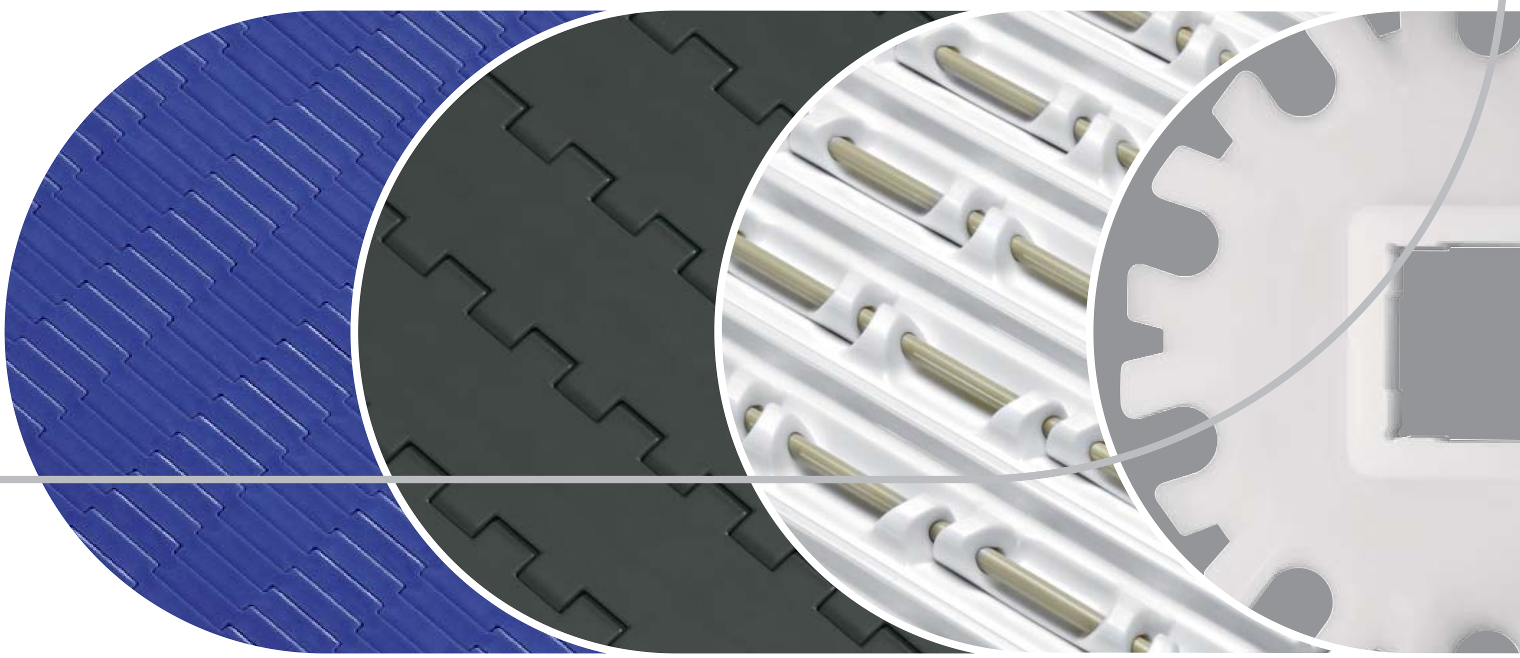
Services
Media No. 6031

HabasitLINK®
Plastic Modular Belts

Engineering Guide

Habasit – Solutions in motion



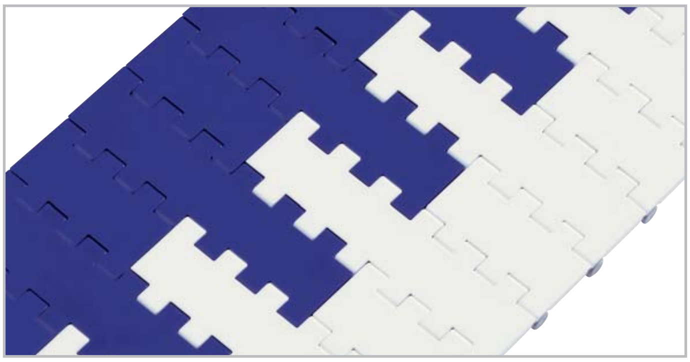
Product liability, application considerations
If the proper selection and application of Habasit products are not recommended by an authorized Habasit sales specialist, the selection and application of Habasit products, including the related area of product safety, are the responsibility of the customer. All indications / information are recommendations and believed to be reliable, but no representations, guarantees, or warranties of any kind are made as to their accuracy or suitability for particular applications. The data provided herein are based on laboratory work with small-scale test equipment, running at standard conditions, and do not necessarily match product performance in industrial use. New knowledge and experiences can lead to modifications and changes within a short time without prior notice.
BECAUSE CONDITIONS OF USE ARE OUTSIDE OF HABASIT'S AND ITS AFFILIATED COMPANIES' CONTROL, WE CANNOT ASSUME ANY LIABILITY CONCERNING THE SUITABILITY AND PROCESS ABILITY OF THE PRODUCTS MENTIONED HEREIN. THIS ALSO APPLIES TO PROCESS RESULTS / OUTPUT / MANUFACTURING GOODS AS WELL AS TO POSSIBLE DEFECTS, DAMAGES, CONSEQUENTIAL DAMAGES, AND FURTHER-REACHING CONSEQUENCES.

⚠ WARNING
Habasit belts and chains are made of various plastics that WILL BURN if exposed to sparks, incendiaries, open flame or excessive heat. NEVER expose plastic belts and chains to a potential source of ignition. Flames resulting from burning plastics may emit TOXIC SMOKE and gasses as well as cause SERIOUS INJURIES and PROPERTY DAMAGE. See the Fire Hazard Data Sheet for additional information.

Contents

The features of modular belts

"Bricklayed" belt pattern
The HabasitLINK® modular belts are constructed with modules molded from thermoplastic materials conected with solid plastic rods.
The all plastic design promotes long life and superior performance in many applications. In specific cases stainless steel rods can be offered, providing high belt stiffnes. Multiple widths are achieved by using a "bricklayed" pattern, which also provides high lateral and diagonal belt strength and stiffness.



"Bricklayed" pattern

The HabasitLINK® belt styles and series
The HabasitLINK® Modular Belts are available in 6 module pitches:
Series M0800 pitch 08.0 mm/0.3": Micropitch belts for extra tight transfers
Series M1100 pitch 12.7 mm/0.5": Minipitch belts for extra tight transfers
Series M1200 pitch 12.7 mm/0.5": Minipitch belts for tight transfers
Series M2400 pitch 25.4 mm/1.0": Bottling/container and corrugated
Series M2500 pitch 25.4 mm/1.0": General conveying
Series M2600 pitch 25.4 mm/1.0": Bottling, container and general heavy conveying
Series M3800 pitch 38.1 mm/1.5": Heavy duty radius belt
Series M5000 pitch 50.8 mm/2.0": Heavy duty
Series M5100 pitch 50.8 mm/2.0": Raised rib belt for pasteurizer
Series M5200 pitch 50.8 mm/2.0": Heavy duty radius belt
Series M6300 pitch 63.5 mm/2.5": Heavy duty
Series M6400 pitch 63.5 mm/2.5": Heavy duty conveying for extreme loads

Closed belt surface versus open area of grid belts
Flat Top Belts are designed to provide a totally closed top surface (0% open area).
Flush Grid Belts are designed to allow the maximum air and fluid flow through the belt, allowing more effective and efficient cooling or washing of the product during conveying. The following open area definitions are used (for individual figures see product data sheets).

- **Open area (free flow):** This is the effective area (%) of vertical openings in the belt. It is relevant for the flow rate through the belt (resistance to air and water flow).

- **Open contact area:** This is the area of the belt (%) which is not in contact with totally flat product conveyed on its surface. This figure is larger than the open area and relevant for the contact of air to the product surface for cooling operations.

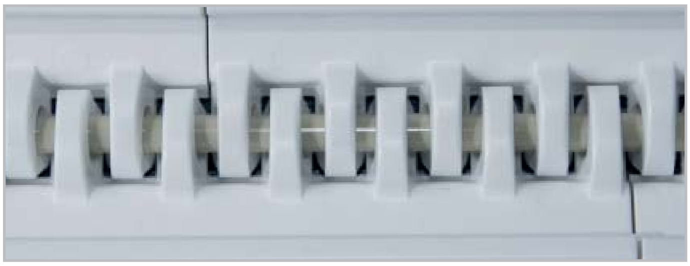
Find an overview about HabasitLINK® products on pages 8 to 15
and more detailed product information on www.habasitlink.com
or in the brochure "4178 Habasit Plastic Modular Belts – Product Guide".

The features of modular belts

Closed hinge design
The closed hinge design for material handling and highly loaded non-food applications offers tightly closed hinges which provide maximum possible load transmission and abrasion resistance.

M2620: Reverse side with closed hinges

Open hinge design
For food applications where sanitation is critical, special link designs are used, which provide gaps between the links and thus allow access to the partially exposed hinge rod. The patented oblong pivot holes, which improve the accessibility, are offered in certain styles. Sanitation is improved and the pivot rods can be visually inspected without disassembling the belt. For the Flat Top open hinge design the hinge area opens as the belt travels over the sprockets to provide access from the top and bottom of the belt during sanitation.



M5010: Reverse side with open hinges

Oblong pivot hole

Dynamic open hinge design
The belt underside features for certain belt types the "dynamic open hinge". Compared to the common open hinge, the scalloped hinge design creates an even bigger gap without weaking the hinge strength. Further the gap width will increase dynamically as the belt articulates around the conveyor's sprockets and thus eases the removal of debris. It is specifically designed to reduce cleaning time and costs, meeting highest HACCP requirements.

M5060: Reverse side with dynamic open hinges

Product conformity

FDA (Food and Drug Administration)
HabasitLINK® is offered in materials which are in compliance with FDA, 21CFR, e. g. part/section 177.1520, 177.2470, 178.3297 and acceptable for direct food contact.

EU conformity
HabasitLINK® is offered in materials which are in compliance with the Directive 2002/72/EC and AP (89) 1 as to direct contact with foodstuffs.

USDA Meat & Poultry acceptance
Several HabasitLINK® belt design have been tested and approved by the NSF, certifying to fulfil the standard NSF/ANSI/3A 14 159-3. USDA certificates based on this are available with Habasit.

USDA Dairy acceptance
Several HabasitLINK® PP belt designs are 3A approved which is a precondition for the USDA Dairy acceptance. Contact Habasit for details.

The features of modular belts

The HabasitLINK® drive system
All HabasitLINK® belts are positively driven by injection molded plastic sprockets or alternatively, machined sprockets.
Two conceptions are used:
a) Double row of teeth in offset relation, allowing bi-directional drive.
b) Lug type single teeth row, also allowing bi-directional drive.
Another advantage of most HabasitLINK® molded sprockets is the "open-window" design, which promotes sanitation across the full width of the conveyor shafts.

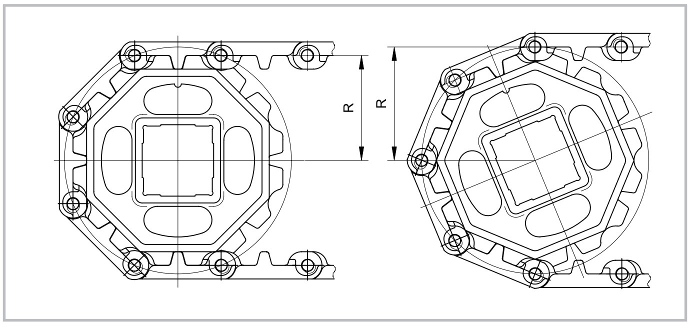
The Habasit HyCLEAN sprockets have been developed to improve hygiene conditions and cleaning efficacy in food processing areas.
This design allows a 100% hinge exposure and accessability for cleaning.

Various sizes are available as split sprockets.


Double row of teeth in offset relation

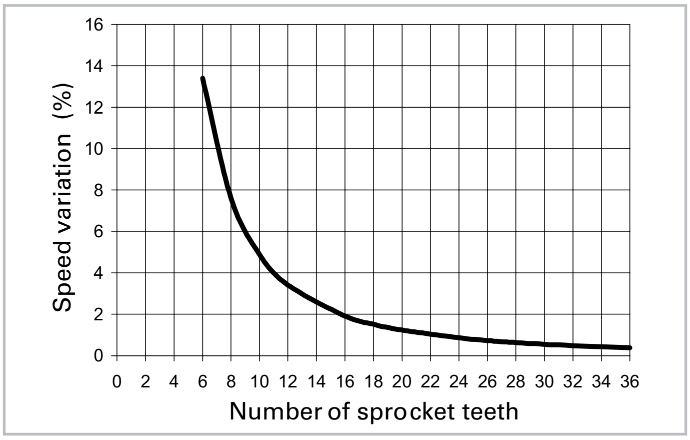

Double row of teeth in offset relation, HyCLEAN concept


Lug type single teeth row



Sprocket engagement

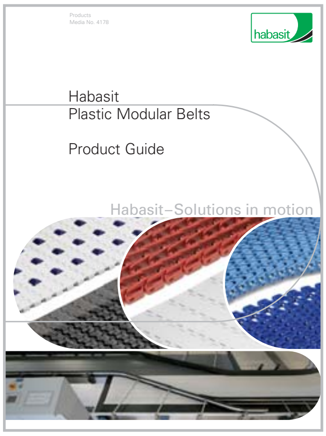
The polygon effect (chordal action)
Module and chain links moving around the radius of the sprocket causes the linear belt speed to vary. The pivot rod travels on the pitch diameter of the sprocket while the module moves through the smaller chordal radius causing a horizontal rise and fall of the module. This polygon effect is typical to all Modular Belt systems. The magnitude of speed variation is dependent on the number of sprocket teeth.



Polygon effect

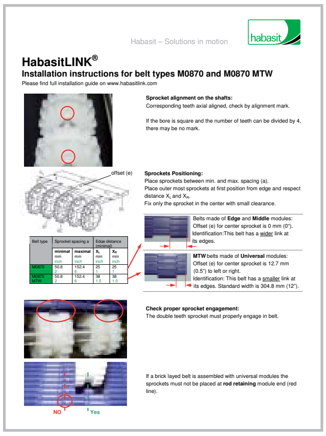
Product information on www.habasitlink.com
Please visit our website for in-depth information on products and applications as well as for detailed technical data (product news, product series overview, information about accessories, product data sheets).

Product information in brochures
HabasitLINK® plastic modular belts are produced to the highest standards. The range comprises more than 80 belt types, with new types constantly under development to always ensure the most advanced offer. For detailed product information about our plastic modular belts refer to the brochures "4178 Habasit Plastic Modular Belts".

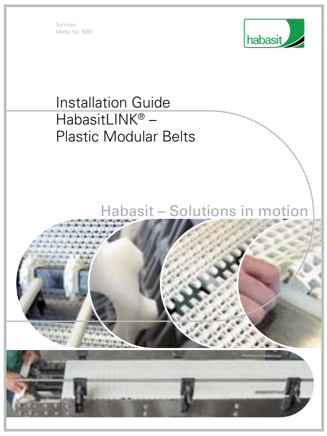


Habasit
Plastic Modular Belts
Product Guide

Belt installation information on www.habasitlink.com
Get detailed information about belt installation on product related installation flyers and in the Installation Guide.



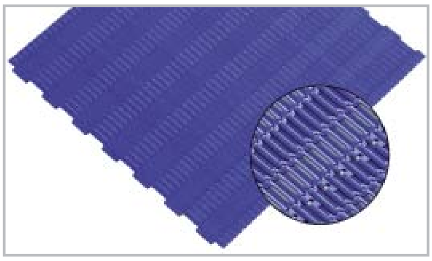
Installation Flyer



Installation Guide

Product range

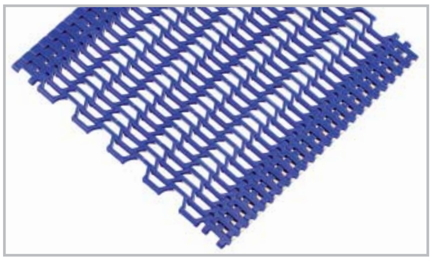
Series M0800



M0870 Micropitch Flat Top
Pitch 8.0 mm *(0.3")*, imperial belt width

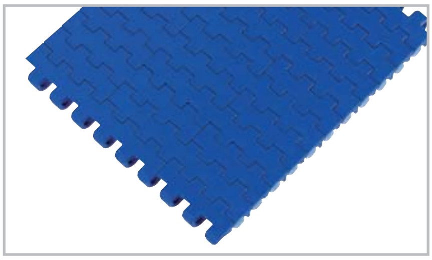
M0873 Micropitch Non Slip
Pitch 8.0 mm *(0.3")*, imperial belt width

Series M1100

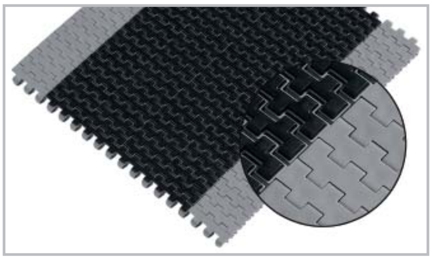


M1185 Flush Grid
Pitch 12.7 mm *(0.5")*, 50% open area, imperial belt width

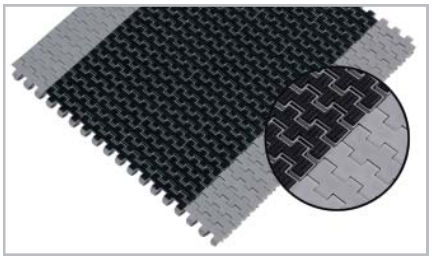
Series M1200



M1220 Flat Top
Pitch 12.7 mm *(0.5")*

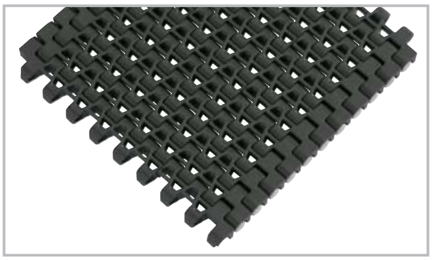


M1220 GripTop
Pitch 12.7 mm *(0.5")*

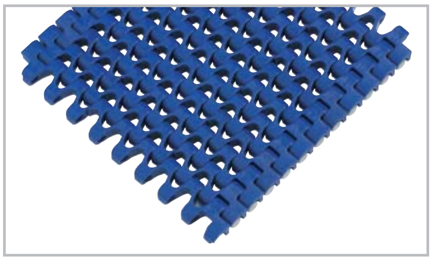


M1220 HighGrip-L
Pitch 12.7 mm *(0.5")*

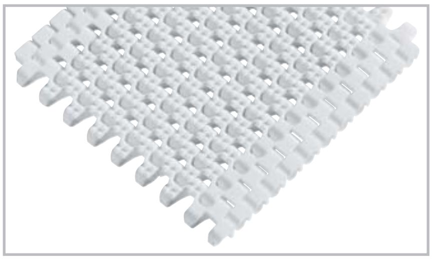
M1220 ActivXchange
Pitch 12.7 mm *(0.5")*



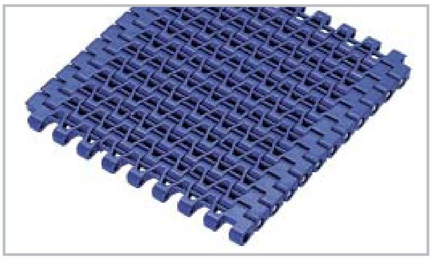
M1230 Flush Grid
Pitch 12.7 mm *(0.5")*, 18% open area



M1233 Flush Grid
Pitch 12.7 mm *(0.5")*, 25% open area



M1234 Nub Top Flush Grid
Pitch 12.7 mm *(0.5")*, 18% open area

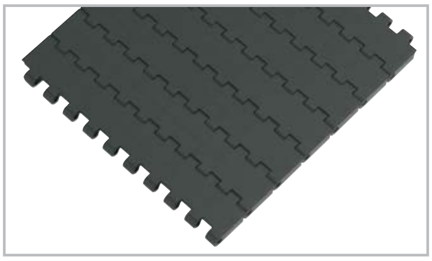


M1280 Flush Grid
Pitch 12.85 mm *(0.51")*, 18% open area

M1280 ActivXchange
Pitch 12.85 mm *(0.51")*, 18% open area

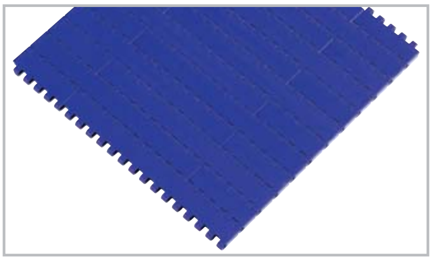
Product range

Series M2400



M2420 Flat Top
Pitch 25.4 mm *(1")*

M2420 ActivXchange
Pitch 25.4 mm *(1")*



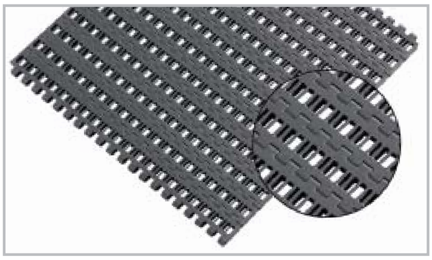
M2470 FlatTop
Pitch 25.4 mm *(1")*, imperial belt width

M2470 Flat Top MTW
Pitch 25.4 mm *(1")*, imperial belt width

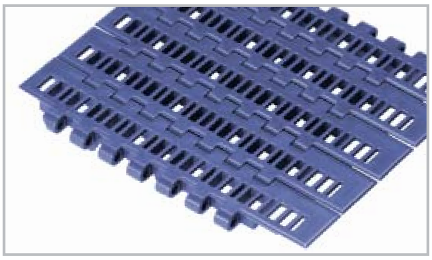
M2470 GripTop
Pitch 25.4 mm *(1")*, imperial belt width

M2470 ActivXchange
Pitch 25.4 mm *(1")*, imperial belt width

M2472 Perforated Flat Top
Pitch 25.4 mm *(1")*, 5.9% open area, imperial belt width

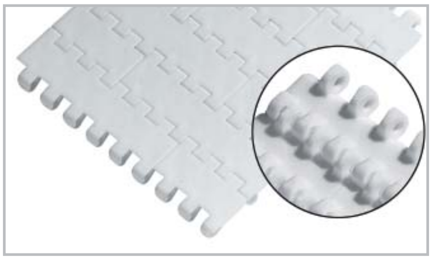


M2480 Flush Grid
Pitch 25.4 mm *(1")*, 25% open area, imperial belt width

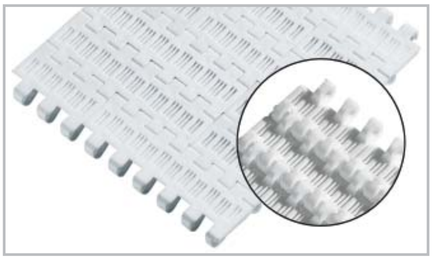


M2480 ActivXchange
Pitch 25.4 mm *(1")*, 25% open area, imperial belt width

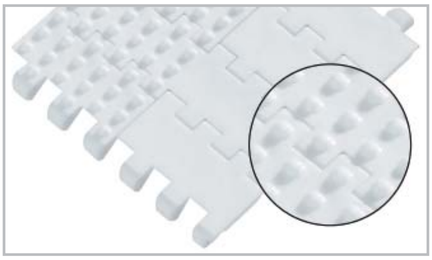
Series M2500



M2510 Flat Top
Pitch 25.6 mm *(1")*



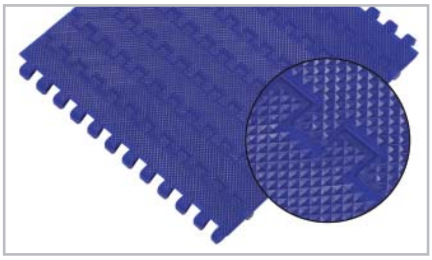
M2511 Mesh Top
Pitch 25.6 mm *(1")*, 16% open area



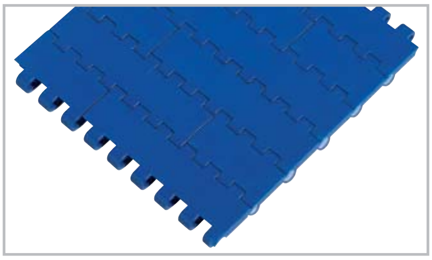
M2514 Nub Top
Pitch 25.6 mm *(1")*, 0% open area

Product range

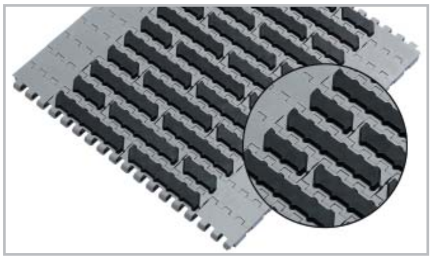
Series M2500



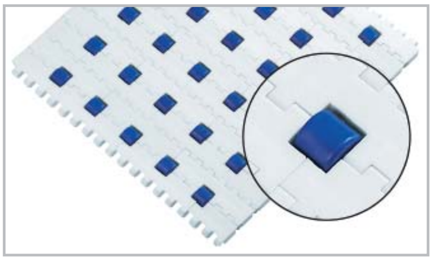
M2516 Diamond Top
Pitch 25.6 mm *(1")*



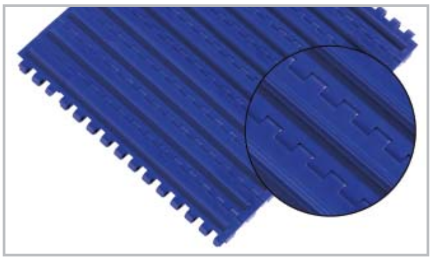
M2520 Flat Top
Pitch 25.4 mm *(1")*



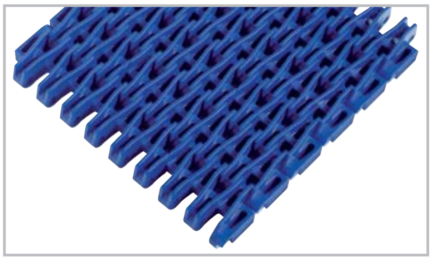
M2520 GripTop
Pitch 25.4 mm *(1")*



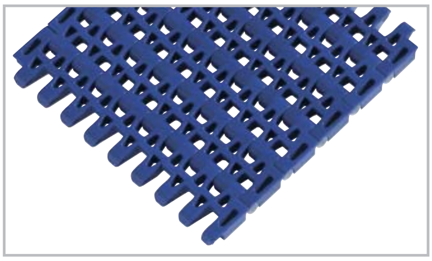
M2520 Roller Top
Pitch 25.4 mm *(1")*



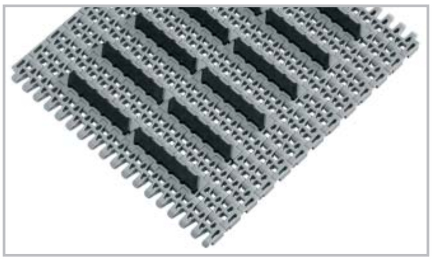
M2527 Minirib
Pitch 25.4 mm *(1")*



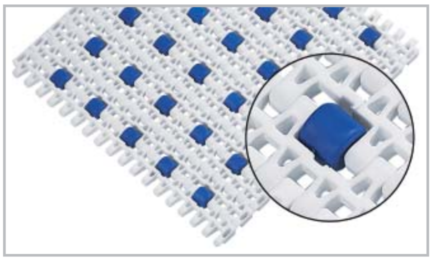
M2531 Raised Rib
Pitch 25.4 mm *(1")*, 35% open area



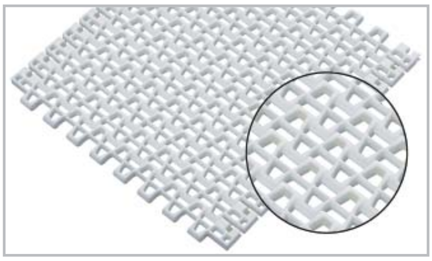
M2533 Flush Grid
Pitch 25.4 mm *(1")*, 35% open area



M2533 GripTop
Pitch 25.4 mm *(1")*, open area dependent on GripTop pattern

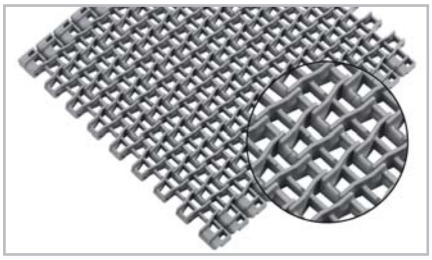


M2533 Roller Top
Pitch 25.4 mm *(1")*, 35% open area



M2585-P0 Flush Grid (plastic rod)
Pitch 25.7 mm *(1")*, 48% open area, imperial belt width

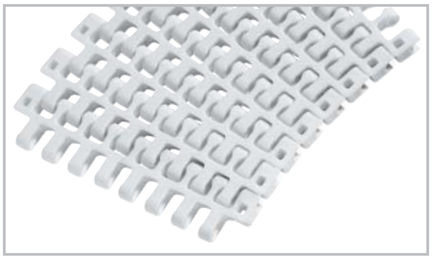
M2585-S0 Flush Grid (steel rod)
Pitch 25.7 mm *(1")*, 54% open area, imperial belt width



M2586 Raised Rib
Pitch 25.7 mm *(1")*, 48% open area, imperial belt width

Product range

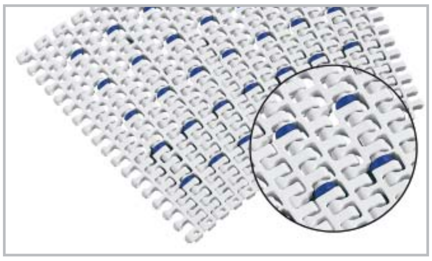
Series M2500 Radius



M2540 Radius Flush Grid
Pitch 25.6 mm *(1")*, 35% open area

M2540 Radius Flush Grid MTW
Pitch 25.6 mm *(1")*, 35% open area, imperial belt width

M2540 Radius GripTop
Pitch 25.6 mm *(1")*, 20% open area



M2540 Roller Top
Pitch 25.6 mm *(1")*, 35% open area

M2544 Tight Radius
Pitch 25.8 mm *(1.02")*, 38% open area

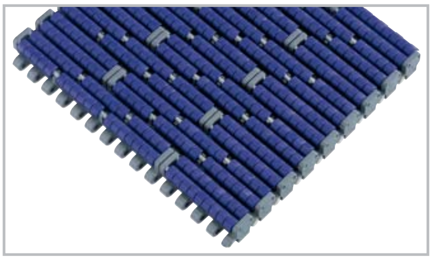
M2544 Tight Radius MTW
Pitch 25.8 mm *(1.02")*, 32% open area

M2544 Radius GripTop
Pitch 25.8 mm *(1.02")*, 38% open area

Series M2600

M2620 Flat Top Heavy Duty
Pitch 25.4 mm *(1")*

M2620 GripTop
Pitch 25.4 mm *(1")*

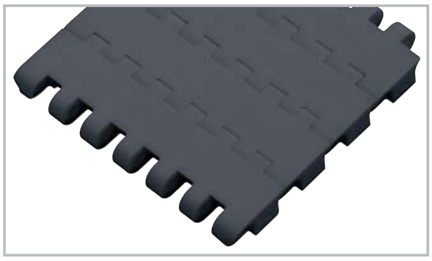


M2620 Roller Top - LBP
Pitch 25.4 mm *(1")*

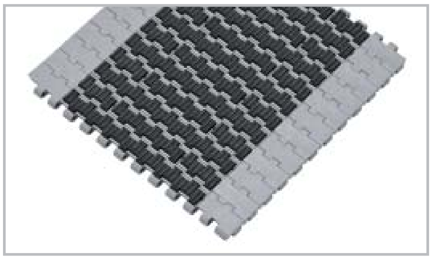
Series M2600

M2623 Non Slip
Pitch 25.4 mm *(1")*

M2670 Flat Top Heavy Duty
Pitch 25.4 mm *(1")*, imperial belt width



M2670 Flat Top Heavy Duty MTW
Pitch 25.4 mm *(1")*, imperial belt width

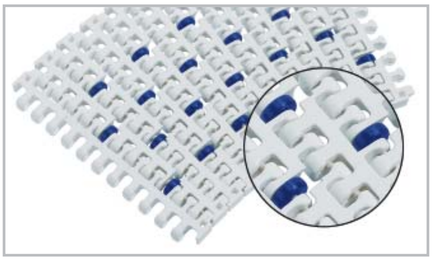


M2670 GripTop
Pitch 25.4 mm *(1")*, imperial belt width

M2670 ActivXchange
Pitch 25.4 mm *(1")*, imperial belt width

Series M3800 Radius

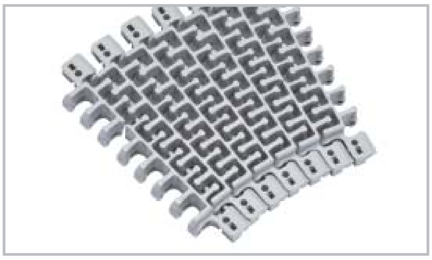
M3840 Radius Flush Grid
Pitch 38.2 mm *(1.5")*, 31% open area



M3840 Roller Top
Pitch 38.2 mm *(1.5")*, 31% open area

M3843 Tight Radius
Pitch 38.2 mm *(1.5")*, 37% open area

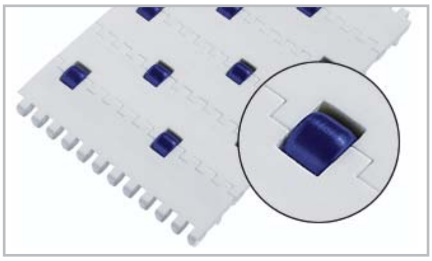
M3843 Tight Radius GripTop
Pitch 38.2 mm *(1.5")*, 25% open area



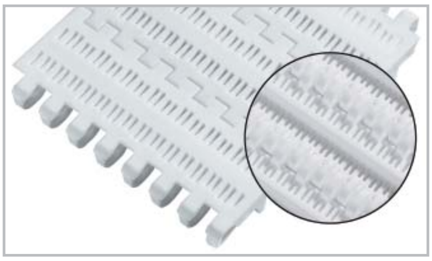
M3892 Raised Deck
Pitch 38.2 mm *(1.5")*, 45% open area, imperial belt width

Series M5000

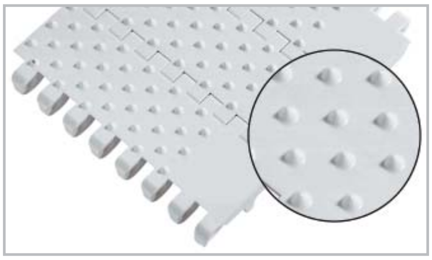
M5010 Flat Top
Pitch 50.8 mm *(2")*



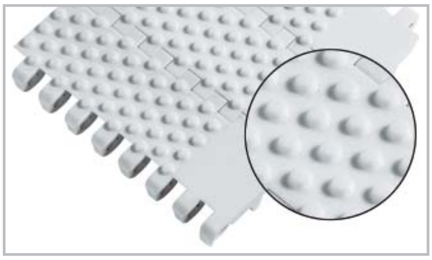
M5010 Roller Top
Pitch 50.8 mm *(2")*



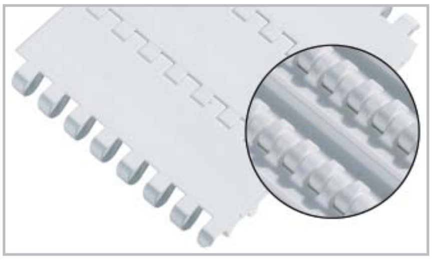
M5011 Perforated Flat Top
Pitch 50.8 mm *(2")*, 18% open area



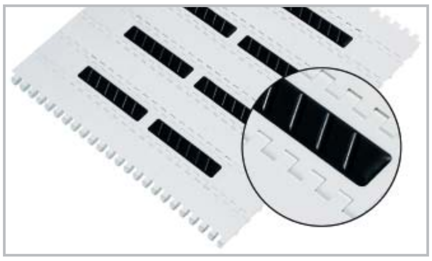
M5013 Cone Top
Pitch 50.8 mm *(2")*



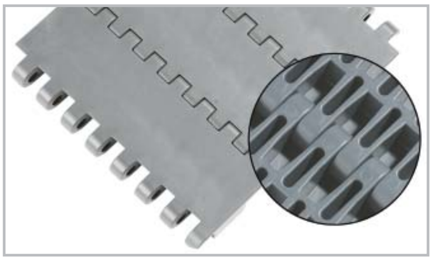
M5014 Nub Top
Pitch 50.8 mm *(2")*



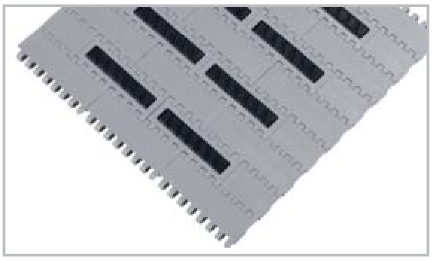
M5015 Flat Top
Pitch 50.8 mm *(2")*



M5015 GripTop
Pitch 50.8 mm *(2")*

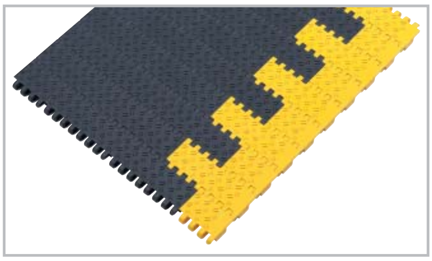


M5020 Flat Top Heavy Duty
Pitch 50.8 mm *(2")*

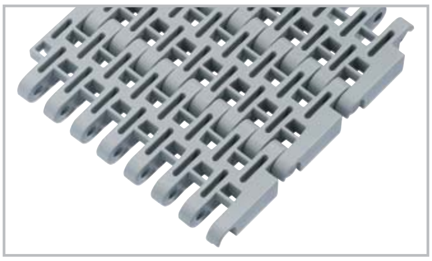


M5020 GripTop
Pitch 50.8 mm *(2")*

M5021 Perforated Flat Top
Pitch 50.8 mm *(2")*, 25% open area



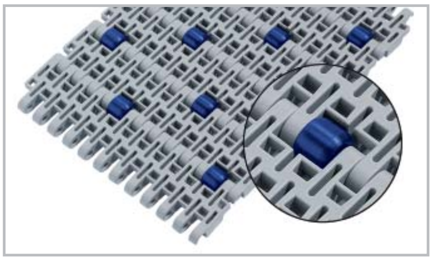
M5023 Non Slip
Pitch 50.8 mm *(2")*



M5032 Flush Grid Heavy Duty
Pitch 50.8 mm *(2")*, 34% open area

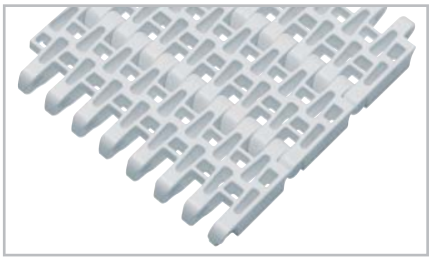
Product range

Series M5000

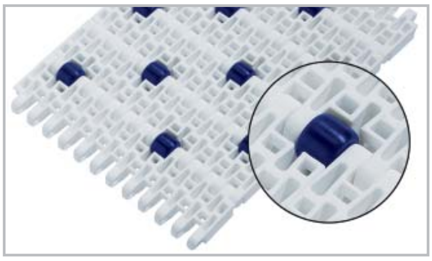


M5032 Roller Top
Pitch 50.8 mm *(2")*, 34% open area

M5032 Roller Top - 0°/45°/90°
Pitch 50.8 mm *(2")*

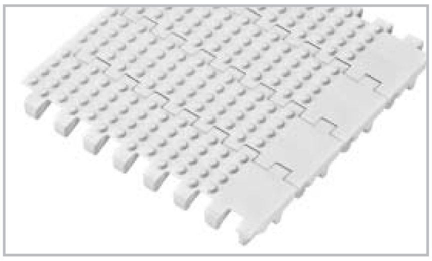


M5033 Flush Grid
Pitch 50.8 mm *(2")*, 37% open area



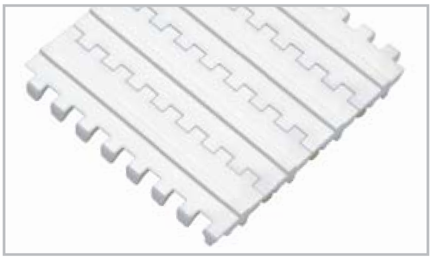
M5033 Roller Top
Pitch 50.8 mm *(2")*, 37% open area

M5060 Flat Top
Pitch 50.8 mm *(2")*, imperial belt width



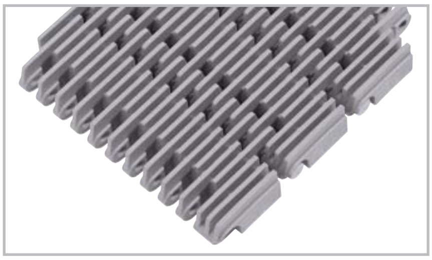
M5064 Nub Top
Pitch 50.8 mm *(2")*, imperial belt width

M5065 HyCLEAN
Pitch 50.8 mm *(2")*, imperial belt width

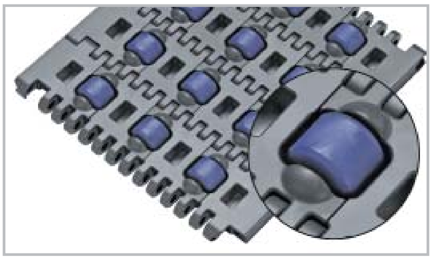


M5067 Minirib
Pitch 50.8 mm *(2")*, imperial belt width

Series M5100



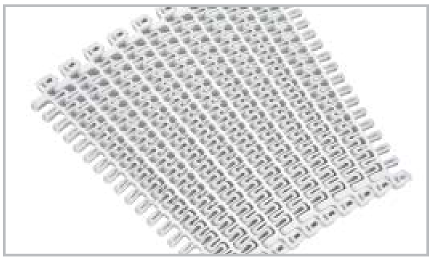
M5131 Raised Rib
Pitch 50.8 mm *(2")*, 36% open area, imperial belt width



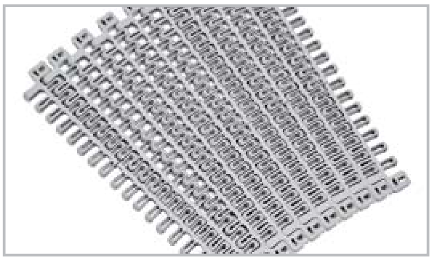
M5182 Roller Top 90°
Pitch 50.8 mm *(2")*, 12% open area, imperial belt width

Product range

Series M5200 Radius

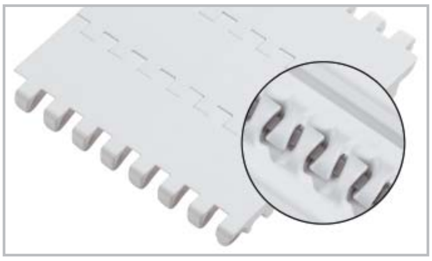


M5290 Radius Flush Grid
Pitch 50.8 mm *(2")*, 55% open area, imperial belt width



M5293 Tight Radius
Pitch 50.8 mm *(2")*, 55% open area, imperial belt width

Series M6300



M6360 Flat Top
Pitch 63.5 mm *(2.5")*, imperial belt width

Series M6400

M6420 Flat Top Heavy Duty
Pitch 63.5 mm *(2.5")*

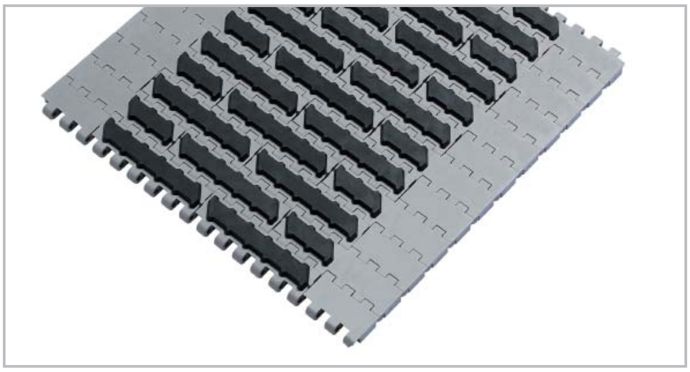
M6423 Non Slip
Pitch 63.5 mm *(2.5")*

M6424 Non Slip Perforated
Pitch 63.5 mm *(2.5")*, 10% open area

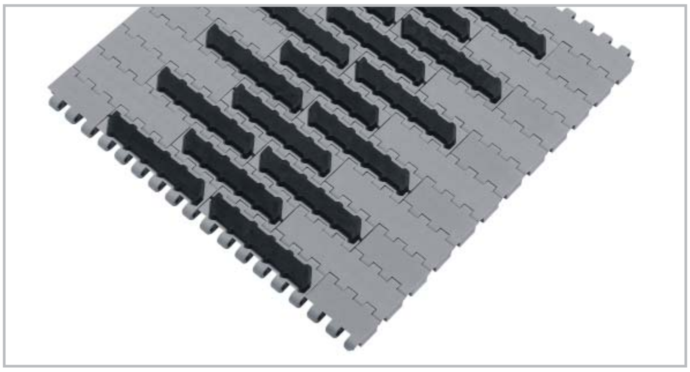
M6425 Reel Top MTW
Pitch 63.5 mm *(2.5")*

Available GripTop configurations

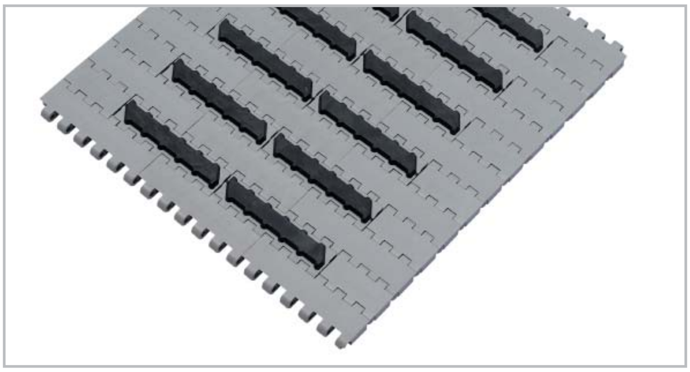
GripTop ULTRA with straight indent
All belt modules except the edge modules are provided with rubber top over the whole width. The standard indent is described in the table below.



GripTop with staggered indent
The belt is composed of rubber top modules with alternating widths on every second row. The standard indent is described in the table below.



GripTop alternating
It is possible to have a configuration with alternating GripTop rows. The distance between the GripTop rows corresponds to the belt pitch. The standard indent is described in the table below.



Belt Type	Standard Indent mm (inch)
M1200	50 mm (2")
M2470	38 mm (1.5")
M2520	50 mm (2")
M2540	21 mm (0.83")
M2544	35.5 mm (1.4")
M2620	43 mm (1.7")
M2670	50 mm (2")
M3800	30 mm (1.18")
M5000	75 mm (3")

Standard belt materials

Material	Code	Description	Food [1)] approv.	Density g/cm³	Temperature range
Polypropylene	PP	Thermoplastic material with good cost/ performance relation (material for most of the common conveying applications). Excellent chemical resistance to acids and alkalines. * High impacts below 10 °C *(50 °F)* must be avoided.	EU FDA	0.9	+5 °C to +105 °C (*) *+40 °F to +220 °F (*)*
Polyethylene	PE	Thermoplastic material well suited for very low temperatures and/or high impact applications. Excellent chemical resistance to acids and alkalines. Not suitable for abrasive applications. * Below -40 °C *(-40 °F)*, thermal belt shrinkage requires a sprocket pitch diameter adaptation.	EU FDA	0.94	-70 °C to +65 °C (*) *-94 °F to +150 °F (*)*
Polyoxymethy-lene (Acetal)	POM	Thermoplastic material with high strength and low coefficient of friction. Impact and cut resistant surface. Suitable for heavy duty applications and low temperatures. Good chemical resistance to oil and alkalines, but not suitable for long-term contact with high concentration of acids and chlorine.	EU FDA	1.42	Wet conditions: -40 °C to +60 °C *-40 °F to +140 °F* Dry conditions: -40 °C to +93 °C *-40 °F to +200 °F*
Polyamide (Nylon for US market)	PA Code add. +US PA 66	Thermoplastic material with high strength and abrasion resistance. Suitable for heavy duty applications at dry conditions and elevated temperatures. Material is modified to keep its good properties stable over a long time at elevated temperatures.	FDA	1.14	Wet conditions: not recommended Dry conditions : -46 °C to +118 °C (short-term +135 °C) *-50 °F to +245 °F* *(short-term +275 °F)*
Polyamide (Nylon)	PA	Thermoplastic material with high strength and abrasion resistance. Suitable for heavy duty applications at dry conditions and elevated temperatures. Material is specially modified to keep its good properties stable over a long time at elevated temperatures.	EU	1.14	Wet conditions: not recommended Dry conditions: -46 °C to +130 °C (short-term +160 °C) *-50 °F to +266 °F* *(short-term +320 °F)*

[1] The food approval statement refers to the HabasitLINK® product range.
For detailed declarations of compliance per material and color, please contact Habasit.

Special belt materials

Material	Code	Description	Food [1] approv.	Density g/cm³	Temperature range
Antistatic Polypropylene	PP Code add. +AS	Thermoplastic material with reduced electrical surface resistance to reduce dust accumulation and belt charge-up. * High impacts below 10 °C *(50 °F)* must be avoided		0.9	Wet conditions: not recommended Dry conditions: +5 °C to +105 °C (*) *+40 °F to +220 °F (*)*
Detectable Polypropylene	PP Code add. +DE	Thermoplastic material with a special additive which makes the material very well detectable (X-ray and metal detectors). Excellent chemical resistance to alkalines. * High impacts below 10 °C *(50 °F)* must be avoided.	EU FDA	0.95	+5 °C to + 105 °C (*) *+40 °F to 220 °F (*)*
Electrically conductive Polypropylene	PP Code add. +EC	Thermoplastic material with a low electrical surface and volume resistance. Electrical surface resistance below 50'000 Ohm/sq (DIN/EN 1637). Good cost/performance relation ship. Electrical resistance fulfills the DIN EN 61340 for ESD safety areas. * High impacts below 10 °C *(50 °F)* must be avoided.		1.02	+5 °C to +105 °C (*) *+40 °F to +220 °F (*)*
Electrically conductive and flame-retardant Polypropylene	PP Code add. +FC	Thermoplastic material with a combination of low electrical resistance and very good flame retardant properties. Electrical surface resistance below 50'000 Ohm/sq (DIN EN 1637). Electrical resistance fulfills the DIN EN 61340 for ESD safety areas. Flammability classification according DIN EN 13501, which is requested from the automotive industry. * High impacts below 10 °C *(50 °F)* must be avoided.		1.32	+5 °C to +80 °C (*) *+40 °F to +176 °F (*)*
Flame retardant Polypropylene	PP Code add. +FR	Flame retardant thermoplastic material for most of the common conveying applications with special demand on low-flammability. Flammability classification according DIN EN 13501, which is requested from the automotive industry. * High impacts below 10 °C *(50 °F)* must be avoided.		1.05	+5 °C to +105 °C (*) *+40 °F to +220 °F (*)*
Submersible Polypropylene	PP Code add. +GR	Thermoplastic material with a density which allows that the material sinks in water. It has a good chemical and hot water resistance which allows a continuous use in boiling water. * High impacts below 10 °C *(50 °F)* must be avoided. For the detailed chemical resistance please contact Habasit	EU FDA	1.24	+ 5 °C to + 105 °C (*) *+40 °F to + 220 °F (*)*
Hot water resistant Polypropylene	PP +HW	Stabilized thermoplastic material with improved resistant against oxidation and embrittlement.		0.9	+ 5 °C to + 105 °C *+40 °F to + 220 °F*

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Special belt materials

Material	Code	Description	Food 1) approv.	Density g/cm³	Temperature range
HabaGUARD® Polypropylene	PP Code add. +H15	Thermoplastic material containing antimicrobial additive, with excellent chemical resistance to acids and alkalines. * High impacts below 10 °C (50 °F) must be avoided.	FDA	0.9	+5 °C to +105 °C (*) *+40 °F to +220 °F (*)*
HabaGUARD® Polyethylene	PE Code add. +H15	Thermoplastic material containing antimicrobial additive, well suited for low temperatures and high impact applications. Excellent chemical resistance against acids and alkalines. * Below -40 °C (-40 °F), thermal belt shrinkage requires a sprocket pitch diameter adaptation.	FDA	0.94	-70 °C to +65 °C (*) *-94 °F to +150 °F (*)*
Detectable Polypropylene	PE Code add. +DE	Thermoplastic material with a special additive, which makes the material very well detectable (X-ray and metal detectors). Well suitable for low temperature and/or high impact applications. Excellent chemical resistance to acids and alkalines. * Below -40 °C (-40 °F), thermal belt shrinkage requires a sprocket pitch diameter adaptation.	EU FDA	1.15	-70 °C to +65 °C (*) *-94 °F to +150 °F (*)*
Antistatic Polyoxymethylene (Acetal)	POM Code add. +AS	Thermoplastic material with reduced electrical surface resistance to reduce dust accumulation and belt charge-up. Suitable for heavy duty applications and low temperatures. Material has high strength, low coefficient of friction and scratch- resistant surface.		1.42	Wet conditions: not recommended Dry conditions: -40 °C to +93 °C *-40 °F to +200 °F*
Detectable Polyoxymethylene (Acetal)	POM Code add. +DE	Thermoplastic material with a special additive, which makes the material very well detectable (X-ray and metal detectors). The material has a good chemical resistance against oil and alkalines, but not suitable for long term contact with high concentration of acids and chlorine.	EU FDA	1.53	Wet conditions: -40 °C to +60 °C *-40 °F to +140 °F* Dry conditions: -40 °C to +93 °C *-40 °F to +200 °F*
Electrically conductive Polyoxymethylene (Acetal)	POM Code add. +EC	Thermoplastic material with a low electrical surface and volume resistance. Electrical surface resistivity ρs below 50'000 Ohm/sq (DIN/EN 1637). Material has a high strength and low coefficient of friction. Suitable for heavy duty applications and low temperatures.		1.42	Dry conditions: -40 °C to +93 °C *-40 °F to +200 °F*
Impact and cut resistant Polyoxymethylene (Acetal)	POM Code add. +IM	Thermoplastic material with advanced impact and cut resistant surface. Suitable for meat cutting conveyors and high impact applications. Good chemical resistance to oil and alkalines, but not suitable for long-term contact with high concentration of acids and chlorine.	EU FDA	1.42	Wet conditions: -40 °C to +60 °C *-40 °F to +140 °F* Dry conditions: -40 °C to +93 °C *-40 °F to +200 °F*

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Special belt materials

Material	Code	Description	Food [1] approv.	Density g/cm³	Temperature range
Fatigue resistant Polyoxymethylene (Acetal)	POM Code add. +JM	Thermoplastic material with high strength, low coefficient of friction and improved fatigue resistance. Good chemical resistance to oil and alkalines, but not suitable for long-term contact with high concentration of acids and chlorine.	EU FDA	1.42	Wet conditions: -40 °C to +60 °C *-40 °F to +140 °F* Dry conditions: -40 °C to +93 °C *-40 °F to +200 °F*
Low friction Polyoxymethylene (Acetal)	POM L	Thermoplastic material with high strength and low coefficient of friction (low friction grade self-lubricating additives). Impact and cut resistant surface. Suitable for heavy duty applications and low temperatures. Good chemical resistance to oil and alkalines, but not suitable for long-term contact with high concentration of acids and chlorine.	FDA	1.42	Wet conditions: -40 °C to +60 °C *-40 °F to +140 °F* Dry conditions: -40 °C to +93 °C *-40 °F to +200 °F*
Low friction Polyoxamethylene (Acetal)	POM Code add. +LF	Thermoplastic material with high strength and low coefficient of friction. Impact and cut resistant surface. Suitable for heavy duty applications and low temperatures. Good chemical resistance to oil and alkalines, but not suitable for long-term contact with high concentration of acids and chlorine.	EU FDA	1.42	Wet conditions: -40 °C to +60 °C *-40 °F to +140 °F* Dry conditions: -40 °C to +93 °C *-40 °F to +200 °F*
Wear resistant Polyoxymethy-lene (Polyacetal)	POM Code add. +PK	Extra wear resistant thermoplastic material with high strength, low coefficient of friction and very good fatigue resistance. Good chemical resistance to oil and alkalines, but not suitable for long-term contact with high concentration of acids and chlorine.		1.42	Wet conditions: -40 °C to +60 °C *-40 °F to +140 °F* Dry conditions: -40 °C to +93 °C *-40 °F to +200 °F*
Ultra low friction Polyoxymethylene (Acetal)	POM U	Thermoplastic material with high strength and low coefficient of friction (ultra low friction grade self-lubricating additives). Impact and cut resistant surface. Suitable for heavy duty applications and low temperatures. Good chemical resistance to oil and alkalines, but not suitable for long-term contact with high concentration of acids and chlorine.	FDA	1.42	Wet conditions: -40 °C to +60 °C *-40 °F to +140 °F* Dry conditions: -40 °C to +93 °C *-40 °F to +200 °F*
UV protected Polyoxymethylene (Acetal)	POM Code add. +UV	Thermoplastic material with improved resistance against UV radiation, especially for outdoor applications. The material has a high strength and low coefficient of friction. It is suitable for heavy duty applications and low temperatures.		1.42	Wet conditions: -40 °C to + 60 °C *-40 °F to + 140 °F* Dry conditions: -40 °C to + 93 °C *-40 °F to + 200 °F*
UV-C, impact and cut resistant Polyoxymethylene (Polyacetal)	POM +UVC	Thermoplastic material with high strength, low coefficient of friction and good cut and impact resistance. It is protected against UV-C radiation and has a good chemical resistance to oil and alkalines. It is not suitable for longterm contact with high concentration of acids and chlorine.	EU FDA	1.42	Wet conditions: -40 °C to + 60 °C *-40 °F to + 140 °F* Dry conditions: -40 °C to + 93 °C *-40 °F to + 200 °F*

[1] The food approval statement refers to the HabasitLINK® product range.
For detailed declarations of compliance per material and color, please contact Habasit.

Special belt materials

Material	Code	Description	Food [1] approv.	Density g/cm³	Temperature range
Reinforced Polyamide (Nylon)	PA Code add. +GF	Reinforced thermoplastic material with high strength. Suitable for heavy conveying applications at dry conditions and elevated temperatures. Material is specially modified to keep its good properties stable over a long time at elevated temperatures.	EU FDA	1.41	Wet conditions: not recommended Dry conditions: -40 °C to +145 °C (short-term +175 °C) *-40 °F to +293 °F* *(short-term +347 °F)*
Reinforced Polyamide (Nylon)	PA Code add. +HT	Reinforced thermoplastic material with very high strength and toughness. Suitable for heavy conveying applications at dry conditions and elevated temperatures. Material is specially modified to keep its good properties stable over a long time at elevated temperatures.		1.41	Wet conditions: not recommended Dry conditions: -40 °C to +170 °C (short-term +200 °C) *-40 °F to +338 °F* *(short-term +392 °F)*
Reinforced non-stick Polyamide (Nylon)	PA Code add. +HN	Reinforced non-stick thermoplastic material with high strength. Suitable for heavy conveying applications at dry conditions and elevated temperatures. Material is specially modified to keep its good properties stable over a long time at elevated temperatures.		1.41	Wet conditions: not recommended Dry conditions: -40 °C to +170 °C (short-term +200 °C) *-40 °F to +338 °F* *(short-term +392 °F)*
Impact and cut resistant Polyamide (Nylon)	PA Code add. +IM	Tough thermoplastic material with good strength and fatigue resistance. Suitable for heavy conveying applications with high impact load. The belt properties and dimensions change with moisture absorption. The material can replace impact resistant acetal in impact intensive applications, but is more susceptible to cuts. In wet environment, dimension change needs to be considered.	EU FDA	1.08	Wet conditions: -46 °C to +60 °C *-50 °F to +140 °F* Dry conditions: -46 °C to +80 °C *-50 °F to +176 °F*
Polyamide 612 (Nylon)	PA 612	Tough thermoplastic material with good strength and fatigue resistance: The belt properties include good dimensional stability, low moisture absorption and high level of heat resistance.	FDA		Wet conditions: not recommended Dry conditions: -40 °C to +118 °C (short term 135 °C) *-40 °F to +245 °F* *(short term 275 °F)*
Super High Temperature	ST	Reinforced thermoplastic material with very good heat and hydrolysis resistance. Suitable for light conveying applications at elevated temperatures. Material is specially modified to keep its good properties stable over a long time at elevated temperatures. Flammability UL94 V0.	EU FDA	1.65	Wet conditions: on request Dry conditions: 0 °C to +200 °C (short-term +240 °C) *+32 °F to +392 °F* *(short-term +464 °F)*

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Special belt materials

Material	Code	Description	Food [1] approv.	Density g/cm³	Temperature range
Flame retardant Polybutylene-terephthalate	PBT Code add. +FR	Flame retardant thermoplastic material with excellent stiffness and hardness. Suitable for conveying applications with special demand on low-flammability. Material has good friction and wear properties by showing a good dynamic long-term behavior. Flammability UL94 V0.		1.47	Wet conditions: -40 °C to +60°C *-40 °F to +140 °F* Dry conditions: -40 °C to +130°C (short-term +150°C) *-40 °F to + 266 °F* *(short-term + 302°F)*
Thermoplastic elastomer	TPE	Soft thermoplastic material with a hardness of 50 or 65 Shore A. Material has high friction values and good abrasion resistance. Suitable for conveying applications where a high grip between belt and product is required. Used for GripTop modules. * TPE with 65 Shore A is not for direct food contact	FDA*	1.12	-40 °C to +60 °C *-40 °F to +140 °F*
Flame retardant thermoplastic elastomer	TPE Code add. +FR	Flame retardant soft thermoplastic material with a hardness of 50 shore A. Material has high friction values and good abrasion resistance. Suitable for conveying applications where a high grip between belt and product is required. Used for GripTop modules. Flammability UL94 V0.		1.25	-40 °C to +60 °C *-40 °F to +140 °F*
Thermoplastic elastomer	TPV	Soft thermoplastic material with a hardness of 55 or 72 Shore A. Material has high friction values and good abrasion resistance. Suitable for conveying applications where a high grip between belt and product is required. Used for GripTop modules.	FDA	0.96	-40 °C to +71 °C *-40 °F to +160 °F*

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For detailed declarations of compliance per material and color, please contact Habasit.

Materials for sprockets

Material	Code	Description	Food [1] approv.	Density g/cm³	Temperature range
Polypropylene	PP	Thermoplastic material with excellent chemical resistance to acids, alkalines and hot water. Abrasion resistance not as good as for POM.		0.90	+5 °C to +105 °C *+40 °F to +220 °F*
Polyoxymethylene (Acetal)	POM (AC)	Lubricated thermoplastic material specially formulated for molded sprockets, with high strength and good abrasion resistance. Good chemical resistance to oil and alkalines, but not suitable for long-term contact with high concentration of acids and chlorine.	EU FDA	1.42	Wet conditions: -40 °C to +60 °C *-40 °F to +140 °F* Dry conditions: -40 °C to +93 °C *-40 °F to +200 °F*
Polyamide	PA	Thermoplastic material for molded or machined sprockets with high strength and very good abrasion resistance. Suitable for heavy duty applications at dry conditions and elevated temperatures. Material is specially modified to keep its good properties stable over a long time at elevated temperatures.	EU (FDA on request)	1.14	Wet conditions: not recommended Dry conditions: -46 °C to +116 °C (short-term +135 °C) *-50 °F to +240 °F* *(short-term +275 °F)*
Thermoplastic Polyurethane	TPU	Tough thermoplastic material for molded or machined sprockets with very good abrasion resistance. Suitable for abrasive applications at wet or dry conditions with medium load. Material is specially formulated to reduce the teeth wear to a minimum.		1.24	-20 °C to +50 °C *-4 °F to +120 °F*
Super High Temperature	ST	Reinforced thermoplastic material with very good heat and hydrolysis resistance. Suitable for light conveying applications at elevated temperatures. Material is specially modified to keep its good properties stable over a long time at elevated temperatures. Flammability UL94 V0	EU FDA	1.65	Wet conditions: on request Dry conditions: 0 °C to +200 °C (short-term +240 °C) *-32 °F to +392 °F* *(short-term +464 °F)*
Ultra high molecular weight Polyethylene	UHMW PE	Ultra high molecular weight material for machined sprockets. Good abrasion resistance and very good chemical resistance.	EU FDA	0.94	-70 °C to +50 °C *-94 °F to +120 °F*

[1] The food approval statement refers to the HabasitLINK® product range.
For detailed declarations of compliance per material and color, please contact Habasit.

Application	standard	POM, UHMW PE
	high abrasion, dry	PA, TPU
	high abrasion, wet	TPU
	chemicals (alkaline, acids)	PP
	high temperature	ST

Materials for wear strips and guides

Material	Code	Description	Density g/cm³	Temperature range
Ultra high molecular weight Polyethylene	UHMW PE (PE 4000)	For heavy conveying applications (high loads); offers reduced wear and longer lifetime. Not suitable for abrasive conditions.	0.94	-70 °C to +65 °C *-94 °F to +150 °F*
High molecular weight Polyethylene	HMW PE (PE 1000)	For quite heavy conveying applications (relatively high loads) offers almost the same features of UHMW PE but with slightly harder surface. Not suitable for abrasive conditions.	0.95	-70 °C to +65 °C *-94 °F to +150 °F*
Medium molecular weight Polyethylene	HDPE (PE 500)	Low cost material suitable for most applications with moderate load and low speed. Not suitable for static nosebars. Not suitable for abrasive conditions.	0.95	-70 °C to +65 °C *-94 °F to +150 °F*
Cast Polyamide with incorporated Polymer and/or solid lubricating additives	Lubricated PA	Cast material with high molecular weight, high strength and very high wear resistance. Due to the incorporated lubricating additives the friction values are very low, and due to the high molecular weight the material is very tough and therefore very abrasion resistant. Suitable for heavy applications and high speeds. Material is hygroscopic (water adsorption should be taken into account).	1.13	-46 °C to +120 °C *-50 °F to +248 °F*

Material combinations

Materials
For standard materials of pivot rods see Product Data Sheets. If no specific requirements are known, the standard rod materials will be delivered with each belt. Other material combinations are recommended for abrasive and other heavy duty applications.

Recommended module/rod material combinations

Application		Modules	Rods
Standard	General use dry	PP	PA
	General use wet	PP	POM
	Chemical resistance	PP	PP
	Impact, low temperature	PE	PE
	High load dry	POM	PA
Specific for meat	High load wet	POM	PBT
Abrasive environment	Cutting, low temperature	POM+IM	PE
	Wet, up to 60 °C *(140 °F)*	PP	POM
	Wet, up to 60 °C *(140 °F)*, high load	POM	PBT
	Dry	POM	PA
High temperatures	Wet, 60 °C to 105 °C *(140 °F to 220 °F)*	PP	PP
	Dry, high load	POM	PA
	Elevated temperatures 130 °C *(266 °F)*	PA	PA
	Food contact and temperatures up to 145 °C *(293 °F)*	PA+GF	ST / Steel
	Temperatures up to 170 °C *(338 °F)*	PA+HT	ST / Steel
	Food contact and/or temperatures up to 200 °C *(392 °F)*	ST	ST / Steel

The suitable material combination has to be selected depending on the specific application.

Applications for HabasitLINK® belts
Meat (Beef & Pork)

The listed selection tables contain belt types in standard materials and are recommendations only.
Dependent on application parameters other belt types or materials may be used as well.
Core applications only without packaging, materials handling or general conveyance.

Belt code	Belt style	Meat (Beef & Pork)																						
		Slaughtering / Evisceration	Cutting lines / Deboning lines	Bone takeaway	Dressing lines	Trim lines	Slicing	Fat line	Offal / Lung lines	Hide lines	Marinate lines	Breading machines	Freezing lines	Hoof / Shank lines	Bone incline decline	High impact / shute discharge	Transfer / Crossover conveyance	Elevator	Bacon microwave	Metal detectors	Shrink wrapping	Ground meat lines	Spiral freezer	Crates handling
Series M1100 0.5"																								
M1185	Flush Grid										PP POM	PP POM	POM				PP POM			PP POM				
Series M1200 0.5"																								
M1220	Flat Top																PP			PE				
M1233	Flush Grid																PP			PE				
M1234	Nub Top												PE POM											
Series M2500 1"																								
M2510	Flat Top					PE POM	PE	PE POM	PP POM									PE POM		PE		PE POM		
M2514	Nub Top												PE POM					PE						
M2533	Flush Grid										PP POM	PP POM	PE POM					PE						PP POM
M2540	Radius Flush Grid																						POM	
M2544	Tight Radius																						POM	
M2585	Flush Grid												PE POM								PA +GF			
M2586	Raised Rib												POM						MW					
Series M3800 1.5"																								
M3840	Radius Flush Grid																						POM	
M3843	Tight Radius																						POM	
Series M5000 2"																								
M5010	Flat Top	PE POM	POM	PE	PP POM	PP POM	PE	PP POM	POM						POM			PP POM		PE		PE POM		PP POM
M5011	Perforated Flat Top				PP POM	PP POM												PP POM		PE				
M5013	Cone Top			PE POM														POM						
M5014	Nub Top																	PE						
M5015	Flat Top									PP														
M5033	Flush Grid					PP																		PP POM
M5060	Flat Top	POM	POM	POM	PP POM	PP POM	PE	PP POM	POM						POM			PP POM		PE		PE POM		PP POM
M5064	Nub Top																	PE						
M5065	Flat Top				PP POM	PP POM																		
M5067	Minirib																	PP POM						
Series M5200 2"																								
M5290	Radius Flush Grid																						POM	
M5293	Tight Radius																						POM	
Series M6300 2.5"																								
M6360	Flat Top		POM	PE POM		PP POM		PP POM	POM					POM	POM	POM		PP POM				PE POM		

Applications for HabasitLINK® belts
Poultry, sea food

Belt code	Belt style	Poultry														Sea food									
		Live birds	Slaughtering / Evisceration	Skinning	Cut-up / Deboning / Trim lines	Chiller discharge	Offal / Feather lines	Rehang / Bird accumulation	Breading machines	Grading	Shrink wrapping	Freezing lines	Metal detectors	Elevator	Spiral freezer	Draining	Trim lines	Breading machines	Control tables	Glazing	Metal detectors	Freezing lines / Spiral	Elevator	Shrink wrapping	Shrimps processing
Series M1100 0.5"																									
M1185	Flush Grid								PP POM			POM	PP POM			PP		PP POM		POM	PP POM	POM			
Series M1200 0.5"																									
M1220	Flat Top												PE								PE				
M1233	Flush Grid											POM	PE						PE	PE POM	PE				
M1234	Nub Top											PE		PE		PE				PE	PE	PE	PE		
Series M2500 1"																									
M2510	Flat Top			POM	PE		POM			PP		POM	PE	PE					PE		PE		PE		
M2511	Mesh Top															PE									
M2514	Nub Top											PE		PE							PE	PE	PE		
M2533	Flush Grid			POM					PP POM	PP			PE			PE PP		POM							
M2540	Radius Flush Grid														POM							POM			
M2544	Tight Radius														POM							POM			
M2585	Flush Grid										PA +GF	PE POM												PA +GF	
M2586	Raised Rib											POM										POM			
Series M3800 1.5"																									
M3840	Radius Flush Grid														POM							POM			
M3843	Tight Radius														POM							POM			
Series M5000 2"																									
M5010	Flat Top	PE POM	PE POM	POM	PE	PP POM	POM	PP		PP		PE	PE	PP POM			PP POM		PE PP	PE PP			PE PP		PE PP
M5011	Perforated Flat Top				PE	PE POM		PP				PE	PE	PP POM		PE PP							PE PP		
M5013	Cone Top			POM										PE									PE		
M5014	Nub Top													PE					PE	PE					
M5015	Flat Top	PE																							
M5033	Flush Grid													PP POM		PE PP							PE PP		
M5060	Flat Top	PE POM	PE POM	POM	PE	PP POM	POM	PP		PP		PE	PE	PP POM			PP POM		PE PP	PE PP			PE PP		PE PP
M5064	Nub Top											PE		PE					PE	PE					
M5065	Flat Top				PE	PP POM	POM	PP		PP		PE							PE PP						PE PP
M5067	Minirib													PP POM									PP POM		
Series M5200 2"																									
M5290	Radius Flush Grid														POM							POM			
M5293	Tight Radius														POM							POM			
Series M6300 2.5"																									
M6360	Flat Top					PE		PE																	

Applications for HabasitLINK® belts
Bakery

Belt code	Belt style	Bakery													
		Raw dough handling	Divider	Proofer lines	Oven infeed / outfeed	Cooling lines	Coating / Glazing lines	Freezing lines	Incline / decline lines	Metal detectors	Spiral infeed / outfeed	Spiral / proofing / cooling / freezing	Conditioning lines	Laminating lines	Pan handling
Series M0800 0.3″															
M0870	Micropitch Flat Top	POM			POM						POM				
M0873	Micropitch Non Slip				POM						POM				
Series M1100 0.5″															
M1185	Flush Grid				POM	POM	POM				POM				
Series M1200 0.5″															
M1220	Flat Top	POM	PP	PP						PE				PE	
M1220	GripTop								PP						PP
M1230	Flush Grid	PP	PP		PP	PP POM	PP POM	PE POM		PE	PP		PP		
M1233	Flush Grid		PP		PP	PP POM	PP POM	PE POM		PE	PP		PP		
Series M2500 1″															
M2510	Flat Top	PP POM		PP						PE				PE PP	
M2516	Diamond Top	PE PP		PP											
M2520	Flat Top														PP POM
M2520	GripTop								PP POM						PP POM
M2520	Roller Top														POM
M2531	Raised Rib					PP POM									
M2533	Flush Grid				ST	PP POM	PP	PE POM		PE	PP POM		PP		POM ST
M2533	GripTop								PP POM						PP POM
M2533	Roller Top														POM
M2540	Radius Flush Grid											PP POM			POM PA
M2540	GripTop								PP						PP
M2540	Roller Top														POM
M2544	Tight Radius											PP POM			PP POM
M2585	Flush Grid				PA +GF	PP POM									
M2586	Raised Rib					PP POM									
Series M3800 1.5″															
M3840	Radius Flush Grid											PP POM			PP POM
M3840	Roller Top														POM
M3843	Tight Radius											PP POM			PP POM
M3843	GripTop								PP POM						PP POM
M3892	Raised Deck														PP POM
Series M5000 2″															
M5010	Flat Top	PE POM												PE PP	
M5010	Roller Top														POM
M5032	Flush Grid Heavy Duty					PP POM									
M5032	Roller Top														POM
M5033	Flush Grid					PP POM									
M5060	Flat Top	PE POM												PE PP	
M5067	Minirib								PP POM						

Applications for HabasitLINK® belts
Bakery, snack food, fruits and vegetables

Belt code	Belt style	Bakery													
		Raw dough handling	Divider	Proofer lines	Oven infeed / outfeed	Cooling lines	Coating / Glazing lines	Freezing lines	Incline / decline lines	Metal detectors	Spiral infeed / outfeed	Spiral / proofing / cooling / freezing	Conditioning lines	Laminating lines	Pan handling
Series M5100 2"															
M5131	Raised Rib					PP									
Series M5200 2"															
M5290	Radius Flush Grid											PP POM			
M5293	Tight Radius											PP POM			

Belt code	Belt style	Snack food (Pretzel, potato chips, tortillas)										Fruits and vegetables												
		Corn draining	Proofer lines	Potato processing	Corn processing	Boiler infeed	Fryer	Oven infeed / outfeed	Cooling lines	Seasoning	Incline / decline lines	Bulk feeding	Prewashing / Rinsing	Washer	Draining	Peeling	Elevator	Control / Sorting table	Filling	Freezing lines	Palletizing / depalletizing	Container conveyance	Sterilization conveyance	Metal detector
Series M0800 0.3"																								
M0870	Micropitch Flat Top							POM																
M0873	Micropitch Non Slip							POM																
Series M1100 0.5"																								
M1185	Flush Grid							PP	PP	POM					POM									
Series M1200 0.5"																								
M1220	Flat Top		PP															PP POM						PE
M1220	GripTop										PP													
M1230	Flush Grid								PP POM						PP POM								PP	PE
M1233	Flush Grid								PP POM						PP POM								PP	PE
M1234	Nub Top																PE							
Series M2500 1"																								
M2510	Flat Top				PP POM							PP POM					PP POM	PE PP						PE
M2511	Mesh Top	PP POM																						
M2514	Nub Top																PE PP							
M2516	Diamond Top		PP																					
M2520	Flat Top																				PP POM	PP POM		
M2520	GripTop										PP POM													
M2531	Raised Rib																				PP POM			
M2533	Flush Grid		PP			PP		ST	PP POM				PP	PP	PP					PE POM	PP POM	PP POM		PE
M2533	GripTop										PP											PP		

Applications for HabasitLINK® belts
Snack food, fruits and vegetables

Belt code	Belt style	Snack food (Pretzel, potato chips, tortillas)										Fruits and vegetables												
		Corn draining	Proofer lines	Potato processing	Corn processing	Boiler infeed	Fryer	Oven infeed / outfeed	Cooling lines	Seasoning	Incline / decline lines	Bulk feeding	Prewashing / Rinsing	Washer	Draining	Peeling	Elevator	Control / Sorting table	Filling	Freezing lines	Palletizing / depalletizing	Container conveyance	Sterilization conveyance	Metal detector
M2540	Radius Flush Grid																					PP POM		
M2540	GripTop										PP													
M2544	Tight Radius																					PP POM		
M2585	Flush Grid						ST	PA +GF	PP POM															
M2586	Raised Rib								PP POM						PP POM					POM				
Series M3800 1.5″																								
M3840	Radius Flush Grid																					PP POM		
M3843	Tight Radius																					PP POM		
M3843	Tight Radius GripTop										PP POM													
M3892	Raised Deck																					PP POM		
Series M5000 2″																								
M5010	Flat Top			PP POM								PP POM					PE PP	PE PP	PP POM					
M5011	Perforated Flat Top	PP POM											PE PP		PE PP	PP	PE PP							
M5014	Nub Top											PE PP												
M5021	Perforated Flat Top												PP		PP	PP								
M5032	Flush Grid Heavy Duty												PE PP	PP POM	PE PP									
M5033	Flush Grid								PP POM					PP POM	PE PP	PP					PP POM	PP POM	PP	
M5060	Flat Top			PP POM								PP POM					PE PP	PE PP	PE PP					
M5064	Nub Top																PE PP							
M5067	Minirib																PE PP							
Series M5100 2″																								
M5131	Raised Rib								PP												PP		PP	
Series M5200 2″																								
M5290	Radius Flush Grid																					PP POM		
M5293	Tight Radius																					PP POM		

Applications for HabasitLINK® belts
Automotive, ski

Belt code	Belt style	Automotive										Ski	
		Metal working Stamping outfeed	Car body assembly People mover	Car body assembly Skid conveyor	Car part manufacturing	Car assembly line Buffer stock	Battery filling	Car transport	Car wash	Car detail wash	Water test line	Ski lift / Incline	Chair lift / feeder
Series M1200 0.5"													
M1220	Flat Top				PP POM								
M1230	Flush Grid				PP POM								
Series M2400 1"													
M2420	Flat Top				POM								
M2470	Flat Top				POM								
Series M2500 1"													
M2520	Flat Top	POM		POM	PP POM	PP POM							
M2533	Flush Grid				PP POM	PP POM							
M2540	Radius Flush Grid				PP POM		PP						
M2585	Flush Grid				POM PP								
Series M2600 1"													
M2620	Flat Top Heavy Duty	POM		POM	PP POM	PP POM							
M2623	Non Slip		POM+AS PP+AS						POM+AS	POM+AS			
M2670	Flat Top Heavy Duty	POM		POM	PP POM	PP POM							
Series M3800 1.5"													
M3840	Radius Flush Grid	POM					PP						
Series M5000 2"													
M5015	Flat Top												POM
M5015	GripTop											POM	
M5020	Flat Top Heavy Duty		POM+AS PP+AS										
M5021	Perforated Flat Top						PP						
M5023	Non Slip		POM+AS PP+AS						POM+AS	POM+AS			
M5032	Flush Grid Heavy Duty				PP POM	PP POM	PP						
Series M5100 2"													
M5131	Raised Rib						PP						
Series M5200 2"													
M5290	Radius Flush Grid	POM					PP						
M5293	Tight Radius	POM					PP						
Series M6400 2.5"													
M6420	Flat Top Heavy Duty		POM+AS	POM	POM+AS			POM					
M6423	Non Slip		POM+AS		POM+AS								
M6424	Perforated Flat Top								POM	POM	POM		

Applications for HabasitLINK® belts
Tire manufacturing

Belt code	Belt style	Mixer infeed / outfeed	Batchoff incline	Dip Tank	90° incline holding conveyor	Calendering infeed	Calendering outfeed	Extrusion infeed	Extrusion outfeed	Extrusion shower lines	Scaling	Marking	Cooling incline	Cooling horizontal	Cooling decline	Sciver cementing	Water blow-off	Accumulation lines	90° transfer	Tire transport horizontal	Tire transport incline / decline
Series M1200 0.5″																					
M1220	Flat Top										POM	POM				POM	POM			POM	
M1230	Flush Grid											POM	POM	POM	POM						
Series M2400 1″																					
M2420	Flat Top	POM	POM		POM		POM		POM		POM	POM				POM	POM			POM	
M2470	Flat Top	POM	POM		POM		POM		POM		POM	POM				POM	POM			POM	
Series M2500 1″																					
M2520	Flat Top	POM	PP POM		POM		PP POM		PP POM		POM	POM				POM	POM			POM	
M2520	GripTop		PP POM			PP POM		PP POM													PP POM
M2520	Roller Top																	POM			
M2531	Raised Rib												POM	POM	POM						
M2533	Flush Grid	POM								POM			POM	POM	POM	POM					
M2585	Flush Grid		PP POM						PA +GF					PP POM							
Series M2600 1″																					
M2620	Flat Top Heavy Duty	POM	POM		POM		PP POM		PP POM		POM	POM				POM	POM			POM	
M2620	GripTop		PP POM			PP POM		PP POM													PP POM
M2670	Flat Top Heavy Duty	POM	POM		POM		PP POM		PP POM		POM	POM				POM	POM			POM	
M2670	GripTop		PP POM			PP POM		PP POM													PP POM
Series M5000 2″																					
M5013	Cone Top					POM															
M5015	Flat Top																			POM	
M5015	GripTop																				POM
M5020	Flat Top Heavy Duty	POM	PP POM		POM		PP POM		PP POM		POM	POM				POM	POM			POM	
M5032	Flush Grid Heavy Duty												PP POM	PP POM	PP POM						
M5032	Roller Top																	PP POM			
Series M5100 2″																					
M5131	Raised Rib			PP																	
M5182	Roller Top - 90°																		PP POM		

Applications for HabasitLINK® belts
Packaging, textile, wood

Belt code	Belt style	Packaging														Textile				Wood						
		Check weighers	Filling	Capping	Labeling	Case packers	Shrink wrapping	Tray packers	Metal detectors	Box inclines / declines	Accumulation	90° transfer	Palletizing / depalletizing	Bulk inclines	Box transport horizontal	Dryer	Cutter	Dyeing	Dye filtering	Board handling	Trimming lines	Cross-cutting	Sanding / Calcbreating lines	Pallets conveying	Chop-saw	Pellets elevator
Series M0800 0.3"																										
M0870	Micropitch Flat Top	POM			POM										POM											
M0873	Micropitch Non Slip				POM										POM											
Series M1200 0.5"																										
M1220	Flat Top	PP POM	PP POM	PP POM	PP POM				PE				POM		PP POM											
M1220	GripTop									PP																
M1230	Flush Grid	PP POM	PP POM						PE				POM		PP POM											
Series M2400 1"																										
M2420	Flat Top				PP POM	PP POM		PP POM					PP POM		PP POM											
M2470	Flat Top				PP POM	PP POM		PP POM					PP POM		PP POM											
M2470	GripTop									PP POM																
Series M2500 1"																										
M2520	Flat Top		PP POM	PP POM	PP POM				PE						PP POM		PP POM									
M2520/33/40	GripTop									PP POM																
M2520/33/40	Roller Top										POM															
M2531	Raised Rib					POM					POM						PP POM	PP	PP							
M2533	Flush Grid		PP POM	PP POM	PP POM				PE		POM		POM		PP POM	PP	PP POM	PP	PP							
M2540	Radius Flush Grid							PP POM							PP POM											
M2544	Tight Radius							PP POM							PP POM											
M2585	Flush Grid						PA +GF																			
Series M2600 1"																										
M2620	Flat Top Heavy Duty														PP POM					POM	POM	POM	POM	POM	POM	
M2620	Low Back Pressure										PP POM															
M2620/70	GripTop									PP POM																
M2670	Flat Top Heavy Duty														PP POM					POM	POM	POM	POM	POM	POM	
Series M3800 1.5"																										
M3840	Radius Flush Grid							PP POM							PP POM											
M3840	Roller Top										POM															
M3843	Tight Radius							PP POM							PP POM											
M3843	Tight Radius GripTop									PP POM																
M3892	Raised Deck							PP POM							PP POM											
Series M5000 2"																										
M5010	Flat Top													PP POM	PP POM											PP POM
M5010	Roller Top										POM															
M5015	GripTop									POM								PP								
M5020	Flat Top Heavy Duty														PP POM					POM	POM	POM	POM	POM	POM	
M5032	Flush Grid Heavy Duty														PP POM			PP								
M5032	Roller Top										PP POM															
M5060	Flat Top													PP POM	PP POM											PP POM

Applications for HabasitLINK® belts Packaging, textile, wood

Belt code	Belt style	Packaging														Textile				Wood						
		Check weighers	Filling	Capping	Labeling	Case packers	Shrink wrapping	Tray packers	Metal detectors	Box inclines / declines	Accumulation	90° transfer	Palletizing / depalletizing	Bulk inclines	Box transport horizontal	Dryer	Cutter	Dyeing	Dye filtering	Board handling	Trimming lines	Cross-cutting	Sanding / Calcbreating lines	Pallets conveying	Chop-saw	Pellets elevator
Series M5100 2"																										
M5131	Raised Rib										PP		PP					PP								
M5182	Roller Top - 90°											PP POM														
Series M5200 2"																										
M5290	Radius Flush Grid						PP POM								PP POM											
M5293	Tight Radius						PP POM								PP POM											
Series M6400 2.5"																										
M6420	Flat Top Heavy Duty																			POM	POM	POM	POM	POM	POM	

Applications for HabasitLINK® belts
Corrugated cardboard, printing, paper, postal

Belt code	Belt style	Corrugated cardboard								Printing & paper							Postal				
		Paper roll transport	Down stacker	Transfer cart	Stack handling / buffer	90° transfer	Strap feed	Palletizer	Casemaker feeder	Printing machine outfeed	Stacker outfeed	Wrapping machine outfeed	90° transfer	Palletizer	Loading docks	Book binding	Mail segregator inclines	Bulk mail handling	Parcel handling	Tray and bag transport	
Series M0800 0.3″																					
M0870	Micropitch Flat Top									POM						POM		POM	POM		
Series M1200 0.5″																					
M1220	Flat Top		POM	POM	POM	POM	POM		POM	POM	POM	POM	POM			POM		POM	POM		
M1220	GripTop															POM	POM				
M1230	Flush Grid		POM	POM	POM	POM	POM		POM	POM	POM	POM	POM			POM					
Series M2400 1″																					
M2420	Flat Top		POM	POM	POM		POM	POM	POM	POM	POM	POM		POM	POM			POM	POM	POM	
M2470	Flat Top		POM	POM	POM		POM	POM	POM	POM	POM	POM		POM	POM			POM	POM	POM	
M2470	GripTop																POM				
M2480	Flush Grid		POM	POM	POM		POM	POM	POM	POM	POM	POM									
Series M2500 1″																					
M2520	Flat Top		POM	POM	POM		POM	POM	POM	POM	POM	POM		POM	POM			POM	POM	POM	
M2520	GripTop																POM				
M2540	Radius Flush Grid																		POM		
M2544	Tight Radius																		POM		
Series M2600 1″																					
M2620	Flat Top Heavy Duty							POM		POM	POM	POM		POM	POM					POM	
M2620/70	GripTop																			POM	
M2670	Flat Top Heavy Duty							POM		POM	POM	POM		POM	POM					POM	
Series M3800 1.5″																					
M3840	Radius Flush Grid																		POM		
M3843	Tight Radius																		POM		
M3843	Tight Radius GripTop																		POM		
M3892	Raised Deck																		POM		
Series M5000 2″																					
M5020	Flat Top Heavy Duty													POM	POM	POM					
M5032	Flush Grid Heavy Duty													POM	POM	POM					
Series M6400 2.5″																					
M6420	Flat Top	POM																			
M6425	Reel Top	POM																			

Applications for HabasitLINK® belts
Beverages and bottling, can manufacturing

Belt code	Belt style	Beverages and bottling										Can manufacturing					
		Can depalletizing / palletizing	Glass depalletizing / palletizing	PET depalletizing / palletizing	Mass conveyance cans	Mass conveyance glass	Mass conveyance PET plastic	Single file lines – all products	Pasteurizers / Warmers	Shrink wrapping	Accumulation tables	Mass conveyance	Vacuum applications	Washer infeeds	Washer holddown	Accumulation tables	Palletizing / depalletizing
Series M0800 0.3″																	
M0870	Micropitch Flat Top	POM	POM	POM	POM	POM	POM					POM				POM	
Series M1200 0.5″																	
M1220	Flat Top	POM	POM	POM	POM	POM	POM				POM	POM				POM	
M1220	ActivXchange	POM	POM	POM	POM	POM	POM	POM			POM	POM				POM	
M1230	Flush Grid	POM	POM	POM	POM		POM				POM			POM		POM	POM
M1280	ActivXchange	POM	POM	POM	POM	POM	POM	POM			POM	POM				POM	
Series M2400 1″																	
M2420	Flat Top	POM	POM	POM	POM	POM	POM				POM					POM	POM
M2420	ActivXchange	POM	POM	POM	POM	POM	POM	POM			POM	POM				POM	
M2470	Flat Top	POM	POM	POM	POM	POM	POM				POM					POM	POM
M2470	ActivXchange	POM	POM	POM	POM	POM	POM	POM			POM	POM				POM	
M2472	Perforated Flat Top												POM				
M2480	Flush Grid	POM	POM	POM	POM		POM				POM					POM	POM
M2480	ActivXchange	POM	POM	POM	POM	POM	POM	POM			POM	POM				POM	
Series M2500 1″																	
M2520	Flat Top	POM	POM	POM	POM	POM	POM	POM			POM					POM	POM
M2531	Raised Rib	POM	POM						PP		POM					POM	POM
M2533	Flush Grid	POM			POM			POM			POM			POM		POM	POM
M2585	Flush Grid									PA +GF					POM		
Series M2600 1″																	
M2620	Flat Top Heavy Duty	POM	POM	POM	POM	POM	POM	POM			POM					POM	POM
M2620	Low Back Pressure										POM					POM	POM
M2670	Flat Top Heavy Duty	POM	POM	POM	POM	POM	POM	POM			POM					POM	POM
M2670	ActivXchange	POM	POM	POM	POM	POM	POM	POM			POM	POM				POM	
Series M5100 1″																	
M5131	Raised Rib		PP						PP		PP					POM	POM

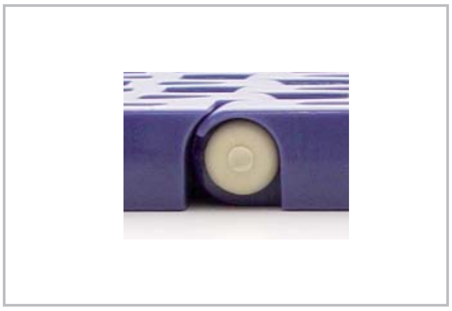
Applications for HabasitLINK® belts
Glass manufacturing, PET manufacturing

Belt code	Belt style	Glass manufacturing				PET manufacturing				
		Single file lines	Accumulation tables	Shrink wrapping	Palletizing	Cooling	Conditioning	Elevator	Shrink wrapping	Palletizing
Series M0800 0.3″										
M0870	Micropitch Flat Top		POM		POM					
Series M1200 0.5″										
M1220	Flat Top		POM		POM			PP POM		POM
M1220	ActivXchange	POM	POM							
M1230	Flush Grid		POM		POM	PP POM	PP POM	PP POM		POM
M1230	ActivXchange	POM	POM							
Series M2400 1″										
M2420	Flat Top	POM	POM		POM					POM
M2420	ActivXchange	POM	POM							
M2470	Flat Top	POM	POM		POM					POM
M2470	ActivXchange	POM	POM							
M2480	Flush Grid		POM							
M2480	ActivXchange	POM	POM							
Series M2500 1″										
M2520	Flat Top	POM	POM		POM			PP POM		
M2531	Raised Rib		POM		POM		POM			POM
M2533	Flush Grid		POM			PP POM	PP POM	PP POM		POM
M2585	Flush Grid			PA +GF					PA +GF	
Series M2600 1″										
M2620	Flat Top Heavy Duty	POM	POM		POM					POM
M2620	Low Back Pressure		POM							
M2670	Flat Top Heavy Duty	POM	POM		POM					POM
M2670	ActivXchange	POM	POM							

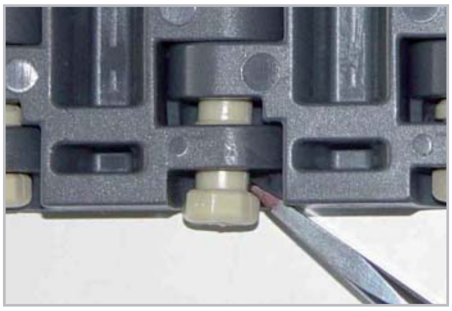
Rod retaining systems

Snap Fit
Snap Fit rod retaining is used for a large range of Habasit modular belts. The rod head is round.

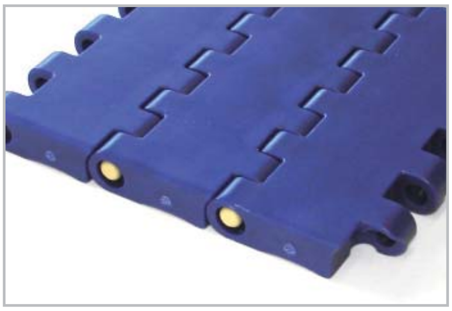
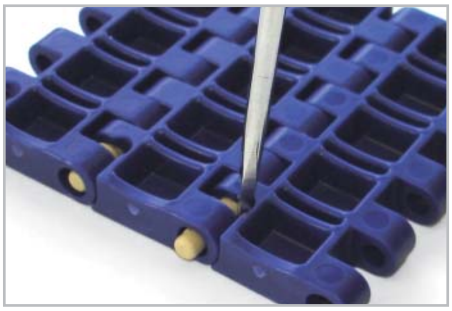
It allows the rods to be inserted with the help of a hammer. It can be extracted using a punch and a hammer from the opposite side (secure the module edge to avoid link breakage) or using a special extraction tool available from Habasit or a narrow side cutter.



Smart Fit (standard, with rod head)
Smart Fit retaining is used for many new product designs. The rod head is octagonally shaped.
It allows an even more comfortable assembly and disassembly by use of a simple screwdriver.

Smart Fit headless
For specific strong belt edge design headless Smart Fit rods are used. Disassembly from bottom side by use of simple screwdriver or with a punch and a hammer from the opposite side.

Evaluate the desired belt style	→	Refer to the product data sheets
Evaluate the suitable material	→	Refer to the table of material properties, pages 17 ff., 80 ff. and product data sheets
Evaluate the design concept	→	Refer to the Design Guide of this manual and draft the layout of your equipment
Calculate the belt tensile force, power requirements and shaft sizes	→	Refer to the Belt Calculation Guide in this manual. Verify the selected belt comparing with values of product data sheets
Establish size and number of sprockets	→	Refer to the product data sheets and LINK-SeleCalc

We advise to use LINK-SeleCalc program for belt evaluation and calculation.
Please contact Habasit representative for installation.

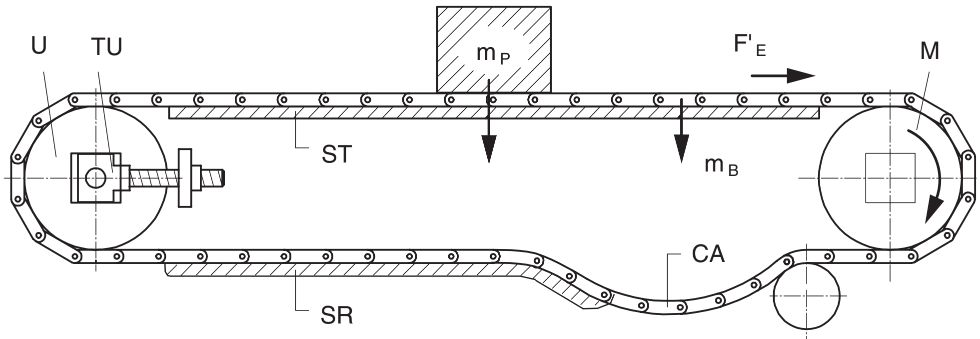
Sprocket compatibility

Belt type	Sprocket Series M0800	Sprocket Series M1100	Sprocket Series M1200	Sprocket Series M2400	Sprocket Series M2500	Sprocket Series M2500-C2	Sprocket Series M2600	Sprocket Series M3800	Sprocket Series M5000	Sprocket Series M5100	Sprocket Series M5200	Sprocket Series M6300	Sprocket Series M6400
Series M0800	●												
Series M1100		●	▼										
Series M1200			●										
Series M2400				●									
Series M2500 (excluding M2585 and M2586)					●								
Belt types M2585/M2586					■	●							
Series M2600							●						
Series M3800								●					
Series M5000									●				
Series M5100										●			
Series M5200											●		
Series M6300												●	
Series M6400													●

● recommendend ■ possible to use ▼ limited use

For detailed information please contact Habasit.

Belt and sprocket evaluation



M **Driving shafts** can be square or round. Square shafts allow the sprockets to move easily on their shaft to follow the thermal expansion or contraction of the belt. In addition square shafts allow higher transmission of torque. The center sprocket is usually fixed for tracking of the belt.

U **Idling shafts** can be equipped with sprockets, coated drums, steel rollers or plastic discs. Alternative tracking methods are required if no sprockets are used.

ST **Slider supports on the transport side**, with parallel or V-shaped wear strips carry the moving belt and load.

SR **Belt support on the return way** can be equipped with rollers or longitudinal wear strips (slider support).

CA **Catenary sag** is an unsupported length of the belt for absorbing belt length variations due to thermal expansion, load changes of belt wear and belt tension.

TU **Take-up device** for adjustment of the catenary sag may be screw type, gravity or pneumatic type.

F'_E **Effective tensile force (belt pull)** is calculated near the driving sprocket, where it reaches in most cases its maximum value during operation. It depends on the friction forces between the belt and the supports (ST) (SR) as well as friction against accumulated load.

v **Belt speed:** Applications exceeding 50 m/min *(150 ft/min)* negatively affect the life expectancy of the belt. For speeds higher than 50 m/min always consult a Habasit specialist. Chain links moving around a sprocket cause the belt speed to vary. The rod travels on the pitch diameter of the sprocket, while the middle of the module moves through the smaller chordal radius.
The **polygon effect** is also called **chordal action**. The magnitude of speed variation is depending on the number of sprocket teeth only. The higher the number of teeth the smaller the speed variation.

m_P **Conveyed product weight** as expected to be distributed over the belt surface; calculated average load per m^2 *(ft^2)*.

m_B **Belt mass (weight)** is added to the product mass for calculation of the friction force between belt and slider frame.

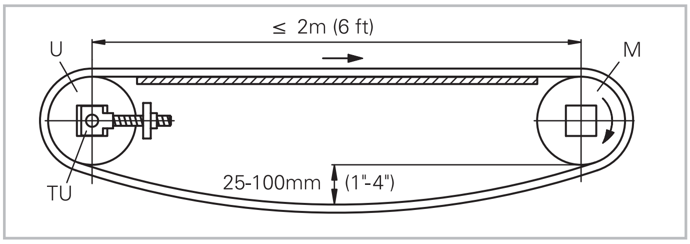
(Glossary of terms see page 90, Appendix)

Design Guide
Horizontal conveyors – Basic design

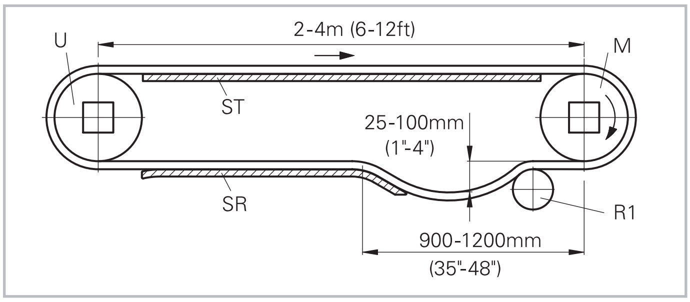
Modular belts typically change their length under varying operational conditions of temperature and load. The extra belt length is accommodated by providing an unsupported section of the return way for catenary sag (calculation of **catenary force** see also page 76).

The design of the conveyor frame is dependent on the total belt length. A screw take-up is used on the idler shaft for initial adjustment of the catenary sag only and not for adjustment of the belt tension.

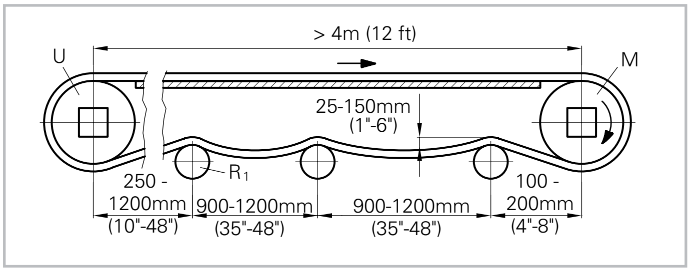
Short conveyors (maximum 2 m *(6 ft)*)
In this case belt support on the return side can be omitted. Screw type take-up (TU) can be necessary for adjustment of catenary sag. Observe perfect parallel alignment of shafts.



Medium length conveyors (2 to 4 m *(6 to 12 ft)*)
Common design; belt on return way supported by slider frame (SR) or wear strips. Rollers (R1) can be used as well. A catenary sag near the driving sprockets is sufficient for moderate temperature changes.



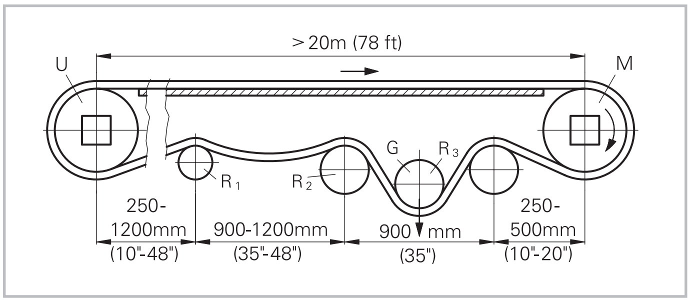
Long conveyors (over 4 m *(12 ft)*)
Longer lengths and greater temperature changes require more than one section for catenary sag. In this case vary roller spacing (e. g. 1200/900/1200/ 900 ...).



Admissible speeds of long conveyors:

Length	max. speed
up to 15 m *(45 ft)*	50 m/min *(150 ft/min)*
15 – 25 m *(45 – 75 ft)*	30 m/min *(90 ft/min)*
over 25 m *(75 ft)*	15 m/min *(45 ft/min)*

For speeds higher than 50 m/min (*150 ft/min)*, always consult a Habasit specialist.



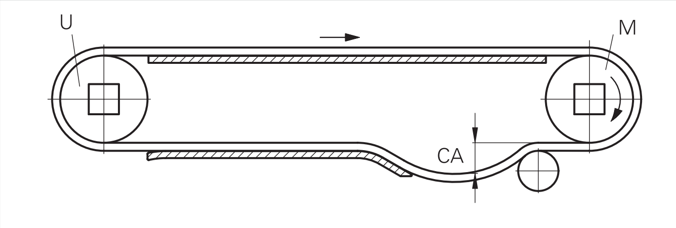
Gravity take-up
For heavily loaded long belts and/or high speed (over 15 m/min) and/or with frequent starts the catenary sags may not sufficiently tension the belt to prevent sprockets from disengaging. In such cases the gravity take-up (G) can be an adequate solution.

Recommended tensioner weight:

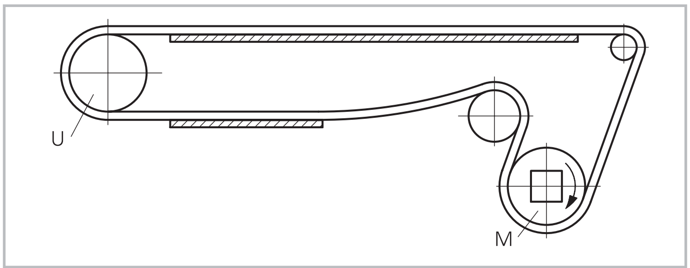
Belt type	Tensioner weight per m (ft) belt width
for 0.3" belts	10 kg/m *(7 lb/ft)*
for 0.5" and 1" belts	15 kg/m *(10 lb/ft)*
for 1.5" and 2" belts	20 kg/m *(14 lb/ft)*
for 2.5" belts	25 kg/m *(17 lb/ft)*

Design Guide
Horizontal conveyors – Drive concepts

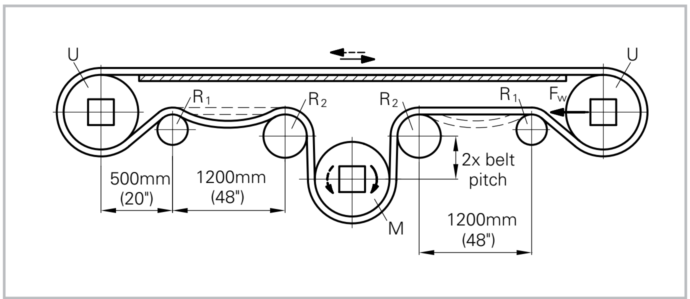
Common drive configuration
Slider support on return way, or rollers alternatively.
For proper sprocket engagement maintain approx. 180° arc of contact.



- **Uni-directional drive**
  One motor (M) at conveyor end, pull action (driving sprockets are pulling the belt). Catenary sag (CA) only required on drive end (see also page 76).
- **Lower head drive**
  For tight transfer with nosebar or with small idling rollers the motor with the drive shaft can be arranged as illustrated.
- **Bi-directional drive**
  Two motors (M), one at each conveyor end. Only one motor is pulling, the other motor remains disengaged (clutch). Catenary sag (CA) at both conveyor ends.

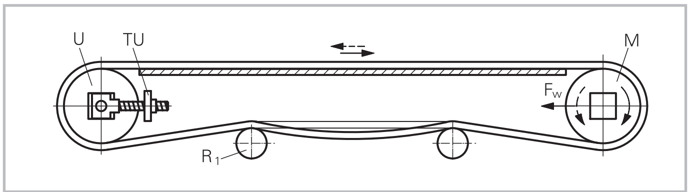


Bi-directional center drive
Only one motor (M) placed in the middle of the belt return. This system works well for bi-directional conveyors. In case of high loads a gravity take-up may be necessary for positive sprocket engagment. Optional solutions: pneumatic or spring-loaded tensioning device. Center drives are not recommended for radius applications.
Since the driving force is applied on the return way of the belt, the shaft load will be two times the calculated belt pull:



$F_W = 2 \cdot F'_E$ (see also calculation guide page 73).

Bi-directional conveyor and pusher drive (push/pull action)
It is possible to apply one head drive motor for bi-directional reversible driving.



For reverse driving (push action = pusher drive), a screw type take-up (TU), or a spring or a pneumatic tensioning device with 110 % pretension of the expected belt load is recommended. The shaft load will increase to:

$F_W = 2.2 \cdot F'_E$ (see also calculation guide page 73).

In case of a bi-directional pusher drive with tensioning device, the shaft load can increase to:

$F_W = 3.2 \cdot F'_E$ (see also calculation guide page 73).

Design Guide
Elevating conveyors

For the design of elevating conveyors, the following basic rules have to be considered:

M **The driving shaft** must be located at the top end of the conveyor or in a center-driven design.

ST **Slider supports** on the transport side with parallel, serpentine or chevron wear strips.

SR **Slider supports** are preferred. For the majority of elevating conveyor applications, flights and/or side guards are used. In these cases belt edge slider supports are necessary.

SF Belt with flights wider than 600 mm *(24")* have to be carried in their middle by a slider support strip (parallel or serpentine). (Fig. below, section x-x).

CA **Catenary sags** follow the same working principle as for horizontal belts but in most cases are positioned at the lower end of the belt (see also page 46).

SH The radius of **hold-down and support shoes** has to be **≥** 150 mm (*6").* The radius should however be selected at the largest possible.
For belts equipped with side guards, the minimum shoe radius (backbending radius) has to be 250 mm *(10")*.

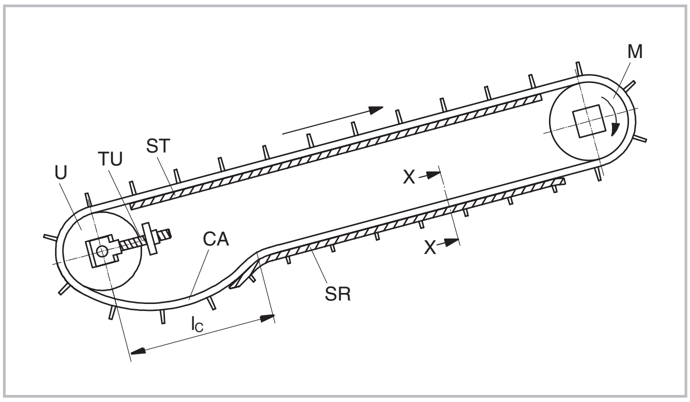
TU Since inclined conveyors are often heavily loaded, the catenary sag **(CA)** may not provide sufficient tension for safe engagement of the driving sprockets. Therefore it is recommended to install a **screw type take-up** belt tensioner **(TU)** at the lower conveyor end (idle shaft **U**).
For large temperature differences, **a gravity take-up may be advisable.**

Find further information for minimum roller diameter and backbending radius (hold-down and support shoes) in the Appendix (page 93).

Example of a straight inclined conveyor

l_C 900 mm – 1200 mm *(35" – 48")*

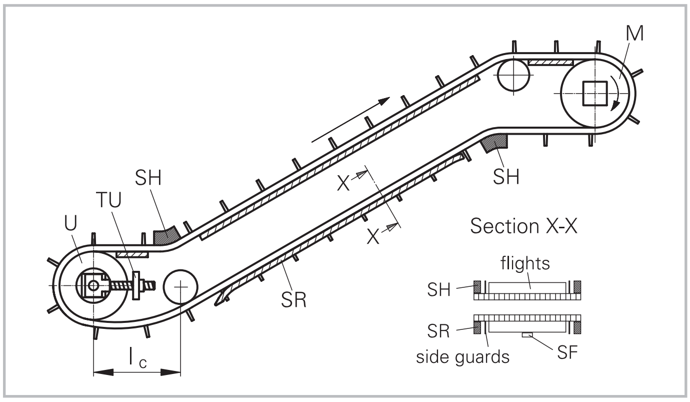
SR For flighted belts the slider support on the return way can be equipped with wear strips at the belt edges (see fig. below, section X – X).



Example of inclined conveyor with horizontal end sections

l_C 900 mm – 1200 mm *(35" – 48")*
If the length of the horizontal section is longer than 1200 mm *(48")*, slider supports are recommended.

SR For flighted belts the slider support on the return way can be equipped with wear strips at the belt edges (see section X – X).

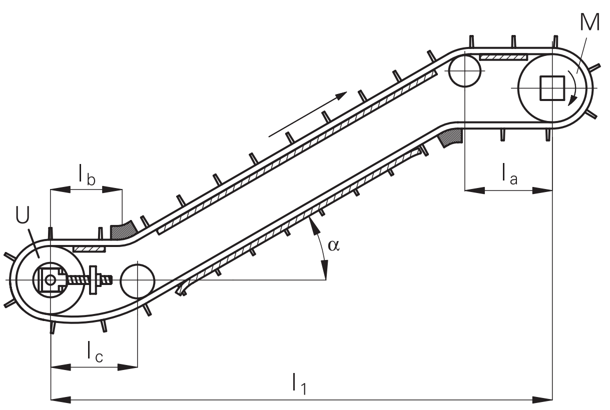


Backbending on elevators (Z-conveyors)
Elevators are usually equipped with flights. Therefore for backbending of Z-conveyors hold-down shoes (SH) or rollers are used at the belt edge only. A hold-down device in the center of the belt, acting from the top, is only possible by leaving a gap in center of the flight row. In most cases this is not possible or not desirable. The belt tension creates lateral bending forces in the backbending area. Depending on the load and the stiffness of the belt, wide belts may tend to buckle. Solutions and recommendations:

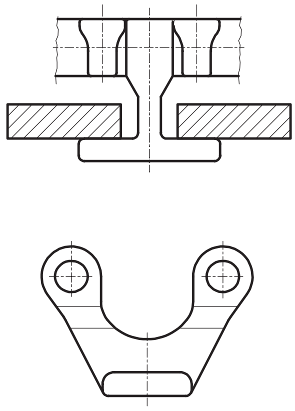
a) Z-conveyors
The applicable belt width without hold-down device in the middle of the belt is limited. The limits are depending on the following criteria:

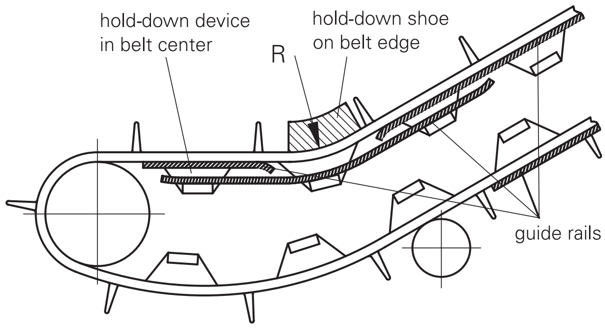
- Length of belt before backbending
- Load on belt before backbending
- Type of belt (belt thickness, module length, lateral belt stiffness)
- Inclination angle α

The precise calculation of the allowable belt width would be very complex. Therefore a simplified general rule for dimensioning and design of the conveyor frame is provided (refer to following table).



b) Z-conveyors with center hold-down devices
Hold-down devices are available for 1" and 2" belts (see also product data sheet). For belt widths larger than 2 m (80"), two tracks are recommended.
For guides use steel strips. Min. backbending radius R = 250 mm *(10")*.





Design Guide
Elevating conveyors

Following table considers admissible deflection of 1% of max. belt widths b_0 for POM and PP belts and 2% for PE belts:

Max belt widths b_0 mm (inch) for speed < 30 m/min	2" and 2.5" belts		1" and 1.5" belts				0.5" belts	
			M2520 and 1.5" belts		other 1" belts			
belt load	< 50%	50–100%	< 50%	50–100%	< 50%	50–100%	< 50%	50–100%
for inclination α < 50°								
l_b ≤ 800 mm (32") (possibly self-adjusting belt tensioner needed!)	1500 *59*	1000 *39*	1200 *47*	800 *32*	800 *32*	600 *24*	700 *28*	500 *20*
l_b = 800 – 2000 mm (32"–78") (longer sect. l_b not recommended)	1200 *47*	800 *32*	1000 *39*	600 *24*	600 *24*	500 *16*	550 *22*	400 *16*
for inclination α ≥ 50°								
l_b ≤ 800 mm (32") (possibly self-adjusting belt tensioner needed!) (longer sect. l_b not recommended)	1050 *41*	700 *28*	850 *33*	550 *22*	550 *22*	400 *16*	500 *20*	350 *14*

Keep section l_b as short as possible. Long straight section l_b will increase the forces in hold-down devices.
For higher speed contact Habasit representative.

Catenary sags for elevators

For proper engagement of the sprockets on the drive shaft (drive at discharge end), the belt must be kept under tension when it leaves the sprocket to the return side (back-tension). This can be achieved by a catenary sag of 900 to 1200 mm *(35 to 50")* length. The position of the catenary sag is depending on the inclination angle α, friction value between belt and return base and length of horizontal sections.
If the inclination angle exceeds a certain value, the belt will slip on its base downwards towards the lower end. In this case the catenary sag needs to be installed at the lower belt end. This is the case for the majority of the inclined conveyors. It is possible to specifically calculate this critical point for every conveyor design. In most cases it may be sufficient to follow the rules below.

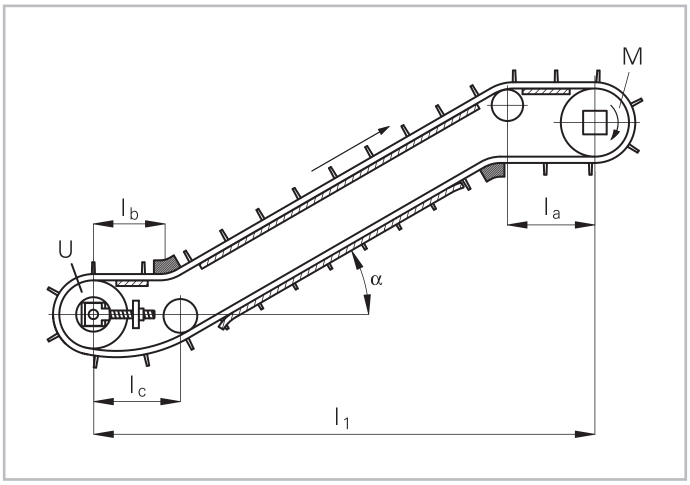
Catenary sag on the lower conveyor end

Condition A: $l_c \geq$ 900 mm (*35")* and $l_a \leq$ 900 mm (*35")*
(must always be fulfilled)

Condition B:

friction value μ_G	< 0.15	0.15 - 0.2	0.2 - 0.3
angle α	>12°	>16°	>20°

In cases where l_c < 900 mm (*35"),* or the above conditions for the inclination α cannot be maintained, no catenary sag on the lower end is recommended. In this case maintain $l_a \geq$ 900 mm (*35")* and place the catenary sag on the upper end.
For all other cases contact the Habasit representative.

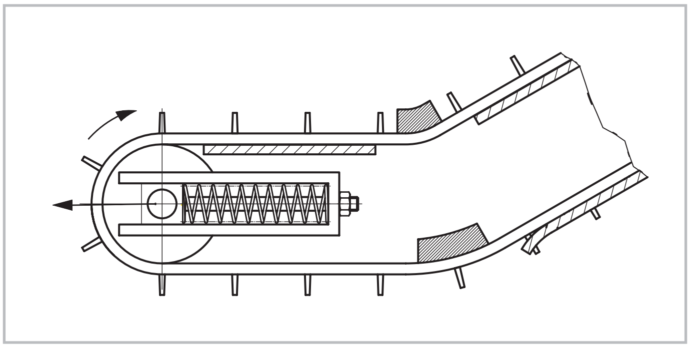


Standard conception: Catenary sag on lower end

Elevators without catenary sag

On Z-conveyors catenary sags may not be accepted, neither on the upper nor on the lower horizontal belt section. This may be due to lack of space under the bottom conveyor end or too short horizontal sections. A tensioning device with fixed adjustment to the belt length as shown on the illustration above is not acceptable, since wear and temperature variations cause the belt length to change. It must be strongly recommended to use a self-adjusting tensioner device. This can be a soft spring type, gas loaded spring or pneumatic tensioner type.
The optimal layout of the spring or pneumatic cylinder is depending on the belt type, conveyor width and temperature conditions. The minimum free movement of the tensioner must be min. 20% more than the calculated belt elongation between lowest and highest process temperature. The belt elongation due to abrasion should also be considered.
The force should be as low as possible, but high enough to overcome eventual friction forces of the belt on its return way, to straighten it and to engage the sprockets safely. As a general rule the following tensioner force is proposed:

Belt type	Tensioner force per m *(ft)* of belt width
for 0.5" and 1" belts	15 kg *(10 lb)*
for 1.5" belts	30 kg *(20 lb)*
for 2" belts	30 kg *(20 lb)*
for 2.5" belts	35 kg *(23 lb)*



Basics
Radius belts create a pressure against the guide in the inner side of the curve. At the same time they tend to lift off from the support on the curve outside. This tendency increases with rising tension, increasing speed and with increasing angle. Therefore the design of radius belts requires special attention to the following rules.

R The minimum inner curve radius **R** is defined by the **collapse factor Q** of a particular radius belt:

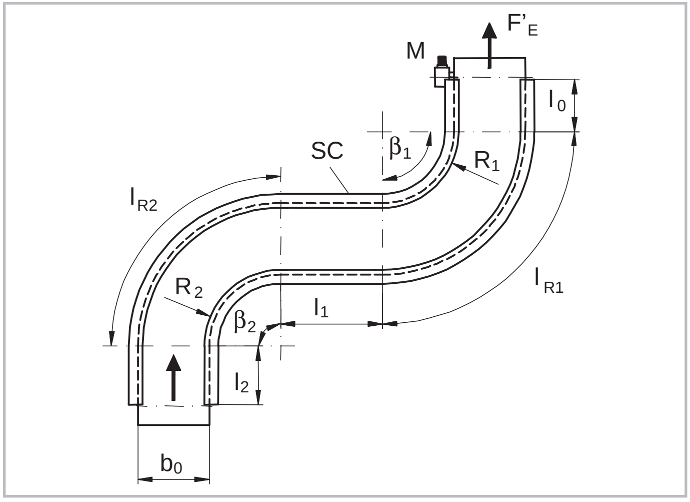
$$R_{min} = Q \cdot b_0$$

Q depends on the belt width, see product data sheet.
For best running conditions it is advisable to design the curves R of the conveyor near to the minimum radius. Bigger radius can lead to undesirable belt vibrations.
Deviations of more than +0.3 of the collapse factor. Never go below the indicated collapse factor.

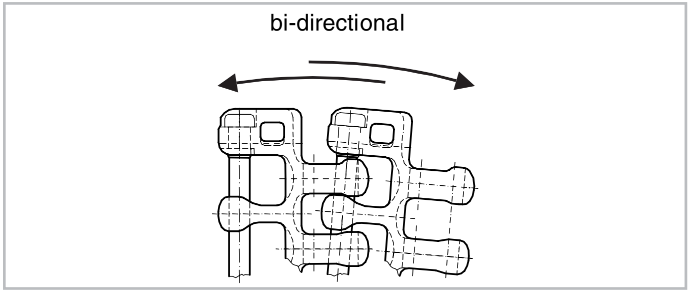
l_0 For proper tensioning of the belt in operation it needs a catenary sag. For this reason the belt section l_0 behind the driving motor must be straight on a length of preferably 1.5 x belt width ($1.5 \cdot b_0$) with a minimum of 1 m *(3 ft.)*. Place the longer straight section behind the driving motor instead near the idling shaft to lower the belt forces in the curves. For different requirements please contact the Habasit representative.

l_1 A minimum straight section of 2 x belt width ($2 \cdot b_0$) is proposed between turns in opposite directions. An absolute minimum straight length of 1.5x belt width is required. No minimum straight length between curves of the same direction.

l_2 At the belt end, near the idling shaft, a minimum straight length of 1.5 x belt width ($1.5 \cdot b_0$) is required.



Direction of movement
Habasit radius belts are bi-directional. For radius belts with one curve and for spirals Habasit recommends to install the belts with the rod heads on the outside of the curve. For further installation instructions please consult the Installation Guidelines.

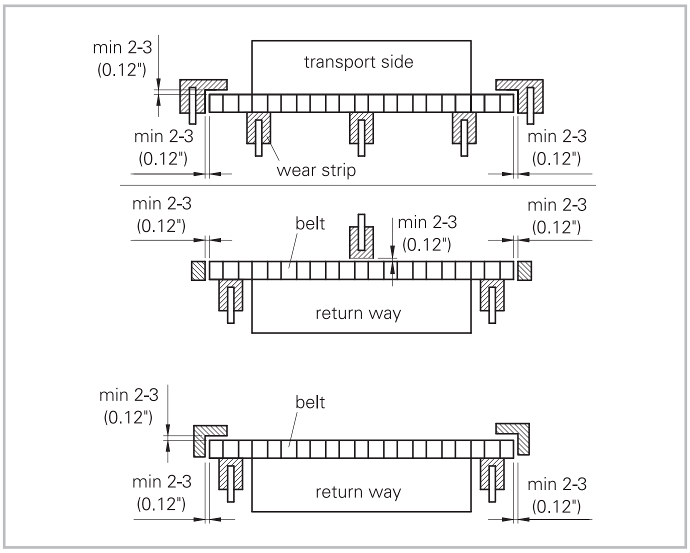


Design Guide
Radius belts

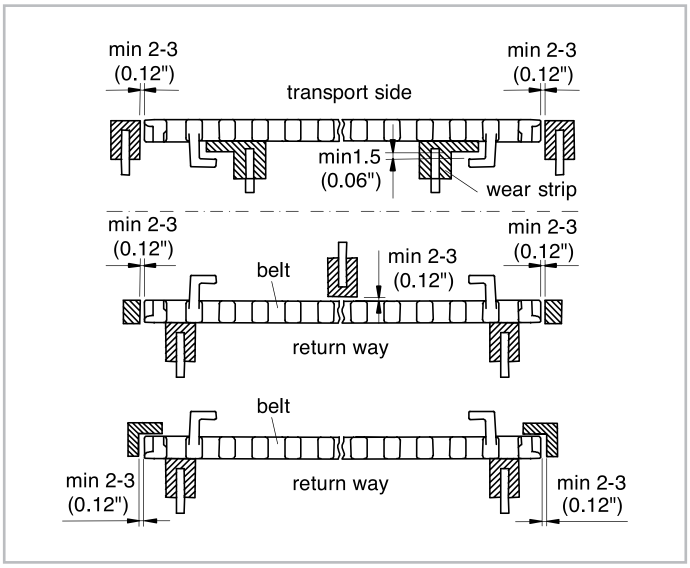
Belt guides and hold-down tabs
Radius belts running around curves are radially pressed against the inner guide rail of the curve. Since the conveyors usually cannot be built at very high geometrical accuracy, the belt may tend to flip over at high loads or angles > 90°. At the inner edge the belt may move upwards while it is radially pressed against the guide rail and slip off.

For this reason hold-down edge guides must be used for the in- and outside guide of a curve. If the product is larger than the belt width or if side transfer over the belt edge is required, hold-down modules or side tabs are used instead of hold-down guides. For availability see also product data sheets.

Standard application (hold-down edge guides)
If no side transfer is required, L-shaped hold-down edge guides can be used. Respect the min. gap between belt and guides. For safety reasons (danger of injuries at end of profile) it is advisable to apply this profile uninterrupted over the complete belt length. The material used for edge guides needs to be low friction in contact with the particular belt material. Generally, UHMW PE is recommended. On the return way, hold-down tabs are needed as well. An economic solution is shown on the illustration beside. For belts wider 600 mm hold-down edge guides or 2 hold-down tabs near the edges should be used.



Hold-down guides for belt with flights. Belts without flights follow the same design.

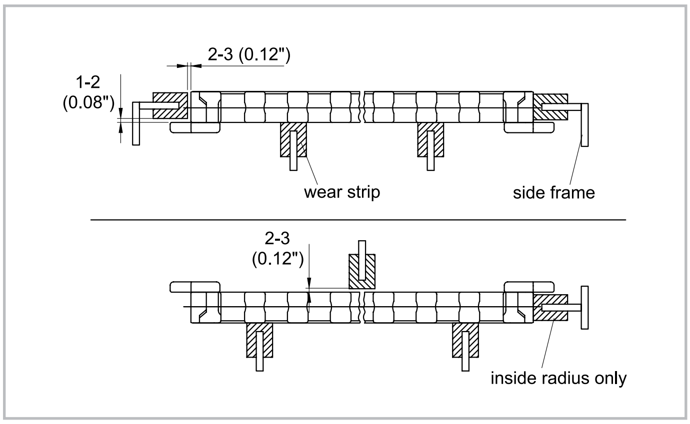


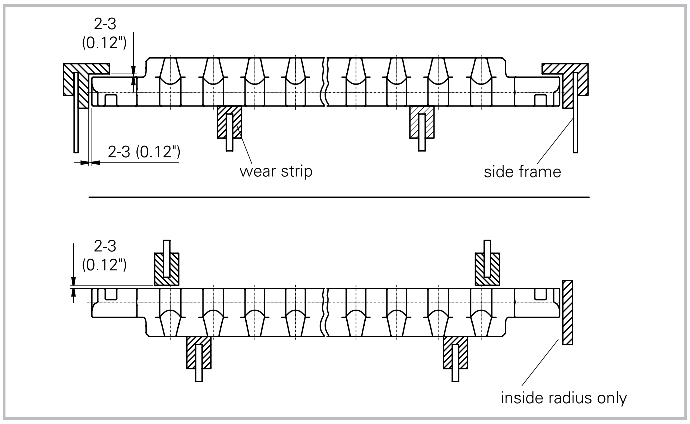
Design Guide
Radius belts

Belts for product side transfer
Belts with hold-down tabs, side tabs or raised deck can be used for all application where products must be moved transversally across the belt edge (side transfer) and in case where the product is wider than the belt itself.
For application with side guards belts with hold-down tabs are conditionally possible (see product data sheet) and belts with side tabs or raised deck are not applicable.

Note
The hold-down or side tabs should not be used for radial guidance or to support (guide) the belt on its return way. They can be worn away too quickly.

High speed applications
For speeds > 40 m/min it is recommended to use prelubricated materials or stainless steel for radius guides. To keep the temperature low, prefer guide material with best possible heat conduction properties (e. g. PA prelubricated or stainless steel).





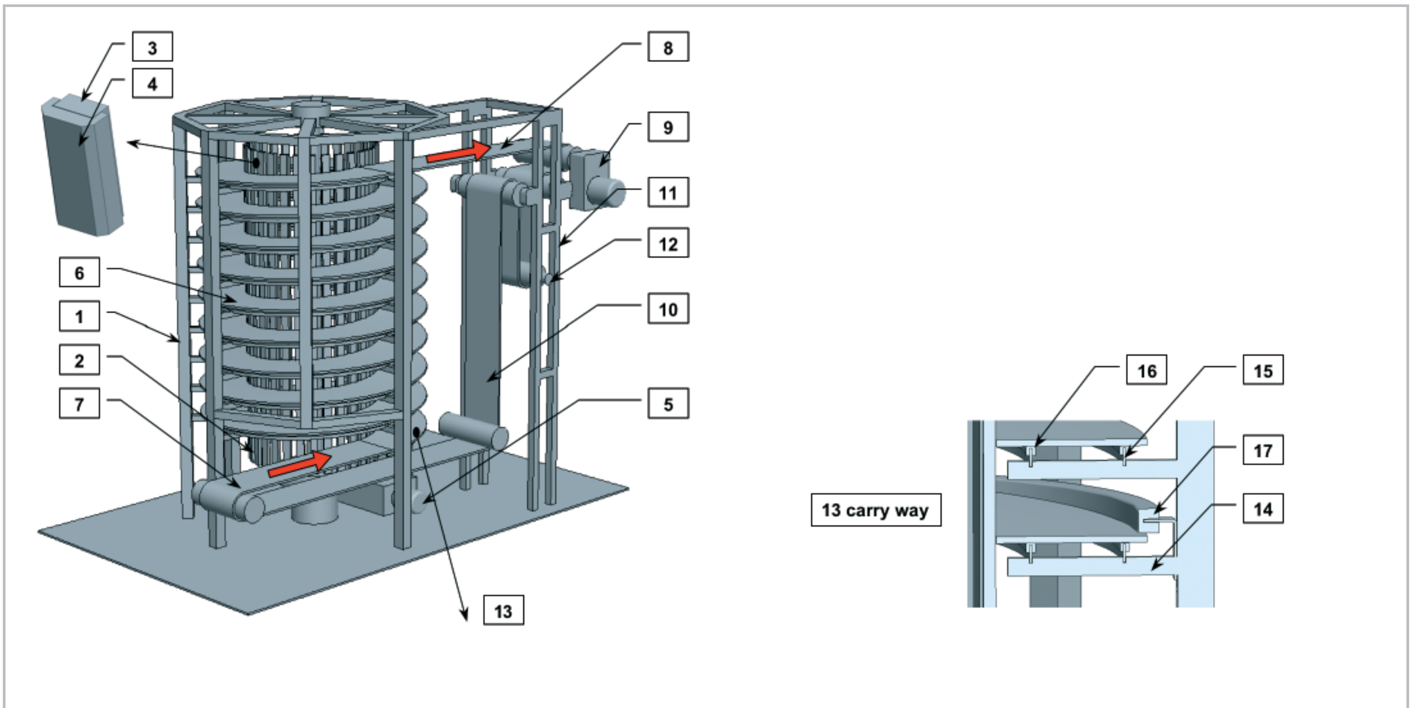
Habasit radius belts are well suitable for the application with spiral conveyors. Most typical processes are proofing, drying, cooling and freezing. The spiral conveyors allow to concentrate the processing within a reduced space and make use of the height of the available building. Spiral conveyors are very specialized equipment and require particular application know-how.

The following illustration and explanations shall provide a general idea about the design principles of spiral conveyors. For design recommendations please contact one of the Habasit spiral specialists.

In the past mainly steel belts have been used for spiral conveyors. Compared to steel, the plastic modular belts offer the following advantages:

- Less sticking of conveyed goods
- Lower belt weight, lighter construction
- Reduced coefficient of friction between belt and cage
- Lower power consumption
- Better cleaning, no blackening
- Less ice formation
- Lower maintenance cost

Side view of a typical spiral conveyor

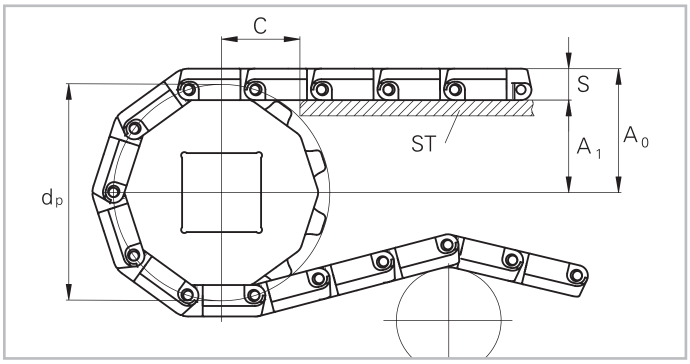


1 Structure assembled with columns and beams
2 Drum or cage
3 Cage bars
4 Cage bar cap
5 Drum drive (or cage drive or primary drive)
6 Radius belt
7 In-run
8 Out-run
9 Belt drive (Take-up drive)
10 Return path
11 Take-up and Take-up tower
12 Dancer roller
13 Carry way
14 Beam
15 Wear strip support
16 Wear strip
17 Hold-down

In an upgoing spiral a narrow light belt tends to flip up – it therefore requires hold-downs over the outer belt edge. It is recommended to install a continuous hold-down guide in the first 1 1⁄2 turns after entering into the spiral and over the last turn before leaving. For heavier and wider belts hold-downs are not necessary.

Design Guide
Sprocket evaluation

Dimensional requirements for installation



Belt pitch, sprocket type	Number of teeth	Polygon effect	Pitch Ø dp		Belt height bottom to pitch	A_1 +1 mm / -0 mm (effective)		A_0 +1 mm / - 0 mm (effective)													
			mm	inch	mm	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
0.3"								M0870/73													
M08S16	16	1.9%	41.4	*1.63*	3.00	17.9	*0.70*	23.7	*0.93*												
M08S24	24	0.9%	61.8	*2.43*	3.00	28.1	*1.11*	33.9	*1.33*												
M08S34	34	0.4%	87.5	*3.44*	3.00	41.0	*1.61*	46.8	*1.84*												
M08S36	36	0.4%	92.6	*3.65*	3.00	43.5	*1.71*	49.3	*1.94*												
0.5"								M1185													
M11S12	12	3.4%	49.8	*1.96*	3.50	21.6	*0.85*	28.4	*1.12*												
M11S14	14	2.5%	58.0	*2.28*	3.50	25.7	*1.01*	32.5	*1.28*												
M11S17	17	1.7%	70.2	*2.76*	3.50	31.8	*1.25*	38.6	*1.52*												
M11S19	19	1.4%	78.4	*3.09*	3.50	35.9	*1.41*	42.7	*1.68*												
M11S24	24	0.9%	98.8	*3.89*	3.50	46.1	*1.81*	52.9	*2.08*												
M11S36	36	0.4%	148.0	*5.83*	3.50	70.7	*2.78*	77.5	*3.05*												
0.5"								M1220 M1230/33		M1220 GT		M1234		M1280							
M12S10	10	4.9%	41.2	*1.62*	4.50	16.3	*0.64*	26.1	*1.03*	28.6	*1.13*	27.6	*1.09*	24.80	*0.98*						
M12S12	12	3.4%	49.6	*1.95*	4.50	20.5	*0.81*	30.3	*1.19*	32.8	*1.29*	31.8	*1.25*	29.00	*1.14*						
M12S15	15	2.2%	62.4	*2.46*	4.50	26.9	*1.06*	36.7	*1.44*	39.2	*1.54*	38.2	*1.50*	35.40	*1.39*						
M12S19	19	1.4%	78.7	*3.10*	4.50	35.1	*1.38*	44.9	*1.77*	47.4	*1.86*	46.4	*1.82*	43.55	*1.71*						
M12S24	24	0.9%	99.2	*3.91*	4.50	45.3	*1.78*	55.1	*2.17*	57.6	*2.27*	56.6	*2.23*	53.80	*2.12*						
M12S28	28	0.6%	116.5	*4.59*	4.50	54.0	*2.12*	63.8	*2.51*	66.3	*2.61*	65.3	*2.57*	62.45	*2.46*						
M12S32	32	0.5%	133.0	*5.24*	4.50	62.2	*2.45*	72.0	*2.83*	74.5	*2.93*	73.5	*2.89*	70.70	*2.78*						
M12S36	36	0.4%	149.8	*5.90*	4.50	70.6	*2.78*	80.4	*3.17*	82.9	*3.26*	81.9	*3.22*	79.10	*3.11*						
1"								M2420 M2470/72 M2480		M2470 GT											
M24S12	12	3.4%	98.9	*3.89*	4.35	45.3	*1.78*	53.8	*2.12*	56.30	*2.22*										
M24S15	15	2.2%	123.1	*4. 85*	4.35	57.4	*2.26*	65.9	*2.59*	68.40	*2.69*										
M24S18	18	1.5%	147.4	*5.80*	4.35	69.6	*2.74*	78.1	*3.07*	80.55	*3.17*										
M24S20	20	1.2%	163.7	*6.44*	4.35	77.7	*3.06*	86.2	*3.39*	88.70	*3.49*										

Belt pitch, sprocket type	Number of teeth	Polygon effect	Pitch Ø dp		Belt height bottom to pitch	A_1 +1 mm / -0 mm (effective)		A_0 +1 mm / - 0 mm (effective)													
			mm	*inch*	mm	mm	*inch*	mm	*inch*	mm	*inch*	mm	*inch*	mm	*inch*	mm	*inch*	mm	*inch*	mm	*inch*
1″								M2510/11 M2516		M2514		M2520 M2533		M2520 RT M2533 RT		M2520/33 GT		M2531		M2527	
M25S07	7	9.9%	59.4	*2.34*	5.00	24.9	*0.98*	35.7	*1.41*	37.7	*1.48*	34.7	*1.37*	38.7	*1.52*	38.7	*1.52*	40.7	*1.60*	39.5	*1.56*
M25S08	8	7.6%	66.7	*2.63*	5.00	28.6	*1.12*	39.4	*1.55*	41.4	*1.63*	38.4	*1.51*	42.4	*1.67*	42.4	*1.67*	44.4	*1.75*	43.2	*1.70*
M25S10	10	4.9%	82.5	*3.25*	5.00	36.5	*1.44*	47.3	*1.86*	49.3	*1.94*	46.3	*1.82*	50.3	*1.98*	50.3	*1.98*	52.3	*2.06*	51.1	*2.01*
M25S12	12	3.4%	98.5	*3.88*	5.00	44.5	*1.75*	55.3	*2.18*	57.3	*2.25*	54.3	*2.14*	58.3	*2.29*	58.3	*2.29*	60.3	*2.37*	59.1	*2.32*
M25S15	15	2.2%	122.7	*4.83*	5.00	56.6	*2.23*	67.4	*2.65*	69.4	*2.73*	66.4	*2.61*	70.4	*2.77*	70.4	*2.77*	72.4	*2.85*	71.2	*2.80*
M25S16	16	1.9%	130.7	*5.15*	5.00	60.6	*2.38*	71.4	*2.81*	73.4	*2.89*	70.4	*2.77*	74.4	*2.93*	74.4	*2.93*	76.4	*3.01*	75.2	*2.96*
M25S18	18	1.5%	146.9	*5.78*	5.00	68.7	*2.70*	79.5	*3.13*	81.5	*3.21*	78.5	*3.09*	82.5	*3.25*	82.5	*3.25*	84.5	*3.32*	83.3	*3.28*
M25S20	20	1.2%	163.0	*6.42*	5.00	76.7	*3.02*	87.5	*3.44*	89.5	*3.52*	86.5	*3.41*	90.5	*3.56*	90.5	*3.56*	92.5	*3.64*	91.3	*3.59*
M25S21	21	1.1%	171.1	*6.74*	5.00	80.8	*3.18*	91.6	*3.60*	93.6	*3.68*	90.6	*3.56*	94.6	*3.72*	94.6	*3.72*	96.6	*3.80*	95.4	*3.75*
1″ ST								M2520 ST M2533 ST													
M25S10	10	4.9%	83.6	*3.29*	5.00	37.0	*1.46*	46.8	*1.84*												
M25S12	12	3.4%	99.8	*3.93*	5.00	45.1	*1.78*	54.9	*2.16*												
M25S18	18	1.5%	148.8	*5.86*	5.00	69.6	*2.74*	79.4	*3.13*												
M25S20	20	1.2%	165.1	*6.50*	5.00	77.8	*3.06*	87.6	*3.45*												
1″ radius								M2540		M2540 RT		M2540 GT		M2543							
M25S07	7	9.9%	59.4	*2.34*	5.00	24.9	*0.98*	35.7	*1.41*	37.5	*1.48*	40.5	*1.59*	37.4	*1.47*						
M25S08	8	7.6%	66.7	*2.63*	5.00	28.6	*1.12*	41.2	*1.55*	41.3	*1.62*	44.2	*1.74*	41.1	*1.62*						
M25S10	10	4.9%	82.5	*3.25*	5.00	36.5	*1.44*	47.3	*1.86*	49.1	*1.93*	52.1	*2.05*	49.0	*1.93*						
M25S12	12	3.4%	98.6	*3.88*	5.00	44.5	*1.75*	55.3	*2.18*	57.1	*2.25*	60.1	*2.37*	57.0	*2.24*						
M25S15	15	2.2%	122.7	*4.83*	5.00	56.6	*2.23*	67.4	*2.65*	69.2	*2.72*	72.2	*2.84*	69.1	*2.72*						
M25S16	16	1.9%	130.8	*5.15*	5.00	60.6	*2.39*	71.4	*2.81*	73.2	*2.88*	76.2	*3.00*	73.1	*2.88*						
M25S18	18	1.5%	146.9	*5.78*	5.00	68.7	*2.70*	79.5	*3.13*	81.3	*3.20*	84.3	*3.32*	81.2	*3.19*						
M25S20	20	1.2%	163.0	*6.42*	5.00	76.7	*3.02*	87.5	*3.44*	89.3	*3.52*	92.3	*3.63*	89.2	*3.51*						
M25S21	21	1.1%	171.1	*6.74*	5.00	80.8	*3.18*	91.6	*3.60*	93.4	*3.68*	96.4	*3.79*	93.3	*3.67*						
1″								M2585-PO M2585-SO		M2586											
M25S07-C2	7	9.9%	59.6	*2.35*	5.50	24.5	*0.96*	35.3	*1.39*	41.3	*1.63*										
M25S08-C2	8	7.6%	67.7	*2.67*	5.50	28.6	*1.12*	39.4	*1.55*	45.4	*1.79*										
M25S10-C2	10	4.9%	83.8	*3.30*	5.50	36.6	*1.44*	47.4	*1.87*	53.4	*2.10*										
M25S12-C2	12	3.4%	100.0	*3.94*	5.50	44.7	*1.76*	55.5	*2.19*	61.5	*2.42*										
M25S15-C2	15	2.2%	124.5	*4.90*	5.50	57.0	*2.24*	67.8	*2.67*	73.8	*2.90*										
M25S16-C2	16	1.9%	132.8	*5.23*	5.50	61.1	*2.41*	71.9	*2.83*	77.9	*3.07*										
M25S18-C2	18	1.5%	149.1	*5.87*	5.50	69.3	*2.73*	80.1	*3.15*	86.1	*3.39*										
M25S20-C2	20	1.2%	165.5	*6.52*	5.50	77.5	*3.05*	88.3	*3.47*	94.3	*3.71*										
M25S21-C2	21	1.1%	173.7	*6.84*	5.50	81.6	*3.21*	92.4	*3.64*	98.4	*3.87*										
1″								M2620/70		M2620 GT		M2670 GT		M2620 RT		M2623					
M26S12	12	3.4%	99.1	*3.90*	6.35	43.4	*1.71*	55.9	*2.20*	58.4	*2.30*	59.9	*2.36*	70.4	*2.77*	57.1	*2.25*				
M26S13	13	2.9%	107.2	*4.22*	6.35	47.5	*1.87*	60.0	*2.36*	62.5	*2.46*	64.0	*2.52*	74.5	*2.93*	61.2	*2.41*				
M26S14	14	2.5%	115.3	*4.54*	6.35	51.5	*2.03*	64.0	*2.52*	66.5	*2.62*	68.0	*2.68*	78.5	*3.09*	65.2	*2.57*				
M26S15	15	2.2%	123.4	*4.86*	6.35	55.6	*2.19*	68.1	*2.68*	70.6	*2.78*	72.1	*2.84*	82.6	*3.25*	69.3	*2.73*				
M26S16	16	1.9%	131.5	*5.18*	6.35	59.6	*2.34*	72.1	*2.84*	74.6	*2.94*	76.1	*3.00*	86.6	*3.41*	73.3	*2.89*				
M26S17	17	1.7%	139.6	*5.50*	6.35	63.7	*2.50*	76.2	*3.00*	78.7	*3.10*	80.2	*3.16*	90.7	*3.57*	77.4	*3.05*				
M26S18	18	1.5%	147.7	*5.81*	6.35	67.7	*2.66*	80.2	*3.16*	82.7	*3.26*	84.2	*3.31*	94.7	*3.73*	81.4	*3.20*				
M26S19	19	1.4%	155.8	*6.13*	6.35	71.8	*2.82*	84.3	*3.32*	86.8	*3.42*	88.3	*3.47*	98.8	*3.89*	85.5	*3.36*				
M26S20	20	1.2%	164.0	*6.46*	6.35	75.9	*2.98*	88.4	*3.48*	90.9	*3.58*	92.4	*3.64*	102.9	*4.05*	89.6	*3.53*				
M26S21	21	1.1%	172.1	*6.78*	6.35	79.9	*3.14*	92.4	*3.64*	94.9	*3.74*	96.4	*3.80*	106.9	*4.21*	93.6	*3.69*				
M26S22	22	1.0%	180.2	*7.09*	6.35	84.0	*3.30*	96.5	*3.80*	99.0	*3.90*	100.5	*3.95*	111.0	*4.37*	97.7	*3.84*				
M26S23	23	0.9%	188.4	*7.42*	6.35	88.1	*3.46*	100.6	3.96	103.1	*4.06*	104.6	*4.12*	115.1	*4.53*	101.8	*4.01*				

Design Guide
Sprocket evaluation

Belt pitch, sprocket type	Number of teeth	Polygon effect	Pitch Ø dp		Belt height bot-tom to pitch	A_1 +1 mm / -0 mm (effective)		A_0 +1 mm / - 0 mm (effective)													
			mm	inch	mm	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
1.5″ radius								M3840/43		M3840 RT		M3843 GT		M3892							
M38S08	8	7.6%	100.5	*3.96*	8.50	42.0	*1.65*	59.8	*2.35*	62.3	*2.45*	64.8	*2.55*	71.8	*2.82*						
M38S12	12	3.4%	149.0	*5.87*	8.50	66.2	*2.61*	84.0	*3.31*	86.5	*3.41*	89.0	*3.50*	96.0	*3.78*						
M38S16	16	1.9%	196.0	*7.72*	8.50	89.7	*3.53*	107.5	*4.23*	110.0	*4.33*	112.5	*4.43*	119.5	*4.70*						
2″								M5010/11/15 M5020/21 M5032/33 M5060/62/65		M5023		M5013/14 M5015 GT M5067		M5010 RT M5032/33 RT		M5032 RT 0 – 90°		M5064			
M50S06	6	13.4%	102.1	*4.02*	8.00	43.3	*1.70*	59.1	*2.32*	60.3	*2.37*	62.1	*2.44*	62.6	*2.46*	75.1	*2.95*	61.6	*2.42*		
M50S08	8	7.6%	133.4	*5.25*	8.00	58.9	*2.32*	74.7	*2.94*	75.9	*2.99*	77.7	*3.06*	78.2	*3.08*	90.7	*3.57*	77.2	*3.04*		
M50S10	10	4.9%	165.2	*6.50*	8.00	74.8	*2.94*	90.6	*3.57*	91.8	*3.61*	93.6	*3.69*	94.1	*3.70*	106.6	*4.20*	93.1	*3.67*		
M50S12	12	3.4%	197.2	*7.76*	8.00	90.8	*3.57*	106.6	*4.20*	107.8	*4.24*	109.6	*4.31*	110.1	*4.33*	122.6	*4.83*	109.1	*4.30*		
M50S16	16	1.9%	261.5	*10.30*	8.00	123.0	*4.84*	138.7	*5.46*	140.0	*5.51*	141.8	*5.58*	142.3	*5.60*	154.8	*6.09*	141.3	*5.56*		
2″								M5131 M5182 RT													
M51S10	10	4.9%	165.2	*6.50*	8.00	74.8	*2.94*	98.6	*3.88*												
M51S12	12	3.4%	197.2	*7.76*	8.00	90.8	*3.57*	114.6	*4.51*												
M51S13	13	2.9%	213.2	*8.39*	8.00	98.8	*3.89*	122.6	*4.83*												
M51S16	16	1.9%	261.5	*10.30*	8.00	123.0	*4.84*	146.8	*5.78*												
2″								M5290/93													
M52S08	8	7.6%	133.4	*5.25*	8.00	58.9	*2.32*	74.7	*2.94*												
M52S09	9	6.2%	149.2	*5.87*	8.00	66.8	*2.63*	82.6	*3.25*												
M52S10	10	4.9%	165.1	*6.50*	8.00	74.8	*2.94*	90.6	*3.56*												
M52S12	12	3.4%	197.2	*7.76*	8.00	90.8	*3.57*	106.6	*4.20*												
2.5″								M6360													
M63S06	6	13.4%	127.0	*5.00*	9.50	54.2	*2.13*	73.0	*2.87*												
M63S08	8	7.6%	165.9	*6.53*	9.50	73.7	*2.90*	92.5	*3.64*												
M63S10	10	4.9%	205.5	*8.09*	9.50	93.5	*3.68*	112.3	*4.42*												
M63S13	13	2.9%	265.3	*10.44*	9.50	123.4	*4.86*	142.2	*5.60*												
2.5″								M6420		M6423/24		M6425									
M64S10	10	4.9%	206.4	*8.13*	13.00	90.4	*3.56*	116.2	*4.57*	117.4	*4.62*	123.7	*4.87*								
M64S12	12	3.4%	246.4	*9.70*	13.00	110.4	*4.35*	136.2	*5.36*	137.4	*5.41*	143.7	*5.66*								
M64S13	13	2.9%	266.4	*10.49*	13.00	120.4	*4.74*	146.2	*5.76*	147.4	*5.80*	153.7	*6.05*								
M64S15	15	2.2%	306.7	*12.07*	13.00	140.6	*5.53*	166.4	*6.55*	167.6	*6.60*	173.9	*6.84*								
M64S20	20	1.2%	407.6	*16.05*	13.00	191.0	*7.52*	216.8	*8.54*	218.0	*8.58*	224.3	*8.83*								

For other sprocket sizes and appropriate dimensions please contact a Habasit representative.

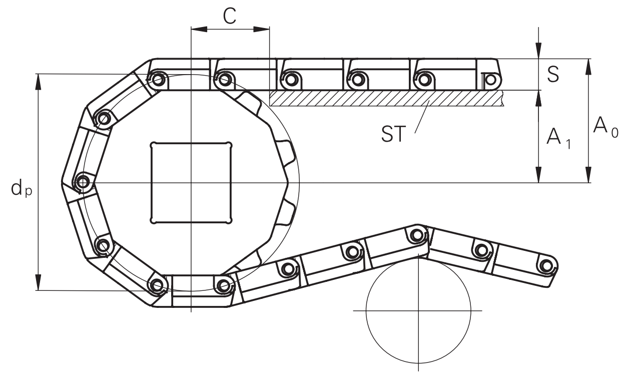
Design Guide
Sprocket evaluation

Design recommendations

The correct adjustment of the belt support or shaft placement (dimension A_1) is important. Excessive noise, increased sprocket wear and engagement problems may result if the recommendations are not followed.

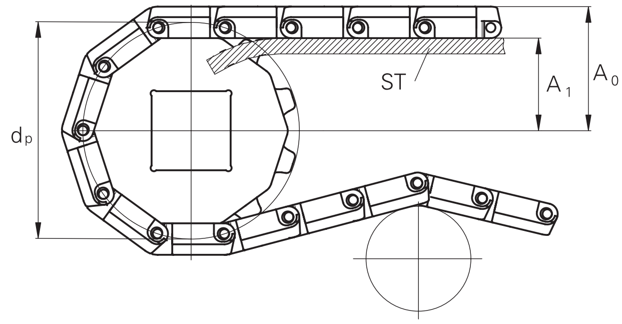
Standard solution

Straight support guides are low cost and simple to produce.
The distance C between belt support and wear strip allows the respective link row to adapt its position to the up and down moving sprocket circumference (polygon effect). Take care that guides do not touch the sprockets. For the dimension of C see sprocket data sheets.



Optional

For smoother belt run and best load support and transmission at belt end it is recommended to bend the wear strips as shown. Take care that guides do not touch the sprockets.



Minimum standard sprocket size

for belts equipped with hold down tabs or hold down devices

	Min. number of teeth	Max. square bore		Max. round bore	
		mm	*inch*	mm	*inch*
Series with hold down tabs (H,T, ActivXchange)					
M1200	15	25	*1*	25	*1 3/16*
M2400	12	40	*1.5*	30	*1*
M2500	10	-	*1*	30	*1 3/16*
M2500	12	40	*1.5*	40	*1 3/16*
M2600	12	40	*1.5*	40	*1.5*
M3800 side tabs only	10	40	*1.5*	-	-
M3800	12	60	*2.5*	-	-
Series with hold down devices (V-modules)					
M2500	12	40	*1.5*	40	*1 3/16*
M5000	8	40	*1.5*	-	-
M5000	10	60	*2.5*	-	-

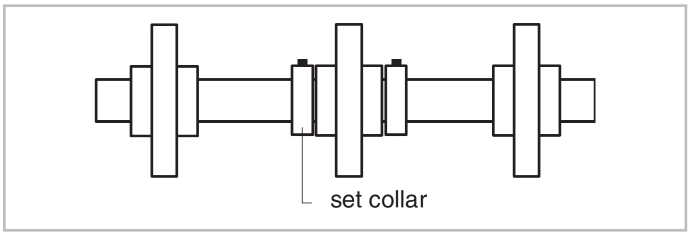
Design Guide
Sprocket evaluation

Sprocket installation, general
(see also product data sheets)
In order to allow the belt to expand/contract, only the center sprocket on each shaft is fixed. For shafts with 2 sprockets, the sprocket on the drive side is fixed. Various locking methods are possible:

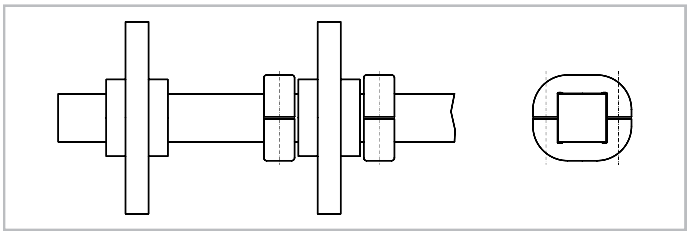
- Set screws and set collars
  Mainly used with round shafts on keyways
- Retainer rings
  For square shafts (no keyways needed)
- Retaining plate
  Simple low cost method for square shafts

There should be a gap of 0.3 mm *(0.01")* between sprocket hub and retaining device. All devices must be securely fastened.

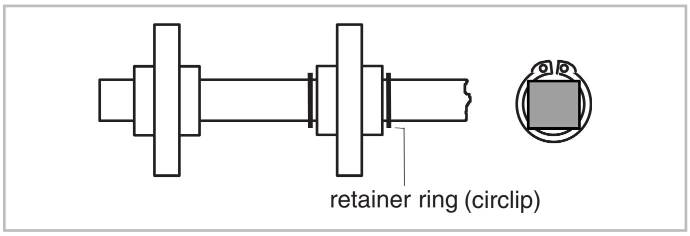
Tracking of
M5010, M5011, M5013, M5014, M5060, M5064
The molded standard sprockets are tracking the belt leaving some transversal clearance to the belt (approx. ± 2.5 mm *(0.10")*). This is of advantage in food applications with very critical cleaning requirements, e. g. in the meat industry. For other applications it might be desirable to reduce this clearance in order to provide accurate tracking performance. The most common way to do this is to use a pair of center sprockets instead of one only. These two sprockets are both located on the shaft at a fixed distance by one center fixing plate. The width of this plate is 20 mm (0.79") for M5010, M5011, M5013, M5014 and 14 mm (0.55") for M5060, M5064



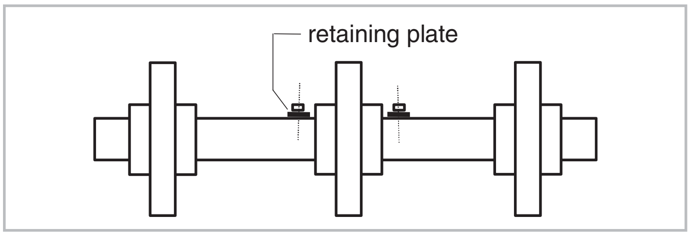
Type: Set screws and set collars



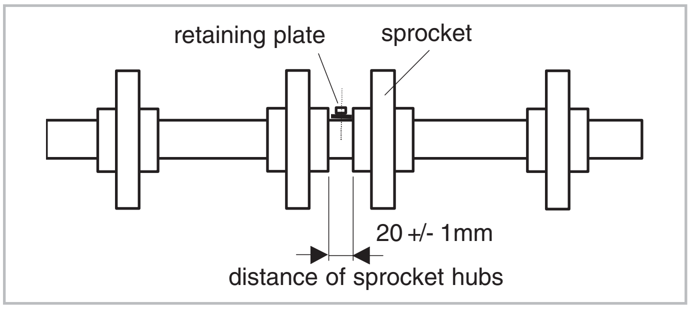
Type: Retainer rings



Type: Retainer rings



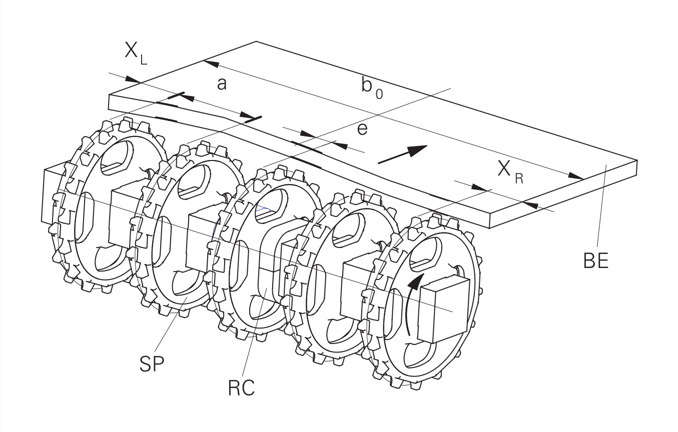
Type: Retaining plate



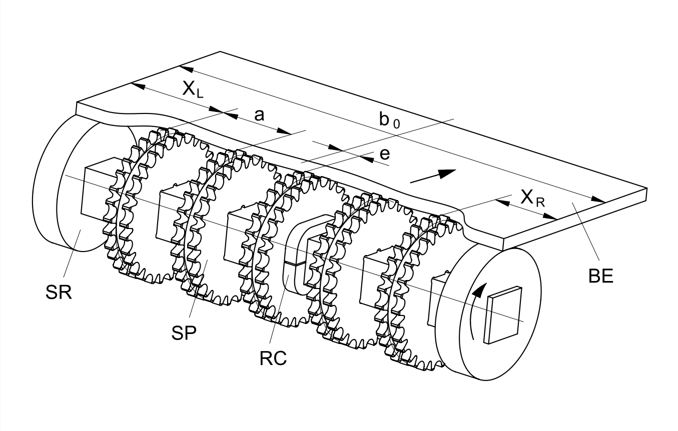
Design Guide
Sprocket evaluation

Positioning and spacing of sprockets
The number of sprockets (n), spacing and positioning must be evaluated from the respective table of the product data sheet.

The center tracking sprocket has to be installed either in the middle of the belt or offset.



Support rollers
For the belts M1185 and M2585 additional support rollers have to be installed on all shafts to support the belt on the edges.

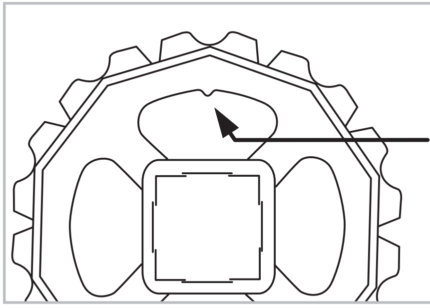


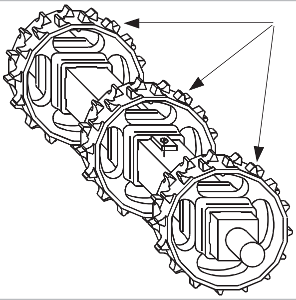
Topside drive for spirals
In exceptional cases some applications, for example spirals, may require to drive the belt by engaging the sprockets from the top side of the belt instead of the bottom side. In this case specially adapted sprockets are needed. Such sprockets are available for M2540, M2544, M3840, M3843, M5290 and M5293.

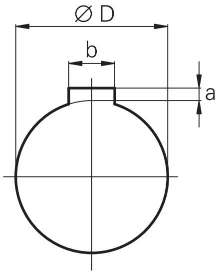
For specific information please contact Habasit.

Design Guide
Sprocket evaluation

Sprocket alignment on the shafts
During installation of the sprockets on the shafts it is important to make sure that the teeth of all sprockets are correctly aligned. For this purpose the sprockets normally feature an alignment mark. If the number of sprocket teeth is a multiple of 4, every radial orientation of the sprocket on the shaft is possible. Therefore some sprockets do not feature alignment marks.







Keyways for round shafts
The keyways on sprockets fit to following shaft key ways:

metric												
øD	mm	20	25	30	35	40	50	60	70	80	90		
a	mm	2.8	3.3	3.3	3.3	3.3	3.8	4.4	4.9	5.4	5.4		
b	mm	6	8	8	10	12	14	18	20	22	25		

According to DIN 6885 Tolerance for a: 0 / -0.2

imperial													
øD	inch	¾	1	1 3/16	1 ¼	1 7/16	1 ½	2	2 ½	2 ¾	3 ¼	3 ½	4 ½
a	inch	0.098	0.130	0.130	0.130	0.193	0.193	0.256	0.319	0.319	0.370	0.429	0.488
b	inch	3/16	¼	¼	¼	3/8	3/8	½	5/8	5/8	¾	7/8	1

According to ANSI B17.1 Tolerance for a: 0 / -0.001

Shaft tolerances
The dimensional tolerance of round and square shaft shapes is according to ISO 286-2 h12.

Design Guide
Slider support systems

Various design versions are possible. The following are commonly used:

A The parallel wear strip arrangement. This is the most economic method. For lower belt wear, the parallel wear strip segments may be arranged alternating offset instead of in-line or as serpentine strip. For number of wear strips refer to the product data sheets.

B The V-shaped arrangement of wear strips (chevron or herringbone type). This provides equal distribution of load and wear over the total belt width. The max. distances between the wear strips have to be 100 mm *(4")* for 2" belts and 50 mm *(2")* for 1" / 0.5" belts. Max. angle β = 45°.

The supports consist of strips made from high density polyethylene, other suitable low wearing plastics or metal, see also material data page 24.

For **proposed number of wear strips see product data sheets**. For both versions A and B it is important to allow for thermal expansion or contraction of the strips. Formula to calculate the necessary clearance d:

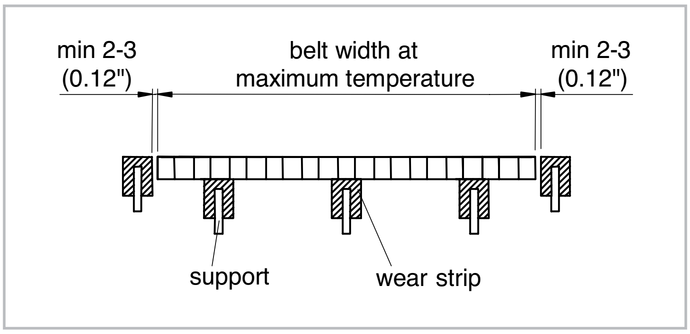
$d > \Delta l = l/1000 \cdot \alpha \cdot (T - 20\ °C)$ [mm]

l = length at installation temperature (20 °C) [mm]
T = max. operation temperature [°C]

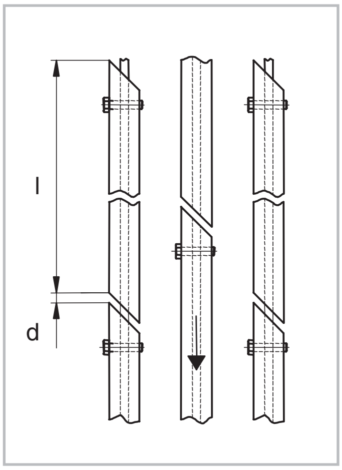
Material	Coeff. of linear thermal expansion α [mm/m · °C]	
	-73 – 30 °C -100 – 86 °F	31 – 100 °C 87 – 210 °F
UHMW PE, HDPE	0.14	0.20
PA6, PA6.6	0.12	0.12
PA6.6 prelubricated	0.06	0.06
Steel	0.01	0.01

For radius belts refer to page 48.

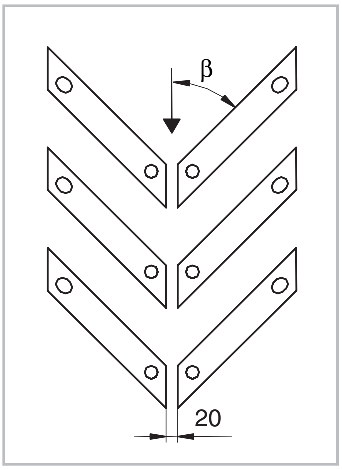
For straight running belts:



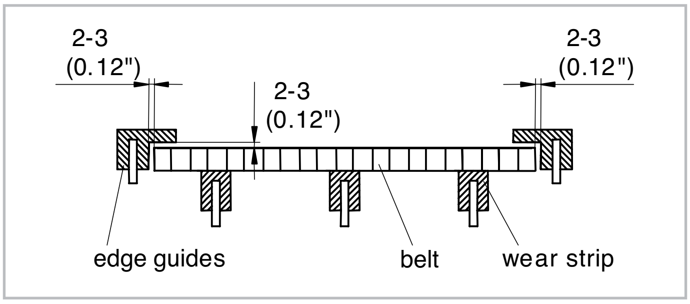
version A



version B



For radius belts:



Design Guide
Slider support systems

Wear strips and guiding profiles
Habasit offers various wear strips made of high molecular weight polyethylene (UHMW PE or HDPE and pre-lubricated UHMW PE). This material provides low friction between belt and support.
The conveyor design including support structure for the guiding profiles must be stiff enough to resist the specific conveying load.

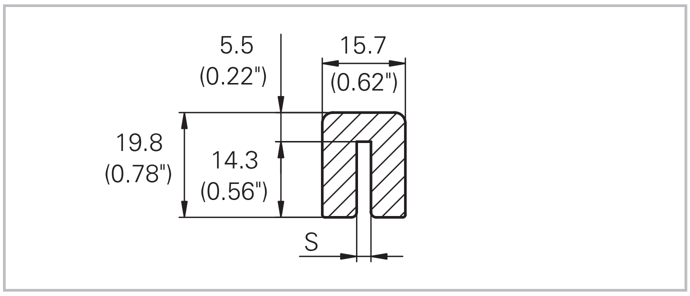
Ask for separate HabiPLAST® brochure.
For highly abrasive conditions, stainless steel, POM, Nylon PA6 or pre-lubricated compounds are recommended.

High speed applications: For speeds > 40 m/min it is recommended to use prelubricated materials or stainless steel (particularly important for radius belts).
To keep the temperature low, prefer guide material which combines low friction with best possible heat conduction properties.

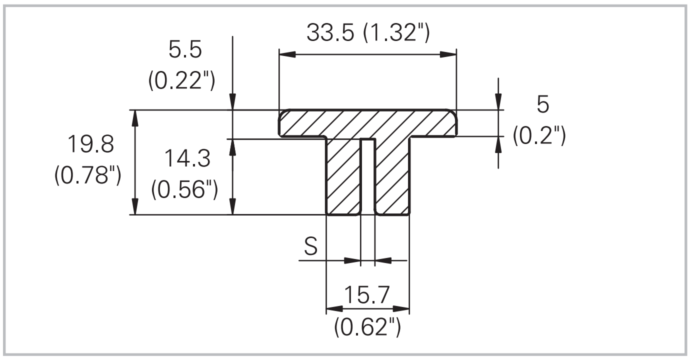
Recommended materials:
For POM belts:
PA prelubricated or stainless steel

For PP belts:
POM or PA prelubricated

The **U-shaped profiles** (MB 01) are commonly used as wear strips for slider supports, fitted onto a simple metal strip of 2.2 mm *(0.09")* to 5 mm *(0.2")* thickness. The type MB 01T offers a wider support area.

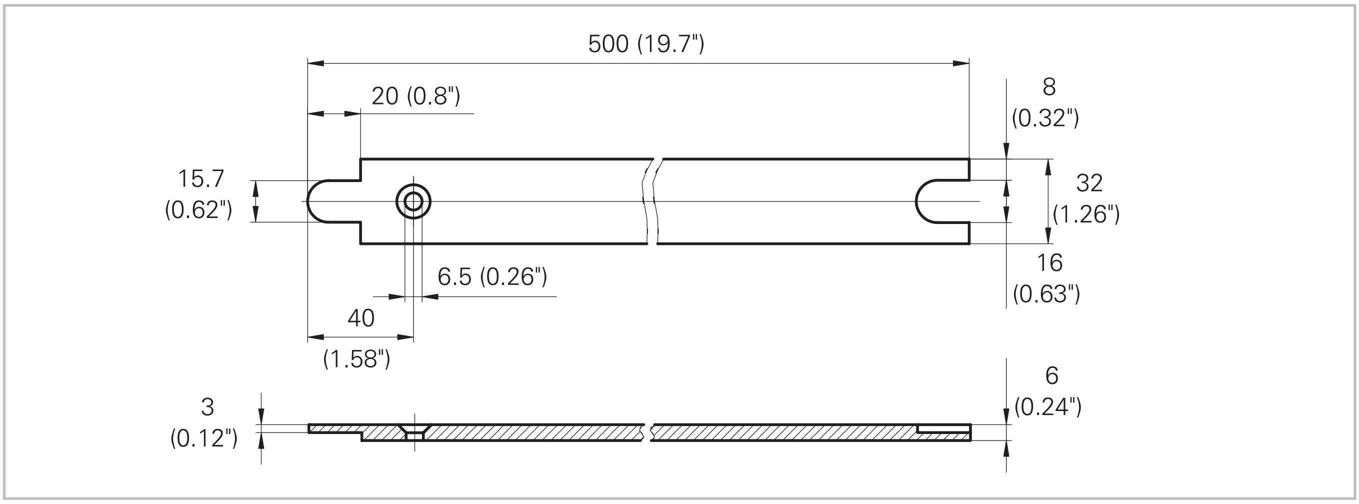


MB 01 type



MB 01T type

WS 01 Wear strip Kit

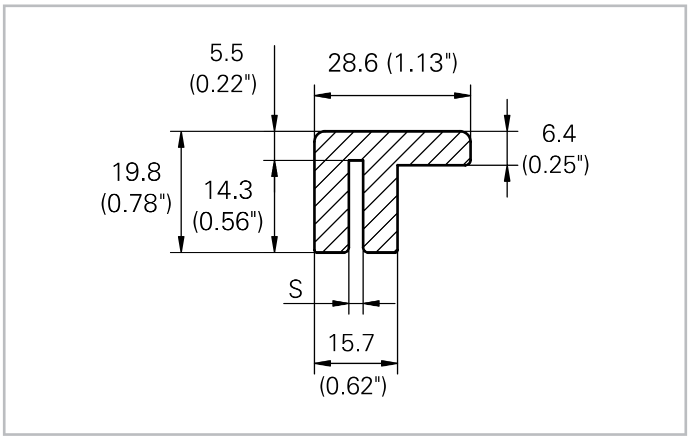


WS 01 Kit (supplied with DIN963 – M6x30 screws and screw nuts)

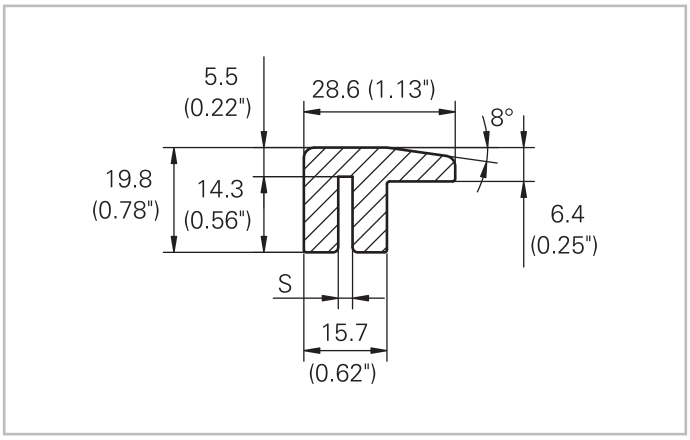
Design Guide
Slider support systems

The **L-shaped guides** (MB 02) are mainly used as hold-down guides for radius belts. See also Design Guide Radius Belt (see page 47).
The type MB 02 is suitable for the 1" radius belt, the MB 02U is larger to fit the thicker 1.5" radius belt.
Special dimensions are possible on request, please ask your Habasit representative.

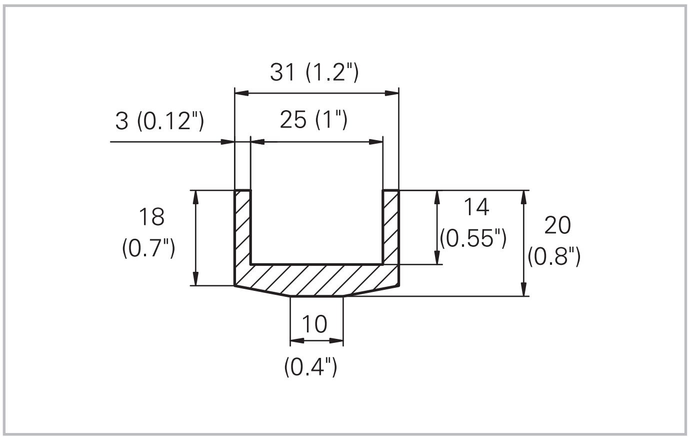
Type	S	
	mm	*inch*
MB 01-X	2.2	*0.09*
MB 01-A	2.7	*0.11*
MB 01-B	3.2	*0.13*
MB 01-C	4.5	*0.18*
MB 01-D	5.2	*0.20*
MB 01T-X	2.2	*0.09*
MB 01T-A	2.7	*0.11*
MB 01T-B	3.2	*0.13*
MB 01T-C	4.5	*0.18*
MB 02-X	2.2	*0.09*
MB 02-A	2.7	*0.11*
MB 02-B	3.2	*0.13*
MB 02-C	4.5	*0.18*
MB 02-D	5.2	*0.20*
MB 02S-X	2.2	*0.09*
MB 02S-A	2.7	*0.11*
MB 02S-B	3.2	*0.13*
MB 02S-C	4.5	*0.18*
MB 02S-D	5.2	*0.20*
MB 02U-X	2.2	*0.09*
MB 02U-A	2.7	*0.11*
MB 02U-B	3.2	*0.13*
MB-02U-C	4.5	*0.18*



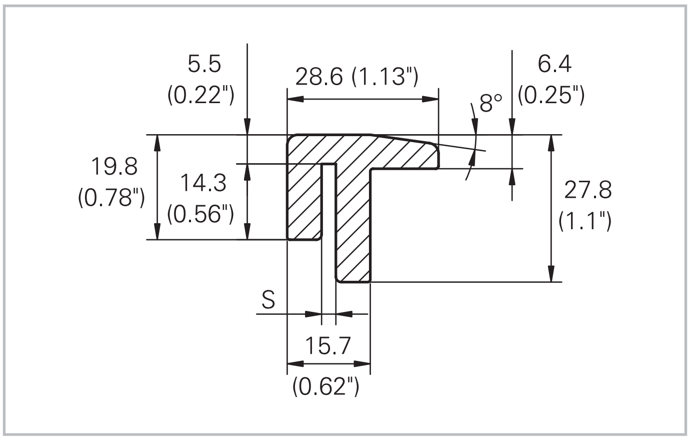
MB 02 type



MB 02S type

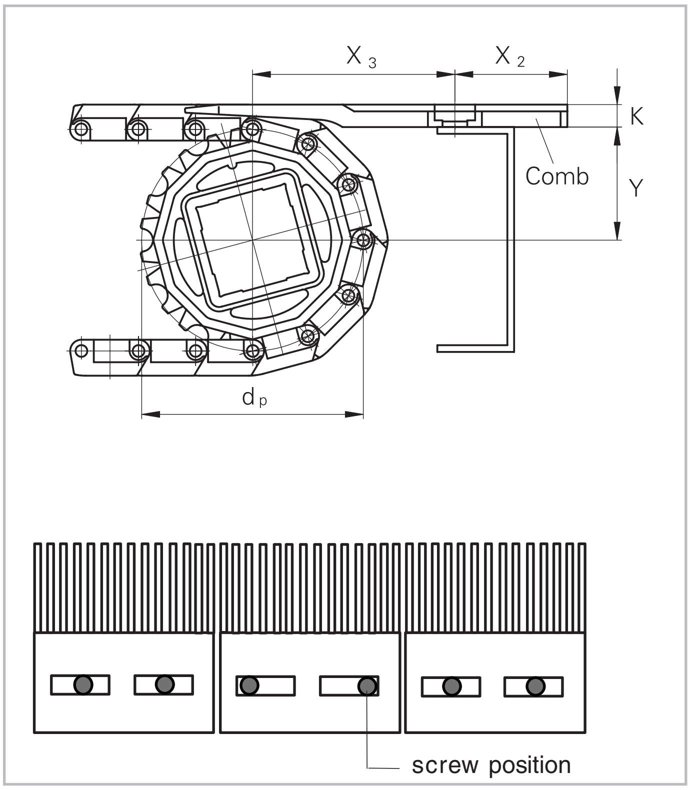


SP2 cage bars for spiral applications

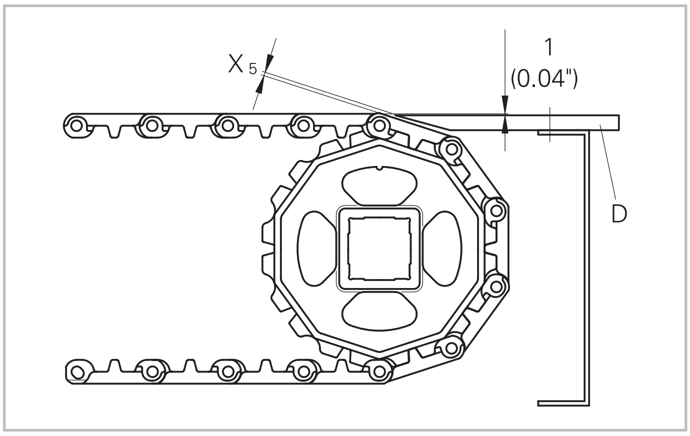


MB 02U type

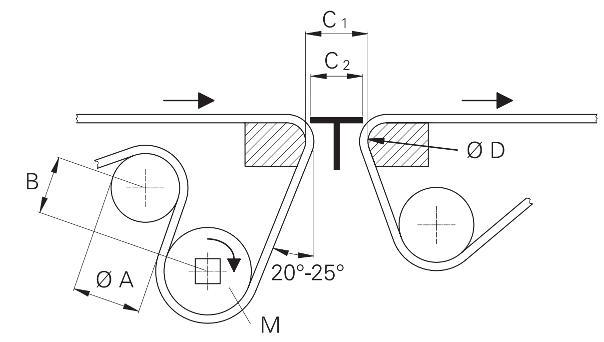
Comb (finger plate) installation
Main dimensions and instructions for combs see product data sheet. The plates contain slots. Special bushings and screws are delivered with the plates; they allow free lateral movement for compensation of thermal expansion or contraction of the belt. For belt widths up to 300 mm *(12")*, the plates can be firmly fixed.



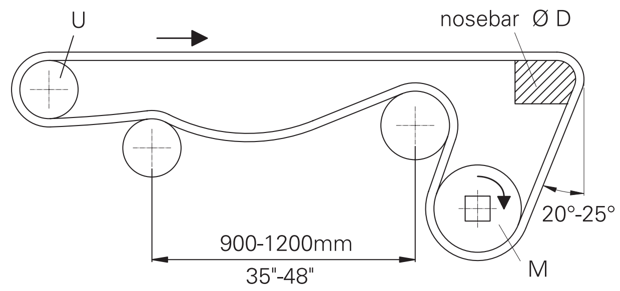
Dead plates for product transfer
Dead plates D are used for product transfer at the conveyor ends of Flat Top and Flush Grid belts.
The discharge end should be adjusted to 1 mm *(0.04")* below the belt surface and the infeed end 1 mm *(0.04")* above the belt surface. The gap (X_5) varies during belt movement, but should be as small as possible when the belt hinge passes the edge of the plate.

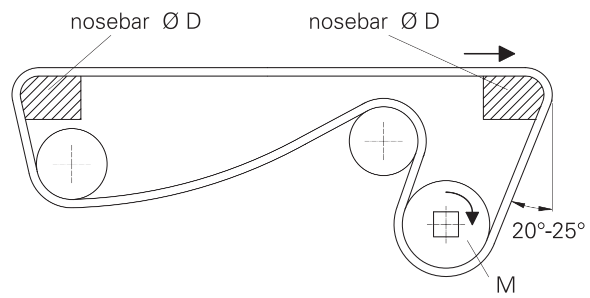


Nosebar transfer for micropitch and minipitch belts
The micropitch belt (Series M0800) and the minipitch belts (Series M1100 and M1200) are perfectly suitable for dynamic or static nosebars.
This allows a smooth and gentle transfer of the product with short sliding distance to the following belt or table.
For certain transfer conditions a minimum diameter is possible. In this case the smoothness of the transfer may be reduced to some extent.
Please respect the correct geometric dimensions of rollers and transfer components.



Series	M0800	M1100	M1200
	mm *inch*	mm *inch*	mm *inch*
Minimal backbending roller diameter A	50 *2*	75 *3*	75 *3*
Minimal straight belt section B between drive and snub roller	50 *2*	50 *2*	50 *2*
Distance C1 between nosebars	16 *0.63*	22 *0.9*	30 *1.2*
Distance C2 Max. width of transport plate	–	16 *0.6*	25 *1*
Recommended nosebar diameter D	7 *0.12*	12.7 *0.5*	18 *0.71*
Minimal nosebar diameter Dmin	7 *0.12*	12.7 *0.5*	16 *0.63*

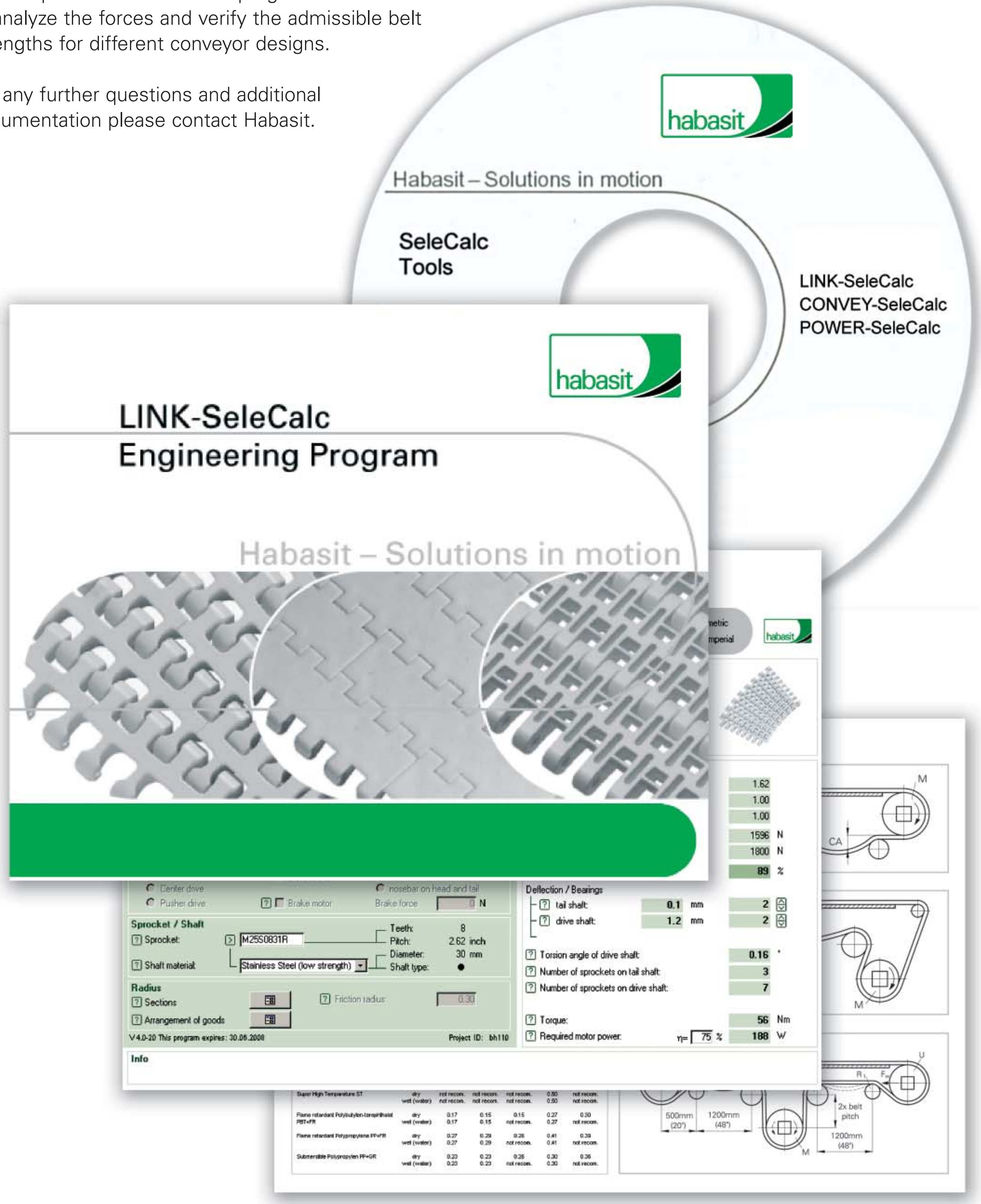




Calculation Guide
Habasit support

Habasit support for design and calculation
Habasit provides a calculation program **LINK-SeleCalc** to analyze the forces and verify the admissible belt strengths for different conveyor designs.

For any further questions and additional documentation please contact Habasit.



Calculation Guide
Belt calculation procedure

After having preselected a suitable belt style and type from product data sheets, the calculation of the belt has to verify and proof the suitability of this belt for the application.

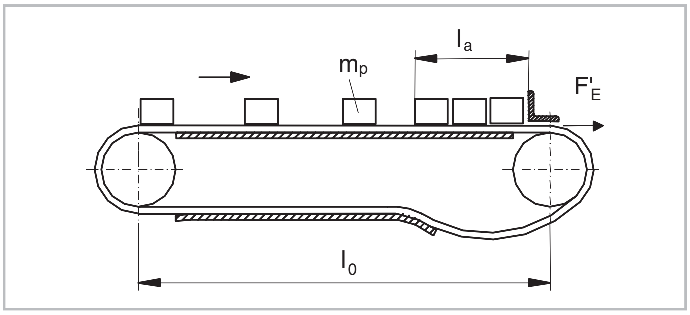
The following formulas are partially simplified.
For abbreviations, glossary of terms and conversion of units see tables in Appendix.
Use the Habasit Calculation Program LINK-SeleCalc for detailed calculations.

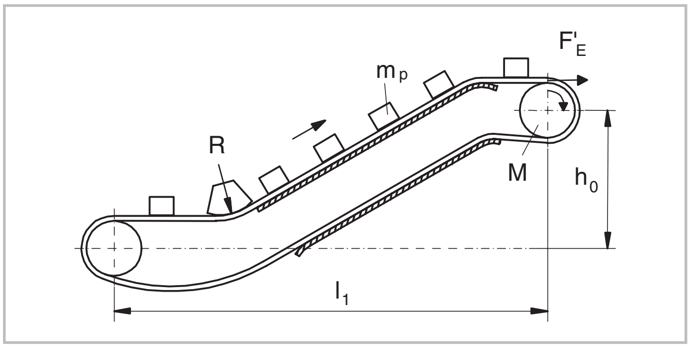
The following procedure is proposed:

Step	Procedure	Typical formula (other diverted formula see detailed instructions)	Refer to page
1	Calculate the **effective tensile force (belt pull) F'_E**, generated during conveying process near the driving sprocket, taking into account product weight, belt weight, friction values, inclination height, product accumulation.	$F'_E = (2\ m_B + m_P)\ l_0 \cdot \mu_G \cdot g$ $F'_E = [(2\ m_B + m_P)\ l_0 \cdot \mu_G + m_P \cdot \mu_P \cdot l_a\ ]\ g$ $F'_E = [(2\ m_B + m_P)\ l_1 \cdot \mu_G + m_P \cdot h_0\ ]\ g$ $F'_E = [(2\ m_B + m_P)\ l_1 \cdot \mu_G + m_P \cdot \mu_P \cdot l_a + m_P \cdot h_0\ ]\ g$ [N/m]	65
	▼		
2	Calculate the **adjusted tensile force (belt pull) F'_S** multiplying with the adequate service factor of your application, taking into account frequent start/stops, direct or soft start drive.	$F'_S = F'_E \cdot c_S$ [N/m]	69
	▼		
3	Calculate the **admissible tensile force F_{adm}.** Speed and high or low temperature may limit the max. admissible tensile force. below nominal tensile strength F'_N (product data sheet).	$F'_{adm} = F'_N \cdot c_T \cdot c_V$ [N/m]	70
	▼		
4	Verify the strength of the selected belt by **comparison of F'_S** with the **admissible tensile force F'_{adm}.**	$F'_S \leq F'_{adm}$ [N/m]	72
	▼		
5	Check the dimensioning of the **driving shaft and sprocket.**	$f = 5/384 \cdot F_W \cdot l_b^3 / (E \cdot I)$ [mm] $T_M = F'_S \cdot b_0 \cdot d_P/2$ [Nm]	73
	▼		
6	Establish the effective **belt length and catenary sag dimensions**, taking into account the thermal expansion.	$F'_C = l_C^2 \cdot m_B \cdot g\ /(8 \cdot h_C)$ [N/m] $l_g = d_P \cdot \pi + 2 \cdot l_0 + 2.66 \cdot h_C^2 / l_C$ [m]	76 77
	▼		
7	Calculate the required shaft **driving power**.	$P_M = F'_S \cdot b_0 \cdot v / 60$ [W]	79
	▼		
8	Check the **chemical resistance** of the belt material selected for your specific process.	Table of chemical resistance	80
	▼		
9	Check your **conveyor design**, if it fulfills all calculated requirements.		

Calculation Guide
1. Effective tensile force (belt pull) F'_E

(Symbols see page 87)





Horizontal straight belt without accumulation

$$F'_E = (2\, m_B + m_P)\, l_0 \cdot \mu_G \cdot g \text{ [N/m]}$$

Horizontal straight belt with accumulation, simplified

$$F'_E = [(2\, m_B + m_P)\, l_0 \cdot \mu_G + m_P \cdot \mu_P \cdot l_a]\, g \text{ [N/m]}$$

Inclined conveyor without accumulation

$$F'_E = [(2\, m_B + m_P)\, l_1 \cdot \mu_G + m_P \cdot h_0]\, g \text{ [N/m]}$$

Inclined conveyor with accumulation, simplified

$$F'_E = [(2\, m_B + m_P)\, l_1 \cdot \mu_G + m_P \cdot \mu_P \cdot l_a + m_P \cdot h_0]\, g \text{ [N/m]}$$

Further analyses of tensile forces caused by accumulated products

Above equations with accumulation are based on the simplification that the product load per m^2 of belt is the same over the accumulation length as when moving with the conveyor. This is generally not the case.
In reality the density of the product distribution over the accumulation length $\mathbf{l_a}$ will be higher (can be double or 3 times). Since this value will often not be known it is common practice to use the same product load value for accumulation as for conveying.
In this case the above formulas are used. The calculated force is somewhat too low, but normally not critical for straight belts.
If the accumulated product load per m^2 is known, and for more accurate calculation, it is proposed to replace m_P in the term $\mathbf{m_P \cdot \mu_P \cdot l_a}$ by $\mathbf{m_{Pa}}$.
The following formulas result:

Horizontal straight belt with accumulation

$$F'_E = [(2\, m_B + m_P)\, l_0 \cdot \mu_G + m_{Pa} \cdot \mu_P \cdot l_a]\, g \text{ [N/m]}$$

Inclined conveyor with accumulation

$$F'_E = [(2\, m_B + m_P)\, l_1 \cdot \mu_G + m_{Pa} \cdot \mu_P \cdot l_a + m_P \cdot h_0]\, g \text{ [N/m]}$$

F'_E = Effective tensile force [N/m]
m_B = Weight of belt [kg/m^2]
m_P = Weight of conveyed product [kg/m^2]
m_{Pa} = Weight of accumulated product [kg/m^2]
μ_G = Coefficient of friction belt to slider support
μ_P = Coefficient of friction belt to product
l_0 = Conveying length [m]
l_a = Length of accumulation [m]
h_0 = Height of elevation [m]
g = Acceleration factor due to gravity (9.81 m/s^2)

Coefficient of friction values see Appendix

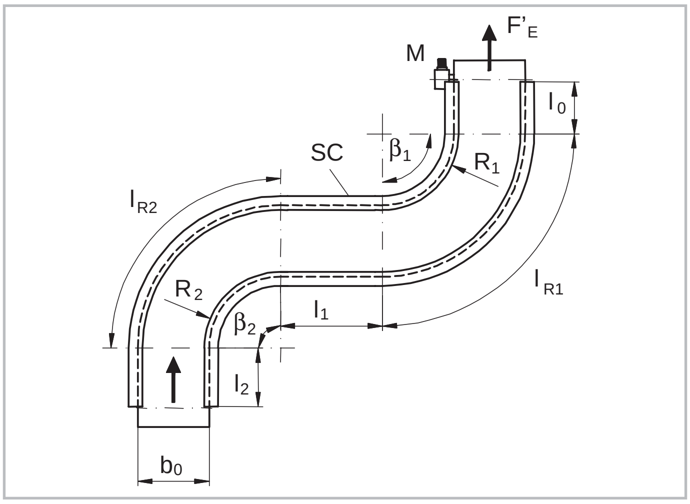
Calculation Guide
1. Effective tensile force (belt pull) F'_E

Radius belts
Radius belts have higher friction losses than straight belts due to the radial forces directed to the inside of the curve. It also has to be taken into account, that in the belt curves the tensile forces are not distributed over the total belt width but are concentrated at the outer belt edge.

Admissible tensile forces (F_{adm}) for radius belts (see also page 72)
Since the belt pull in the curve is concentrated at the outer belt edge, the admissible belt force is limited by the belt strength of the outermost belt modules. Therefore the absolute tensile forces F_{SR} [N] are applied for comparison with the nominal belt strength F_N.

$F_{SR} = F'_E \cdot b_0 \cdot c_s \leq F_{adm}$ [N] (radius belts only)

For calculation of radius belts please ask Habasit for the calculation program LINK-SeleCalc.



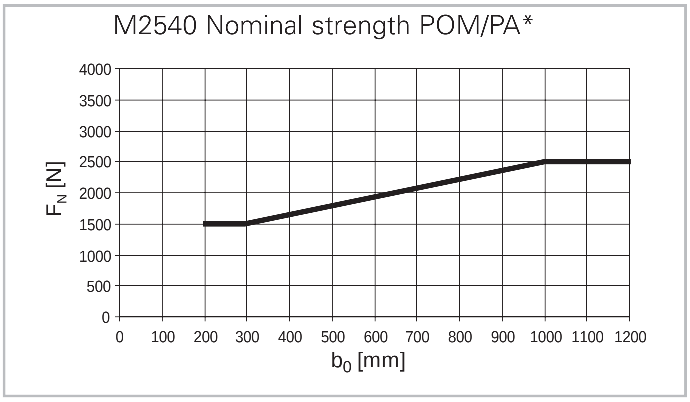
F_{SR} = Absolute tensile force [N]
F'_E = Effective tensile force [N/m]
b_0 = Belt width [m]
c_s = Service factor (see page 69)

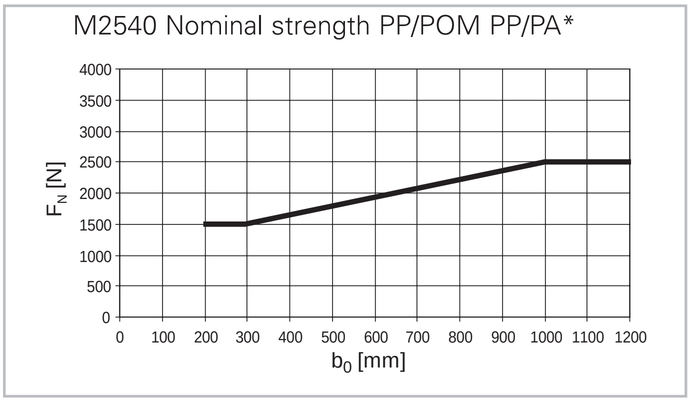
Note
Due to the concentration of the belt pull (tensile forces) on the outer belt edge at curve end, the applicable number of curves is very limited. In practice 1 to 2 curves are often used. For long radius belts it is advisable to place the curve as near to the idling shaft as possible. This way the belt pull at the outer curve edge is minimized.

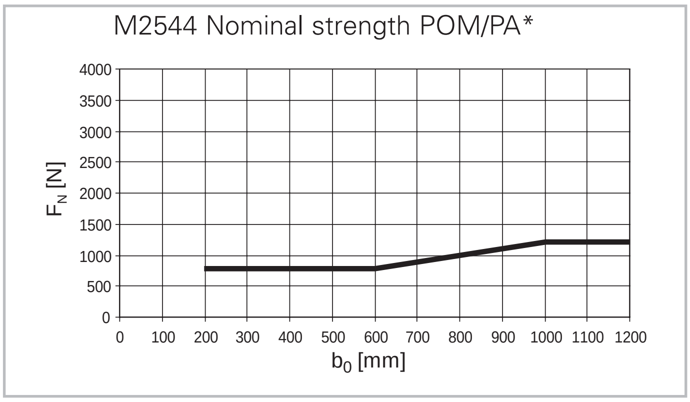
Nominal strength for radius belts in curve
The nominal strength for radius belts in curve increases with wider belts (bigger radius). Due to the smaller angle between the modules the forces are distributed on more links.
In case of high loads the application of steel rods may be advisable to increase the belt stiffness.
Please contact your Habasit representative for detailed information.

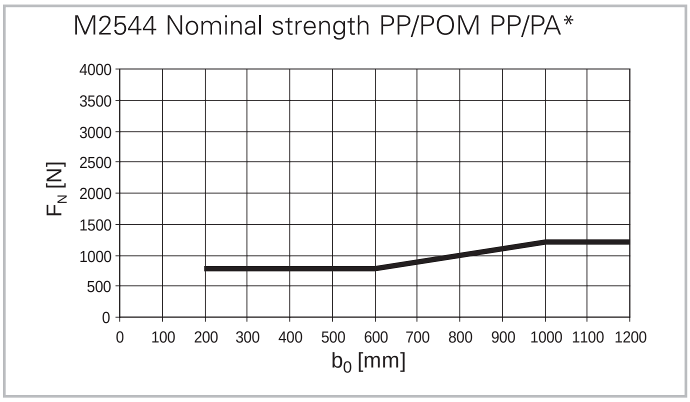
Appropriate quality of the conveyor, especially smooth and low coefficient of friction inside wear strips and smooth start-up are important. Belt at return way must be properly held down by wear strips or hold-down tabs according to page 48.

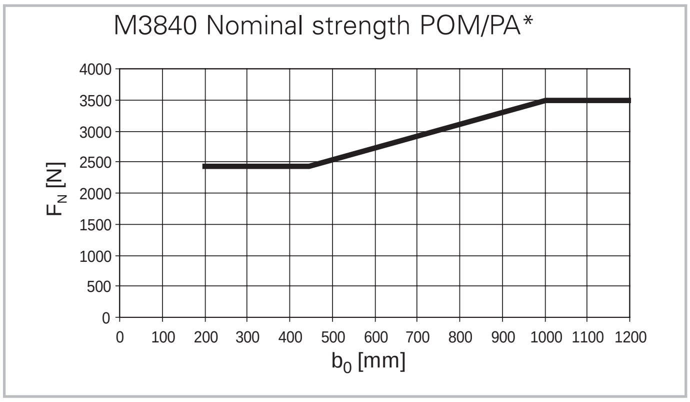
Calculation Guide
1. Effective tensile force (belt pull) F'_E

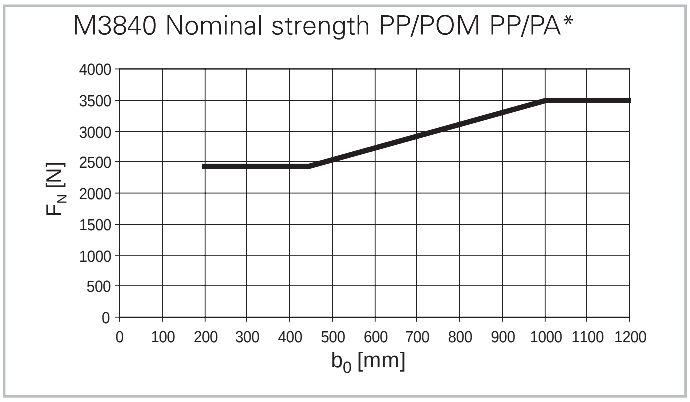


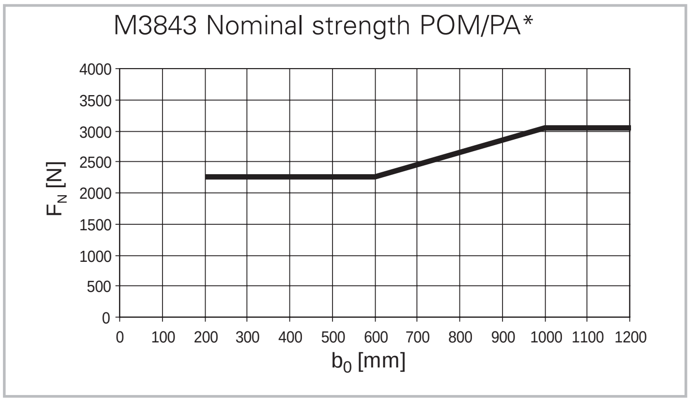


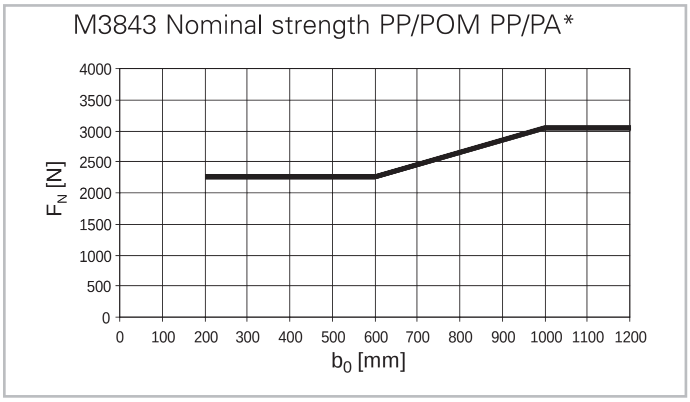








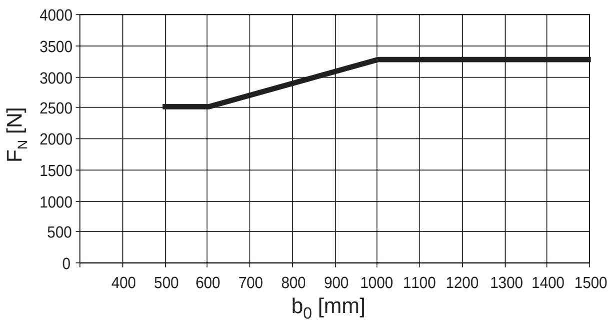




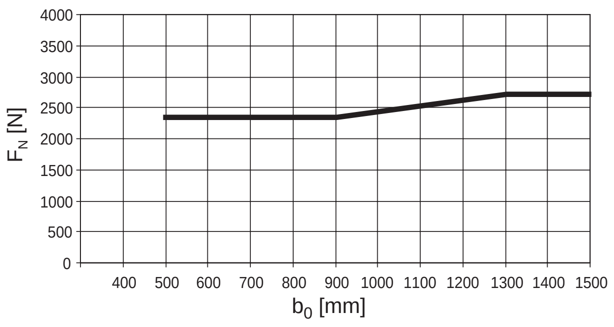
For calculation of radius belts please contact a Habasit representative.
* Module/rod material combination

Calculation Guide
1. Effective tensile force (belt pull) F'_E

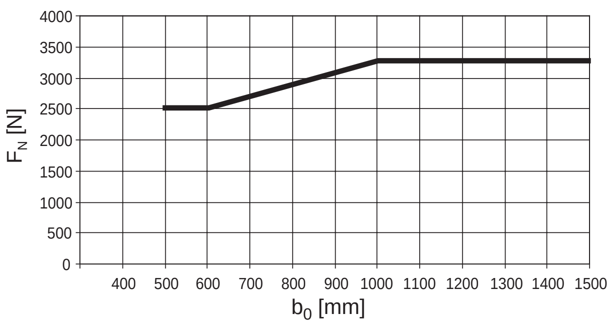
M5290 Nominal strength POM/PA*



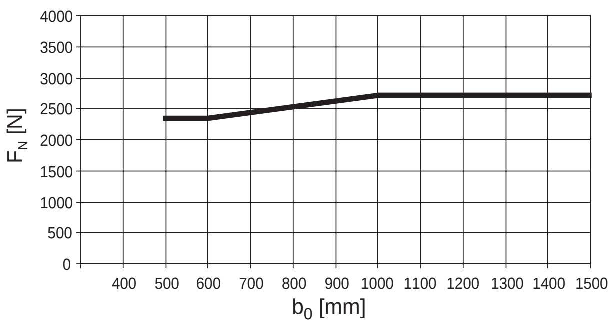
M5290 Nominal strength PP/POM PP/PA*



M5293 Nominal strength POM/PA*



M5293 Nominal strength PP/POM PP/PA*



For calculation of radius belts please contact a Habasit representative.
* Module/rod material combination

Calculation Guide
2. Adjusted tensile force (ad. belt pull) F'_S

$F'_S = F'_E \cdot c_s$ [N/m]

(Symbols see page 87)

F'_S = Adjusted tensile force (belt pull) per m of belt width [N/m]
F'_E = Effective tensile force [N/m]
c_s = Service factor (see table below)

Service factors c_s
Service factors take into account the impact of stress conditions reducing the belt life.
Z-conveyors include all elevators with at least 1 back-bending.
Service factors for Z-conveyor consider additional friction in the backbending.

Operating condition Note: Drive with soft start is recommended and is mandatory for frequent start/stops and start-up with full load.	Service factor c_s Standard straight belts				Minipitch with nosebar (**)		Radius belt curves with 90° (*)
	Standard head drive	Lower head drive	Pusher drive (uni- and bi-directional)	Center drive (uni- and bi-directional)	head side	both ends	standard head drive and lower head drive
Start-up prior to loading	1	1.1	1.4	1.2	1.6	2	1.6 (*)
Frequent start/stops during process (more than once per hour)	+ 0.2	+ 0.2	+ 0.2	+ 0.2	+ 0.2	+ 0.2	+ 0.2
Z-conveyors inclination <20° hold-down shoes only hold-down tabs	+ 0.2 + 0.3	+ 0.2 + 0.3	+ 0.2 + 0.3	+ 0.2 + 0.3	+ 0.2 + 0.3	+ 0.2 + 0.3	+ 0.2 + 0.3
inclination 20°–50° hold-down shoes only hold-down tabs	+ 0.4 + 0.6	+ 0.4 + 0.6	+ 0.4 + 0.6	+ 0.4 + 0.6	+ 0.4. + 0.6	+ 0.4 + 0.6	+ 0.4 + 0.6
inclination 50°–70° hold-down shoes only hold-down tabs	+ 1.1 + 1.4	+ 1.1 + 1.4	+ 1.1 + 1.4	+ 1.1 + 1.4	+ 1.1 + 1.4	+ 1.1 + 1.4	+ 1.1 + 1.4
inclination 70°–90° hold-down shoes only hold-down tabs	+ 1.8 + 2.2	+ 1.8 + 2.2	+ 1.8 + 2.2	+ 1.8 + 2.2	+ 1.8 + 2.2	+ 1.8 + 2.2	+ 1.8 + 2.2
Speed greater 30 m/min					+ 0.2	+ 0.2	+ 0.2

(*) The radius belt service factor depends on the angle of the curve.
(**) Z-conveyors with nosebar are not recommended
For accurate calculation use the Habasit Calculation Program LINK-SeleCalc.

Calculation Guide
3. Admissible tensile force F_{adm}

Speed and temperature reduce the maximum admissible tensile force F'_{adm} below nominal tensile strength F'_N. For nominal tensile strength F'_N please refer to the product data sheets.

$F'_{adm} = F'_N \cdot c_T \cdot c_V$ [N/m]

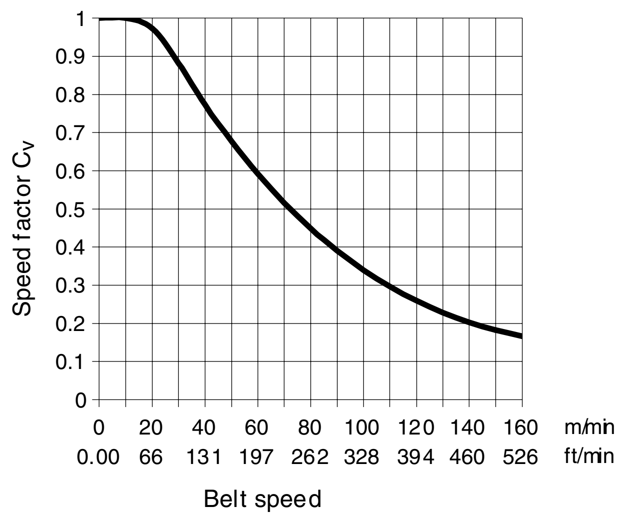
For radius belt calculations the absolute tensile forces are applied (N), see also Calculation Guide for radius belts.

F'_{adm} = Admissible tensile force [N/m]
F'_N = Nominal tensile strength [N/m]
c_T = Temperature factor (see diagram below)
c_V = Speed factor (see diagram below)

Speed factor c_V
The belt speed increases the stress in the belt mainly at the point where the direction of movement is changing:

- driving sprockets
- idling shafts with or without sprockets
- support rollers
- snub rollers

The centrifugal forces and sudden link rotations increase the forces in the belt and the belt wear. These impacts are substantially increasing above 30 m/min *(98 ft/min).*



Lifetime (influence of belt length and sprocket / roller size)
The calculation with c_v is not taking into account theinfluence of the conveyor length and sprocket / roller sizes used. These design features are influencing the lifetime, because the number and angle of link rotations are depending on them. The bigger the number and / or angle of rotation the greater the wear in the link and the earlier the belt will be lengthened to its limit.
General rule:

- Doubling of the length is reducing the number of link rotations by half and vice versa.
- Doubling the sprocket / roller diameter is reducing the angle of link rotation by half and vice versa.

Consequently the lifetime increases / decreases with the same relation. For the lifetime the lengthening of the belt is a main criterion. The initial length is measured after running-in, generally appr. 1 hour.

General rule: The maximum **allowable belt lengthening is approx. 3%** of the belt length. When this value is reached, the belt should be exchanged. The lifetime cannot easily be predicted since the rate of wear in the links and consequently the lengthening is dependent on the process and environmental conditions (dust, sand and other contaminations).

Calculation Guide
3. Admissible tensile force F_{adm}

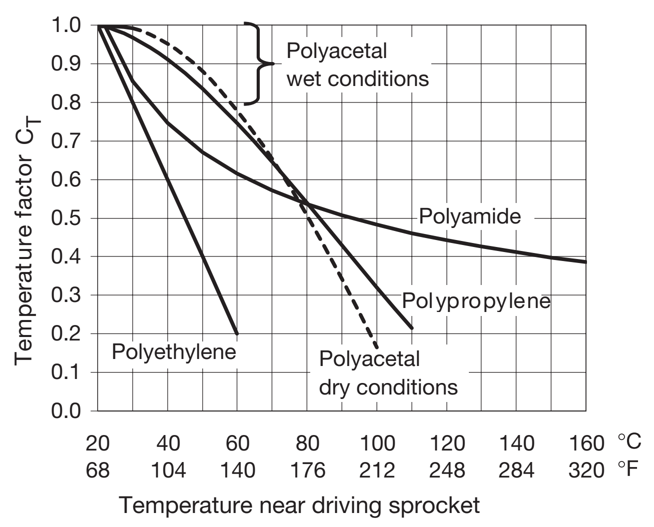
Temperature factor c_T
The measured breaking strength (tensile test) of thermoplastic material increases at temperatures below 20 °C *(68 °F)*. At the same time other mechanical properties are reduced at low temperatures.
For this reason follows:

At temperatures **≤ 20 °C (68 °F): $c_T = 1$**

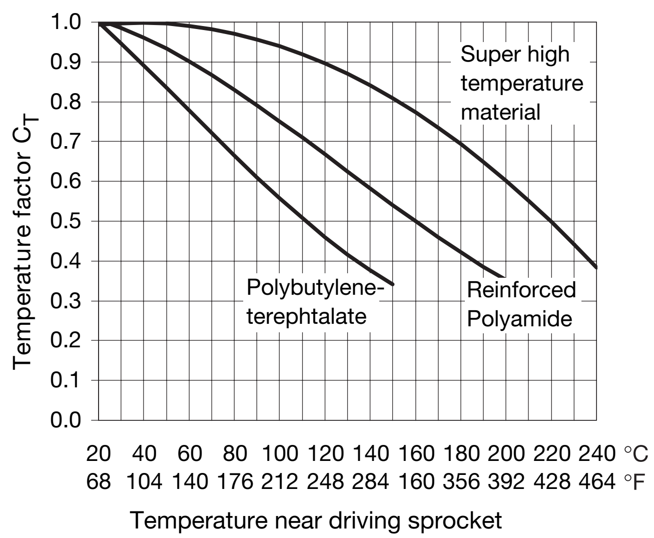
Admissible temperature ranges

Material	°C	°F
Polypropylene (PP)	+5 to +105	*+40 to +220*
Polyethylene (PE)	-70 to +65	*-94 to +150*
Polyoxymethylene (POM) / Acetal (AC)	-40 to +90	*-40 to +195*
Polybutyleneterephtalate (PBT)	-40 to +130 (short-term +150)	*-40 to +266 (short term +302)*
Polyamide +US (PA +US)	-46 to +116 (short-term +135)	*-50 to +240 (short-term +275)*
Polyamide (PA)	-46 to +130 (short-term +160)	*-50 to +266 (short-term +320)*
Polyamide reinforced (PA +GF)	0 to +145 (short-term +175)	*+32 to +293 (short-term +347)*
Polyamide reinforced (PA +HT)	0 to +170 (short-term +200)	*+32 to +338 (short-term +392)*
Super High Temperature Material (ST)	0 to +200 (short-term +240)	*+32 to +392 (short-term +464)*

Standard materials



Special materials



Calculation Guide
4. Verification of the belt strength

The selected belt is suitable for the application, if the adjusted tensile force (belt pull) (F'_S) is smaller or equal to the admissible tensile force (F'_{adm}).

For radius belt calculations the absolute tensile forces are applied (N); see also explanations to radius belts page 66.

Straight belts

$$F'_S \leq F'_{adm} \text{ [N/m]}$$

Radius belts

$$F_{SR} = F'_E \cdot b_0 \cdot c_s \leq F_{adm} \text{ [N]}$$

F'_{adm} = Admissible tensile force [N/m]
F'_S = Adjusted tensile force (belt pull) per m of belt width [N/m]
F'_E = Effective tensile force [N/m]
F_{SR} = Absolute tensile force [N]
b_0 = Belt width [m]
c_s = Service factor (see page 69)

Calculation Guide
5. Dimensioning of shafts

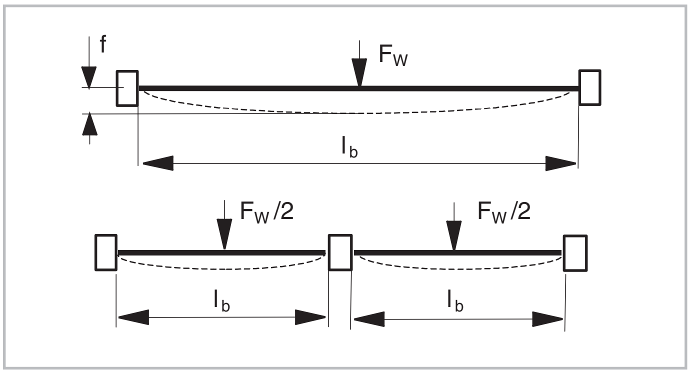
Select shaft type, shaft material and size. The shaft must fulfill the following conditions:

- Max. shaft deflection under full load (F_W):
  f_{max} = 2.5 mm *(0.1")*
  For more accurate approach refer to LINK-SeleCalc program. If the calculated shaft deflection exceeds this max. value, select a bigger shaft size or install an intermediate bearing on the shaft.
- Torque at max. load F'_S below critical value (admissible torque, see table "Maximum admissible torque").

(Symbols see page 87)

Shaft deflection

2 bearings: $f = 5/384 \cdot F_W \cdot l_b^3 / (E \cdot I)$ [mm]
3 bearings: $f = 1/2960 \cdot F_W \cdot l_b^3 / (E \cdot I)$ [mm]



For uni-directional head drives: $F_W = F'_S \cdot b_0$
For lower head drives: $F_W = 1.5 \cdot F'_S \cdot b_0$
For bi-directional center drives: $F_W = 2 \cdot F'_S \cdot b_0$
For uni-directional pusher drives: $F_W = 2.2 \cdot F'_S \cdot b_0$
For bi-directional pusher drives: $F_W = 3.2 \cdot F'_S \cdot b_0$
Note: pusher drives need a tensioning device

b_0 = belt width [m]
l_b = distance between bearings [mm]
If the effective distance is not known use belt width + 100 mm

Shaft size		Inertia I	
mm	*inch*	mm⁴	*inch⁴*
Ø 20	*Ø ¾*	7’850	*0.0158*
Ø 25	*Ø 1*	19’170	*0.05*
❑ 25	*❑ 1*	32’550	*0.083*
Ø 40	*Ø 1.5*	125’660	*0.253*
❑ 40	*❑ 1.5*	213’330	*0.42*
Ø 60	*Ø 2.5*	636’170	*1.95*
❑ 60	*❑ 2.5*	1’080’000	*3.25*
Ø 90	*Ø 3.5*	3’220’620	*7.5*
❑ 90	*❑ 3.5*	5’467’500	*12.5*

Table "Inertia"

Shaft materials	Modulus of elasticity E	Shearing strength	Possible material specifications
Carbon steel	206’000 N/mm²	60 N/mm²	St 37-2, KG-37
Stainless steel (low strength)	195’000 N/mm²	60 N/mm²	X5CrNi18 10, AISI 316, 304
Stainless steel (high strength)	195’000 N/mm²	90 N/mm²	X12CrNi 17 7, AISI 301
Aluminum	70’000 N/mm²	40 N/mm²	AlMg3, AA 5052

Calculation Guide
5. Dimensioning of shafts

Torque on journal (shaft end on motor side)
The torque is calculated in order to evaluate the shaft journal diameter needed for transmission. Verify the selected size of the shaft journals by comparing the effective torque (T_M) with the **admissible torque** indicated in table "Maximum admissible torque".

effective torque: $T_M = F'_S \cdot b_0 \cdot d_P/2 \cdot 10^{-3}$ **[Nm]**

admiss. torque: $T_{adm} = \tau_{adm} \cdot p \cdot d_W^3 / 16 \cdot 10^{-3}$
simplified: $T_{adm} \approx \tau_{adm} \cdot d_W^3 / 5000$ **[Nm]**

b_0 = belt width (m)
d_P = pitch diameter of sprocket [mm]
τ_{adm} = max. admissible shearing stress [N/mm^2]
for carbon steel approx. 60 N/mm^2
for stainless steel approx. 90 N/mm^2
for aluminum-alloy approx. 40 N/mm^2
d_W = shaft diameter [mm]

Shaft Ø (d_W)		Carbon steel		Stainless steel	
mm	*inch*	Nm	*in-lb*	Nm	*in-lb*
20	*0.75*	94	*834*	141	*1'251*
25	*1*	184	*1'629*	276	*2'444*
30	*1 3/16*	318	*2'815*	477	*4'223*
40	*1.5*	754	*6'673*	1'131	*10'009*
45	*1 3/4*	1'074	*9'501*	1'610	*14'251*
50	*2*	1'473	*13'033*	2'209	*19'549*
55	*2 1/4*	1'960	*17'347*	2'940	*26'020*
60	*2.5*	2'545	*22'520*	3'817	*33'781*
80	*3*	6'032	*53'382*	9'048	*80'073*
90	*3.5*	8'588	*76'007*	12'882	*114'010*

Table "Maximum admissible torque", T_{adm}

Calculation Guide
6. Dimensioning of sprockets

Necessary information for selection and positioning of the suitable sprocket is given in the product data sheet. The number of sprockets needed for the driving shaft of your application can approximately be calculated with the formula given below. The resulting number of sprockets should preferably be uneven (center sprocket fixed for tracking) but this is not mandatory. For safety the calculated number should be rounded up, not down. The number of sprockets finally should be in between the min. and the max. number of sprockets.
For detailed calculation refer to the Habasit Calculation Program LINK-SeleCalc.

$n\ (\text{sprocket}) = F'_S \cdot b_0 \,/\, F_{max}\ (\text{sprocket})$

$n_{max}\ (\text{sprocket}) = b_0 \,/\,$ min. sprocket spacing

$n_{min}\ (\text{sprocket}) = b_0 \,/\,$ max. sprocket spacing

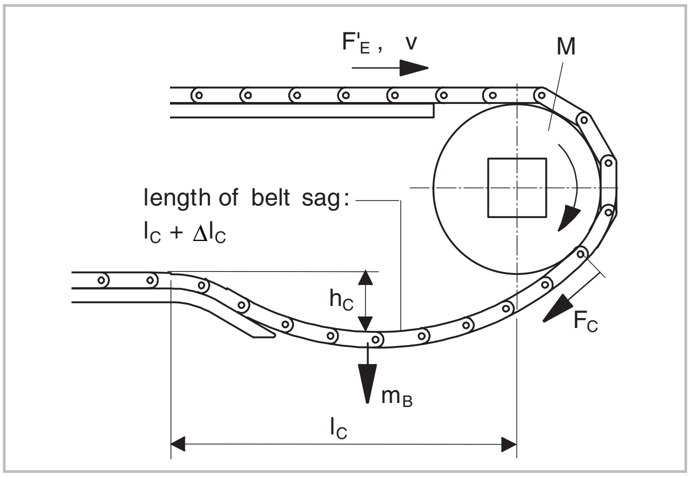
n (sprocket)	=	required number of sprockets
n_{min} (sprocket)	=	min. number of sprockets
n_{max} (sprocket)	=	max. number of sprockets
F_{max} (sprocket)	=	max. pull allowed on one sprocket [N]
F'_S	=	adjusted tensile force (belt pull) [N/m]
b_0	=	belt width [m]

Admissible sprocket load
Admissible sprocket loads depend on sprocket type, sprocket size, shaft size and sprocket material.
The admissible sprocket load is valid for molded solid sprockets (generally open window type). Big sprockets with small shaft bores may have lower admissible sprocket loads.
The compliance of admissible sprocket loads is considered in LINK-SeleCalc program.

General rules
Split sprockets and machined sprockets may have higher admissible loads than molded one-piece sprockets.
PP sprockets have 20% lower admissible loads.
PA and ST sprockets have the same or higher admissible load than POM sprockets.
Polyamide +GF, +HT and Super High Temperature belts should be used together with sprockets made of ST material.
Sprockets for round shafts can have lower admissible loads due to higher contact stress in key way.

Calculation Guide
7. Calculation of the catenary sag

Catenary sag (belt sag) is an unsupported length of the belt for absorbing belt length variations caused by thermal expansion/contraction and load changes of the belt. In addition, due to its weight the sag exerts tension to the belt, which is necessary for firm engagement of the sprockets in the belt. This tension again is depending on the length (l_C) and height (h_C) of the sag.



Following minimal tension force should be applied by catenary sag for proper sprocket engagement:

0.5" and 1" belts:	150 N per m belt width (10 lb/ft)
1.5" and 2" belts:	200 N per m belt width (14 lb/ft)
2.5" belts:	250 N per m belt width (17 lb/ft)

The experience shows that the sag of the dimensions proposed on pages 41 – 43 provides the belt tension needed for proper engagement of the sprockets.
For belts running in cold environment (freezers etc.) additional belt length should be considered in catenary layout to compensate the belt shortening (refer also to next page).

Belt tension of catenary sag:

$F'_C = (l_C^2 \cdot m_B \cdot g) / (8 \cdot h_C)$ [N/m]

F'_C = Belt tension of catenary sag [N]
l_C = Length of the sag [m]
h_C = Height of the sag [m]
m_B = Weight of belt [kg/m²]
g = Acceleration factor due to gravity (9.81 m/s²)

Example:
For l_C = 1 m, m_B = 10 kg/m², h_C = 122 mm,
we get: F'_C = 100 N/m (≈ 10 kg/m)

Calculation Guide
8. Effective belt length and width

After the sag length (l_C) and height (h_C) have been established, it is of particular interest to calculate the excessive belt length (Δl_C) required by the sag (see formula below). This permits to calculate the final belt length needed.

$$\Delta l_C = 2.66 \cdot (h_C / 1000)^2 / l_C \; [m]$$

$$l_g = 2 \cdot l_0 + d_P/1000 \cdot \pi + 2.66 \cdot (h_C / 1000)^2 / l_C \; [m]$$

l_g, l_0, l_C = Length [m]
d_P = Pitch diameter of sprocket [mm]
h_C = Height of catenary sag [mm]

The calculated geometrical belt length (lg) is the total belt length, which equals to the length of the transport side plus return side and sprocket circumference plus the excessive length of the catenary sag (Δl_C).
The final length of the assembled belt will be somewhat longer than the calculated length, due to clearance between the pivot rod and the bore in the link (hinge clearance).
The excessive length may be around 1% of the belt length.

Influence of thermal expansion
After installation the belt may be heated or cooled by the process, its length will change and consequently the height h_c of the catenary sag will change as well. The resulting belt length difference will have to be compensated within the tolerance of the sag height. For proposed dimension of the catenary sag see pages 41 – 43. The sag height should not be less than 25 mm. If the process temperature deviates from installation temperature, correct the calculated belt length as indicated by this formula.

$$l_g(T) = l_g + l_g / 1000 \cdot \alpha \cdot (T_2 - T_1) \; [m]$$

l_g = Total belt length [m]
T_1 = Installation temperature [°C]
T_2 = Process temperature [°C]
α = Coeff. of linear thermal expansion

Belt material	Coeff. of linear thermal expansion α	
	mm/m · °C	*in/ft · °F*
Polypropylene	0.13	*0.00087*
Polyethylene	0.20	*0.00133*
Polyoxymethylene (Acetal)	0.09	*0.00060*
Polybutyleneterephtalate	0.12	*0.00078*
Polyamide	0.12	*0.00078*
Polyamide reinforced	0.08	*0.00053*
Super High Temperature Material	0.05	*0.00033*

Dimensional change due to moisture
Dimensional changes due to moisture absorption are generally quite small under common operating conditions. Therefore for all used HabasitLINK® thermoplastic materials, dimensional change due to moisture absorption must not be considered, except for polyamide.
HabasitLINK® polyamide products absorb moisture from the air and reach an equilibrium at about 2.8% water at 50% RH (relative humidity) and at about 8.5% at 100% RH. The day-to-day or week-to-week variations in relative humidity will have little effect on the total moisture content of the HabasitLINK® polyamide products.

PA rods
Also PA rods can absorb humidity which mainly effects the rod length. Typical elongation of unconditioned PA rod from dry to wet environment is between 1% and 2% of rod length. This should be considered when using PA rods.
It is recommended to reduce the PA rod length as follows:

Unconditioned PA rods
For dry applications (humidity < 60%) 1%
For wet applications (humidity ≥ 60%) 2%

Conditioned PA rods
For dry applications (humidity < 60%) 0%
For wet applications (humidity ≥ 60%) 1%

Calculation Guide
9. Calculation of driving power

The required power for driving a belt is the result of the friction forces in the conveyor, the change of height for elevators plus the efficiency losses (also friction) of the drive itself. The latter are not taken into account in the following formula.

Note, that the efficiency of gear and drive motor is to be considered for drive motor installation and that the drive motor should not run near 100% working load.

For efficiency of the gear and drive motor and the necessary power installed consult drive manufacturer.

$$P_M = F'_S \cdot b_0 \cdot v \,/\, 60 \text{ [W]}$$

F'_S = Adjusted tensile force (belt pull) per m of belt width [N/m]
P_M = Drive output power [W]
b_0 = Belt width [m]
v = Belt speed [m/min]

Material properties
Chemical resistance

The data presented in the following table are based on the information given by the raw material manufacturers and suppliers. It does not relieve of a qualification test of the products for your application.
In individual cases the stability of the material in the questionable medium is to be examined.

Code: ■ = good resistance ▼ = conditionally / sometimes resistant ❑ = not resistant (not to be used)

Designation of chemical	Poly-propylene (PP) also valid for +FR, +AS, +DE, +HW and +H15		Poly-ethylene (PE, HD PE or UHMW PE) also valid for +DE and +H15		Polyoxy-methylene (POM) Acetal (AC) also valid for +AS, +EC, +DE, +UV, +UVC, +IM, +JM, +LF, L and U		Polyamide (PA) also valid for +US, +GF, +HT and +IM		Super High Temperature Material (ST)			Thermo-plastic Poly-urethane (TPU)		Thermo-plastic elastomer (TPE) also valid for +FR		Flame retardant Polybuty-leneter-ephthalate (PBT) also valid for +FR	
	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)	93 °C (200 °F)	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)
Acetic Acid > 5%	■	■	■	▼	▼	❑	❑	❑	■	■	■	❑		❑		▼	❑
Acetic Acid – 5%	■	■	■	■	■		▼	❑	■	■	■	❑		❑		■	▼
Acetone	■	■	■	■	▼	▼	■	■	■	■	■			❑		▼	❑
Alcohol – all types	■	■	■	■	■	▼	■	■	■	■	■	❑		▼		■	▼
Aluminum Comp.	■	■	■	■			■	■	■	■	■						
Ammonia	■	■	■	■	■	■	■	■	■	▼	❑	■				▼	❑
Ammonium Comp.	■	■	■	■			■	■	■	■	■					▼	❑
Aniline	■	■	■	❑		▼			■	▼	❑	❑				▼	
Aqua Regia	❑	❑	■	❑			❑	❑	❑								
Arsenic Acid	■	■	■	■													
Barium Comp.	■	■	■	■			■	■	■	■	■						
Beer	■	■	■	■	■							■					
Benzene	▼	❑	▼	❑	▼	▼	■	■	■	▼	❑	❑				▼	❑
Benzenesulfonic Acid – 10%	■	■	■	■					■	▼	❑						
Benzoic Acid	■	■	■	■			▼	▼	■	▼	❑	■					
Beverages (soft drinks)	■	■	■	■	■	■	■	■									
Borax	■	■	■	■					■	■	■						
Boric Acid	■	■	■	■			■	■				■					
Brine – 10%	■	■	■	■	■	■											
Butyl Acrylate	❑	❑	■	▼					■	■	■					■	▼
Butyric Acid	■		■	▼			■	■				■					
Carbon Dioxide	■	■	■	■			■	■	■	■	■					■	■
Carbon Disulfide	▼	❑	▼	❑			■	■	■	■	■						
Carbon Tetrachloride	▼	❑	▼	❑	■	▼	■	■	■	▼	❑	❑					
Chloracetic Acid	■	■					❑	❑									
Chlorine – Gas	❑	❑	▼	❑	❑	❑	❑	❑				❑					
Chlorine – Liquid	❑	❑	❑	❑	❑	❑	❑	❑				❑					
Chlorine Water (0.4% Cl)	■	▼	■	▼	❑	❑	❑	❑	❑								
Chlorobenzene	❑	❑	▼	❑	▼	▼	■	■	■	▼	❑	❑				❑	
Chloroform	❑	❑	❑	❑	❑	❑	▼		■	▼	❑					❑	
Chromic Acid – 50%	■	■	■	▼	❑	❑	▼		❑			▼					
Chromic Acid – 3%	■	■	■	■	▼	▼			❑							■	■
Citric Acid – 40%	■	■	■	■	■	❑	■	■				■					
Citric Acid – 10%	■	■	■	■	■		■	■				■				■	▼
Citrus Juices	■	■	■	■	■		■	■								■	
Coconut Oil	■	■	■	■	■	■	■		■	■	■	■				■	■

Material properties
Chemical resistance

Designation of chemical	Polypropylene (PP) also valid for +FR, +AS, +DE, +HW and +H15		Polyethylene (PE, HD PE or UHMW PE) also valid for +DE and +H15		Polyoxymethylene (POM) Acetal (AC) also valid for +AS, +EC, +DE, +UV, +UVC, +IM, +JM, +LF, L and U		Polyamide (PA) also valid for +US, +GF, +HT and +IM		Super High Temperature Material (ST)			Thermoplastic Polyurethane (TPU)		Thermoplastic elastomer (TPE) also valid for +FR		Flame retardant Polybutyleneterephthalate (PBT) also valid for +FR	
	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)	93 °C (200 °F)	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)
Copper Comp.	■	■	■	■			▼										
Corn Oil	■	■	■	■	■	■	■		■	■	■					■	■
Cottonseed Oil	■	■	■	■	■	■	■		■	■	■	■				■	■
Cresol	■	■	■	▼			❑	❑	■	▼	❑	❑					
Cyclohexane	■	▼	❑	❑			■		■	■	■	▼					
Cyclohexanol	■	▼	▼	❑			■		■	■	■	❑					
Cyclohexanone	■	▼	❑	❑					■	■	■	❑					
Detergents	■	■	■	■	■	■	■		■	■	■	■		■		■	■
Dextrin	■	■	■	■													
Dibutyl Phthalate	■	▼					■	■									
Diethyl Ether	❑	❑	❑	❑	▼	▼	■	■	■	■	■					■	▼
Diethylamine	■	■		❑													
Diglycolic Acid – 30%	■	■	■	■													
Diisooctyl Phthalate	■	■															
Dimethyl Phthalate	■	■							■	▼	❑						
Dimethylamine	■						■	■									
Dioctyl Phthalate	■	▼					■	■	■	▼	❑						
Ethyl Acetate	■	■	▼	▼	▼	❑	■	■	■	■	■	❑		❑		▼	❑
Ethyl Ether	▼	▼							■	■	■	❑					
Ethylamine	■	■															
Ethylene Glycol – 50%	■	■	■	■	■	▼	■	▼	■	■	■					■	▼
Ferric/Ferrous Comp.	■	■	■	■	▼	❑			■	■	■						
Formaldehyde – 37%	■	■	■	▼	■	■			■	■	■	❑		▼			
Formic Acid – 85%	■	▼	■	■			▼	❑	■	■	■	❑		❑		▼	❑
Freon			■	■	▼	▼			■	▼	❑						
Fuel Oil # 2	■	▼	■	❑	▼	▼	■	■	■	■	■	■		❑		■	■
Fruit Juices	■	■	■	■	■		■					■				■	
Furfural	▼	▼	▼	❑			■		■	■	■						
Gasoline	▼	❑	■	❑	■	■	■	■	■	■	■						
Glucose	■	■	■	■	■	■						■					
Glycerol	■	■					■	■				▼		▼		■	■
Heptane	❑	❑	▼	❑	■	■	■	■	■	■	■	■				■	■
Hexane	■	▼	❑	❑	■		■	■	■	■	■	■				■	■
Hydrobromic Acid – 50%	■	■	■	■			❑	❑	❑								
Hydrochloric Acid – 35%	■	■	■	■	❑	❑	❑	❑	❑			▼					
Hydrochloric Acid – 10%	■	■	■	■	❑	❑	❑	❑	❑			▼		▼		■	❑
Hydrofluoric Acid – 35%	■	■	■	■	❑	❑	❑	❑	❑			❑				❑	
Hydrogen Peroxide – 3%	■	■	■	■	■	■	▼	▼	❑			▼		■		■	▼
Hydrogen Peroxide – 90%	▼	▼	■	▼	▼	❑	❑	❑	❑			❑				■	❑
Hydrogen Sulfide	■	■	■	■			■	■	■	■	■						
Igepal – 50%	■	■			■	▼											
Iodine – Crystals	■	■	▼	▼	❑	❑	❑	❑	❑			❑					

Material properties
Chemical resistance

Designation of chemical	Polypropylene (PP) also valid for +FR, +AS, +DE, +HW and +H15		Polyethylene (PE, HD PE or UHMW PE) also valid for +DE and +H15		Polyoxymethylene (POM) Acetal (AC) also valid for +AS, +EC, +DE, +UV, +UVC, +IM, +JM, +LF, L and U		Polyamide (PA) also valid for +US, +GF, +HT and +IM		Super High Temperature Material (ST)			Thermoplastic Polyurethane (TPU)		Thermoplastic elastomer (TPE) also valid for +FR		Flame retardant Polybutyleneterephthalate (PBT) also valid for +FR	
	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)	93 °C (200 °F)	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)
Isooctane	❑	❑	■				■	■	■	■	■	■				■	■
Isopropyl Alcohol	■	■	■	■	■	■	■	■	■	■	■	❑		▼		■	▼
Jet Fuel	▼	❑	▼	▼	■	■	■	■	■	■	■			❑		■	■
Kerosene	▼	❑	▼	▼	■	■			■	■	■	■		❑			
Lactic Acid	■	■	■	■			▼	❑	■	■	■						
Lanolin	■	▼	■	■													
Lauric Acid	■	■	■	■													
Lead Acetate	■	■	■	■			■	■									
Linseed Oil	■	■	■	■	■	■	■	■				■				■	■
Lubricating Oil	■	▼			■	■	■	▼	■	■	■	■		❑		■	■
Magnesium Comp.	■	■	■	■			■		■	■	■						
Malic Acid – 50%	■	■	■	■			■	■									
Manganese Sulfate	■		■	■			▼	▼									
Margarine	■	■	■	■													
Mercury	■	■	■	■			■									■	
Methyl Chloride	▼	▼					■	■								❑	
Methyl Ethyl Ketone	■	▼	❑	❑	▼	▼	■		■	■	■	❑		❑		❑	❑
Methyl Isobut. Ketone	■	▼							■	■	■						
Methylsulfuric Acid	■	■	■	■													
Methylene Chloride	▼	❑	❑	❑			▼	▼	■	▼	❑	❑		❑			
Milk	■	■	■	■	■	■	■	■				■					
Mineral Oil	▼	❑	■	▼	■	■	■		■	■	■	■		❑		■	■
Mineral Spirits	▼	❑							■	■	■			❑		■	■
Molasses	■	■	■	■			■	■									
Motor Oil	■	▼			■	■	■	■	■	■	■	■		❑		■	■
Naphtha	■	▼	▼	❑			■	■	■	■	■						
Nitric Acid – 30%	■	▼	■	■	❑	❑	❑	❑	❑			▼				❑	
Nitric Acid – 50%	▼	❑	■	▼	❑	❑	❑	❑	❑			▼				❑	
Nitrobenzene	■	▼	❑	❑			▼		■	▼	❑						
Nitrous Acid	■								❑								
Nitrous Oxide	■																
Oleic Acid	■	❑			■	■	■	■	❑								
Olive Oil	■	■	■	■					■	■	■	■		❑		■	■
Oxalic Acid	■	■	■	■					❑			■					
Ozone	▼	▼	▼	❑	❑	❑	▼	▼	❑			■					
Palmitic Acid – 70%	■	■	■	■			■		❑								
Paraffin	■	■	■	■	■	■	■	■	■	■	■	■		▼			
Peanut Oil	■	■					■		■	■	■	■		❑			
Perchloric Acid – 20%	■	■	■	■					❑								
Perchlorothylene	❑	❑	❑	❑			▼	❑	■	▼	❑					■	❑
Pathalic Acid – 50%	■	■	■	■					❑								
Phenol	■	■	■	■	❑	❑	❑	❑	■	▼	❑	❑					

Material properties
Chemical resistance

Designation of chemical	Poly-propylene (PP) also valid for +FR, +AS, +DE, +HW and +H15		Poly-ethylene (PE, HD PE or UHMW PE) also valid for +DE and +H15		Polyoxy-methylene (POM) Acetal (AC) also valid for +AS, +EC, +DE, +UV, +UVC, +IM, +JM, +LF, L and U		Polyamide (PA) also valid for +US, +GF, +HT and +IM		Super High Temperature Material (ST)			Thermo-plastic Poly-urethane (TPU)		Thermo-plastic elastomer (TPE) also valid for +FR		Flame retardant Polybuty-leneter-ephthalate (PBT) also valid for +FR	
	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)	93 °C (200 °F)	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)	20 °C (70 °F)	60 °C (140 °F)
Phenol – 5%	■	■	■	■	□	□	□	□				□				▼	□
Phosphoric Acid – 30%	■	■	■	■	▼	□	□	□	□							■	□
Phosphoric Acid – 85%	■	■	■	■	□	□	□	□	□							■	□
Photographic Solutions	■	■	■	■			■										
Plating Solutions	■	■	■	■													
Potassium Comp.	■	■	■	■	■	■	▼					■				■	■
Potassium Hydroxide	■	■	■	■	■	■	▼		■	■	■					□	
Potassium Iodide (3% Iodine)	■	■	■	■													
Potassium Permanganate	■	▼	■	■			□	□	□								
Silver Cyanide	■	■															
Silver Nitrate	■	■	■	■													
Sodium Comp.	■	■	■	■													
Sodium Chlorite	■	▼	■	■			□	□	■	■	■						
Sodium Hydroxide – 60%	■	■	■	■	■	■	□	□	■	■	■	▼		▼		□	
Sodium Hypochlorite – 5%	■	▼	■	▼	□	□	▼		▼	▼	▼					■	▼
Stearic Acid	■	▼	■	■	▼		■	■									
Sulfamic Acid – 20%	■	■			□	□											
Sulfate Liquors	■	■															
Sulfur	■	■	■	■			■	■									
Sulfur Chloride	■																
Sulfur Dioxide	■	■	■	■	□	□	▼	▼									
Sulfuric Acid – 10%	■	■	■	■	■	□	□	□	■	▼	□	▼		■		■	■
Sulfuric Acid – 50%	■	■	■	■	□	□	□	□	▼	□	□	▼		■		▼	
Sulfuric Acid – 70%	■	▼	■	▼	□	□	□	□	□	□	□	▼				□	
Sulfurous Acid	■		■	■			▼	▼									
Tannic Acid – 10%	■	■	■	■													
Tartaric Acid	■	■	■	■			■	▼				■					
Tetrahydrofuran	▼	□			▼	▼	■										
Toluene	□	□	□	□	▼	□	■	■	■	■	■	▼				■	□
Transformer Oil	■	▼	■	▼			■	■	■	■	■	■		□			
Tributyl Phosphate	■	▼															
Trichloroacetic Acid	■	■	▼				□	□									
Trichloroethylene	□	□	□	□	▼	▼	▼	□				□				▼	□
Tricresyl Phosphate	■	▼															
Trisodium Phosphate	■	■	■	■													
Turpentine	▼	□	■	□	■		■	■				▼				■	■
Urea	■	■	■	■	■		■	■				■				■	
Vinegar	■	■	■	■	■	■	■	■	■	■	■	▼					
Wine	■	■	■	■	■	■	■	■	■	■	■	■					
Xylene	□	□	□	□	■	■	■	■				▼				▼	□

Material properties
General material data

Criteria	Unit	PP Polypropylene	PE Polyethylene (HD PE, UHMW PE)	POM Polyacetal	PA6, PA6.6 Polyamide	Carbon steel	Stainless steel
Density	g/cm^3	0,90	0,94	1,42	1,14	7,8	7
E-module	N/mm^2	1'500	800 – 1'100	3'200	1'400 – 2'000	206'000	195'000
Tensile strength	N/mm^2	30	24	70	40 – 65	350 – 550	800 – 900
Melting point	°C	165	135	166	223 – 263	1500	1400
Linear coefficient of thermal expansion	(mm/m · °C) *(in/ft · °F)*	0,13 *0,00087*	0,20 *0,00133*	0,09 *0,00060*	0,12 *0,00078*	0,011 *0,000073*	0,010 – 0,016 *~0,00009*
Ball hardness	N/mm^2	60	38	114	70 – 90		

Appendix
Trouble-shooting guide

➔ Tracking problems

Possible cause	Proposed measures
Sprockets are not "timed" correctly	If the total number of teeth is not divisible by 4, the sprockets must be "timed" by alignment of the timing marks.
Sprockets on drive and idle shaft misaligned; locked sprocket on drive or idle shaft has incorrect placement or is loose	The center sprocket on the drive and idle shafts must be aligned and engaging the belt. Check the retaining devices to ensure the sprockets are secured.
Conveyor frame not level and square	Check and adjust if necessary.
Drive and idle shafts are not level and square with each other	Check and adjust if necessary to ensure that drive and idle shafts are level and square.
Bad splice in belt	Inspect belt for a bad splice.

➔ Sprocket engagement fails

Possible cause	Proposed measures
Incorrect "A" and "C" dimensions (see Design Guide)	Check to see that the shaft is adjusted to provide the recommended "A" and "C" dimensions (Design Guide).
Sprockets not timed correctly	If the total number of teeth is not divisible by 4, the sprockets must be "timed" by alignment of the timing marks.
Insufficient belt tension	Check to see that there is sufficient length for catenary sag located at the recommended area, see Design Guide.
Arc of contact too small	Min. arc of contact between belt and sprocket approx 150°. In critical cases increase the arc of contact to ≥180° by installation of support roller (see Design Guide)

➔ Excessive sprocket wear

Possible cause	Proposed measures
Abrasive material	Improve cleaning or add protective shields to reduce the amount of abrasive material contacting the belt and sprockets. Use TPU sprockets.
Incorrect number of sprockets	Check to see if the minimum number of recommended sprockets is used. Too few sprockets will cause premature sprocket wear.
Sprockets not timed correctly	If the total number of teeth is not divisible by 4, the sprockets must be timed by alignment of the timing marks.
Incorrect "A" and "C" dimensions	Check to see that the shaft is adjusted to provide the recommended "A" and "C" dimensions.
Locked sprocket on drive or idle shaft has incorrect placement or is loose (sprockets misaligned)	The center sprocket on the drive and idle shafts must be aligned and engaging the belt. Check the retaining devices to ensure the sprockets are secured.
High belt speed	High belt speeds will increase the wear especially on conveyors with short centerline distances. Reduce belt speed if possible.
High belt tension	High belt tension will increase belt wear. Check to ensure that recommended catenary sag is present. Use TPU sprockets.

Appendix
Trouble-shooting guide

➔ Excessive belt wear

Possible cause	Proposed measures
Abrasive material	Improve cleaning or add protective shields to reduce the amount of abrasive material contacting the belt and sprockets.
Incorrect belt material	Check material specifications to ensure that the optimal material is used. Call Habasit technical service for a recommendation.
Incorrect wear strip material	Check material specifications to ensure that the optimal material is used. Call Habasit technical service for a recommendation.
Incorrect wear strip placement	Check material specifications to ensure that the optimal material is used. Call Habasit technical service for a recommendation.
Method of product loading	Reduce the distance that product is deposited on the belt. If product sliding occurs, refer to material specifications.
High belt speed	High belt speeds will increase the wear especially on conveyors with short centerline distances. Reduce belt speed if possible.

➔ Belt stretching and excessive catenary sag

Possible cause	Proposed measures
Abrasive material	Improve cleaning or add protective shields to reduce the amount of abrasive material contacting the belt and sprockets.
Incorrect tension	Adjust.
Incorrect belt/rod material	Check the material combinations used and call Habasit to confirm the correct material application.
High temperatures	High temperatures cause the belt to elongate a large percentage. Check if the catenary sag is long enough to compensate the elongation. It might be necessary to install a gravity or pneumatic tensioning device.

➔ Pivot rod (hinge pin) migrating out of belt

Possible cause	Proposed measures
Rods not properly seated in snap-in position	Check if rod head and/or edge module is damaged; if necessary replace. Reinstall properly.
Rod elongates due to high load and/or high temperature	Shorten rod and reinstall or replace by new and shorter rod.
Rod does not snap in properly (too loose or too tight)	Check if correct rod is used -> see PDS
Rod cannot be extracted	Smart Fit retaining system: check correct screw driver position (should be between modules).

Appendix
List of abbreviations

1. Symbols for calculations

Term	Symbol	Metric unit	*Imperial unit*
Coefficient of thermal expansion	α	$\frac{mm}{m \cdot °C}$	$\frac{inch}{ft \cdot °F}$
Coefficient of friction belt/support	μ_G	–	–
Coefficient of friction belt/product	μ_P	–	–
Belt width	b_0	mm	*inch*
Radius factor (for radius belts only)	c_R	–	–
Service factor	c_S	–	–
Temperature factor	c_T	–	–
Speed factor	c_V	–	–
Pitch diameter of sprocket	d_P	mm	*inch*
Shaft diameter	d_W	mm	*inch*
Shaft deflection	f	mm	*inch*
Admissible tensile force, per m of belt width	F_{adm}	N/m	*lb/ft*
Belt tension caused by the catenary sag	F'_C	N/m	*lb/ft*
Effective tensile force (belt pull), per m of belt	F'_E	N/m	*lb/ft*
Nominal tensile strength, per m of belt width	F'_N	N/m	*lb/ft*
Adjusted tensile force (belt pull) with service factor, per m of belt width	F'_S	N/m	*lb/ft*
Shaft load	F_W	N	*lb*
Acceleration factor due to gravity	g	9.81 m/s²	–
Conveying height	h_0	mm	*inch*
Height of catenary sag	h_C	mm	*inch*
Distance between conveyor shafts	l_0	m	*ft*
Conveying distance, horizontal projection	l_1	m	*ft*
Belt length with accumulated products	l_a	m	*ft*
Distance between bearings	l_b	mm	*inch*
Length of catenary sag	l_C	mm	*inch*
Total geometrical belt length	l_g	mm	*inch*
Length of curve (radius belt)	l_R	mm	*inch*
Mass of belt / m² (weight of belt / m²)	m_B	kg/m²	*lb/sqft*
Mass of product / m² (weight of prod. / m²)	m_P	kg/m²	*lb/sqft*
Belt (module) pitch	p	mm	*inch*
Power, motor output	P_M	kW	*PS*
Collapse factor (radius belts)	Q	–	–
Inner radius of curve radius belt	R	mm	*inch*
Operation temperature	T	°C	*°F*
Torque of motor	T_M	Nm	*in-lb*
Belt speed	v	m/s	*ft/min*

Appendix
List of abbreviations

2. Symbols for illustrations

Term	Symbol	Metric unit	*Imperial unit*
Sprocket distance	a	mm	*inch*
Level (height) of belt surface in respect to the shaft center	A_0	mm	*inch*
Level (height) of slider support in respect to the shaft center	A_1	mm	*inch*
Hub size (shaft diameter) of sprocket, square or round	B	mm	*inch*
Belt	BE		
Width (length) of sprocket hub	B_L	mm	*inch*
Distance between end of slider support and sprocket shaft center	C	mm	*inch*
Catenary sag	CA	–	–
Pitch diameter of sprocket	d_p	mm	*inch*
Offset center sprocket from belt centerline	e	mm	*inch*
Flight indent (free belt edge)	E	mm	*inch*
Free belt edge outside of flight row	E	mm	*inch*
Free belt edge outside of side guard	F	mm	*inch*
Gap between flights and side guards	G	mm	*inch*
Height of flights / side guards	H	mm	*inch*
Thickness of transfer plate (comb)	K	mm	*inch*
Length of flight module	L	mm	*inch*
Motor / drive shaft	M	–	–
Inside radius of radius belt	R	–	–
Retainer clip for sprockets	RC	–	–
Belt thickness	S	mm	*inch*
Side guides radius belt (hold-down rails)	SC	–	–
Wear strip for support of flights on return way	SF	–	–
Slider shoe for hold-down or support of belt	SH	–	–
Sprocket	SP	–	–
Slider support return side	SR	–	–
Slider support transport side	ST	–	–
Take-up device (tensioning device)	TU	–	–
Idling shaft	U	–	–
Width of transfer plate (comb)	W	mm	*inch*
Length of transfer plate (comb)	W_L	mm	*inch*
Sprocket distance to right belt edge	X_R	mm	*inch*
Sprocket distance to left belt edge	X_L	mm	*inch*

Appendix
Conversion of units metric / imperial

Metric units		multiply by...➔	for imperial units		multiply by...➔	for metric units	
Length							
mm	(millimeter)	0.0394	*in.*	*(inch)*	25.4	mm	(millimeter)
m	(meter)	3.281	*ft.*	*(foot)*	0.3048	m	(meter)
Area							
mm^2	(square-mm)	0.00155	*in^2*	*(square-inch)*	645.2	mm^2	(square-mm)
m^2	(square-m)	10.764	*ft^2*	*(square-foot)*	0.0929	m^2	(square-m)
Speed							
m/min	(meter/min)	3.281	*ft/min*	*(foot/min)*	0.3048	m/min	(meter/min)
Mass							
kg	(kilogram)	2.205	*lb*	*(pound-weight)*	0.4536	kg	(kilogram)
kg/m^2	(kilogram/sqm)	0.205	*lb/ft^2*	*(pound/sqft)*	4.882	kg/m^2	(kilogram/sqm)
Force and strength							
N	(Newton)	0.225	*lb*	*(pound-force)*	4.448	N	(Newton)
N/m	(Newton/meter)	0.0685	*lb/ft*	*(pound/foot)*	14.6	N/m	(Newton/meter)
Power							
kW	(kilowatt)	1.341	*hp*	*(horsepower)*	0.7457	kW	(kilowatt)
Torque							
Nm	(Newton-meter)	8.85	*in-lb*	*(inch-pound)*	0.113	Nm	(Newton-meter)
Temperature							
°C	(Celsius)	9 · (°C / 5) +32°	*°F*	*(Fahrenheit)*	5/9 · (°F -32°)	°C	(Celsius)

Appendix
Glossary of terms

Term	Explanation	Habasit symbol
Accumulation conveyors	Conveyors that collect temporary product overflows.	l_a
Accumulation length (distance)	Distance of product accumulation in running direction of the belt.	
Acetal	*see Polyacetal.*	
Adjusted tensile force (adjusted belt pull) per meter of belt width	Applies a service factor to adjust the effective tensile force calculated near the driving sprocket, taking into account possible inclines and frequent start/stops.	F'_S
Admissible tensile force per meter of belt width	Force or belt pull per meter of belt width allowed near the driving sprocket under process conditions (temperature, speed).	F'_{adm}
Transport length	Conveying length measured between the centers of driving and idling shafts.	l_0
Backbending	Negative bending of the belt (opposite of belt bending over sprocket)	
Belt length, inclined	Conveying length measured as vertical projection of distance between the centers of driving and idling shafts.	l_1
Belt length (theoretical)	Length of belt measured around the sprockets including additional length of catenary sag.	l_g
Belt pitch (module pitch)	Center distance between the pivot rods (hinge rods) of a belt module.	**p**
Belt width	Geometrical width of assembled belt from edge to edge.	b_0
Bi-directional drive	Driving concept allowing to run the belt forward and backward.	
Bricklayed	Modules of the assembled belts are staggered from row to row (like bricks of a brick wall).	
Carry way	Transport side of the belt, carrying the product.	
Catenary sag	Unsupported length of the belt for absorbing belt length variations due to thermal expansion and load changes of belt.	**CA**
Center driven belt	Sprocket of the belt engaging in the middle of the modules.	
Central drive concept	Motor located on the lower belt track halfway in-between of the belt ends (for bi-directional drive).	
Chevron supports	Belt supports with wear strips arranged in an overlapping "V"-pattern.	
Chordal action	Polygon effect: Pulsation of the belt velocity caused by the polygon shape of the driving sprocket, with rise and fall of the belt surface.	
Coefficient of friction	Ratio of frictional force and contact force acting between two material surfaces.	μ_G, μ_P
Coefficient of thermal expansion	Ratio of belt lengthening and the product of belt length and temperature change.	α
Dead plate	Metal or plastic plate installed between meeting conveyors as transfer bridge.	
Effective tensile force (effective belt pull) per meter of belt width	Calculated near the driving sprocket, where it reaches in most cases its maximum value during operation. It depends on the friction forces between the belt and the slider supports (ST) and (SR) as well as friction against accumulated load.	F'_E
Elevating conveyor	Conveyors transporting the products to a higher or lower level, using flights or other suitable means to keep the products in place.	
EU	Material is compliant for food contact articles in at least one member state of the European Union.	**EU**
FDA	Food and drug administration. Federal agency of the US which regulates materials that may come in contact with food.	**FDA**
Finger plates (Combs)	Transfer plates, installed at the belt ends of a raised rib belt. Their fingers extend between the ribs of the belt for smooth transfer of the product	
Flat top belt	Flat top belt with 0% open area and a variety of reverse sides, e. g. smooth (M5010) or grid-like reinforcement (e. g. M2520)	
Flat top belt, perforated	The same as flat top belt solid, but its plate-modules are providing slots or holes for draining fluids.	
Flight	Belt module with molded vertical plate for elevating conveyors. The flights prevent the product from slipping back while being moved upwards.	

Appendix
Glossary of terms

Term	Explanation	Habasit symbol
Flush grid belt	Belt with large percentage of open area, usually over 20%. Particularly suitable for washing, cooling applications or if dust/dirt is falling off the product.	
Gravity take-up	Belt is tensioned by the weight of a roller resting on the belt at the catenary sag on its return way (for long belts mainly).	
Hinge driven belts	Sprocket engages at the hinge of the belt.	
Hold-down device	Module for straight running belts with T-shaped tab on the belt bottom, running in special guiding rails. Main application for large Z-conveyors to keep the belt on the base when changing from horizontal to inclined run.	
Hold-down tab (Hook modules)	"Hook" shaped tabs on the bottom of the radius belt edge, running below a gide rail. Prevent belt lifting in the curve.	
Idling shafts	Shaft at the belt end opposite to the driving shaft. It is normally equipped with sprockets. Alternatively for shorter belts flat drums can be used.	
Indent	Space at belt edge free of flight or rubber lining.	
ISO 340 and EN 20340	International Standard for flame retardation of conveyor belts. Standardized test specimen is cut out of a belt including rod and modules and will be exposed to a flame for 45 seconds. Standard is fulfilled if the flame is extinct within 15 seconds after the flame is removed.	**ISO 340**
Mass of belt per m² (belt weight per m²)	The belt mass (weight) is added to the product mass per m² for calculation of the friction force between belt and slider frame.	$\mathbf{m_B}$
Mass of product per m² (product weight per m²)	Conveyed product weight as expected to be distributed over the belt surface; calculated average load per m².	$\mathbf{m_P}$
Nominal tensile strength per meter of belt width	Catalogue value. It reflects the maximum allowable belt pull at room temperature and very low speed.	$\mathbf{F'_N}$
Oblong hole	Pivot hole with oblong shape for better cleaning.	
Open area	Percentage of open surface (real openings in projection, perforation of the belt).	
Open contact area	Percentage of belt surface which is not in contact with the conveyed product.	
Open hinge	The module hinge is designed in a way that the pivot rod (hinge rod) is exposed to a part of its surface allowing better cleaning.	
Perforated flat top	see flat top perforated	
Pitch diameter	Diameter of the sprocket which defines the position of the pivot rods of the driven belt.	$\mathbf{d_P}$
Pivot rods (hinge rods)	These rods (pins) link the modules of a belt to provide pivoting and strong connection. Materials are normally PP, POM and PE.	
Polygon effect	*"Chordal action":* Pulsation of the belt velocity caused by the polygon shape of the driving sprocket, with rise and fall of the belt surface.	
Radius belt	Belt suitable for running around curves (radius applications).	
Raised rib belt	Belt with higher longitudinal ribs on its top surface. These ribs create longitudinal "slots" for the engagement of finger plates for smooth product transfer at the belt ends.	
Screw type take-up	The catenary sag is adjusted by means of a screw tensioning device at the *idling* shaft of the conveyor.	
Service factor	The calculated *effective belt pull* is adjusted with the service factor taking into account possible heavy running conditions (start/stop, inclination).	$\mathbf{c_S}$
Sideguards	Plates designed to be installed lengthwise at the belt edge to form a wall. Usually used in connection with flights.	
Slider support/bed	Frame equipped with wear strips to carry the running belt with low friction and wear. A closed plate is called a slider bed.	**ST, SR**
Speed factor	*The nominal tensile strength* , valid at very low speed and room temperature, is reduced to the admissible tensile force by the influence of higher speed and/or temperature; therefore it is multiplied with the respective factor.	$\mathbf{c_V}$

Appendix
Glossary of terms

Term	Explanation	Habasit symbol
Spiral conveyor	Radius belt with more than 1 full turn, travelling in a helical path around a central cylinder upwards or downwards.	
Sprocket	Gear, mostly plastic, in exceptional cases made of metal, shaped to engage in the grid pattern of the belt modules, providing positive torque transmission to the belt.	
Take-up	Tensioning device for adjustment of the catenary sag, screw type, gravity type or spring loaded type at the idling shaft of the conveyor	**TU**
Temperature factor	*The nominal tensile force*, valid at very low speed and room temperature, is reduced to the admissible tensile force by the influence of higher speed and/or temperature; therefore it is multiplied with the respective factor.	c_T
USDA	United States Department of Agriculture. US federal agency which had defined requirements for equipment which may be in contact with meat and poultry or dairy.	**USDA**
UL 94	Underwriters Laboratories Standard for flame retardation of thermoplastic materials. UL94 V0 (5 samples, mean duration of burning ≤ 10 sec) UL94 V1 (5 samples, mean duration of burning ≤ 30 sec) UL94 V2 (like V1 but burning particles may drop down) UL94 HB (test material which does not fulfil V1 can be tested with horizontally arranged test specimens instead of vertically)	**UL 94 V0** **UL 94 V1** **UL 94 V2** **UL 94 HB**
Wear strip	Plastic strip, mainly from PE, used on the support frame of the belt to provide low friction and low wear.	

Note

The "apostrophe" after the symbols (F') indicates that these forces are not absolute values but are specific forces (N per meter of belt width).

Recommendations for nosebars, support, idling rollers and backbending diameters

	Nosebar diameter		Diameter for idling rollers [U]		Diameter for support rollers [R1]		Diameter of gravity, center and lower head drive rollers [R2]		Backbending radius for elevators Z- conveyor without side guards		Backbending radius for elevators Z- conveyor with side guards	
Belt Series	**mm**	***inch***	**mm**	***inch***	**mm**	***inch***	**mm**	***inch***	**mm**	***inch***	**mm**	***inch***
M0800	7	*0.28*	7	*0.28*	50	*2.0*	50	*2.0*	-	-	-	-
M1100	12	*0.5*	12	*0.5*	50	*2.0*	75	*3.0*	-	-	-	-
M1200	18	*0.7*	18	*0.7*	50	*2.0*	75	*3.0*	150	*6.0*	250	*10.0*
M2400			40	*1.6*	50	*2.0*	100	*4.0*	150	*6.0*	-	-
M2500			40	*1.6*	50	*2.0*	100	*4.0*	150	*6.0*	250	*10.0*
M2600			40	*1.6*	50	*2.0*	100	*4.0*	150	*6.0*	-	-
M3800			60	*2.4*	100	*4.0*	150	*6.0*	150	*6.0*	250	*10.0*
M5000			90	*3.5*	100	*4.0*	150	*6.0*	150	*6.0*	250	*10.0*
M5100			90	*3.5*	100	*4.0*	150	*6.0*	150	*6.0*	-	-
M5200			100	*4.0*	100	*4.0*	150	*6.0*	150	*6.0*	-	-
M6300			100	*4.0*	100	*4.0*	150	*6.0*	150	*6.0*	-	-
M6400			100	*4.0*	100	*4.0*	200	*8.0*	200	*8.0*	-	-

See illustrations on pages 42, 43 and 62.

Appendix
Coefficient of friction values

Coefficient of friction between belt and slider support (wear strips), μ_G

Following tables list the coefficient of friction under lab condition (new clean belt and new wear strip) and should not be used for calculation.

For calculation please use program LINK SeleCalc including coefficients of friction of different conditions.

Belt material	Condition	UHMW PE	HDPE	Lubricat. PA	Steel	Hard wood (beech)
Polypropylene	dry	0.13	0.11	0.13	0.25	0.22
(PP)	wet (water)	0.11	0.10	not recom.	0.20	not recom.
Polyethylene	dry	0.32	not recom.	0.12	0.11	0.16
(PE)	wet (water)	0.25	not recom.	not recom.	0.12	not recom.
Polyoxymethylene Acetal	dry	0.10	0.08	0.10	0.14	0.12
(POM)	wet (water)	0.10	0.08	not recom.	0.12	not recom.
Polyamide (PA)	dry	0.14	0.14	0.12	0.18	0.2
Polyamide reinforced (PA +HT, PA+GF)	dry	0.14	0.15	0.16	0.16	0.18
Super High Temperature	dry	not recom.	not recom.	not recom.	0.23	not recom.
(ST)	wet (water)	not recom.	not recom.	not recom.	0.23	not recom.
Flame retardant Polybutyleneterephthalate	dry	0.11	0.10	0.10	0.18	0.2
(PBT+FR)	wet (water)	0.11	0.10	not recom.	0.18	not recom.
Flame retardant Polypropylene	dry	0.18	0.19	0.17	0.27	0.26
(PP+FR, PA+FC)	wet (water)	0.19	0.19	not recom.	0.27	not recom.
Submersible Polypropylene	dry	0.15	0.15	0.17	0.20	0.24
(PP+GR)	wet (water)	0.15	0.15	not recom.	0.20	not recom.

* on request

Coefficient of friction between belt and product, μ_P

Belt material	Condition	Glass	Metal	Plastic (PET)	Cardboard	
Polypropylene	dry	0.19	0.32	0.17	0.22	
(PP)	wet (water)	0.17	0.30	0.15	not recom.	
Polyethylene	dry	0.10	0.13	0.10	0.15	
(PE)	wet (water)	0.08	0.11	0.08	not recom.	
Polyoxymethylene Acetal	dry	0.15	0.20	0.18	0.20	
(POM)	wet (water)	0.13	0.18	0.15	not recom.	
Polyamide (PA, PA+US)	dry	0.17	0.19	0.12	0.17	
Polyamide reinforced (PA+HT, PA+GF)	dry	0.13	0.20	0.13	0.20	
Super High Temperature	dry	0.12	0.23	0.13	0.21	
(ST)	wet (water)	*	*	*	not recom.	
Flame retardant Polybutyleneterephthalate	dry	0.14	0.18	0.12	0.17	
(PBT +FR)	wet (water)	0.14	0.18	0.12	not recom.	
Flame retardant Polypropylene	dry	0.18	0.25	0.21	0.24	
(PP+FR, PP+FC)	wet (water)	0.19	0.19	0.14	not recom.	

* on request

Note

The friction values listed in the above tables are valid for new belts and wear strips in clean environment. For regular conditions and after certain runtime these values can be around 1.5–2.5 times higher, for highly abrasive or dirty conditions about 2.5–3.5 times. The values for glass are valid for new material. Recycled glass usually has higher friction values.

The Habasit solution

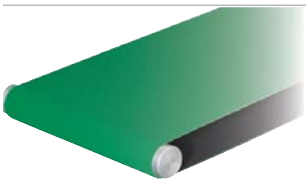
Customers first
At Habasit we understand that our success depends on your success. This is why we offer solutions, not just products; partnership, not just sales.
Since our foundation in 1946, Habasit has brought this understanding of customer needs to life every day and for every application. That's why we're the No. 1 in belting today. Worldwide.
Learn more on www.habasit.com

Committed to innovation
Habasit is strongly committed to the continuous development of innovative, value-added solutions. Over 3% of our staff are dedicated exclusively to R&D, and our annual investment in this area exceeds 8% of turnover.

Certified for quality
We deliver the highest quality standards not only in our products and solutions, but also in our employees' daily work processes. Habasit AG is certified according to ISO 9001:2000.

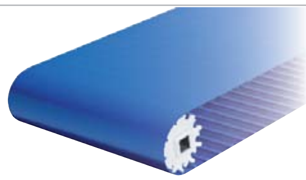
Certified Management System SQS ISO 9001

Worldwide leading product range
Habasit offers the largest selection of belting, conveying, processing and complementary products in the industry. Our response to any request is nothing less than a specific, tailor-made solution.

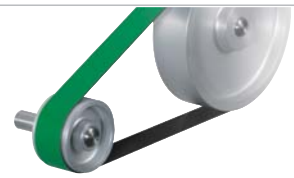


Fabric based conveyor and processing belts
HabaFLOW®

Plastic modular belts
HabasitLINK®/KVP®



Positive drive conveyor and processing belts
Habasit Cleandrive™

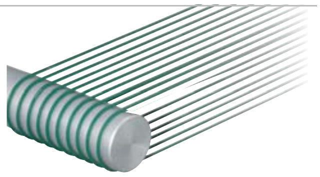


Power transmission belts
HabaDRIVE®

Timing belts
HabaSYNC®

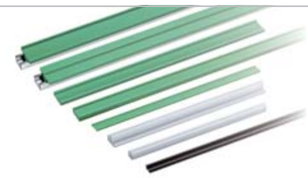
Chains (slat and conveyor chains)
HabaCHAIN®

Machine tapes



Round belts

Seamless belts



Profiles, Guides, Wear strips
HabiPLAST®

Fabrication tools (joining tools)

Gearmotors
Electric motors
Motion control

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Rossi is one of Europe's largest manufacturers of gear reducers, gearmotors, inverters, standard and brakemotors, and is a member of the Habasit Group.

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