recommended at temperatures below 0 °C unless oil-resistance is required. Retaining strips can also be supplied in silicone (only bolted) or other materials if required.

Recommendations are for guidance only, and the suitability of a material for a specific application can be confirmed only when we know the actual service conditions. Continuous development may necessitate changes in technical data without notice.

Manufacturing certified according to ISO 9001 and ISO 14001.