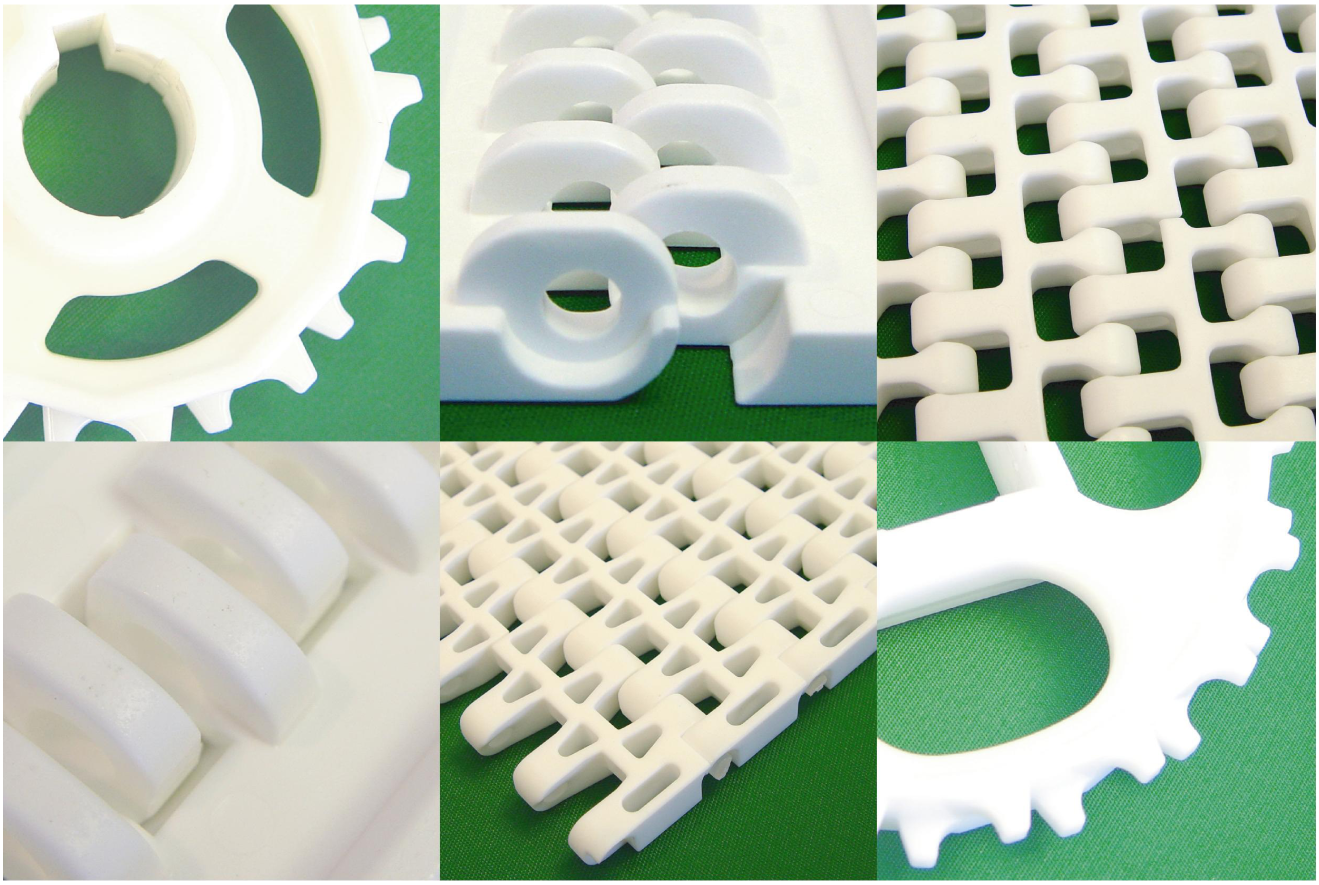
5310

Engineering Guidelines

HabasitLINK® – Modular Belts



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Habasit – your Partner

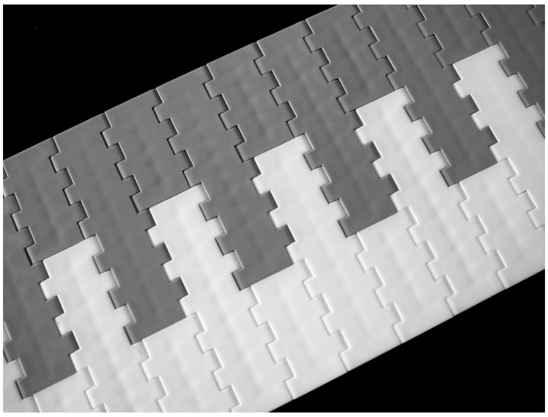
Habasit was founded in 1946 and has accumulated more than 50 years of belting experience. Production at Habasit is maintained by well trained and committed teams. Our activities are supported by in-house Research & Development teams and aim at excellence in application and customer oriented solutions.
Habasit – your modular belting source for high quality injection molded belt designs, innovative engineering, concepts and materials.

This manual provides all information for belt evaluation, calculation, availability and application of the **HabasitLINK® Modular Belts.**

The Features of Modular Belts

"Bricklayed" belt pattern

The **HabasitLINK®** Modular Belts are constructed with modules molded from thermoplastic materials connected with solid plastic rods. The all plastic design promotes long life and superior performance in many applications. 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

Habasit Modular Belts are available in 4 module pitches:

Series 1200, pitch 0.5" (12.7 mm):	"Minipitch" belts for tight transfers
Series 2500, pitch 1" (25.4 mm):	General conveying
Series 3800, pitch 1.5" (38.1 mm):	Heavy duty radius belt
Series 5000, pitch 2" (50.8 mm):	Heavy duty for high loads

All pitch sizes are offered in various styles, see pages 8 to 16.

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):

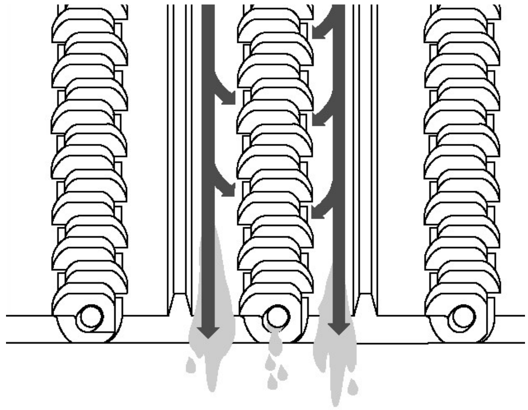
- **Open area (free flow)**: This is the effective area (%) of vertical openings in the belt. It is relevant for the flow rate through the belt (resistance to air and water flow).
- **Open contact area**: This is the area of the belt (%) which is not in contact with totally flat product conveyed on its surface. This figure is larger than the open area and relevant for the contact of air to the product surface for cooling operations.

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.

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 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.

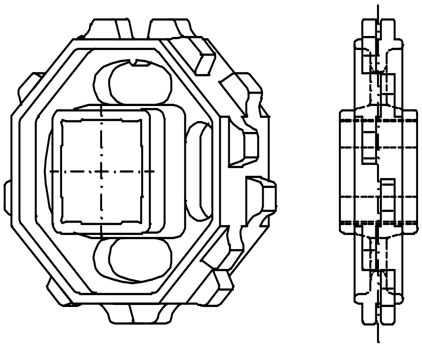


USDA acceptance

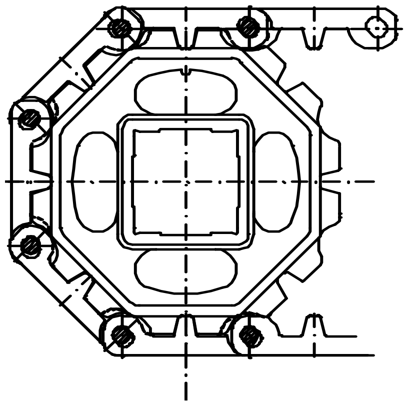
Prior to publication of this manual, the USDA Meat & Poultry discontinued publishing a list of acceptable products designed for food contact. Third party approvals are being investigated but are not yet authorized by the USDA. All HabasitLINK open hinge products are conform to the prior USDA standards.

The HabasitLINK® drive system

All HabasitLINK® belts are positively driven by injection molded plastic sprockets, featuring a double row of teeth that allow bi-directional drive, superior sprocket to belt engagement and long sprocket life.
Another advantage of HabasitLINK® molded sprockets is the "open-window" design that promotes sanitation across the full width of the conveyor shafts.



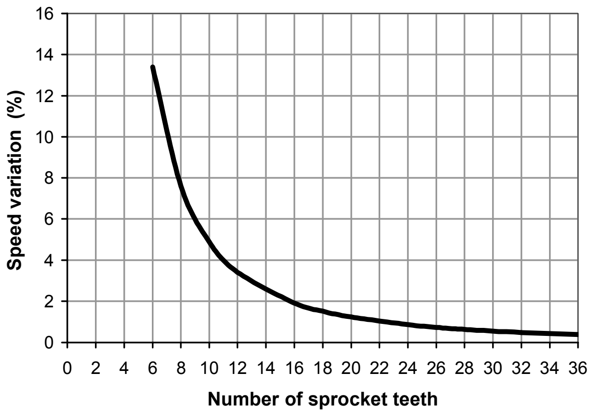
Sprocket



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

Belt Materials

The following standard materials are applied for HabasitLINK® Modular Belts. Other materials such as Nylon, conductive POM, flame retardant PP, are available on request; contact a Habasit representative.

Material	Code	Property	Density gr/cm³	Temperature range	Habasit colors
Polypropylene	PP	Thermoplastic material with good cost/ performance relation (material for most of the common conveying applications). Excellent chemical resistance against acids and alka-lines. FDA approved. Belt impacts below 10 °C *(40 °F)* should be avoided.	0.9	+5 ° to +105 °C *+40 ° to +220 °F*	white grey blue
Polyethylene	PE	Thermoplastic material well suited for very low temperatures and/or with high impact applications. Excellent chemical resistance against acids and alkalines. FDA approved. High coefficient of friction. Not suitable for abrasive applications. *Below -40 °C *(-40 °F)* thermal belt shrinkage may cause the sprocket engagement to fail	0.94	-70 ° to +65 °C (*) *-94 ° to +150 °F (*)*	natural black tan red
Polyoxy-methylene (Acetal)	POM (AC)	Thermoplastic material with high strength and low coefficient of friction. Suitable for heavy conveying applications and low temperatures. Impact and cut resistant surface. Good chemical resistance against oil and alkalines, but not suitable for long term contact with high concentration of acids and chlorine. FDA approved. Combination POM modules and POM rods not suitable!	1.42	wet conditions: -40 ° to +60 °C *-40 ° to +140 °F* dry conditions: -40 ° to +90 °C *-40 ° to +200 °F*	blue white dark grey
Polyamid	PA	Thermoplastic material with good strength and toughness. Suitable for heavy conveying applications at dry and elevated tempera-tures. Material is specially modified to keep its good properties stable over a long time at elevated temperatures. FDA approved. * Above +40 °C the material behaves very tough and evolve it's best properties.	1.14	wet conditions: not recommended dry conditions *: -46 ° to +130°C (short-term +160 °C) *-50 ° to +270 °F* *(short-term +320 °F)*	beige
Electrically conductive Polyoxy-methylene (Acetal)	POM (AC) Code addition +EC	Thermoplastic material with a low electrical surface and volume resistance. Material has a high strength and low coefficient of friction. Suitable for heavy conveying applications and low temperatures. Not FDA approved and not suitable for wet applications. For chemical resistance please contact HQ. Combination POM modules and POM rods not suitable!	1.42	dry conditions: -40 ° to +90 °C *-40 ° to +195 °F*	black

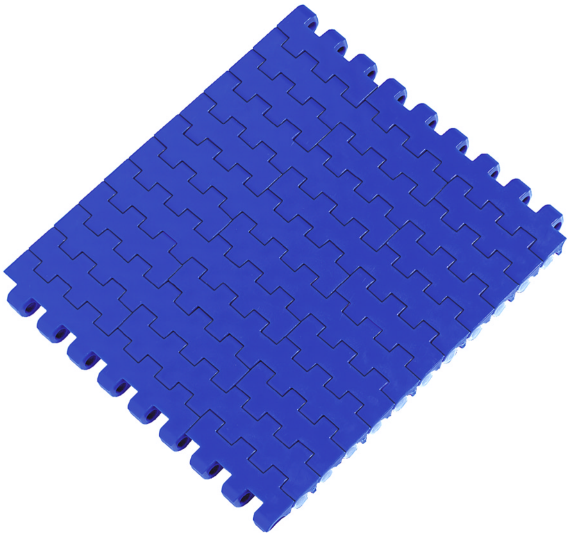
Material	Code	Property	Density gr/cm³	Temperature range	Habasit colors
Detectable Polypropylene	PP Code addition +DE	Thermoplastic material with a special additive, which makes the material very well detectable (x-ray and metal detectors) and electrically conductive. Excellent chemical resistance against alkalines. FDA approved. Belt impacts below 10 °C *(40 °F)* should be avoided.	0.95	+5 ° to +105 °C *+40 ° to +220 °F*	marmo-rate - white
Detectable Polyoxy-methylene (Acetal)	POM (AC) Code addition +DE	Thermoplastic material with a special additive, which makes the material very well detectable (x-ray and metal detectors) and electrically conductive. The material has a high strength and low coefficient of friction. Suitable for heavy conveying applications and low temperatures. Impact and cut resistant surface. Good chemical resistance against oil and alkalines, but not suitable for long term contact with high concentration of acids and chlorine. FDA approved. Combination POM modules and POM rods not suitable!	1.51	wet conditions: -40 ° to +60 °C *-40 ° to +140 °F* dry conditions: -40 ° to +90 °C *-40 ° to +195 °F*	marmo-rate-blue
Thermoplastic elastomer	TPE	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. White TPE rubber is FDA approved. For chemical resistance please contact your Habasit representative.		-40 ° to +60 °C (*) *-40 ° to +140 °F (*)*	black white

Materials for Wearstrips and Guides

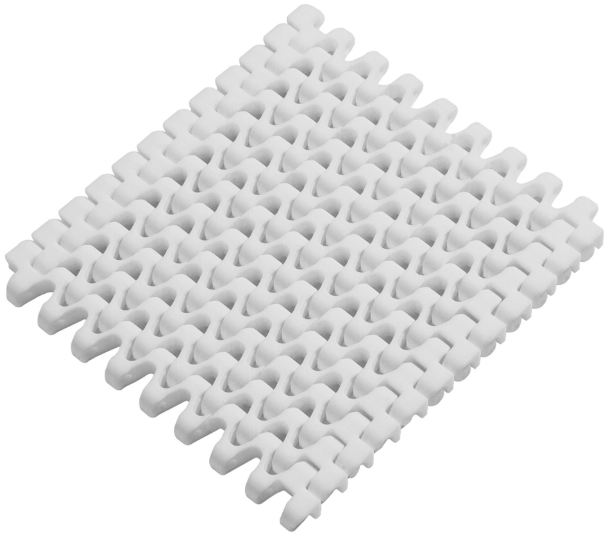
Material	Code	Property	Density gr/cm³	Temperature range
Ultra high molecular weight Polyethylene	UHMW (PE1000)	For heavy conveying applications (high loads); offers reduced wear and longer lifetime. Habasit can offer standard guiding profiles and wearstrips	0.95	-50 ° to +65 °C *-95 ° to +150 °F*
High Density Polyethylene	HDPE (PE 500)	Low cost material suitable for most applications with moderate load and low speed. Not suitable for static nosebars.	0.94	-50 ° to +65 °C *-95 ° to +150 °F*
Polyamide Pre-lubricated PA (eg. Nylatron)	PA6 PA6.6	Thermoplastic material with high strength, high impact resistance and high wear resistance. Suitable for heavy applications. Material is hydroscopic (water adsorption should be taken into account).	1.13	-40 ° to +120 °C *-40 ° to +248 °F*

Product Line – Overview

Series 1200

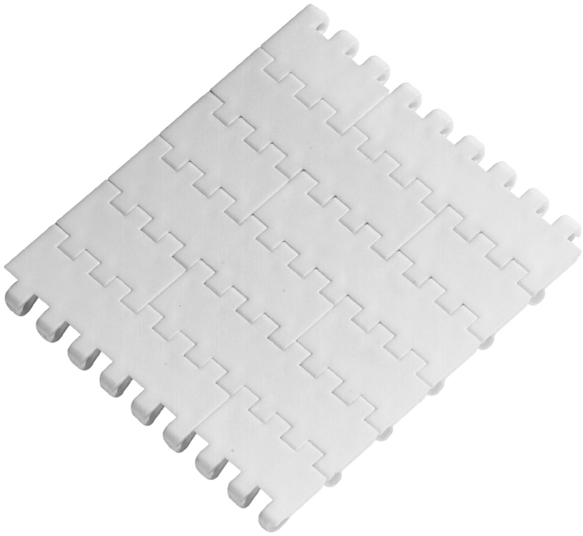


M1220 Flat Top
Pitch 12.7 mm *(0.5")*, 0 % open area

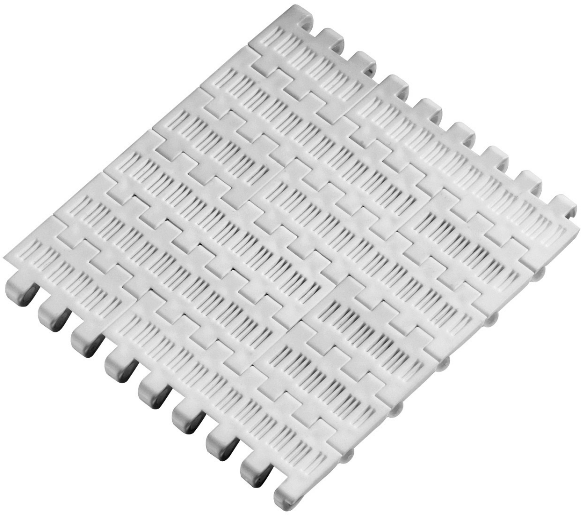


M1233 Flush Grid
Pitch 12.7 mm *(0.5")*, 25 % open area

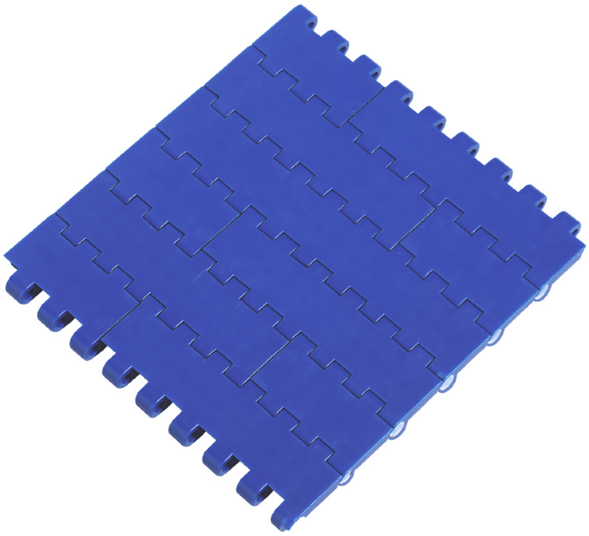
Series 2500



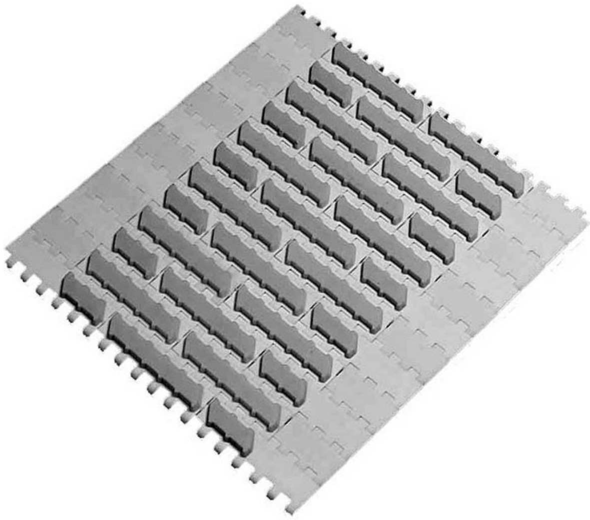
M2510 Flat Top
Pitch 25.6 mm *(1")*, 0 % open area



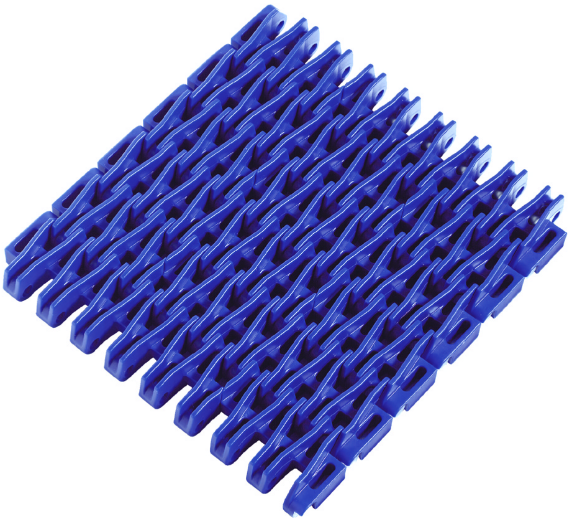
M2511 Mesh Top
Pitch 25.6 mm *(1")*, 16 % open area



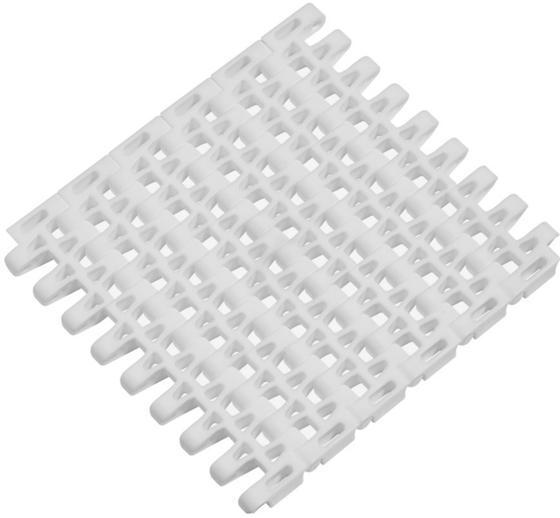
M2520 Flat Top
Pitch 25.4 mm *(1")*, 0 % open area



M2520 Flat GripTop
Pitch 25.4 mm *(1")*, 0 % open area

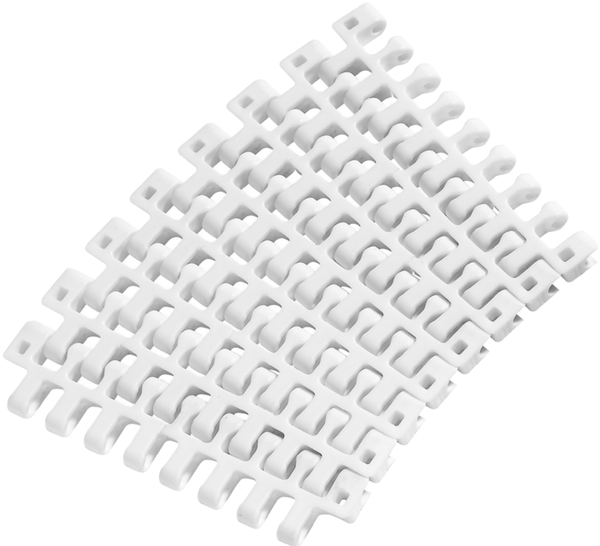


M2531 Raised Rib
Pitch 25.4 mm *(1")*, 35 % open area



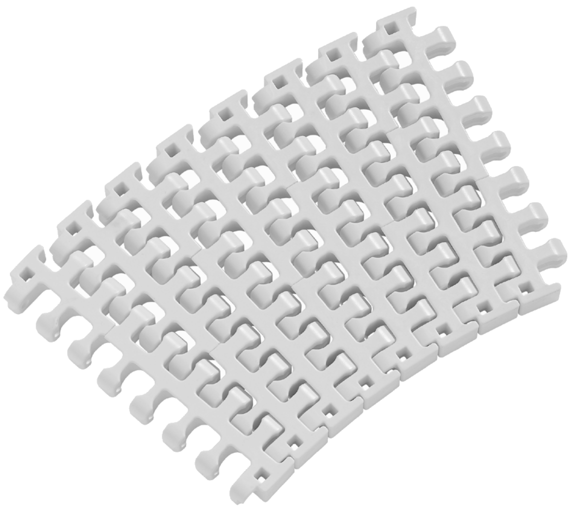
M2533 Flush Grid
Pitch 25.4 mm *(1")*, 35 % open area

Series 2500 Radius Belt



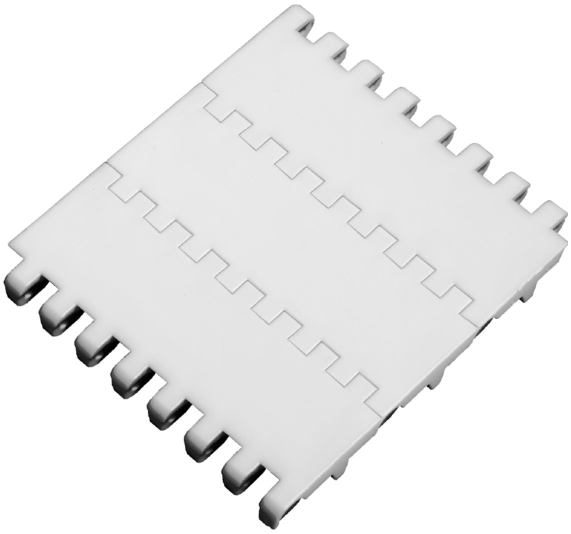
M2540 Radius Flush Grid
Pitch 25.4 mm *(1")*, 35 % open area

Series 3800 Radius Belt

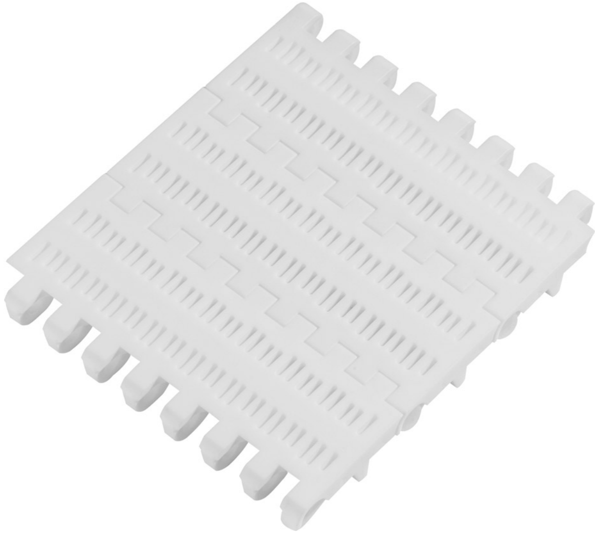


M3840 Radius Flush Grid
Pitch 38 mm *(1.5")*, 31 % open area

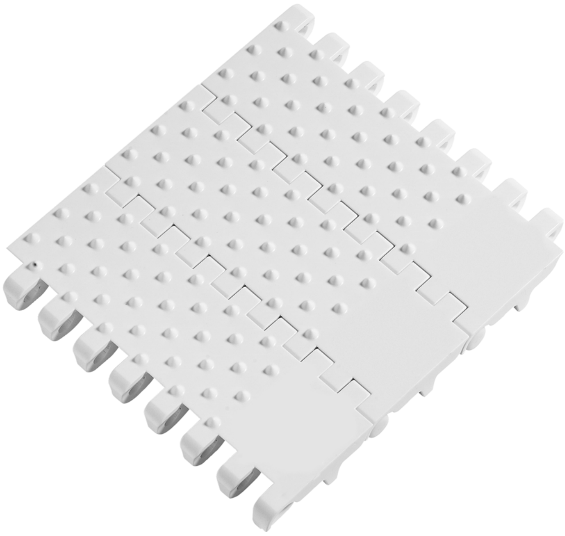
Series 5000



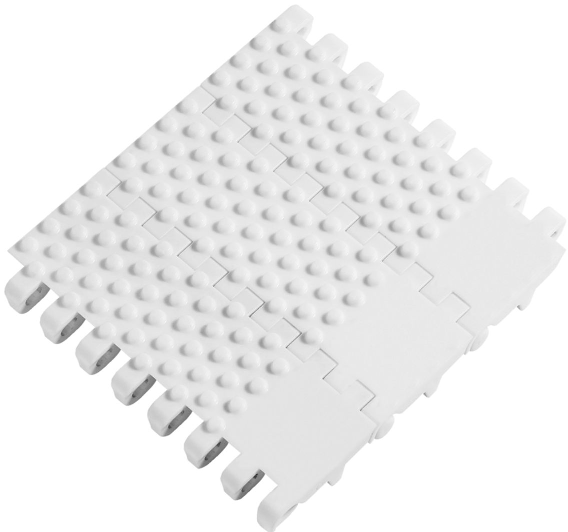
M5010 Flat Top
Pitch 50.8 mm *(2″)*, 0 % open area



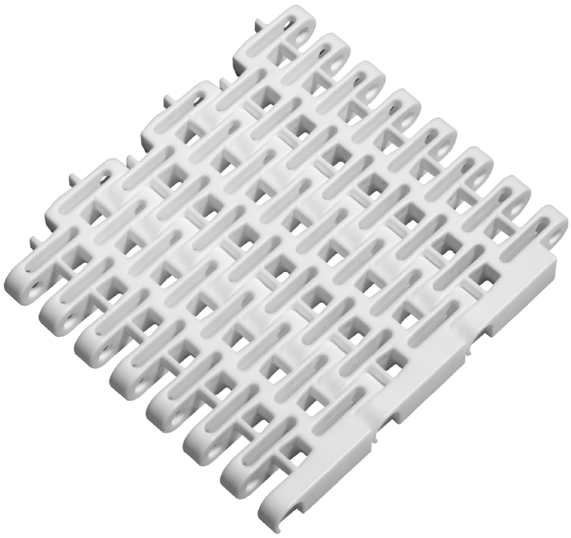
M5011 Flat Top Perforated
Pitch 50.8 mm *(2″)*, 18 % open area



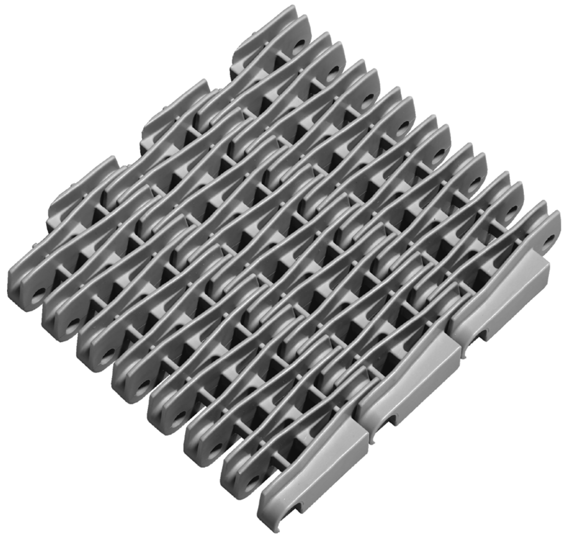
M5013 Cone Top
Pitch 50.8 mm *(2″)*, 0 % open area



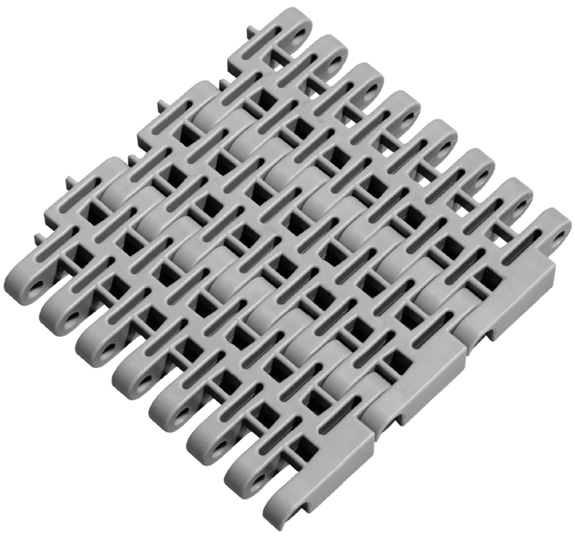
M5014 Nub Top
Pitch 50.8 mm *(2″)*, 0 % open area



M5030 Flush Grid
Pitch 50.8 mm *(2″)*, 37 % open area



M5031 Raised Rib
Pitch 50.8 mm *(2″)*, 37 % open area



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

Availability of Belt Styles, Materials and Colors

Belt Code	Belt Type	Open hinge design	Pitch mm *(inch)*	Belt material and color: PP white	PP grey	PE natural	POM white	POM blue	Flights (Cleats): 25 mm (1")	50 mm (2")	75 mm (3")	100 mm (4")	150 mm (6")	Scoop: 100 mm (4")	150 mm (6")	Side guards: 25 mm (1")	50 mm (2")	75 mm (3")	100 mm (4")	Comb: 150 mm (6")
M1220	Flat Top	yes	12.7 *(0.5)*	■	■	■		■		■										
M1233	Flush Grid	yes	12.7 *(0.5)*	■	■	■		■		■										
M2510	Flat Top	yes	25.4 *(1)*	■		■	■													
M2511	Mesh Top	yes	25.4 *(1)*	■		■	■													
M2520	Flat Top	no	25.4 *(1)*	■	■	■		■	■	■	■						■			
M2520	Flat GripTop	no	25.4 *(1)*	■	■			■												
M2530	Flush Grid	yes	25.4 *(1)*	■	■	■		■	■	■	■						■			
M2533	Flush Grid	yes	25.4 *(1)*	■	■	■		■	■	■	■						■			
M2531	Raised Rib	yes	25.4 *(1)*		■			■												■
M2540	Radius Flush Grid	yes	25.4 *(1)*	■	■		■			■										
M3840	Radius Flush Grid	yes	38 *(1.5)*	■			■			■										
M5010	Flat Top	yes	50.8 *(2)*	■	■	■	■		■	■	■	■	■	■			■	■	■	
M5011	Flat Top Perforated	yes	50.8 *(2)*	■	■	■			■	■	■	■	■	■			■	■	■	
M5013	Cone Top	yes	50.8 *(2)*				■		■	■	■	■	■	■			■	■	■	
M5014	Nub Top	yes	50.8 *(2)*	■		■			■	■	■	■	■	■			■	■	■	
M5030	Flush Grid	yes	50.8 *(2)*	■		■			■	■	■	■	■	■			■	■	■	
M5031	Raised Rib	no	50.8 *(2)*		■															■
M5032	Flush Grid Heavy	no	50.8 *(2)*		■				■	■	■	■	■	■			■	■	■	

■ Standard

☐ not available

Further to the above standard belt materials and colors Habasit provides also special materials such as electrically conductive, detectable materials and Polyamide. For local availability please contact the Habasit representative.

Applications for HabasitLINK® Belts

The listed selections are recommendations only. Other belt styles may be used as well.

Belt Code	Belt Type	Meat (Beef & Pork)									Poultry								Fish processing							
		Cutting lines	Deboning lines	Dressing lines	Fast deboning lines	Packing lines	Elevator	Metal detectors	Packing	Trim lines	Live Birds	Deboning	Cold-discharge	Elevator	General conveyance	Metal detectors	Packing	Freezing	Elevator	Draining	Control tables	General conveyance	Glazing	Metal detectors	Packing	Freezing
Series 1200	**0.5" Belts**																									
M1220	Flat Top							PE							PE	PE										
M1233	Flush Grid							PE							PE	PE					PE	PE PP	PE AC	PE	PE	
Series 2500	**1" Belts**																									
M2510	Flat Top							PE	PE			PE		PE	PE	PE	PE AC PP		PE		PE	PE		PE	PE AC PP	
M2511	Mesh Top																			PE		PE				
M2520	Flat Top																									
M2520	Flat GripTop								PP AC								PP AC								PP AC	
M2530 M2533	Flush Grid							PE	PE						PE	PE	PE			PE PP	PE PP	PE PP	PE AC	PE	PE PP	PE
M2531	Raised Rib																									
M2540	Radius Flush Grid								AC PP						PE AC		PE AC	PE				PE			PP AC	AC PE
Series 3800	**1.5" Belts**																									
M3840	Radius Flush Grid								AC								PE AC	PE				PP AC			PP AC	AC PE
Series 5000	**2" Belts**																									
M5010	Flat Top	AC	AC	AC	AC	AC	AC	PE	AC	AC	PE PP	PE	PE	PE	PE				PE PP		PE PP	PE PP			PE PP	
M5011	Flat Top Perfo-rated													PE						PE PP						
M5013	Cone Top	AC					AC																			
M5014	Nub Top													PE	PE				PE PP		PE	PE	PE			
M5030	Flush Grid													PE					PE PP	PE PP			PE AC			
M5031	Raised Rib																									
M5032	Flush Grid Heavy					AC PP													PE PP	PE PP						

Belt Code	Belt Type	Bakery											Fruit and Vegetables									
		Washer	Cooling	Freezing	General conveyance	Coating / glazing lines	Metal detectors	Packing	Raw Dough Handling	Conditioning	Laminating	Pan handling	Prewashing / rinsing	Draining	Elevator	Control / sorting table	General conveyance	Freezing lines	Palletizing/Depalletizing	Container conveyance	Sterilization/cooling	Packing
Series 1200	**0.5" Belts**																					
M1220	Flat Top				PP		PE	PP AC	AC		PP PE		PP	PP		PP PE						PP AC
M1233	Flush Grid		PP AC	PE AC	PP	PP AC	PE	PP		PP			PP	PP					AC		PP	PP
Series 2500	**1" Belts**																					
M2510	Flat Top				PP AC		PE	PP	PE AC		PP PE				PP PE	PP PE	PP PE					PP
M2511																						
M2520	Flat Top				PP AC		PE	PP PE				PP AC			PP PE		PP PE		PP AC	PP AC		PP AC
M2520	Flat GripTop						PP AC	PP AC														PP AC
M2530 M2533	Flush Grid		PP AC	PE AC	PP AC	PP	PE	PP		PP		PP AC	PP AC PE	PP AC PE	PP PE	PP PE	PP PE	PE AC	PP AC	PP AC		PP AC
M2531	Raised Rib		PP		AC PP														PP AC	PP AC	PP	PP AC
M2540	Radius Flush Grid		PP AC	PE AC	PP AC	PP AC		PP					PP AC PE	PP AC PE								PP AC
Series 3800	**1.5" Belts**																					
M3840	Radius Flush Grid	PP AC	PP AC	PE AC	PP AC		PP AC PE	PP	PP AC			PP AC	PP AC PE	PP AC PE				AC PE			PP	PP AC
Series 5000	**2" Belts**																					
M5010	Flat Top								PE AC		PP PE	PP AC			PP PE	PP PE	PP PE		AC			PP AC
M5011	Flat Top Perforated												PP PE	PP PE	PP PE							
M5013	Cone Top																	AC				
M5014	Nub Top														PE PP		PE PP					
M5030	Flush Grid		PP AC				PP PE					PP AC		PP PE	PP PE		PP PE					
M5031	Raised Rib		PP																PP		PP	PP
M5032	Flush Grid Heavy	PP AC					PP					PP AC	PP PE	PP PE	PP PE				PP		PP	

Belt Code	Belt Type	Tyre Manufacturing													Corrugated							
		Banbury Mixer Infeed/Outfeed	Dip Tank	Batchoff-Incline	90° Incline Holding conveyor	Infeed Calendering	Outfeed Calendering	Scaling	Marking	Cooling Incline	Cooling horizontal	Cooling decline	Sciver cementing	Water blow-off	Down stacker	Transfer cart	Stack handling/ Buffer	90° transfer	Strap feed	Palletizer	Casemaker feeder	
Series 1200	**0.5" Belts**																					
M1220	Flat Top														AC	AC	AC	AC	AC		AC	
M1233	Flush Grid								AC						AC	AC	AC	AC	AC		AC	
Series 2500	**1" Belts**																					
M2510	Flat Top																					
M2520	Flat Top	AC			AC		PP	AC	AC	AC	AC		AC	AC	PP AC	PP AC	PP AC		PP AC	PP AC	PP AC	
M2520	Flat GripTop					PP AC																
M2530 M2533	Flush Grid										AC	AC	AC									
M2531	Raised Rib											AC										
M2540	Radius Flush Grid																					
Series 3800	**1.5" Belts**																					
M3840	Radius Flush Grid																					
Series 5000	**2" Belts**																					
M5010	Flat Top																					
M5011	Flat Top Perforated																					
M5013	Cone Top					AC																
M5014	Nub Top																					
M5030	Flush Grid																					
M5031	Raised Rib		PP																			
M5032	Flush Grid Heavy		PP								PP											

Belt Code	Belt Type	Beverages / 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	Accumulation Tables	Packing	Mass conveyance	Vacuum applications	Washer infeeds	Accumulation tables	Palletizing/depalletizing					
Series 1200	**0.5" Belts**																				
M1220	Flat Top	AC	AC	PP AC	AC	AC	AC PP			AC			AC			AC					
M1233	Flush Grid	AC		AC PP	AC		AC PP			AC	AC	AC	AC	AC	AC	AC					
Series 2500	**1" Belts**																				
M2520	Flat Top	AC	AC	PP AC		AC	AC	AC		PP AC	AC				AC	AC					
M2520	Flat GripTop										PP AC										
M2530 M2533	Flush Grid	AC			AC			AC			AC	AC	AC	AC	AC	AC					
M2531	Raised Rib	PP AC	PP AC						PP AC	PP AC	PP AC				AC PP	AC					
M2540	Radius Flush Grid										PP AC										
Series 3800	**1.5" Belts**																				
M3840	Radius Flush Grid										PP AC										
Series 5000	**2" Belts**																				
M5010	Flat Top									PP											
M5011	Flat Top Perforated																				
M5030	Flush Grid																				
M5031	Raised Rib		PP						PP	PP											
M5032	Flush Grid Heavy																				

Habasit Support for Design and Calculation

Habasit provides a **Calculation Program** to analyze the forces and verify the admissible belt strengths for all conveyor designs.

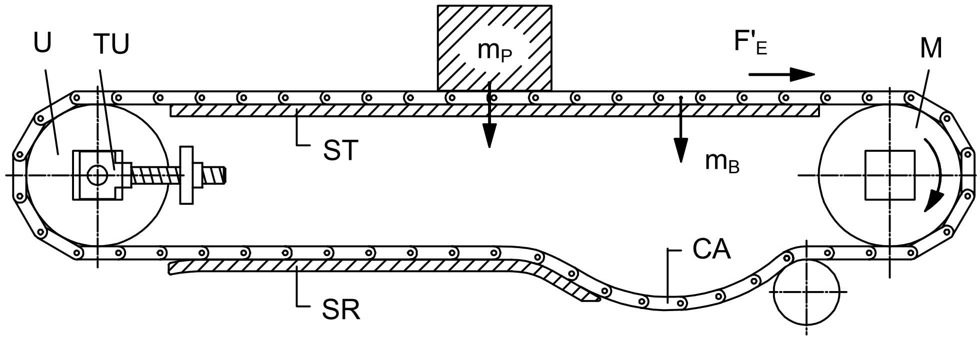
For any further questions and additional documentation requested please contact Habasit.

Product Liability, Application Considerations

The proper selection and application of Habasit products, including the related area of product safety, is 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.

Modular Belt Conveyor Components

(Glossary of Terms see page 103, Appendix)



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 sprockets are not 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 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 effect the life expectancy of the belt. For speeds higher 50 m/min always consult the 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. This **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.

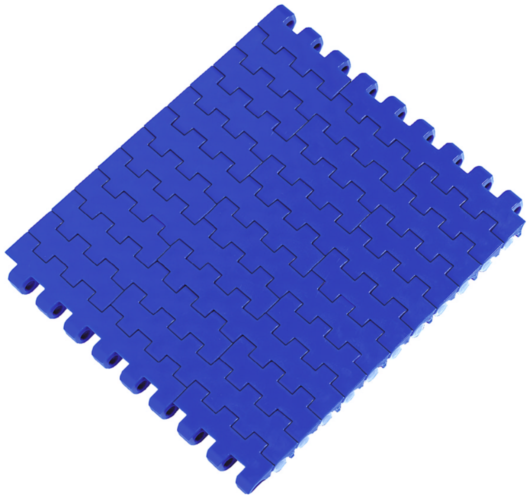
m_P Conveyed product weight as expected to be distributed over the belt surface; calculated average load per m^2 (ft^2).

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

Belt Evaluation

Evaluate the desired belt style	➔	Refer to the Product Data Sheets
Evaluate the suitable material	➔	Refer to the table of Material Properties, pages 8, 93 and Product Data Sheets
Evaluate the design concept	➔	Refer to the Design Guide of this manual and draft the lay out 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 sprock-ets	➔	Refer to the **Product Data Sheets** and the **Design Guide**

M1220 Flat Top 0.5"

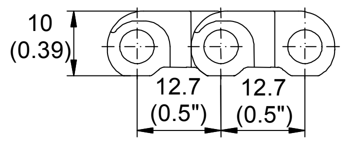


Description

- "Nosebar transfer", recommended diameter 18 mm *(0.71")*; min. possible 16 mm *(0.63")*
- 0 % open area
- FDA approved materials
- Easy to clean, open hinge
- Rod diameter 5 mm *(0.2")*
- "Open window" sprockets

Available accessories

- Flights



Belt data

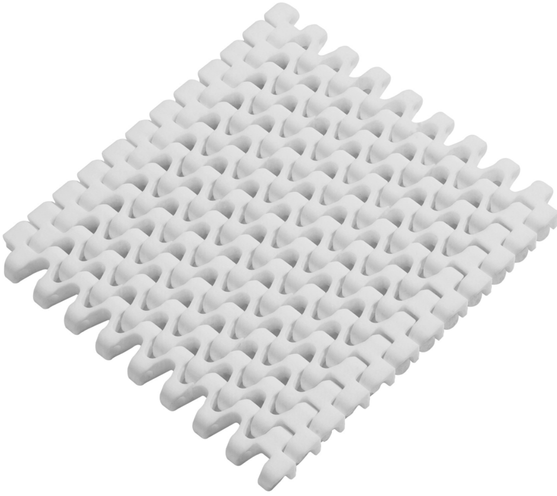
Belt material			Poly-propylene	Poly-ethylene	Polyacetal	
Standard rod material			PP	PE	PP	PA
Nominal tensile strength [F'_N]		N/m *lb/ft*	9'000 *617*	6'000 *411*	16'000 *1'096*	18'000 *1'233*
Temperature range		°C *°F*	5 – 105 *40 – 220*	-70 – 65 *-94 – 150*	5 – 90 *40 – 195*	-40 – 90 *-40 – 195*
Belt weight [m_B]		kg/m² *lb/sqft*	5.8 *1.2*	6.2 *1.27*	8.7 *1.78*	8.7 *1.78*
Coefficient of friction belt to support [μ_G]	• UHMW		0.13	0.25	0.10	0.10
	• HDPE		0.11	–	0.08	0.08
	• PA6, PA66		0.30	0.23	0.20	0.20
	• Steel		0.30	0.14	0.18	0.18
Coefficient of friction belt to goods [μ_P]	• Glass		0.19	0.10	0.15	0.15
	• Steel		0.32	0.13	0.20	0.20
	• Plastic		0.17	0.10	0.18	0.18
	• Cardboard		0.22	0.15	0.20	0.20

Standard range of belt widths

mm	50	10	150	200	250	300	350	400	450	500	550	600	650	700	etc.
inch (nom.)	*2*	*4*	*6*	*8*	*10*	*12*	*14*	*16*	*18*	*20*	*22*	*24*	*26*	*28*	*etc.*

Standard belt widths in increments of 50 mm *(2")* stock. Non-standard widths are offered in increments of 16.66 mm *(0.66")*. Smallest possible width 83.4 mm *(3.25")*. Non bricklayed belts 50 mm *(2")* and 100 mm *(4")* wide.
For material selection refer to detailed material properties page 9 and for **colors** see Table page 16.
Coefficient of friction: The indicated values are valid for dry and clean conditions only. Under dirty conditions this factor may be 2 to 3 times higher.
The nominal tensile strength is valid for 20 °C *(68 °F)*. The admissible tensile force is dependent on the operating temperature near the drive sprockets. Within the temperature range allowed, the admissible tensile force may vary from 100 % to 20 % of the nominal tensile strength. For detailed information and correct calculation of effective tensile force refer to the Calculation Guide, page 85.

M1233 Flush Grid 0.5"

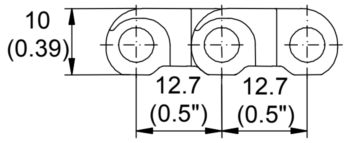


Description

- "Nosebar transfer", recommended diameter 18 mm *(0.71")*; min. possible 16 mm *(0.63")*
- 25 % open area; 70 % open contact area; largest opening 5x6 mm *(0.2"x0.25")*
- FDA approved materials
- Open hinge
- Superior cleanability
- Rod diameter 5 mm *(0.2")*
- "Open window" sprockets

Available accessories

- Flights



Belt data

Belt material		Poly-propylene	Poly-ethylene	Polyacetal	
Standard rod material		PP	PE	PP	PA
Nominal tensile strength [F'$_N$]	N/m *lb/ft*	11'000 *750*	7'000 *480*	16'000 *1096*	18'000 *1'233*
Temperature range	°C *°F*	5 – 105 *40 – 220*	-70 – 65 *-94 – 150*	5 – 90 *40 – 195*	-40 – 90 *-40 – 195*
Belt weight [m$_B$]	kg/m² *lb/sqft*	4.0 *0.82*	4.2 *0.86*	7.0 *1.43*	7.0 *1.43*
Coefficient of friction belt to support [μ_G]	• UHMW	0.13	0.25	0.10	0.10
	• HDPE	0.11	–	0.08	0.08
	• PA6, PA66	0.30	0.23	0.20	0.20
	• Steel	0.30	0.14	0.18	0.18
Coefficient of friction belt to goods [μ_P]	• Glass	0.19	0.10	0.15	0.15
	• Steel	0.32	0.13	0.20	0.20
	• Plastic	0.17	0.10	0.18	0.18
	• Cardboard	0.22	0.15	0.20	0.20

Standard range of belt widths

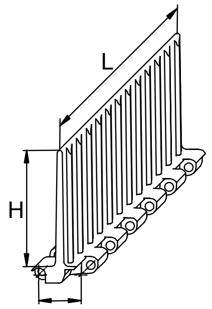
mm	150	200	250	300	350	400	450	500	550	600	650	700	750	800	etc.
inch (nom.)	*6*	*8*	*10*	*12*	*14*	*16*	*18*	*20*	*22*	*24*	*26*	*28*	*30*	*32*	*etc.*

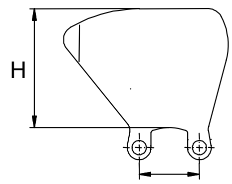
Standard belt widths in increments of 50 mm *(2")* stock. Non-standard widths are offered in increments of 16.66 mm *(0.66")*. Smallest possible width 83.4mm *(3.25")*.
For material selection refer to detailed material properties page 9 and for **colors** see Table page 16.
Coefficient of friction: The indicated values are valid for dry and clean conditions only. Under dirty conditions this factor may be 2 to 3 times higher.
The nominal tensile strength is valid for 20 °C *(68 °F)*. The admissible tensile force is dependent on the operating temperature near the drive sprockets. Within the temperature range allowed, the admissible tensile force may vary from 100 % to 20 % of the nominal tensile strength. For detailed information and correct calculation of effective tensile force refer to the Calculation Guide, page 85.

Flights and Side Guards Series M1200

Flights are available with ribs on one side for better release of wet or sticky food products ("no-cling"). Standard flights can be cut to specific width and height if required. The flights and side guards fit to all 0.5" belts.

	Flights straight height **H**	Flights straight length **L**	Side guards height **H**
mm *inch*	50 *2*	100 *4*	50 *2*





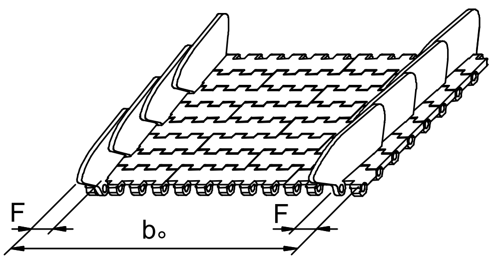
Indents for flights

The flight indent E is required for adequate support of the belt on its return way and hold down during back-bending applications (elevators). On short conveyors or with special support structure, the flights may also be applied over the full belt width (E = 0). The distance E_1 between the flight end and the hold down- and support-shoes/wearstrips should not be smaller than 5 mm. For further details see Design Guide.

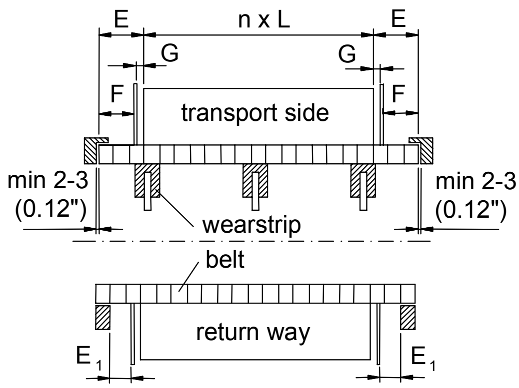
Installation of flights and side guards; indents

The side guards have a pitch of 25.4 mm *(1")*, the double of the module pitch. Therefore only one link per module needs to be cut for the side guard installation. This special solution provides higher strength.
The smallest applicable sprocket size is M12S15 (15 teeth).

	Possible flight indents E											
	Flight only		Flight + Side Guard with gap (G ~ 8 mm / *0.03"*)				Flight + Side Guard without gap (G ~ 2 mm / *0.08"*)					
	E		E		F		E		F			
	mm	*inch*	mm	*inch*	mm	*inch*	mm	*inch*	mm	*inch*		
Flight over full belt width	**0**	***0***	–	–	–	–	–	–	–	–		
Module cutting necessary	33	*1.3*	33	*1.3*	16	*0.65*	33	*1.3*	25	*1*		
Standard, no module cutting	**50**	***2***	**50**	***2***	33	*1.3*	**50**	***2***	41	*1.6*		
Module cutting necessary	66	*2.6*	66	*2.6*	50	*2*	66	*2.6*	58	*2.3*		
Module cutting necessary	83	*3.2*	83	*3.2*	66	*2.6*	83	*3.2*	75	*3*		
Standard, no module cutting	**100**	***4***	**100**	***4***	83	*3.2*	**100**	***4***	93	*3.7*		



M1220G05
Double pitch side guard, fixed every second module row.

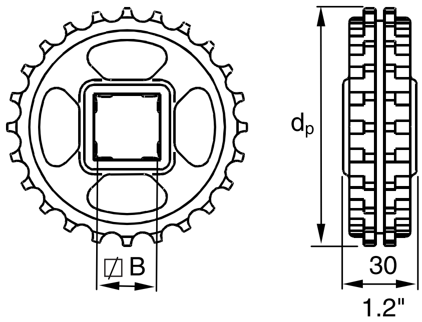


Sprocket Data Series M1200

Sprocket code

M = modular belts
Belt pitch
S = molded 1 piece; Z = split sprocket molded
Number of teeth
Shaft size (diameter)
Shaft type: Q = square, R = round
Material: 6 = POM, 1 = PP

M	12	S	24	40	Q	6

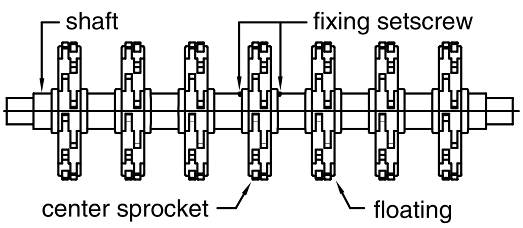


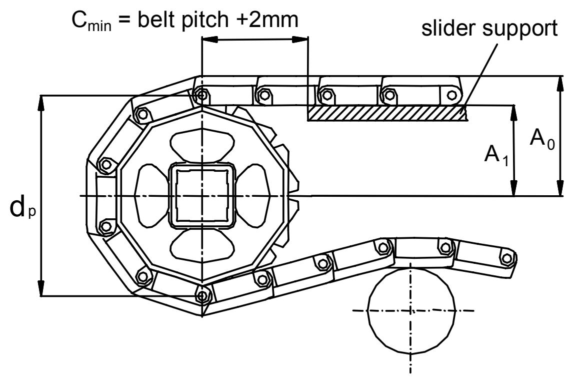
M12S2425Q

Sprocket availability

No. of teeth	Pitch ∅ d_p		A_1		Molded sprockets (M12Sxx)				Split sprockets (M12Zxx)
					Square bore		∅ Round bore *		
	mm	*inch*	mm	*inch*	mm	inch	mm	inch	
10	41	*1.6*	16	*0.63*	–	–	20	–	Available on request, please contact the Habasit representative
15	62	*2.5*	27	*1.05*	25	1	25	1	
24	99	*3.9*	45	*1.78*	25 / 40	1 / 1.5	25	1	
28	116	*4.6*	54	*2.12*	25 / 40	1 / 1.5	–	1	
36	150	*5.9*	70	*2.77*	40 / 60 50	1.5 / 2.5	–	–	

* Key ways: for round bore ∅ 20 mm: 6 mm *(0.24")*; for round bore ∅ 25 mm: 8 mm *(0.315")*
for round bore ∅ 1": 6.3 mm *(0.25")*





Sprocket arrangement

The maximum sprocket spacing is 100 mm *(4")*. The minimum spacing is 33.3 mm *(1.3")*. The distance C between sprocket axis and slider support is min. 14 mm (0.55"). Further information to sprocket installation see Design Guide Sprocket Evaluation.

Sprocket material

Standard material Acetal, natural color.
Optional: Polypropylene (PP), blue, acid resistant.

Numbers of sprockets and wearstrips

Standard belt width mm	*inch nominal*	Number of sprockets per shaft min. number	>8000 N/m *>550 lb/ft*	Number of wear-strips Carry-way (top)	Return-way (bottom)
150	*6*	2	3	2	2
200	*8*	2	5	2	2
250	*10*	3	5	3	2
300	*12*	3	7	3	2
350	*14*	3	7	4	3
400	*16*	5	9	4	3
450	*18*	5	9	5	3
500	*20*	5	11	5	3
550	*22*	7	11	6	4
600	*24*	7	13	6	4
700	*28*	7	15	7	4
800	*32*	9	17	7	4
900	*36*	9	19	8	5
1000	*40*	11	21	8	5
1100	*43*	11	23	9	5
1200	*47*	13	25	9	5
1300	*51*	13	27	10	6
1400	*55*	15	29	10	6
1600	*63*	15	33	11	6
1800	*71*	17	37	12	7
2000	*79*	19	41	13	7

Sprocket load

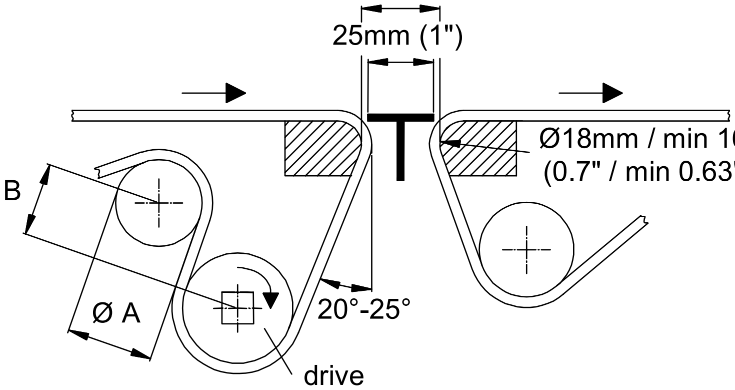
The numbers of sprockets listed in the table above give a general indication and refer to the upper limit of the range of tensile force (belt pull) indicated. The maximum load on one sprocket should normally not exceed 800 N. For PP sprockets do not exceed 80% admissible belt load. Further instructions see Calculation Guide, page 89 or contact the Habasit representative.

Wearstrips

Between driving shaft and idling sprockets or rollers the belt is carried by a slider support furnished with longitudinal wear strips from UHMW Polyethylene or other suitable material. Minimum backflexing radius for belts without side guards 150 mm *(6")*, with side guards 600 mm *(24")*. More details see Design Guide, page 76.

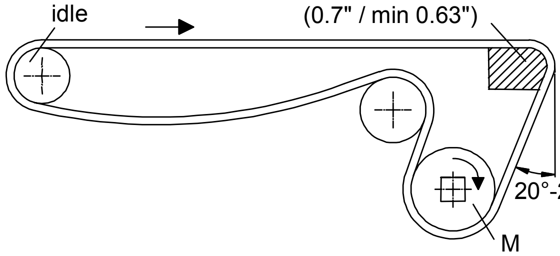
Nosebar Transfer Minipitch M1220, M1233

The minipitch belts M1220 and M1233 are perfectly suitable for dynamic or static fixtures with a minimum diameter of 18 mm *(0.71")*. 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 min. diameter of 16 mm *(0.63")* 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.

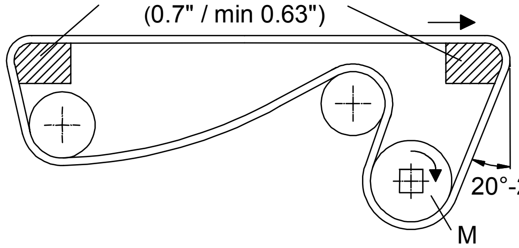


A:	Min. backbending-roller diameter:	M1220 M1233	90 mm *(3.5")* 75 mm *(3")*
B:	Min. straight belt section between drive and snub-roller:	all belt types	50 mm *(2")*

Nosebar on head side only



Nosebar on both conveyor ends



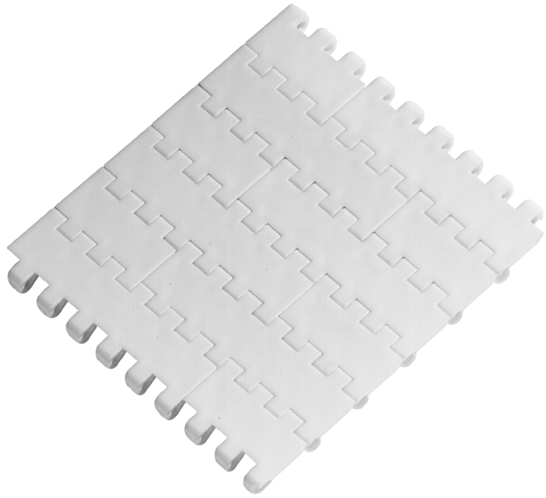
M2510 Flat Top 1" (USDA)

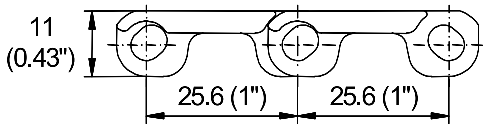
Description

- 0% open area
- Open hinge, easy to clean
- FDA approved materials
- Rod diameter 5 mm *(0.2")*
- "Open window" sprockets

Available accessories

- Flights straight
- Side guards





Belt data

Belt material		Poly-propylene	Poly-ethylene	Polyacetal	
Standard rod material		PP	PE	PP	PA
Nominal tensile strength [F'N]	N/m *lb/ft*	12'000 *822*	8'000 *548*	16'000 *1'096*	20'000 *1'370*
Temperature range	°C *°F*	5 –105 *40 –220*	-70 – 65 *-94 – 150*	5 – 90 *40 – 195*	-40 – 90 *-40 – 195*
Belt weight [m_B]	kg/m² *lb/sqft*	4.9 *1.0*	5.2 *1.05*	8.1 *1.66*	8.1 *1.66*
Coefficient of friction belt to support [μ_G]	• UHMW	0.13	0.25	0.10	0.10
	• HDPE	0.11	–	0.08	0.08
	• PA6, PA66	0.30	0.23	0.20	0.20
	• Steel	0.30	0.14	0.18	0.18
Coefficient of friction belt to goods [μ_P]	• Glass	0.19	0.10	0.15	0.15
	• Steel	0.32	0.13	0.20	0.20
	• Plastic	0.17	0.10	0.18	0.18
	• Cardboard	0.22	0.15	0.20	0.20

Standard range of belt widths

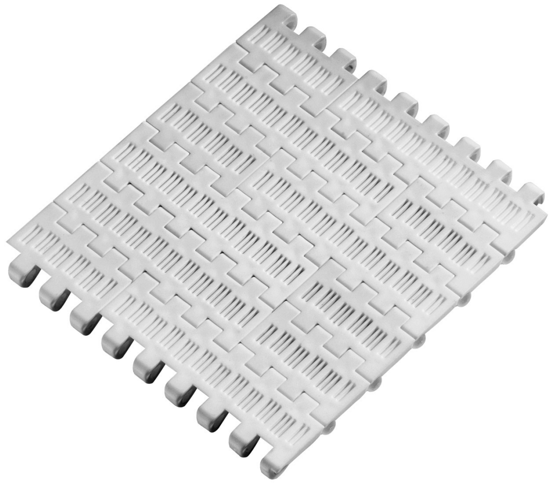
mm	50	100	150	200	250	300	350	400	450	500	550	600	650	700	etc.
inch (nom.)	*2*	*4*	*6*	*8*	*10*	*12*	*14*	*16*	*18*	*20*	*22*	*24*	*26*	*28*	*etc.*

Standard belt widths in increments of 50 mm *(2")* stock. Non-standard widths are offered in increments of 16.66 mm *(0.66")*. Smallest possible width 83.4 mm *(3.25")*. Non-bricklayed belts 50 mm *(2")* and 100 mm *(4")* wide.
For material selection refer to detailed material properties page 9 and for **colors** see Table page 16.
Coefficient of friction: The indicated values are valid for dry and clean conditions only. Under dirty conditions this factor may be 2 to 3 times higher.
The nominal tensile strength is valid for 20 °C *(68 °F)*. The admissible tensile force is dependent on the operating temperature near the drive sprockets. Within the temperature range allowed, the admissible tensile force may vary from 100 % to 20 % of the nominal tensile strength. For detailed information and correct calculation of effective tensile force refer to the Calculation Guide, page 85.

M2511 Mesh Top 1"

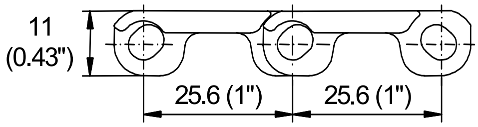
Description

- 16% open area;
  largest opening 1.2x10 mm *(0.05"x0.4")*
- Open hinge, easy to clean
- FDA approved materials
- Rod diameter 5 mm *(0.2")*
- "Open window" sprockets



Available accessories

- Flights straight
- Side guards



Belt data

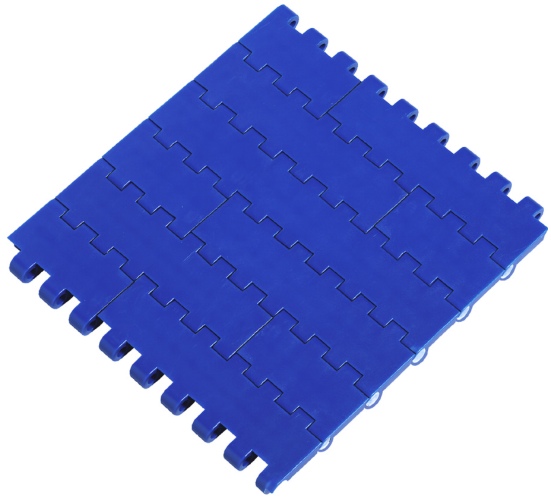
Belt material		Poly-propylene	Poly-ethylene	Polyacetal	
Standard rod material		PP	PE	PP	PA
Nominal tensile strength [F'N]	N/m *lb/ft*	11000 *753*	7'000 *479*	15'000 *1'027*	18'000 *1'233*
Temperature range	°C *°F*	5 –105 *40 –220*	-70 – 65 *-94 – 150*	5 – 90 *40 – 195*	-40 – 90 *-40 – 195*
Belt weight [m_B]	kg/m^2 *lb/sqft*	4.9 *1.*	5.2 *1.05*	8.1 *1.66*	8.1 *1.66*
Coefficient of friction belt to support [μ_G]	• UHMW	0.13	0.25	0.10	0.10
	• HDPE	0.11	–	0.08	0.08
	• PA6, PA66	0.30	0.23	0.20	0.20
	• Steel	0.30	0.14	0.18	0.18
Coefficient of friction belt to goods [μ_P]	• Glass	0.19	0.10	0.15	0.15
	• Steel	0.32	0.13	0.20	0.20
	• Plastic	0.17	0.10	0.18	0.18
	• Cardboard	0.22	0.15	0.20	0.20

Standard range of belt widths

mm	50	100	150	200	250	300	350	400	450	500	550	600	650	700	etc.
inch (nom.)	*2*	*4*	*6*	*8*	*10*	*12*	*14*	*16*	*18*	*20*	*22*	*24*	*26*	*28*	*etc.*

Standard belt widths in increments of 50 mm *(2")* stock. Non-standard widths are offered in increments of 16.66 mm *(0.66")*. Smallest possible width 83.4 mm *(3.25")*. Non-bricklayed belts 50 mm *(2")* and 100 mm *(4")* wide.
For material selection refer to detailed material properties page 9 and for **colors** see Table page 16.
Coefficient of friction: The indicated values are valid for dry and clean conditions only. Under dirty conditions this factor may be 2 to 3 times higher.
The nominal tensile strength is valid for 20 °C *(68 °F)*. The admissible tensile force is dependent on the operating temperature near the drive sprockets. Within the temperature range allowed, the admissible tensile force may vary from 100 % to 20 % of the nominal tensile strength. For detailed information and correct calculation of effective tensile force refer to the Calculation Guide, page 85.

M2520 Flat Top 1"

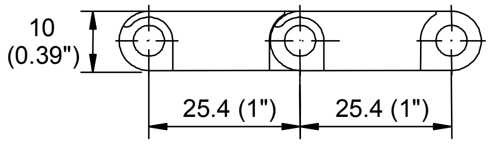


Description

- 0 % open area
- High lateral stiffness
- FDA approved materials
- Rod diameter 5 mm *(0.2")*
- "Open window" sprockets

Available accessories

- Flights
- Side guards



Belt data

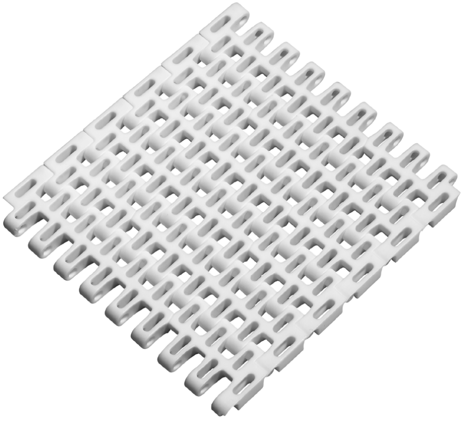
Belt material		Polypropylene		Poly-ethylene	Polyacetal	
Standard rod material		PP	POM	PE	PP	PA
Nominal tensile strength [F'_N]	N/m *lb/ft*	14'000 *959*	18'000 *1'233*	9'000 *616*	18'000 *1'233*	26'000 *1'781*
Temperature range	°C *°F*	5 – 105 *40 – 220*	5 – 105 *40 – 220*	-70 – 65 *-94 – 150*	5 – 90 *40 – 195*	-40 – 90 *-40 – 195*
Belt weight [m_B]	kg/m² *lb/sqft*	6.2 *1.27*	6.2 *1.27*	6.5 *1.34*	9.4 *1.93*	9.4 *1.93*
Coefficient of friction belt to support [μ_G]	• UHMW	0.13	0.13	0.25	0.10	0.10
	• HDPE	0.11	0.11	–	0.08	0.08
	• PA6, PA66	0.30	0.30	0.23	0.20	0.20
	• Steel	0.30	0.30	0.14	0.18	0.18
Coefficient of friction belt to goods [μ_P]	• Glass	0.19	0.19	0.10	0.15	0.15
	• Steel	0.32	0.32	0.13	0.20	0.20
	• Plastic	0.17	0.17	0.10	0.18	0.18
	• Cardboard	0.22	0.22	0.15	0.20	0.20

Standard range of belt widths

mm	50	100	150	200	250	300	350	400	450	500	550	600	650	700	etc.
inch (nom.)	*2*	*4*	*6*	*8*	*10*	*12*	*14*	*16*	*18*	*20*	*22*	*24*	*26*	*28*	*etc.*

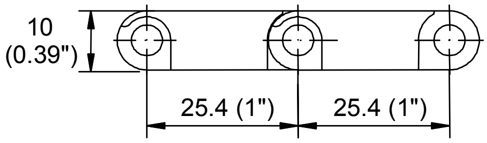
Standard belt widths in increments of 50 mm *(2")* stock. Non-standard widths are offered in increments of 16.66 mm *(0.66")*. Smallest possible width 83.4 mm *(3.25")*. Non-bricklayed belts 50 mm *(2")* and 100 mm *(4")* wide.
For material selection refer to detailed material properties page 9 and for **colors** see Table page 16.
Coefficient of friction: The indicated values are valid for dry and clean conditions only. Under dirty conditions this factor may be 2 to 3 times higher.
The nominal tensile strength is valid for 20 °C *(68 °F)*. The admissible tensile force is dependent on the operating temperature near the drive sprockets. Within the temperature range allowed, the admissible tensile force may vary from 100 % to 20 % of the nominal tensile strength. For detailed information and correct calculation of effective tensile force refer to the Calculation Guide, page 85.

M2530 Flush Grid 1"



Description

- 35 % open area; 60 % open contact area; largest opening 5.5x7 mm *(0.22"x0.28")*
- Excellent for cooling and draining
- Open hinge
- Easy to clean
- FDA approved materials
- Rod diameter 5 mm *(0.2")*
- "Open window" sprockets



Available accessories

- Flights
- Side guards

Belt data

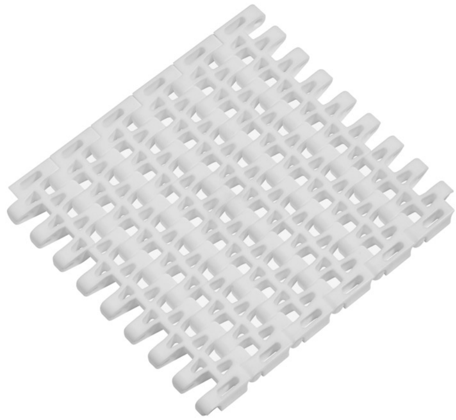
Belt material			Poly-propylene	Poly-ethylene	Polyacetal		Polyamide MT
Standard rod material			PP	PE	PP	PA	PA
Nominal tensile strength [F'N]		N/m *lb/ft*	13'000 *890*	8'000 *548*	18'000 *1'232*	22'000 *1'507*	20'000 *1'370*
Temperature range		°C *°F*	5 – 105 *40 – 220*	-70 – 65 *-94 – 150*	5 – 90 *40 – 195*	-40 – 90 *-40 – 195*	-46 to +130 °C (short-term +160 °C) *-50 to +266 °F* *(short-term +320 °F)*
Belt weight [mB]		kg/m² *lb/sqft*	5.5 *1.13*	5.8 *1.18*	8.2 *1.68*	8.2 *1.68*	7.0 *1.43*
Coefficient of friction belt to support [µG]	• UHMW		0.13	0.25	0.10	0.10	0.14
	• HDPE		0.11	–	0.08	0.08	0.14
	• PA6, PA66		0.30	0.23	0.20	0.20	–
	• Steel		0.30	0.14	0.18	0.18	0.19
Coefficient of friction belt to goods [µP]	• Glass		0.19	0.10	0.15	0.15	0.17
	• Steel		0.32	0.13	0.20	0.20	0.19
	• Plastic		0.17	0.10	0.18	0.18	0.12
	• Cardboard		0.22	0.15	0.20	0.20	0.17

Standard range of belt widths

mm	150	200	250	300	350	400	450	500	550	600	650	700	750	800	etc.
inch (nom.)	*6*	*8*	*10*	*12*	*14*	*16*	*18*	*20*	*22*	*24*	*26*	*28*	*30*	*32*	*etc.*

Standard belt widths in increments of 50 mm *(2")* stock. Non-standard widths are offered in increments of 16.66 mm *(0.66")*. Smallest possible width 83.4 mm *(3.25")*.
For material selection refer to detailed material properties page 9 and for **colors** see Table page 16.
Coefficient of friction: The indicated values are valid for dry and clean conditions only. Under dirty conditions this factor may be 2 to 3 times higher.
The nominal tensile strength is valid for 20 °C *(68 °F)*. The admissible tensile force is dependent on the operating temperature near the drive sprockets. Within the temperature range allowed, the admissible tensile force may vary from 100 % to 20 % of the nominal tensile strength. For detailed information and correct calculation of effective tensile force refer to the Calculation Guide, page 85.

M2533 Flush Grid 1"

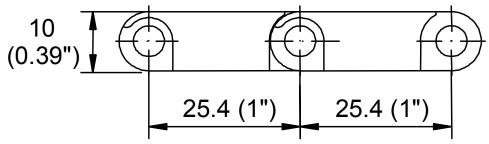


Description

- 35 % open area; 60 % open contact area; largest opening 5.5x7 mm *(0.22"x0.28")*
- Excellent for cooling and draining
- Open hinge
- Superior cleanability
- FDA approved materials
- Rod diameter 5 mm *(0.2")*
- "Open window" sprockets

Available accessories

- Flights
- Side guards



Belt data

Belt material		Poly-propylene	Poly-ethylene	Polyacetal		Polyamide MT
Standard rod material		PP	PE	PP	PA	PA
Nominal tensile strength [F'_N]	N/m *lb/ft*	13'000 *890*	8'000 *548*	18'000 *1'232*	22'000 *1'507*	20'000 *1'370*
Temperature range	°C *°F*	5 – 105 *40 – 220*	-70 – 65 *-94 – 150*	5 – 90 *40 – 195*	-40 – 90 *-40 – 195*	-46 to +130 °C (short-term +160°C) *-50 to +266 °F (short-term +320 °F)*
Belt weight [m_B]	kg/m² *lb/sqft*	4.6 *0.94*	5.1 *1.04*	7.1 *1.45*	7.1 *1.45*	7.0 *1.43*
Coefficient of friction belt to support [μ_G]	• UHMW	0.13	0.25	0.10	0.10	0.14
	• HDPE	0.11	–	0.08	0.08	0.14
	• PA6, PA66	0.30	0.23	0.20	0.20	-
	• Steel	0.30	0.14	0.18	0.18	0.19
Coefficient of friction belt to goods [μ_P]	• Glass	0.19	0.10	0.15	0.15	0.17
	• Steel	0.32	0.13	0.20	0.20	0.19
	• Plastic	0.17	0.10	0.18	0.18	0.12
	• Cardboard	0.22	0.15	0.20	0.20	0.17

Standard range of belt widths

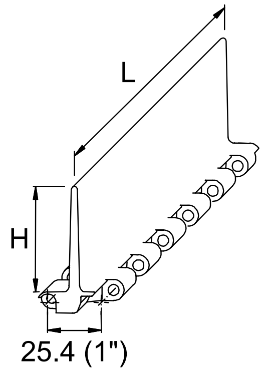
mm	150	200	250	300	350	400	450	500	550	600	650	700	750	800	etc.
inch (nom.)	*6*	*8*	*10*	*12*	*14*	*16*	*18*	*20*	*22*	*24*	*26*	*28*	*30*	*32*	*etc.*

Standard belt widths in increments of 50 mm *(2")* stock. Non-standard widths are offered in increments of 16.66 mm *(0.66")*. Smallest possible width 83.4 mm *(3.25")*.
For material selection refer to detailed material properties page 9 and for **colors** see Table page 16.
Coefficient of friction: The indicated values are valid for dry and clean conditions only. Under dirty conditions this factor may be 2 to 3 times higher.
The nominal tensile strength is valid for 20 °C *(68 °F)*. The admissible tensile force is dependent on the operating temperature near the drive sprockets. Within the temperature range allowed, the admissible tensile force may vary from 100 % to 20 % of the nominal tensile strength. For detailed information and correct calculation of effective tensile force refer to the Calculation Guide, page 85.

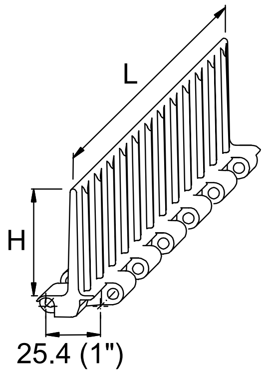
Flights and Side Guards Series M2500

Flights and side guards are available in the following versions and sizes. Standard flight sizes can be cut to specific width and height if required. For M2540 please refer to the psecific data sheet.
Code: xx = height of flight: 25 mm =02, 50 mm = 05, 75 mm = 07, 100 mm = 10

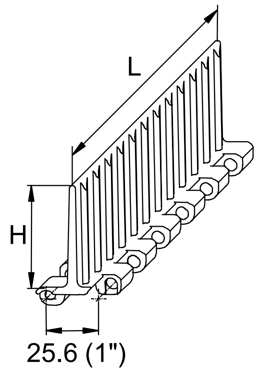
	Flat Top flights straight closed hinge		Flat Top flights straight open hinge (USDA)		Flush Grid flight corrugated open hinge (USDA)		Side guards
Code flight side guard	M2520Fxx (xx=code for height)		M2510Fxx (xx=code for height)		M2533F07, M253JF07		M2520G05
Applicable for belt type	M2520, M2530, M2533		M2510, M2511		M2530, M2533		all 1" belts except M2531
	height **H**	length **L**	height **H**	length **L**	height **H**	length **L**	height **H**
mm *inch*	25 *1*	100 *4*	25 *1*	100 *4*	–	–	–
mm *inch*	50 *2*	100 *4*	50 *2*	100 *4*	–	–	50 *2*
mm *inch*	75 *3*	100 *4*	75 *3*	100 *4*	75 *3*	100 *4*	–
mm *inch*	100 *4*	100 *4*	–	–	–	–	–



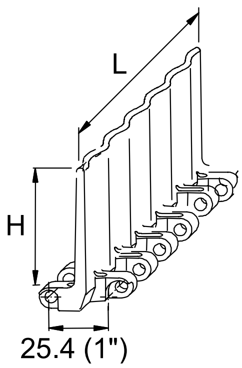
M2520Fxx
smooth side



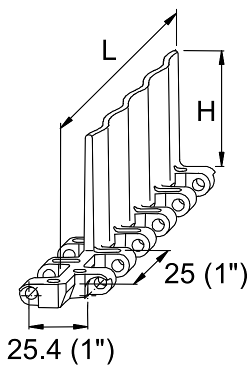
M2520Fxx
"no-cling" side (ribs)



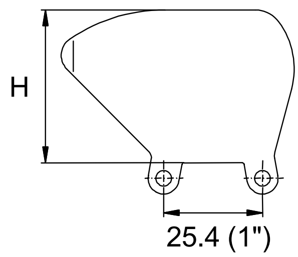
M2510Fxx
open hinge; "no-cling" side



M2533F07, open hinge;
mid flight, corrugated



M2533JF07, open hinge; indent
flight, corrugated



M2520G05

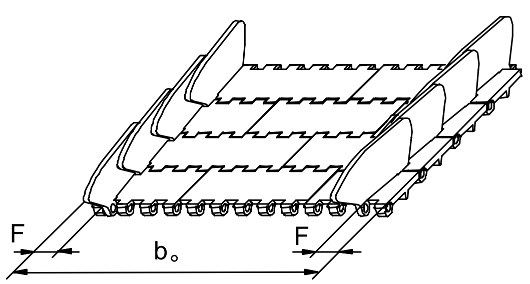
Installation of flights and side guards; indents

(for radius belts please refer to the specific data sheets)

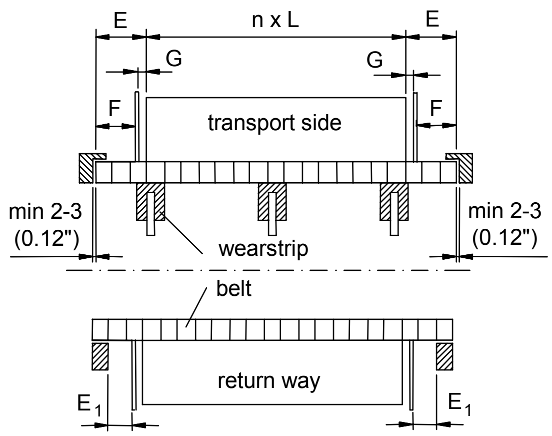
The flight indent, E or F, is required for adequate support of the belt on its return way and hold down during back-bending applications (elevators). On short conveyors or with special support structure, the flights may also be applied over the full belt width (E = 0). For the Flush Grid flights edge modules with indents are available (fixed indent see illustration).

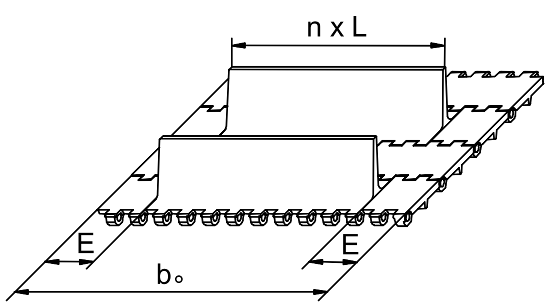
The side guards are usually installed with a gap (G) between the side guards and the flights. It is also possible to install the side guards without gap (very small distance between flight and side guard approx. 2 mm / *0.08"*). There is a certain risk for rubbing and abrasion between the flights and the side guards. The distance E_1 between the side guards and the hold down- and support-shoes/wearstrips should not be smaller than 5 mm *(0.2").* For further details see Design Guide.

	Possible flight indents E (not for M2533F05 edge flight)									
	Flight only		Flight + Side Guard with gap (G ~ 8 mm / *0.3"*)				Flight + Side Guard without gap (G ~ 2 mm / *0.08"*)			
	E		**E**		**F**		**E**		**F**	
	mm	*inch*	mm	*inch*	mm	*inch*	mm	*inch*	mm	*inch*
Flight over full belt width	**0**	***0***	–	–	–	–	–	–	–	–
Module cutting necessary	33	*1.3*	33	*1.3*	16	*0.65*	33	*1.3*	25	*1*
Standard, no module cutting	**50**	***2***	**50**	***2***	33	*1.3*	**50**	***2***	41	*1.6*
Module cutting necessary	66	*2.6*	66	*2.6*	50	*2*	66	*2.6*	58	*2.3*
Module cutting necessary	83	*3.2*	83	*3.2*	66	*2.6*	83	*3.2*	75	*3*
Standard, no module cutting	**100**	***4***	**100**	***4***	83	*3.2*	**100**	***4***	93	*3.7*

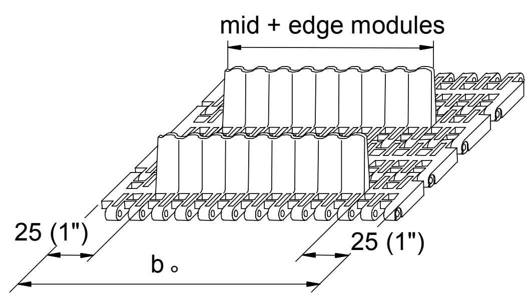


Side Guards M2520G05



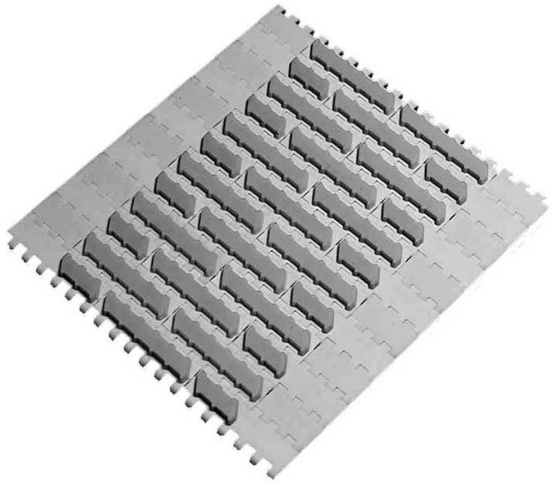


Flat Top flights M2510, M2520



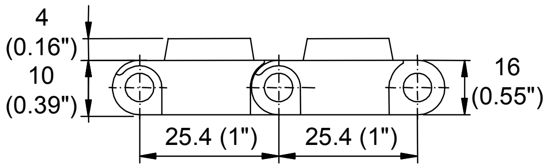
Flush Grid flight M2533F07 + M253JF07

M2520 Flat GripTop 1"



Description

- 0% open area
- FDA approved grade available in white
- Indent 50mm *(2")*
- Abrasion resistant GripTop, high friction
- Rubber hardness: 50 shore A
- Rod diameter 5 mm *(0.2")*
- "Open window" sprockets



Belt data

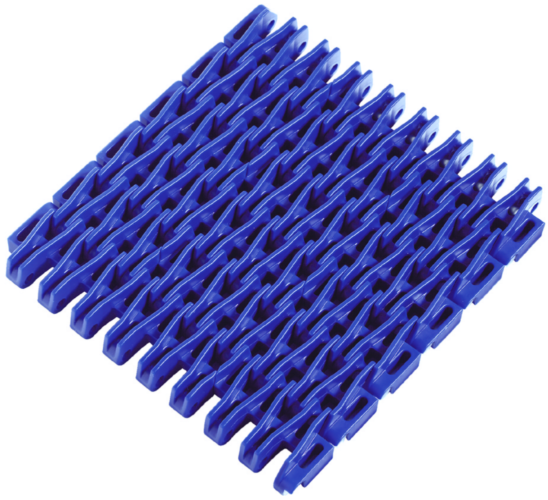
Belt material		Polypropylene grey		Polypropylene white		Polyacetal blue	
GripTop material		TPE black (non FDA)		TPE white (FDA)		TPE white (FDA)	
Standard rod material		PP	POM	PP	POM	PP	PA
Nominal tensile strength [F'_N]	N/m *lb/ft*	14'000 *959*	18'000 *1'233*	14'000 *959*	18'000 *1'233*	18'000 *1'233*	26'000 *1'781*
Temperature range	°C *°F*	5 – 60 *40 – 140*	5 – 60 *40 – 140*	5 – 60 *40 –140*	5 – 60 *40 – 140*	5 – 60 *40 – 140*	-40 – 60 -40 – 140
Belt weight [m_B]	kg/m² *lb/sqft*	8.7 *1.74*	8.7 *1.74*	8.7 *1.74*	8.7 *1.74*	11.4 *2.34*	11.4 *2.34*
Coefficient of friction belt to support [μ_G]	• UHMW	0.13	0.13	0.13	0.13	0.10	0.10
	• HDPE	0.11	0.11	0.11	0.11	0.08	0.08
	• PA6, PA66	0.30	0.30	0.30	0.30	0.20	0.20
	• Steel	0.30	0.30	0.30	0.30	0.18	0.18
Coefficient of friction belt to goods [μ_P]		The coefficient of friction varies depending on the type of material and surface. For dry and clean conditions: μ_P = 0.8 - 1.2 For specific elevation angles contact the Habasit representative					

Standard range of belt widths

mm	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	etc.
inch (nom.)	*8*	*12*	*16*	*20*	*24*	*28*	*32*	*36*	*40*	*44*	*48*	*52*	*56*	*etc.*

Standard belt widths: in increments of 50 mm *(2")* stock. Non-standard widths are offered in increments of 16.66 mm *(0.66")*. Smallest possible width 150 mm *(6")*.
For material selection refer to detailed material properties page 9 and for **colors** see Table page 16.
Coefficient of friction belt to product: In addition to the product material and surface the friction values may depend on the percentage of inlay or Full Grip surface selected. Tests may be advisable.
The nominal tensile strength is valid for 20 °C *(68 °F)*. The admissible tensile force is dependent on the operating temperature near the drive sprockets. Within the temperature range allowed, the admissible tensile force may vary from 100 % to 20 % of the nominal tensile strength. For detailed information and correct calculation of effective tensile force refer to the Calculation Guide, page 85.

M2531 Raised Rib 1"

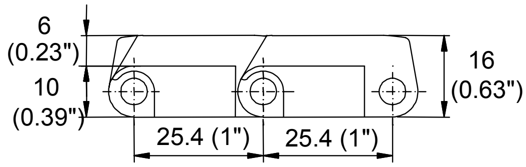


Description

- 35 % open area; 75 % open contact area; largest opening 5.5x7 mm *(0.22"x0.28")*
- Excellent for cooling and draining
- FDA approved materials
- Rod diameter 5 mm *(0.2")*
- "Open window" sprockets

Available accessories

Combs (finger transfer plates) for smooth and easy product transfer



Belt data

Belt material		Poly-propylene	Polyacetal	
Standard rod material		PP	PP	PA
Nominal tensile strength [F'$_N$]	N/m *lb/ft*	16'000 *1096*	19'000 *1'300*	27'000 *1'850*
Temperature range	°C *°F*	5 – 105 *40 – 220*	5 – 90 *40 – 195*	-40 – 90 *-40 – 195*
Belt weight [m$_B$]	kg/m^2 *lb/sqft*	6.8 *1.4*	10.4 *2.13*	10.4 *2.13*
Coefficient of friction belt to support [μ_G]	• UHMW	0.13	0.10	0.10
	• HDPE	0.11	0.08	0.08
	• PA6, PA66	0.30	0.20	0.20
	• Steel	0.30	0.18	0.18
Coefficient of friction belt to goods [μ_P]	• Glass	0.19	0.15	0.15
	• Steel	0.32	0.20	0.20
	• Plastic	0.17	0.18	0.18
	• Cardboard	0.22	0.20	0.20

Standard range of belt widths

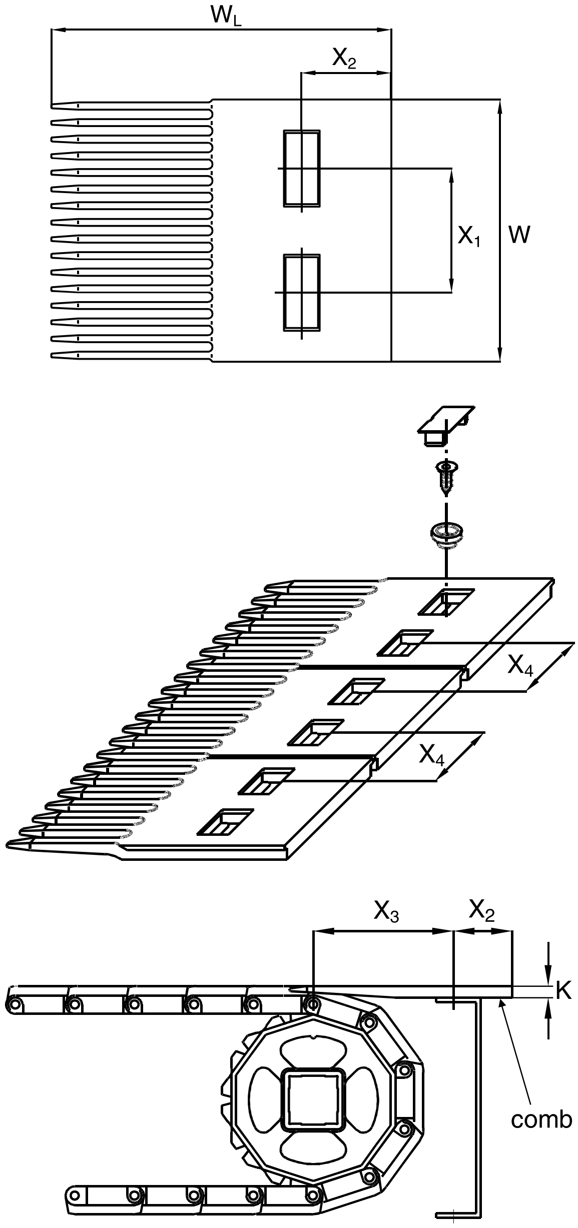
mm	150	200	250	300	350	400	450	500	550	600	650	700	750	800	etc.
inch (nom.)	*6*	*8*	*10*	*12*	*14*	*16*	*18*	*20*	*22*	*24*	*26*	*28*	*30*	*32*	*etc.*

Standard belt widths in increments of 50 mm *(2")* stock. Non-standard widths are offered in increments of 16.66 mm *(0.66")*. Smallest possible width 83.4 mm *(3.25")*.
For material selection refer to detailed material properties page 9 and for **colors** see Table page 16.
Coefficient of friction: The indicated values are valid for dry and clean conditions only. Under dirty conditions this factor may be 2 to 3 times higher.
The nominal tensile strength is valid for 20 °C *(68 °F)*. The admissible tensile force is dependent on the operating temperature near the drive sprockets. Within the temperature range allowed, the admissible tensile force may vary from 100 % to 20 % of the nominal tensile strength. For detailed information and correct calculation of effective tensile force refer to the Calculation Guide, page 85.

Data of Combs for M2531

(Finger transfer plates)

Material		Acetal (standard)	other materials on request
Temperature range	°C *°F*	-40 – 90 *-40 – 195*	
Color		grey	



Installation data

Dimensions	mm	*inch*
W	148	*5.8*
W_L	170	*7.5*
X_1	70	*2.75*
X_2	50	*2*
X_3	80 – 90	*3.2 – 3.5*
X_4	80	*5.9*
K	10	*0.4*

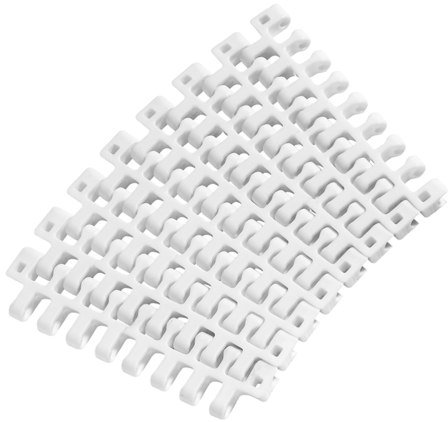
Note

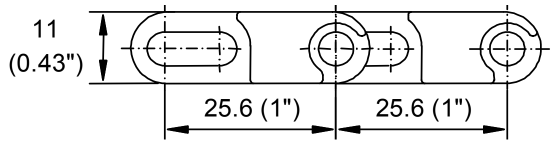
The combs are fixed using a special distance bushing which allows lateral movement. This allows the combs to adapt their position to the lateral displacement of the belt, caused by thermal expansion. For belt width up to 300 mm *(12")*, the plates can be firmly fixed (2 plates max.).

M2540 Radius Flush Grid 1"

Description

- For radius and straight conveying
- 35 % open area; 53 % open contact area; largest opening 6x12.5 mm *(0.24"x0.49")*
- Excellent for cooling and draining
- Easy to clean
- FDA approved materials
- Rod diameter 5 mm *(0.2")*
- Suitable for universal sprocket 1"
- "Open window" sprockets





Belt data

Belt material			Polypropylene		Polyethyl-ene	Polyacetal
Standard rod material			POM	PA	POM	PA
Nominal tensile strength [F'_N]	straight run	N/m	19'000	19'000	12'000	27'000
		lb/ft	*1'300*	*1'300*	*822*	*1'850*
	in curve	N	1'000	1'000	800	1'500
		lb	*225*	*225*	*180*	*338*
Temperature range		°C	5 – 105	5 – 105	-40 – 65	-40 – 90
		°F	*40 – 220*	*40 – 220*	*-40 – 150*	*-40 – 195*
Belt weight [m_B]		kg/m²	4.7	4.7	5.0	7.0
		lb/sqft	*0.96*	*0.96*	*1.02*	*1.44*
Coefficient of friction belt to support [μ_G]	• UHMW		0.13	0.13	0.25	0.10
	• HDPE		0.11	0.11	–	0.08
	• PA6, PA66		0.30	0.30	0.23	0.20
	• Steel		0.30	0.30	0.14	0.18
Coefficient of friction belt to goods [μ_P]	• Glass		0.19	0.19	0.10	0.15
	• Steel		0.32	0.32	0.13	0.20
	• Plastic		0.17	0.17	0.10	0.18
	• Cardboard		0.22	0.22	0.15	0.20

Standard range of belt widths

mm	200	250	300	350	400	450	500	550	600	650	700	750	800	850	etc.
inch (nom.)	*8*	*10*	*12*	*14*	*16*	*18*	*20*	*22*	*24*	*26*	*28*	*30*	*32*	*34*	*etc.*
Coll.fact. Q	2.03	2.07	2.10	2.12	2.14	2.15	2.16	2.17	2.18	2.18	2.19	2.19	2.19	2.20	etc.

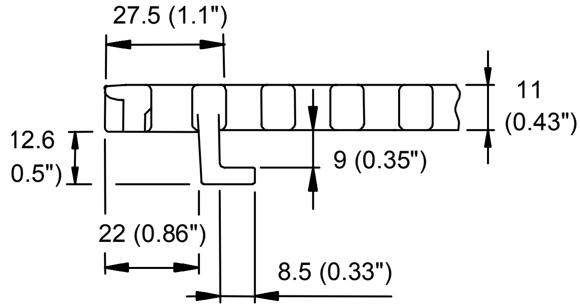
Standard belt widths in increments of 50 mm *(2")* stock. Non-standard widths are offered in increments of 16.66 mm *(0.66")*. Smallest possible width 83.4 mm *(3.25")*.
For material selection refer to detailed material properties page 9 and for **colors** see Table page 16.
Coefficient of friction: The indicated values are valid for dry and clean conditions only. Under dirty conditions this factor may be 2 to 3 times higher.
The nominal tensile strength is valid for 20 °C *(68 °F)*. The admissible tensile force is dependent on the operating temperature near the drive sprockets and along the belt edge on the outside of the curve. Within the temperature range allowed, the admissible tensile force may vary from 100 % to 20 % of the nominal tensile strength. For detailed information and correct calculation of effective tensile force refer to the Calculation Guide, page 85.

Hold Down Tabs for M2540

To avoid the belt in the curve to flipp over or slip off the inner guide rail, hold down guides are normally used. They are however not suitable if the conveyed goods are larger than the belt width or if side transfer over the belt edge is required. For these cases hold down tabs (hook modules) are available for for both belt edges.

Hold down tabs (M2540H)

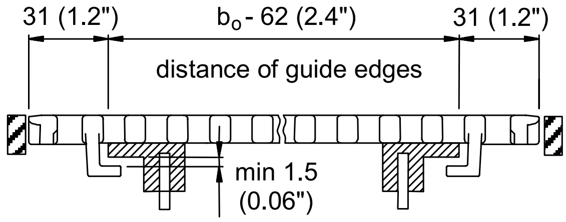
Hold down tabs (hook modules) are used for all applications where the products must be able to move over the belt edge. The use of hold down tabs is also conditional for the application of side guards (see also datasheet side guards in this manual).



Installation

Make sure to keep clearance between guides and hooks. The hold down tabs are ment to act as lift-off safety devices and not as guides! Hooks in contact with the guides will wear off quickly and may increase the tension in the belt.
For these reasons the conveyor needs to be designed with the appropriate accuracy.

Standard application:



Sprocket sizes

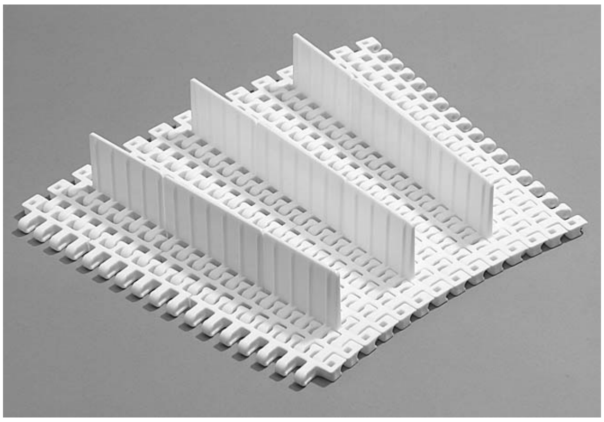
The combination sprocket/shaft size has to be selected in such a way to avoid collision of the hold down tabs with the shaft. Minimum sprocket sizes: M25S1025Q, M25S1030R, M25S1240Q.

Note

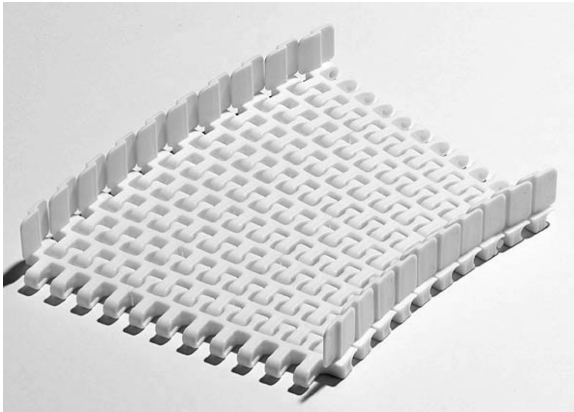
The hold down tabs are not recommended to be used for radial guidance. They can be worn away too quickly. Also tabs should not be used to hang-up the belt on its return way.
Further design indications see Design Guide Radius Belts and Slider Support Systems.

Flights and Side Guards M2540

M2540 with mid- and edge flights



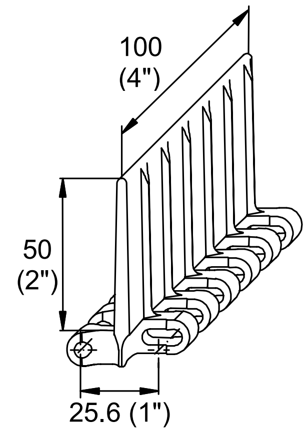
M2540 with side guards only



Flights and side guards are available in one size only. Flights can be cut to specific width and height if required. The collapse factor remains unchanged.

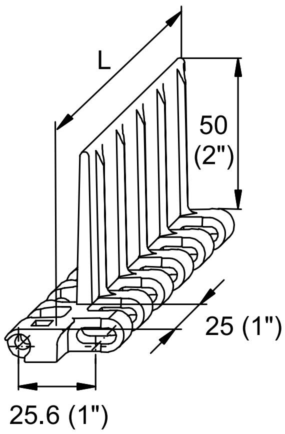
Middle flight

M2540F05



Edge flight

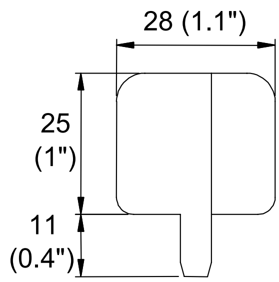
M254RF05 (right side)
M254LF05 (left side)
The total length L of the right and left type add to 200 mm *(8")*



Side guards

M254RG02 (right side)
M254LG02 (left side)

left and right version can be assembled on the opposite edge, (no functional problems) but they cannot be mixed.

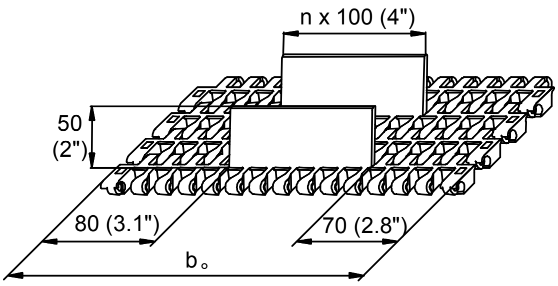


Standard range of belt widths for belts with flights:

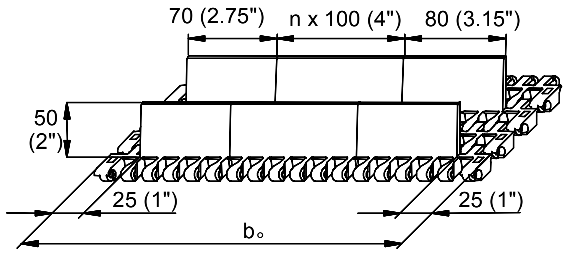
mm	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	etc.
inch (nom.)	*8*	*12*	*16*	*20*	*24*	*28*	*32*	*36*	*40*	*44*	*48*	*52*	*56*	*etc.*

Assembly conceptions for M2540 Radius Belt Flights and Side Guards

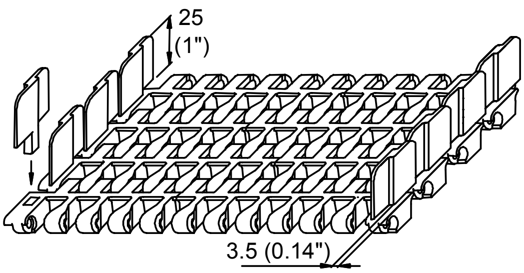
Flights and side guards are available in one height, see illustration below. Smaller heights can be cut on request.



Mid-flights only



Mid- and edge-flights



Side guards only (clip-on version)

Standard indents

The combination of flights and side guards is possible, but not recommended. With side guards hold down tabs must be used. On the return way the belt has to be supported either on the flights or between flights and side guards (gap only 15 mm *(0.6")* wide). Do not support or guide the belt on the tabs.

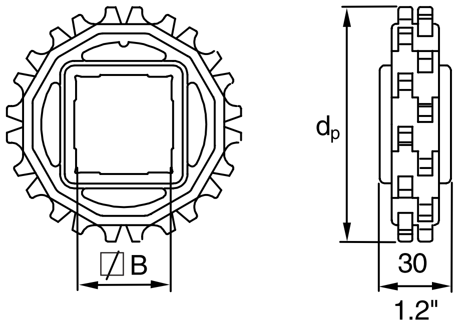
	left belt edge (running direction)	right belt edge (running direction)
Mid flights only (no indent-flight)	70 mm *(2.8")*	80 mm *(3.1")*
Mid. flights and indent flights	25 mm *(1")*	25 mm *(1")*
Side guards	5 mm *(0.2")*	5 mm *(0.2")*

Sprocket Data Series M2500

Sprocket code

M = modular belts
Belt pitch
S = molded 1 piece; Z = split sprocket molded
Number of teeth
Shaft size (diameter)
Shaft type: Q = square, R = round
Material: 6 = POM, 1 = PP

M	25	S	12	40	Q	6

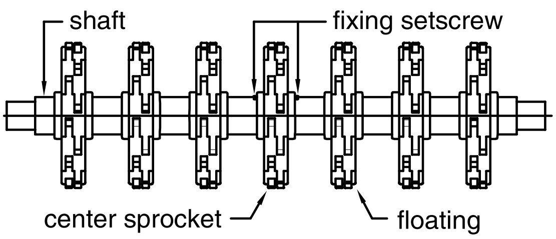


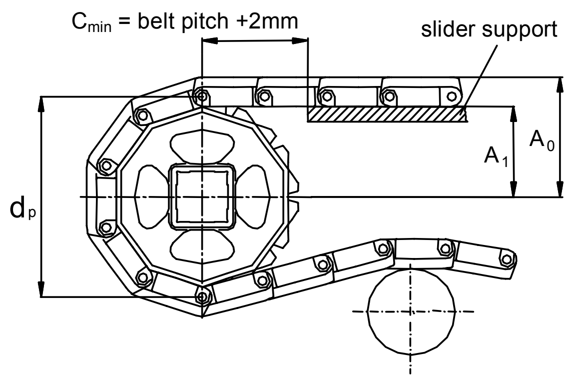
M25S1240Q

Sprocket availability

No. of teeth	Pitch ∅ d_p		A_1		Molded sprockets (M25Sxx)				Split sprockets (M25Zxx)
					Square bore		∅ Round bore *		
	mm	*inch*	mm	*inch*	mm	inch	mm	inch	
7	59	*2.3*	25	*0.97*	25	1	–	–	Available on request, please contact the Habasit representative
8	67	*2.6*	28	*1.12*	25	–	30	1 / 1$^{3/16}$	
10	83	*3.3*	36	*1.43*	40	1 / 1.5	30	1 / 1$^{3/16}$	
12	99	*3.9*	44	*1.74*	40	1 / 1.5	30 / 40	1 / 1$^{3/16}$	
18	147	*5.8*	68	*2.69*	40 / 60	1.5 / 2.5	30	1 / 1$^{3/16}$	
20	163	*6.4*	77	*3.01*	40 / 60	1.5 / 2.5	30	1 / 1$^{3/16}$	

* Key ways: for round bore ∅ 30 mm / 1": 8 mm *(0.315")*
for round bore ∅ 1"and 1$^{3/16}$": 6.3 mm *(0.25")*





Sprocket arrangement

The maximum sprocket spacing is 100 mm *(4")*.The minimum spacing is 33.3 mm *(1.3")*. The distance C between sprocket axis and slider support is min. 28 mm *(1.1")*. Further information to sprocket installation see Design Guide Sprocket Evaluation.

Sprocket material

Standard material Acetal, natural color.
Optional: Polypropylene (PP), blue, acid resistant

Numbers of sprockets and wearstrips

Standard belt width		Number of sprockets per shaft		Number of wear-strips	
mm	*inch nominal*	min. number	>10000 N/m *>685 lb/ft*	Carry-way (top)	Return-way (bottom)
150	*6*	2	3	2	2
200	*8*	2	5	2	2
250	*10*	3	5	3	2
300	*12*	3	7	3	2
350	*14*	3	7	4	3
400	*16*	5	9	4	3
450	*18*	5	9	5	3
500	*20*	5	11	5	3
550	*22*	5	11	6	4
600	*24*	7	13	6	4
700	*28*	7	15	7	4
800	*32*	7	17	7	4
900	*36*	9	19	8	5
1000	*40*	9	21	8	5
1100	*43*	11	23	9	5
1200	*47*	11	25	9	5
1300	*51*	13	27	10	6
1400	*55*	13	29	10	6
1600	*63*	15	33	11	6
1800	*71*	17	37	12	7
2000	*79*	19	41	13	7

Sprocket load

The numbers of sprockets listed in the above table give a general indication and refer to the upper limit of the range of tensile force (belt pull) indicated. The maximum load on one sprocket should normally not exceed 1000 N. For PP sprockets do not exceed 80% admissible belt load. Further instructions see Calculation Guide, page 89 or contact the Habasit representative.

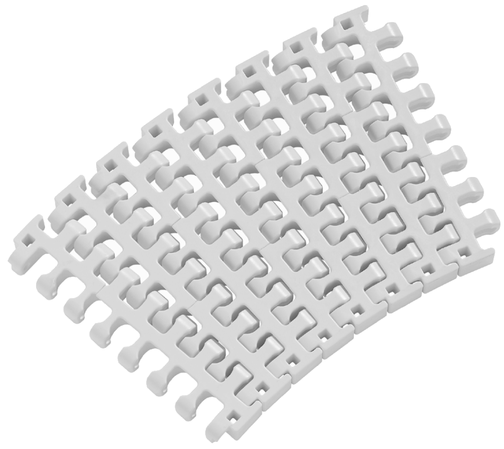
Wearstrips

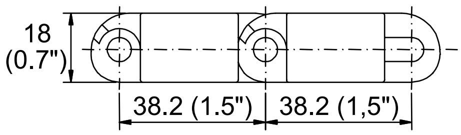
Between driving shaft and idling sprockets or rollers the belt is carried by a slider support furnished with longitudinal wear strips from UHMW Polyethylene or other suitable material. Minimum backflexing radius for belts without side guards 150 mm *(6")*, with side guards 600 mm *(24")*. More details see Design Guide, page 76.

M3840 Radius Flush Grid 1.5"

Description

- For radius and straight conveying
- 31 % open area; 50 % open contact area; largest opening 7x19 mm *(0.27"x0.25")*
- Excellent for cooling and draining
- Open hinge
- Easy to clean
- FDA approved materials
- Rod diameter 6 mm *(0.23")*
- "Open window" sprockets





Belt data

Belt material			Polypropylene		Polyethyl-ene	Polyacetal
Standard rod material			POM	PA	POM	PA
Nominal tensile strength [F'_N]	straight run	N/m	25'000	25'000	16'000	32'000
		lb/ft	*1'712*	*1'712*	*1'096*	*2'192*
	in curve	N	2'000	2'000	1'500	2'500
		lb	*450*	*450*	*338*	*562*
Temperature range		°C	5 – 105	5 – 105	-40 – 65	-40 – 90
		°F	*40 – 220*	*40 – 220*	*-40 – 150*	*-40 – 195*
Belt weight [m_B]		kg/m²	8.0	8.0	8.4	11.8
		lb/sqft	*1.64*	*1.64*	*1.72*	*2.42*
Coefficient of friction belt to support [μ_G]	• UHMW		0.13	0.13	0.25	0.10
	• HDPE		0.11	0.11	–	0.08
	• PA6, PA66		0.30	0.30	0.23	0.20
	• Steel		0.30	0.30	0.14	0.18
Coefficient of friction belt to goods [μ_P]	• Glass		0.19	0.19	0.10	0.15
	• Steel		0.32	0.32	0.13	0.20
	• Plastic		0.17	0.17	0.10	0.18
	• Cardboard		0.22	0.22	0.15	0.20

Standard range of belt widths

mm	200	250	300	350	400	450	500	550	600	650	700	750	800	850	etc.
inch (nom.)	*8*	*10*	*12*	*14*	*16*	*18*	*20*	*22*	*24*	*26*	*28*	*30*	*32*	*34*	*etc.*
Coll.fact. Q	1.9	1.98	2.03	2.06	2.08	2.10	2.12	2.13	2.14	2.15	2.15	2.16	2.17	2.17	etc.

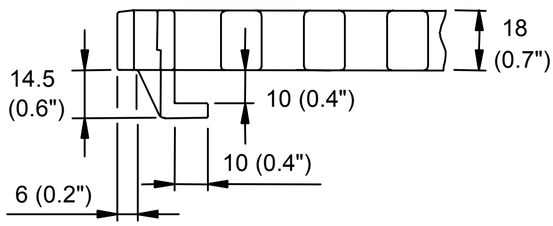
Standard belt widths in increments of 50 mm *(2")* stock. Non-standard widths are offered in increments of 25 mm *(1")*. Smallest possible width 175 mm *(7")*.
For material selection refer to detailed material properties page 9 and for **colors** see Table page 16.
Coefficient of friction: The indicated values are valid for dry and clean conditions only. Under dirty conditions this factor may be 2 to 3 times higher.
The nominal tensile strength is valid for 20 °C *(68 °F)*. The admissible tensile force is dependent on the operating temperature near the drive sprockets and along the belt edge on the outside of the curve. Within the temperature range allowed, the admissible tensile force may vary from 100 % to 20 % of the nominal tensile strength. For detailed information and correct calculation of effective tensile force refer to the Calculation Guide, page 85.

Hold Down Tabs for M3840

To avoid the belt in the curve to flipp over or slip off the inner guide rail, hold down guides are normally used. They are however not suitable if the conveyed goods are larger than the belt width or if side transfer over the belt edge is required. For these cases hold down tabs (hook modules) are available for for both belt edges.

Hold down tabs (M3840H)

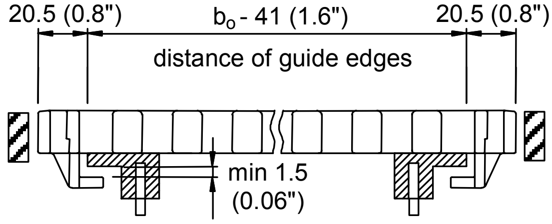
Hold down tabs (hook modules) are used for all applications where the products must be able to move over the belt edge. The use of hold down tabs is also conditional for the application of side guards (see also datasheet side guards in this manual).



Installation

Make sure to keep clearance between guides and hooks. The hold down tabs are ment to act as lift-off safety devices and not as guides! Hooks in contact with the guides will wear off quickly and may increase the tension in the belt.
For these reasons the conveyor needs to be designed with the appropriate accuracy.

Standard application:



Sprocket sizes

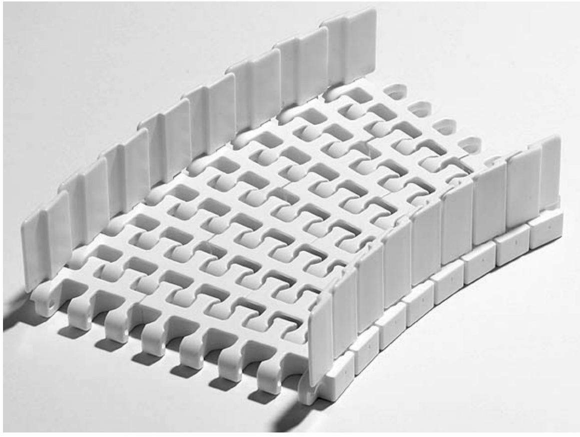
The combination sprocket/shaft size has to be selected in such a way to avoid collision of the hold down tabs with the shaft. Minimum sprocket sizes: M38S1240Q, M38S1260Q

Note

The hold down tabs are not recommended to be used for radial guidance. They can be worn away too quickly. Also tabs should not be used to hang-up the belt on its return way.
Further design indications see Design Guide Radius Belts and Slider Support Systems.

Flights and Side Guards M3840

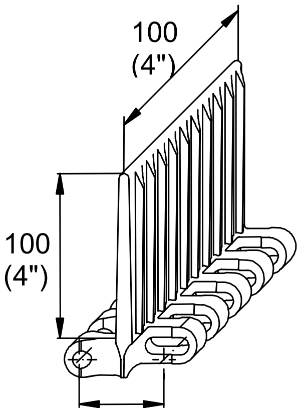
Flights and side guards are available in one size only. Flights can be cut to specific width and height if required.The collapse factor remains unchanged.



M3840 with side guards

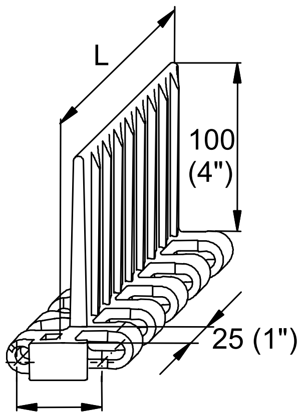
Middle flight

M3840F10



Edge flight

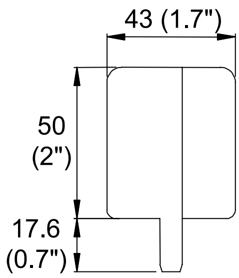
M384RF10 (right side)
M384LF10 (left side)
The total length L of the right and left type add to 200mm (8")



Side guards

M384RG05 (right side)
M384LG05 (left side)

left and right version can be assembled on the opposite edge, (no functional problems) but they cannot be mixed.

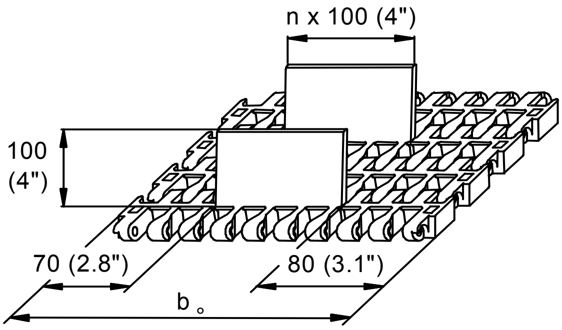


Standard range of belt widths for belts with flights

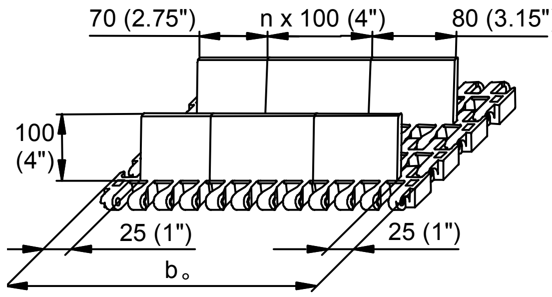
mm	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	etc.
inch (nom.)	*8*	*12*	*16*	*20*	*24*	*28*	*32*	*36*	*40*	*44*	*48*	*52*	*56*	*etc.*

Assembly conceptions for M3840 Radius Belt Flights and Side Guards

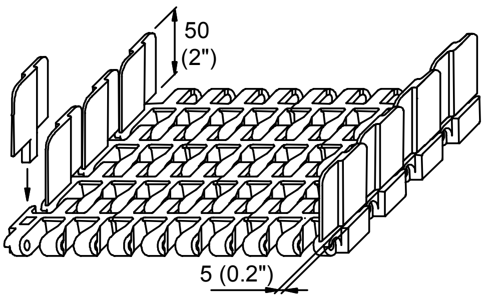
Flights and side guards are available in one height, see illustration below. Smaller heights can be cut on request.



Mid-flights only



Mid- and edge-flights



Side guards only (clip-on version)

Standard indents

The combination of flights and side guards is possible, but not recommended. With side guards hold down tabs must be used. On the return way the belt has to be supported either on the flights or between flights and side guards (gap only 15mm (0.6") wide). Do not support or guide the belt on the tabs.

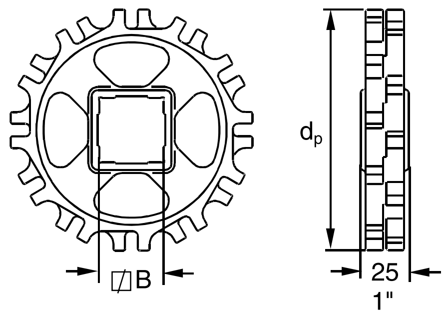
	left belt edge (running direction)	right belt edge (running direction)
Mid flights only (no indent-flight)	70 mm *(2.8")*	80 mm *(3.1")*
Mid. flights and indent flights	25 mm *(1")*	25 mm *(1")*
Side guards	5 mm *(0.2")*	5 mm *(0.2")*

Sprocket Data Series M3800

Sprocket code

M = modular belts
Belt pitch
S = molded 1 piece; Z = split sprocket molded
Number of teeth
Shaft size (diameter)
Shaft type: Q = square, R = round
Material: 6 = POM, 1 = PP

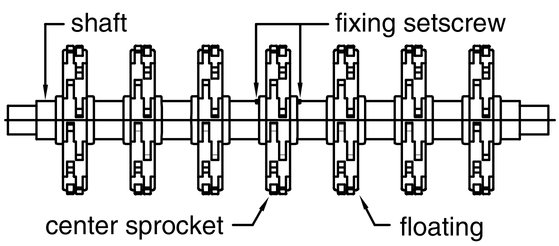
M	**38**	**S**	**12**	**40**	**Q**	**6**

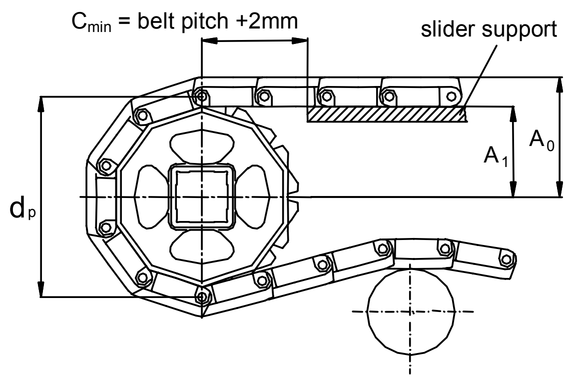


Example:M38S1240Q

Sprocket availability

No. of teeth	Pitch ∅ d_p		A_1		Molded sprockets (M38Sxx)				Split sprockets (M38Zxx)
					Square bore		∅ Round bore		
	mm	*inch*	mm	*inch*	mm	inch	mm	inch	
8	102	*4.0*	42	*1.65*	40	1.5	–	–	Available on request, please contact the Habasit representative
12	150	*5.9*	66	*2.60*	40	1.5	–	–	
16	198	*7.8*	90	*3.55*	40	1.5	–	–	





Sprocket arrangement

The maximum sprocket spacing is 125 mm *(6")*. The minimum spacing is 50 mm *(2")*. The distance C between sprocket axis and slider support is min. 41 mm *(1.6")*. Further information to sprocket installation see Design Guide Sprocket Evaluation.

Sprocket material

Standard material Acetal, natural color.
Optional: Polypropylene (PP), blue, acid resistant.

Numbers of sprockets and wearstrips

Standard belt width		Number of sprockets per shaft		Number of wear-strips	
mm	*inch nominal*	min. number	>12'000 N/m / *822 lb/ft* (straight run) > 1000 N / *225 lb* (curve)	Carry-way (top)	Return-way (bottom)
200	*8*	2	3	2	2
250	*10*	2	4	2	2
300	*12*	3	5	2	2
350	*14*	3	5	2	2
400	*16*	3	7	3	3
450	*18*	5	7	3	3
500	*20*	5	9	3	3
550	*22*	5	9	3	3
600	*24*	5	11	4	3
650	*26*	5	11	4	3
700	*28*	7	13	4	3
750	*30*	7	13	5	3
800	*32*	7	15	5	4
850	*34*	7	15	5	4
900	*36*	7	17	6	4
950	*38*	9	17	6	4
1000	*40*	9	19	6	5
1050	*42*	9	19	7	5
1100	*44*	9	21	7	5
1150	*46*	9	21	7	5
1200	*48*	11	23	8	6
1250	*50*	11	23	8	6

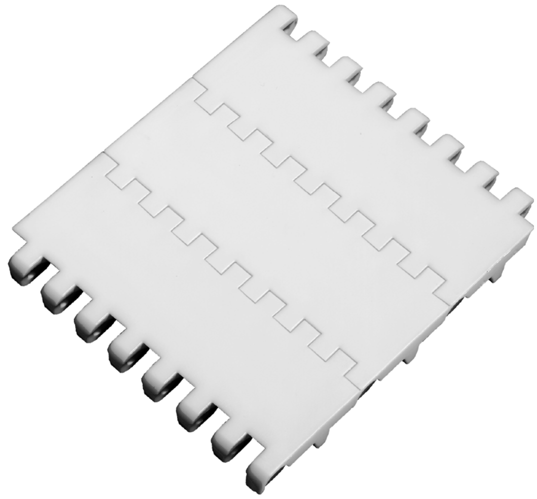
Sprocket load

The numbers of sprockets listed in the above table give a general indication and refer to the upper limit of the range of tensile force (belt pull) indicated. The maximum load on one sprocket should normally not exceed 1700 N *(382.5 lb).* For PP sprockets do not exceed 80% admissible belt load. Further instructions see Calculation Guide, page 89 or contact the Habasit representative.

Wearstrips

Between driving shaft and idling sprockets or rollers the belt is carried by a slider support furnished with longitudinal wear strips from UHMW Polyethylene or other suitable material. Minimum backflexing radius for belts without side guards 150 mm *(6"),* with side guards 600 mm *(24").* More details see Design Guide, page 76.

M5010 Flat Top 2"

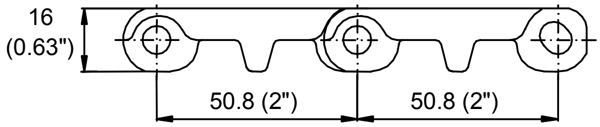


Description

- 0% open area
- Solid plate
- Open hinge, easy to clean
- FDA approved materials
- Rod diameter 7 mm *(0.27")*
- "Open window" sprockets

Available accessories

- Flights straight and scoops (flight bent)
- Side guards



Belt data

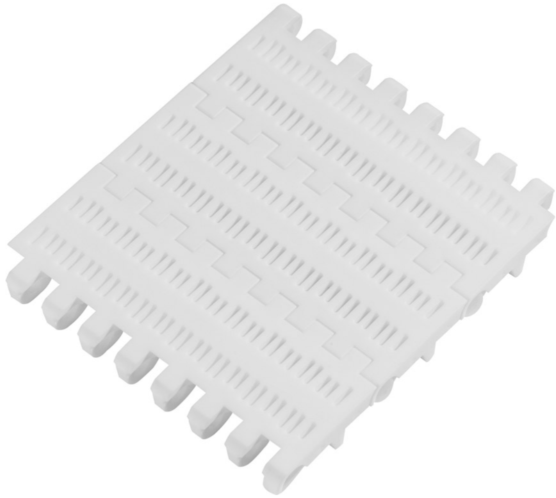
Belt material		Poly-propylene	Poly-ethylene	Polyacetal	
Standard rod material		PP	PE	PE	PA
Nominal tensile	N/m	18'000	10'000	18'000	30'000
strength [F'_N]	*lb/ft*	*1'233*	*685*	*1'233*	*2'055*
Temperature range	°C	5 – 105	-70 – 65	-40 – 90	-40 – 90
	°F	*40 – 220*	*-94 – 150*	*-40 – 195*	*-40 – 195*
Belt weight [m_B]	kg/m²	9.0	9.4	13.5	13.5
	lb/sqft	*1.85*	*1.93*	*2.77*	*2.77*
Coefficient of friction belt to support [μ_G]	• UHMW	0.13	0.25	0.10	0.10
	• HDPE	0.11	–	0.08	0.08
	• PA6, PA66	0.30	0.23	0.20	0.20
	• Steel	0.30	0.14	0.18	0.18
Coefficient of friction belt to goods [μ_P]	• Glass	0.19	0.10	0.15	0.15
	• Steel	0.32	0.13	0.20	0.20
	• Plastic	0.17	0.10	0.18	0.18
	• Cardboard	0.22	0.15	0.20	0.20

Standard range of belt widths

mm	75	150	225	300	375	450	525	600	675	750	825	900	975	etc.
inch (nom.)	*3*	*6*	*9*	*12*	*15*	*18*	*21*	*24*	*27*	*30*	*33*	*36*	*39*	*etc.*

Standard belt widths in increments of 75 mm *(3")* stock. Non-standard widths are offered in increments of 18.75 mm *(0.74")*. Smallest possible width 112.5 mm *(4.42")*. Non-bricklayed belts 75 mm *(3")* and 150 mm *(4")*.
For material selection refer to detailed material properties page 9 and for **colors** see Table page 16.
Coefficient of friction: The indicated values are valid for dry and clean conditions only. Under dirty conditions this factor may be 2 to 3 times higher.
The nominal tensile strength is valid for 20 °C *(68 °F)*. The admissible tensile force is dependent on the operating temperature near the drive sprockets. Within the temperature range allowed, the admissible tensile force may vary from 100 % to 20 % of the nominal tensile strength. For detailed information and correct calculation of effective tensile force refer to the Calculation Guide, page 85.

M5011 Flat Top Perforated 2"

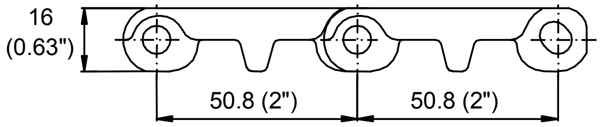


Description

- 18 % open area;
  largest opening 2x10 mm *(0.08"x0.4")*
- Solid plate
- Open hinge, easy to clean
- FDA approved materials
- Rod diameter 7 mm *(0.27")*
- "Open window" sprockets

Available accessories

- Flights straight and scoops (flight bent)
- Side guards



Belt data

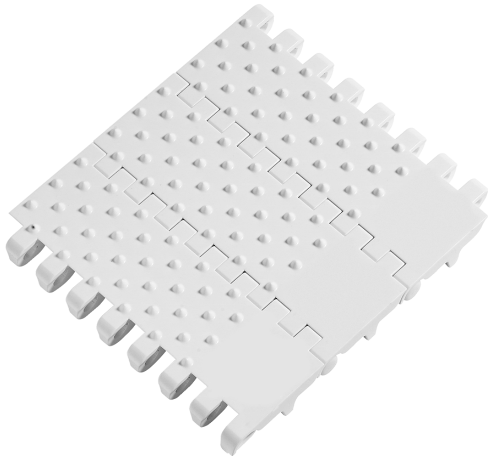
Belt material			Poly-propylene	Poly-ethylene	Polyacetal	
Standard rod material			PP	PE	PE	PA
Nominal tensile strength [F'_N]		N/m	18'000	10'000	18'000	30'000
		lb/ft	*1'233*	*685*	*1'233*	*2'055*
Temperature range		°C	5 – 105	-70 – 65	-40 – 90	-40 – 90
		°F	*40 – 220*	*-94 – 150*	*-40 – 195*	*-40 – 195*
Belt weight [m_B]		kg/m²	9.0	9.4	13.5	13.5
		lb/sqft	*1.85*	*1.93*	*2.77*	*2.77*
Coefficient of friction belt to support [μ_G]	• UHMW		0.13	0.25	0.10	0.10
	• HDPE		0.11	–	0.08	0.08
	• PA6, PA66		0.30	0.23	0.20	0.20
	• Steel		0.30	0.14	0.18	0.18
Coefficient of friction belt to goods [μ_P]	• Glass		0.19	0.10	0.15	0.15
	• Steel		0.32	0.13	0.20	0.20
	• Plastic		0.17	0.10	0.18	0.18

Standard range of belt widths

mm	75	150	225	300	375	450	525	600	675	750	825	900	975	etc.
inch (nom.)	*3*	*6*	*9*	*12*	*15*	*18*	*21*	*24*	*27*	*30*	*33*	*36*	*39*	*etc.*

Standard belt widths in increments of 75 mm *(3")* stock. Non-standard widths are offered in increments of 18.75 mm *(0.74")*. Smallest possible width 112.5 mm *(4.42")*. Non-bricklayed belts 75 mm *(3")* and 150 mm *(4")*.
For material selection refer to detailed material properties page 9 and for **colors** see Table page 16.
Coefficient of friction: The indicated values are valid for dry and clean conditions only. Under dirty conditions this factor may be 2 to 3 times higher.
The nominal tensile strength is valid for 20 °C *(68 °F)*. The admissible tensile force is dependent on the operating temperature near the drive sprockets. Within the temperature range allowed, the admissible tensile force may vary from 100 % to 20 % of the nominal tensile strength. For detailed information and correct calculation of effective tensile force refer to the Calculation Guide, page 85.

M5013 Cone Top 2"

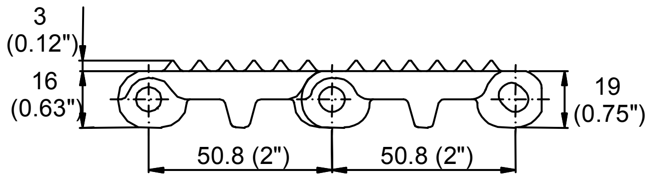


Description

- 0% open area
- Solid plate
- Belt with extra grip, exact positioning
- Inclines / declines
- Saw lines for meat
- Standard indent 37.5 mm *(1.5")*
- Open hinge, easy to clean
- Rod diameter 7 mm *(0.27")*
- FDA approved materials
- "Open window" sprockets

Available accessories

- Flights straight and scoops (flight bent)
- Side guards



Belt data

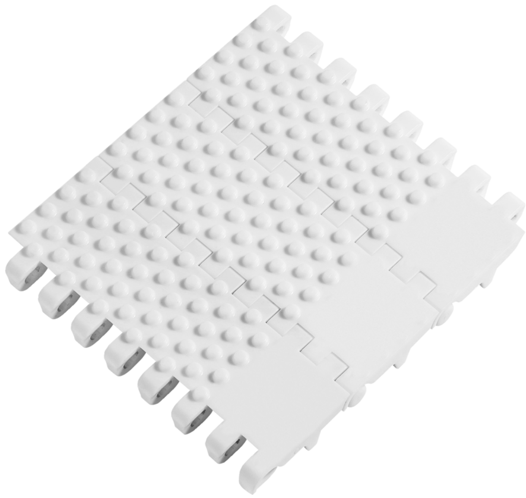
Belt material			Poly-propylene	Poly-ethylene	Polyacetal	
Standard rod material			PP	PE	PE	PA
Nominal tensile strength [F'_N]		N/m *lb/ft*	18'000 *1'233*	10'000 *685*	18'000 *1'233*	30'000 *2'055*
Temperature range		°C *°F*	5 – 105 *40 – 220*	-70 – 65 *-94 – 150*	-40 – 90 *-40 – 195*	-40 – 90 *-40 – 195*
Belt weight [m_B]		kg/m^2 *lb/sqft*	9.0 *1.85*	9.4 *1.93*	13.5 *2.77*	13.5 *2.77*
Coefficient of friction belt to support [μ_G]	• UHMW		0.13	0.25	0.10	0.10
	• HDPE		0.11	–	0.08	0.08
	• PA6, PA66		0.30	0.23	0.20	0.20
	• Steel		0.30	0.14	0.18	0.18
Coefficient of friction belt to goods [μ_P]	• Glass		0.19	0.10	0.15	0.15
	• Steel		0.32	0.13	0.20	0.20
	• Plastic		0.17	0.10	0.18	0.18

Standard range of belt widths

mm	225	300	375	450	525	600	675	750	825	900	975	1050	1125	etc.
inch (nom.)	*9*	*12*	*15*	*18*	*21*	*24*	*27*	*30*	*33*	*36*	*39*	*42*	*45*	*etc.*

Standard belt widths in increments of 75 mm *(3")* stock. Non-standard widths are offered in increments of 18.75 mm *(0.74")*. Smallest possible width 112.5 mm *(4.42")*.
For material selection refer to detailed material properties page 9 and for **colors** see Table page 16.
Coefficient of friction: The indicated values are valid for dry and clean conditions only. Under dirty conditions this factor may be 2 to 3 times higher.
The nominal tensile strength is valid for 20 °C *(68 °F)*. The admissible tensile force is dependent on the operating temperature near the drive sprockets. Within the temperature range allowed, the admissible tensile force may vary from 100 % to 20 % of the nominal tensile strength. For detailed information and correct calculation of effective tensile force refer to the Calculation Guide, page 85.

M5014 Nub Top 2"

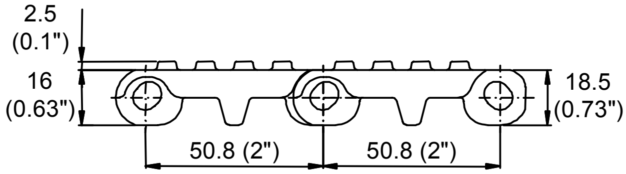


Description

- 0% open area
- Solid plate
- Non-adhesive because of less contact surface
- Open hinge, easy to clean
- Standard indent 37.5 mm (*1.5"*)
- Rod diameter 7 mm *(0.27")*
- FDA approved materials
- "Open window" sprockets

Available accessories

- Flights straight and scoops (flight bent)
- Side guards



Belt data

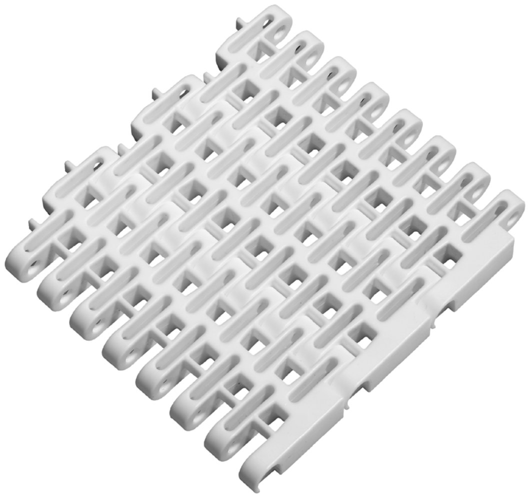
Belt material		Poly-propylene	Poly-ethylene	Polyacetal	
Standard rod material		PP	PE	PE	PA
Nominal tensile strength [F'_N]	N/m *lb/ft*	18'000 *1'233*	10'000 *685*	18'000 *1'233*	30'000 *2'055*
Temperature range	°C *°F*	5 – 105 *40 – 220*	-70 – 65 *-94 – 150*	-40 – 90 *-40 – 195*	-40 – 90 *-40 – 195*
Belt weight [m_B]	kg/m² *lb/sqft*	9.0 *1.85*	9.4 *1.93*	13.5 *2.77*	13.5 *2.77*
Coefficient of friction belt to support [μ_G]	• UHMW	0.13	0.25	0.10	0.10
	• HDPE	0.11	–	0.08	0.08
	• PA6, PA66	0.30	0.23	0.20	0.20
	• Steel	0.30	0.14	0.18	0.18
Coefficient of friction belt to goods [μ_P]	• Glass	0.19	0.10	0.15	0.15
	• Steel	0.32	0.13	0.20	0.20
	• Plastic	0.17	0.10	0.18	0.18

Standard range of belt widths

mm	225	300	375	450	525	600	675	750	825	900	975	1050	1125	etc.
inch (nom.)	*9*	*12*	*15*	*18*	*21*	*24*	*27*	*30*	*33*	*36*	*39*	*42*	*45*	*etc.*

Standard belt widths in increments of 75 mm *(3")* stock. Non-standard widths are offered in increments of 18.75 mm *(0.74")*. Smallest possible width 112.5 mm *(4.42")*.
For material selection refer to detailed material properties page 9 and for **colors** see Table page 16.
Coefficient of friction: The indicated values are valid for dry and clean conditions only. Under dirty conditions this factor may be 2 to 3 times higher.
The nominal tensile strength is valid for 20 °C *(68 °F)*. The admissible tensile force is dependent on the operating temperature near the drive sprockets. Within the temperature range allowed, the admissible tensile force may vary from 100 % to 20 % of the nominal tensile strength. For detailed information and correct calculation of effective tensile force refer to the Calculation Guide, page 85.

M5030 Flush Grid 2"

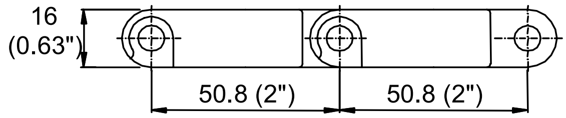


Description

- 37 % open area; 55 % open contact area; largest opening 8.5x8.5 mm *(0.33"x0.33")*
- Excellent for cooling and draining
- Open hinge
- Smooth grid
- Easy to clean
- FDA approved materials
- Rod diameter 7 mm *(0.27")*
- "Open window" sprockets

Available accessories

- Flights straight and scoops (flight bent)
- Side guards



Belt data

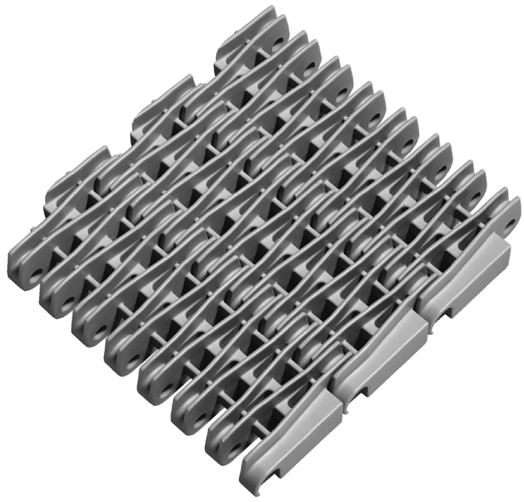
Belt material		Poly-propylene	Poly-ethylene	Polyacetal	
Standard rod material		PP	PE	PP	PA
Nominal tensile strength [F'_N]	N/m *lb/ft*	25'000 *1'712*	16'000 *1'096*	28'000 *1'918*	28'000 *1'918*
Temperature range	°C *°F*	5 – 105 *40 – 220*	-70 – 65 *-94 – 150*	5 – 90 *40 – 195*	-40 – 90 *-40 – 195*
Belt weight [m_B]	kg/m^2 *lb/sqft*	7.4 *1.52*	7.7 *1.58*	11.7 *2.4*	11.7 *2.4*
Coefficient of friction belt to support [μ_G]	• UHMW	0.13	0.25	0.10	0.10
	• HDPE	0.11	–	0.08	0.08
	• PA6, PA66	0.30	0.23	0.20	0.20
	• Steel	0.30	0.14	0.18	0.18
Coefficient of friction belt to goods [μ_P]	• Glass	0.19	0.10	0.15	0.15
	• Steel	0.32	0.13	0.20	0.20
	• Plastic	0.17	0.10	0.18	0.18
	• Cardboard	0.22	0.15	0.20	0.20

Standard range of belt widths

mm	225	300	375	450	525	600	675	750	825	900	975	1050	1125	etc.
inch (nom.)	*9*	*12*	*15*	*18*	*21*	*24*	*27*	*30*	*33*	*36*	*39*	*42*	*45*	*etc.*

Standard belt widths in increments of 75 mm *(3")* stock. Non-standard widths are offered in increments of 18.75 mm *(0.74")*. Smallest possible width 112.5 mm *(4.42")*.
For material selection refer to detailed material properties page 9 and for **colors** see Table page 16.
Coefficient of friction: The indicated values are valid for dry and clean conditions only. Under dirty conditions this factor may be 2 to 3 times higher.
The nominal tensile strength is valid for 20 °C *(68 °F)*. The admissible tensile force is dependent on the operating temperature near the drive sprockets. Within the temperature range allowed, the admissible tensile force may vary from 100 % to 20 % of the nominal tensile strength. For detailed information and correct calculation of effective tensile force refer to the Calculation Guide, page 85.

M5031 Raised Rib 2"

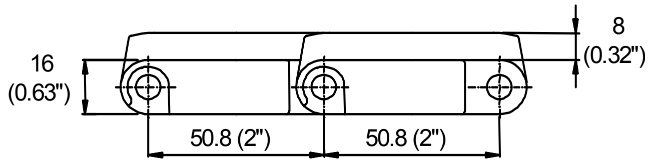


Description

- 37 % open area; 75 % open contact area; largest opening 8.5x8.5 mm *(0.33"x0.33")*
- Excellent for flushing and draining
- Easy to clean
- FDA approved materials
- Rod diameter 7 mm *(0.27")*
- "Open window" sprockets

Available accessories

- Combs (finger transfer plates) for smooth and easy product transfer.



Belt data

Belt material		Polypropylene	
Standard rod material		PP	POM
Nominal tensile strength [F'_N]	N/m *lb/ft*	30'000 *2'055*	36'000 *2'466*
Temperature range	°C *°F*	5 – 105 *40 – 220*	5 – 105 *40 – 220*
Belt weight [m_B]	kg/m² *lb/sqft*	10.0 *2.05*	10.0 *2.05*
Coefficient of friction belt to support [μ_G]	• UHMW	0.13	0.13
	• HDPE	0.11	0.11
	• PA6, PA66	0.30	0.30
	• Steel	0.30	0.30
Coefficient of friction belt to goods [μ_P]	• Glass	0.19	0.19
	• Steel	0.32	0.32
	• Plastic	0.17	0.17
	• Cardboard	0.22	0.22

Standard range of belt widths

mm	225	300	375	450	525	600	675	750	825	900	975	1050	1125	etc.
inch (nom.)	*9*	*12*	*15*	*18*	*21*	*24*	*27*	*30*	*33*	*36*	*39*	*42*	*45*	*etc.*

Standard belt widths in increments of 75 mm *(3")* stock. Non-standard widths are offered in increments of 18.75 mm *(0.74")*. Smallest possible width 112.5 mm *(4.42")*.
For material selection refer to detailed material properties page 9 and for **colors** see Table page 16.
Coefficient of friction: The indicated values are valid for dry and clean conditions only. Under dirty conditions this factor may be 2 to 3 times higher.
The nominal tensile strength is valid for 20 °C *(68 °F)*. The admissible tensile force is dependent on the operating temperature near the drive sprockets. Within the temperature range allowed, the admissible tensile force may vary from 100 % to 20 % of the nominal tensile strength. For detailed information and correct calculation of effective tensile force refer to the Calculation Guide, page 85.

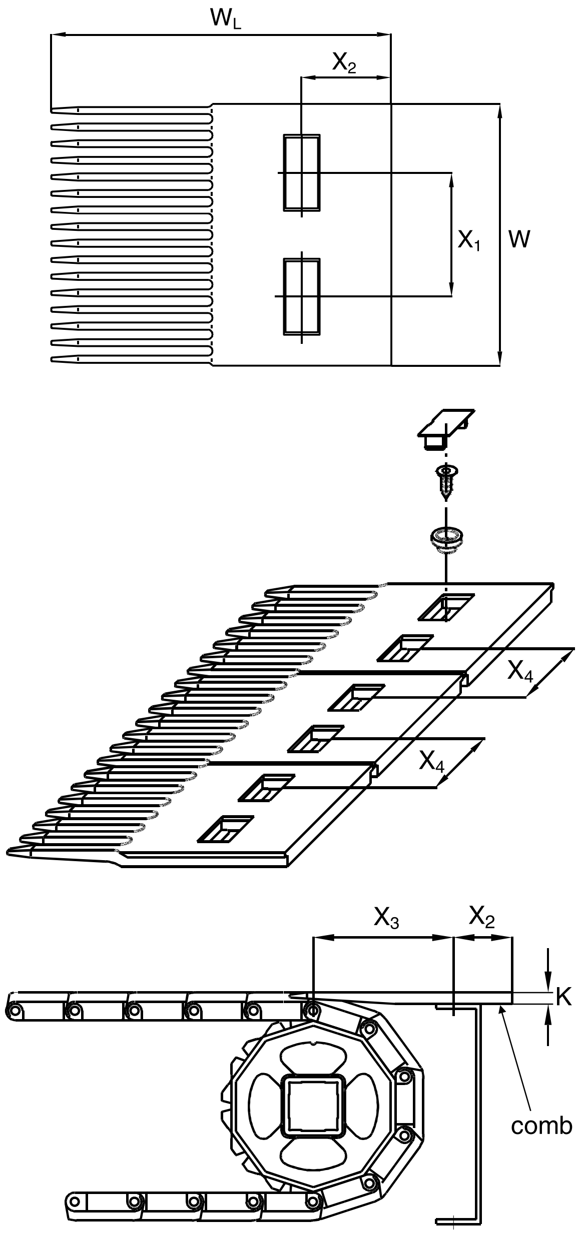
Data of Combs for M5031

(Finger transfer plates)

Material	Acetal (standard)	other materials on request
Temperature range °C *°F*	-40 – 90 *-40 – 195*	
Color	grey	

Installation data

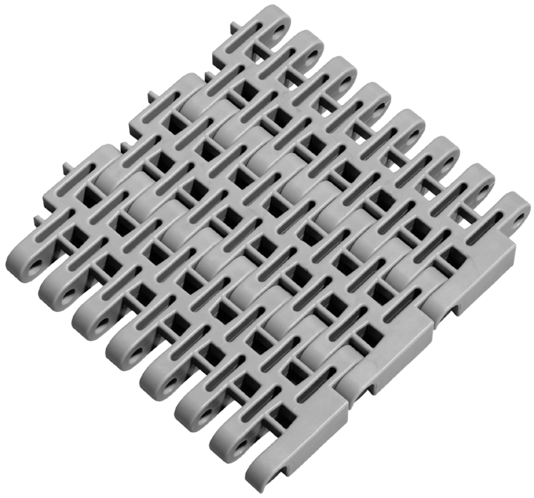
Dimensions	mm	*inch*
W	148	*5.8*
W_L	190	*7.5*
X_1	70	*2.75*
X_2	50	*2*
X_3	100 – 110	*4 – 4.3*
X_4	80	*5.9*
K	10	*0.4*



Note

The combs are fixed using a special distance bushing which allows lateral movement. This allows the combs to adapt their position to the lateral displacement of the belt, caused by thermal expansion. For belt width up to 300 mm (12"), the plates can be firmly fixed (2 plates max.).

M5032 Flush Grid 2" Heavy

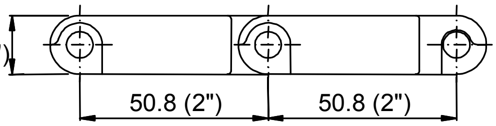


Description

- Strong design
- 34 % open area; 60% open contact area; largest opening 6.4x8.5 mm *(0.25"x0.33")*
- Excellent for flushing and draining
- Closed hinge
- Smooth grid
- FDA approved materials
- Rod diameter 7 mm *(0.27")*
- "Open window" sprockets

Available accessories

- Flights straight and scoops (flight bent)
- Side guards



Belt data

Belt material		Polypropylene		Poly-ethylene	Polyacetal	
Standard rod material		PP	POM	PE	PP	PA
Nominal tensile strength [F'_N]	N/m	36'000	38'000	24'000	36'000	40'000
	lb/ft	*1'712*	*2'603*	*1'644*	*1'918*	*2'740*
Temperature range	°C	5 – 105	5 – 105	-70 – 65	-5 – 90	-40 – 90
	°F	*40 – 220*	*40 – 220*	*-94 – 150*	*40 – 195*	*-40 – 195*
Belt weight [m_B]	kg/m²	8.0	8.0	8.3	12.0	12.0
	lb/sqft	*1.64*	*1.64*	*1.7*	*2.46*	*2.46*
Coefficient of friction belt to support [μ_G]	• UHMW	0.13	0.13	0.25	0.10	0.10
	• HDPE	0.11	0.11	–	0.08	0.08
	• PA6, PA66	0.30	0.30	0.23	0.20	0.20
	• Steel	0.30	0.30	0.14	0.18	0.18
Coefficient of friction belt to goods [μ_P]	• Glass	0.19	0.19	0.10	0.15	0.15
	• Steel	0.32	0.32	0.13	0.20	0.20
	• Plastic	0.17	0.17	0.10	0.18	0.18
	• Cardboard	0.22	0.22	0.15	0.20	0.20

Standard range of belt widths

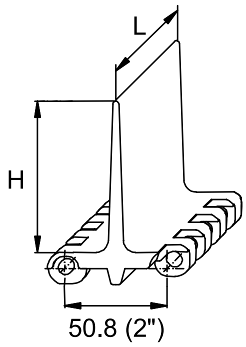
mm	225	300	375	450	525	600	675	750	825	900	975	1050	1125	etc.
inch (nom.)	*9*	*12*	*15*	*18*	*21*	*24*	*27*	*30*	*33*	*36*	*39*	*42*	*45*	*etc.*

Standard belt widths in increments of 75 mm *(3")* stock. Non-standard widths are offered in increments of 18.75 mm *(0.74")*. Smallest possible width 112.5 mm *(4.42")*.
For material selection refer to detailed material properties page 9 and for **colors** see Table page 16.
Coefficient of friction: The indicated values are valid for dry and clean conditions only. Under dirty conditions this factor may be 2 to 3 times higher.
The nominal tensile strength is valid for 20 °C *(68 °F)*. The admissible tensile force is dependent on the operating temperature near the drive sprockets. Within the temperature range allowed, the admissible tensile force may vary from 100 % to 20 % of the nominal tensile strength. For detailed information and correct calculation of effective tensile force refer to the Calculation Guide, page 85.

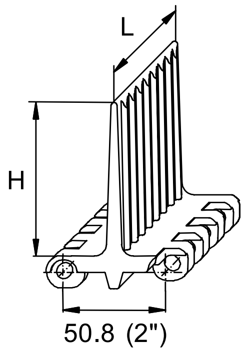
Flights and Side Guards Series M5000

Flights and side guards are available in corresponding nominal sizes. Standard flight sizes can be cut to specific width and height if required.
Code: xx = height of flight: 25 mm = 02, 50 mm = 05, 75 mm = 07, 100 mm = 10, 150 mm = 15

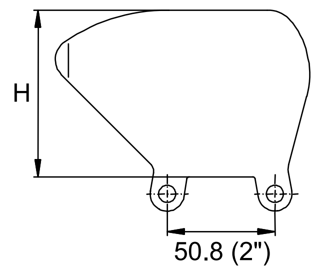
	Flights straight		Flights corrugated		Flights bent (Scoop)		Side guards
Code flight side guard	M5010Fxx (xx=code for height)		M5030Fxx (xx=code for height)		M5010Bxx (xx=code for height)		M5010Gxx xx = height
Applicable for belt type	all 2" belts except M5031		all 2" belts		all 2" belts except M5031		all 2" belts except M5031
	height **H**	length **L**	height **H**	length **L**	height **H**	length **L**	height **H**
mm *inch*	25 *1*	150 *6*	– –	– –	– –	– –	– –
mm *inch*	50 *2*	150 *6*	– –	– –	– –	– –	50 *2*
mm *inch*	75 *3*	150 *6*	– –	– –	– –	– –	75 *3*
mm *inch*	100 *4*	150 *6*	100 *4*	150 *6*	100 *4*	150 *6*	100 *4*
mm *inch*	150 *6*	150 *6*	– –	– –	– –	– –	– –



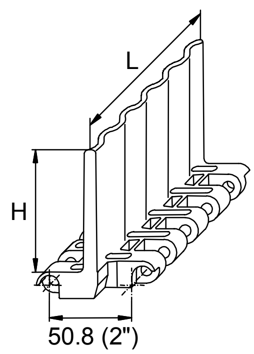
M5010Fxx, smooth side



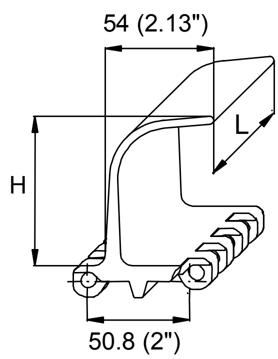
M5010Fxx, "non-cling" side



M5010Gxx



M5030F10, corrugated



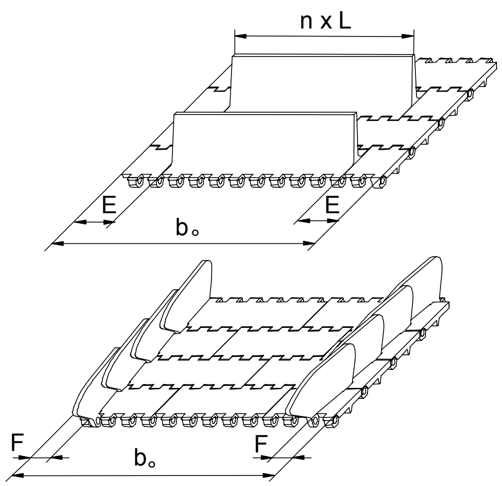
M5010B10

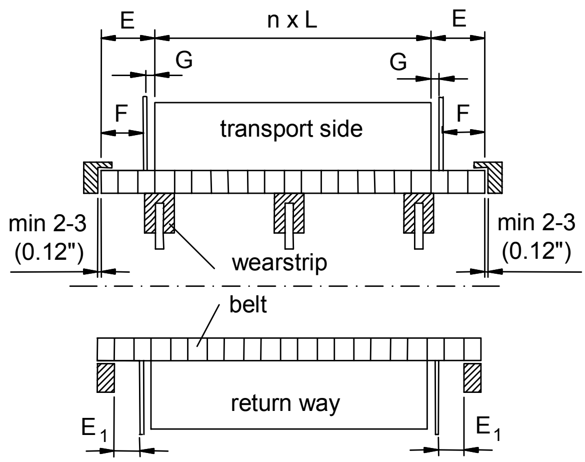
Installation of flights and side guards; indents

The flight indent, E or F, is required for adequate support of the belt on its return way and hold down during back-bending applications (elevators). On short conveyors or with special support structure, the flights may also be applied over the full belt width (E = 0). The distance E_1 between the side guards and the hold down- and support-shoes/wearstrips should not be smaller than 5 mm *(0.2").* For further details see Design Guide.

The side guards are usually installed with a gap (G) between the side guards and the flights. It is also possible to install the side guards without gap (very small distance between flight and side guard, approx. 2 mm *(0.08").* There is a certain risk for rubbing and abrasion between the flights and the side guards.

	Possible flight indents E									
	Flight only		Flight + Side Guard with gap (G ~ 9 mm / *0.35"*)				Flight + Side Guard without gap (G ~2 mm / *0.08"*)			
	E		**E**		**F**		**E**		**F**	
	mm	*inch*	mm	*inch*	mm	*inch*	mm	*inch*	mm	*inch*
Flight over full belt width	**0**	***0***	–	–	–	–	–	–	–	–
Module cutting necessary	37.5	*1.47*	37.5	*1.47*	18	*0.47*	37.5	*1.47*	28	*1.1*
Module cutting necessary	56	*2.2*	56	*2.2*	37	*1.47*	56	*2.2*	46	*1.83*
Standard, no module cutting	**75**	***3***	**75**	***3***	56	*2.2*	**75**	***3***	66	*2.6*
Module cutting necessary	112	*4.4*	112	*4.4*	75	*3*	112	*4.4*	85	*3.3*
Module cutting necessary	131	*5.2*	131	*5.2*	112	*3.2*	131	*5.2*	131	*4.1*





Hold Down Devices for 2" Belts, M5000V01

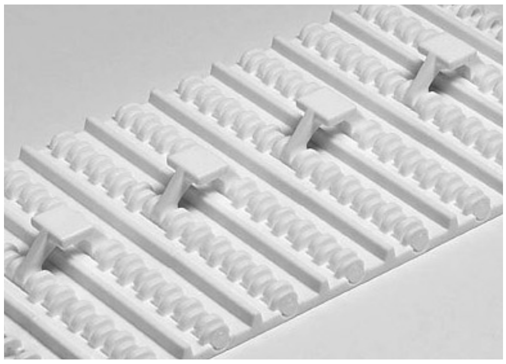
For elevators with backbending (Z-conveyors) **hold down devices** are needed to keep the belt down when it is changing from horizontal to inclined direction. For wide belts (eg. > 600 mm *(24")* wide) slider shoes on the belt edge are often not sufficient to keep it on the track. In such cases hold down devices on the bottom side of the belt are used to guide it through the backbending curve.

Compatibility: The hold down modules can be assembled to any 2" HabasitLINK modular belt. The modules are inserted into the prepared position, one module every second row. Over the belt width any position is possible. Allow the necessary distance for the sprocket engagement!

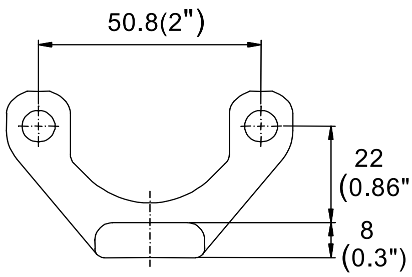
Backbending radius R: min. 300 mm *(12"),* with side guards 600 mm *(24").*

Sprockets: minimum size 8 teeth (M50S08)

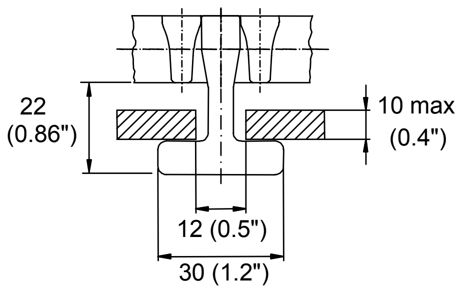
Standard materials: POM white
other materials possible on request.

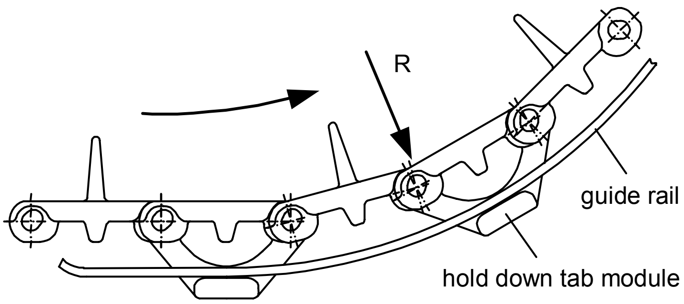


M5010 with M5000V01



Hold down device M5000V01



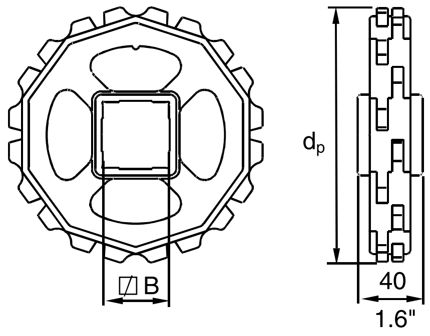


Sprocket Data Series M5000

Sprocket code

M = modular belts
Belt pitch
S = molded 1 piece; Z = split sprocket molded
Number of teeth
Shaft size (diameter)
Shaft type: Q = square, R = round
Material: 6 = POM, 1 = PP

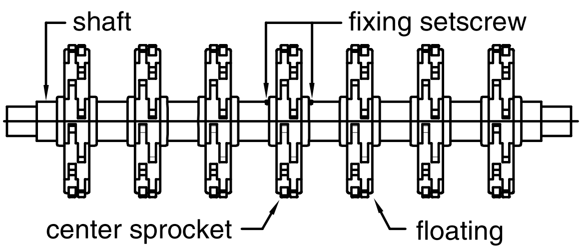
M	**50**	**S**	**10**	**40**	**Q**	**6**

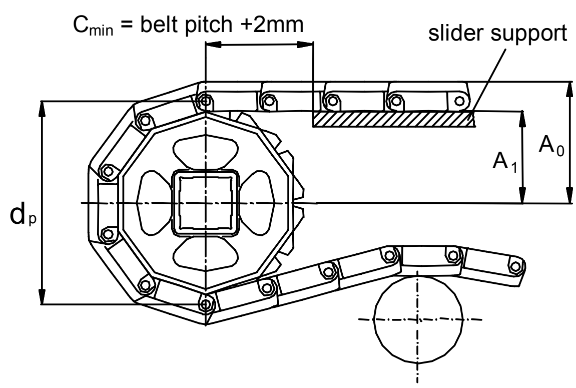


Example:M50S1040Q

Sprocket availability

No. of teeth	Pitch ∅ d_p		A_1		Molded sprockets 1 piece (M50Sxx)				Split sprockets (M50Zxx)
					Square bore		∅ Round bore		
	mm	*inch*	mm	*inch*	mm	inch	mm	inch	
6	102	*4*	43	*1.70*	40	1.5	–	–	Available on request, please contact the Habasit representative
8	133	*5.3*	59	*2.31*	40	1.5	–	–	
10	165	*6.5*	75	*2.94*	40 / 60	1.5 / 2.5	–	–	
12	197	*7.8*	91	*3.57*	40 / 60	1.5 / 2.5	–	–	
16	261	*10.3*	123	*4.83*	40 / 60 90	1.5 / 2.5 –	–	–	





Sprocket arrangement

The maximum sprocket spacing is 150 mm *(6")*. The minimum spacing is 56.25 mm *(2.2")*. The min. distance C between sprocket axis and slider support is min. 53mm (2.1"). Further information to sprocket installation see Design Guide Sprocket Evaluation.

Sprocket material

Standard material Acetal, natural color.
Optional: Polypropylene (PP), blue, acid resistant.

Numbers of sprockets and wearstrips

Standard belt width		Number of sprockets per shaft		Number of wear-strips	
mm	*inch nominal*	min. number	>15'000 N/m *>680 lb/ft*	Carry-way (top)	Return-way (bottom)
150	*6*	2	3	2	2
225	*9*	2	5	2	2
300	*12*	3	7	2	2
375	*15*	3	7	3	3
450	*18*	3	9	3	3
525	*21*	5	9	3	3
600	*24*	5	11	4	3
675	*27*	5	11	4	3
750	*30*	5	13	4	4
825	*33*	7	13	5	4
900	*36*	7	15	5	4
975	*39*	7	15	5	4
1050	*42*	7	17	6	5
1125	*45*	9	19	6	5
1200	*48*	9	21	7	5
1500	*59*	11	27	8	6
1800	*70*	13	31	9	6
2100	*83*	15	35	10	7
2400	*95*	17	41	11	8
2700	*106*	19	47	12	9
3000	*118*	21	53	13	10

Sprocket load

The numbers of sprockets listed in the table above give a general indication and refer to the upper limit of the range of tensile force (belt pull) indicated. The maximum load on one sprocket should normally not exceed 1700 N *(382 lb).* For PP sprockets do not exceed 80% admissible belt load. Further instructions see Calculation Guide, page 89 or contact the Habasit representative.

Wearstrips

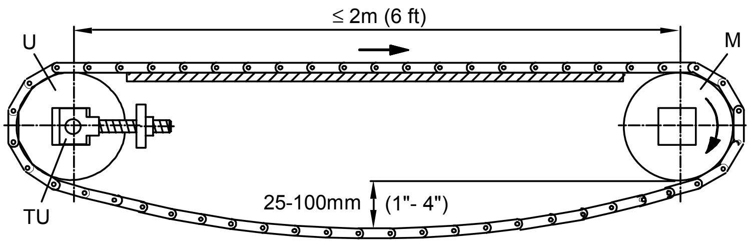
Between driving shaft and idling sprockets or rollers the belt is carried by a slider support furnished with longitudinal wear strips from UHMW Polyethylene or other suitable material. Minimum backflexing radius for belts without side guards 150 mm *(6"),* with side guards 600 mm *(24").* More details see Design Guide, page 76.

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 90).
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.

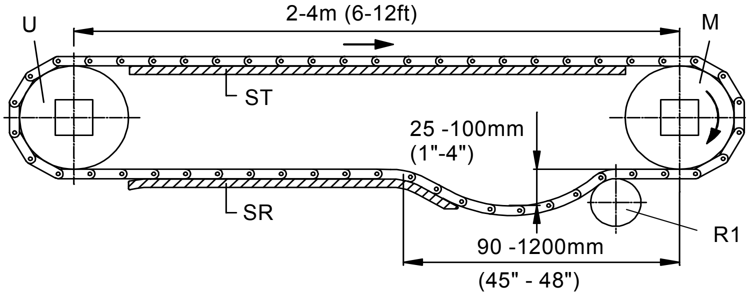
Short conveyors

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.



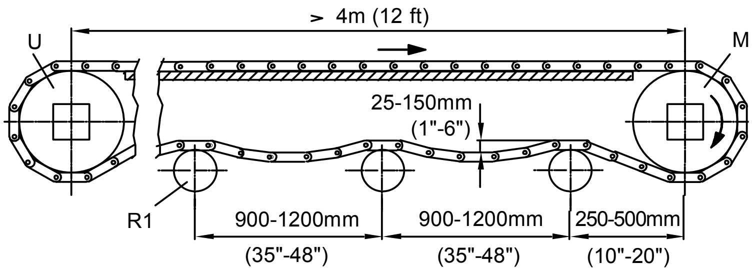
Medium length conveyors

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

Longer lengths and greater temperature changes require more than one section for catenary sag. Special concern to vary the roller spacings over long conveyors.

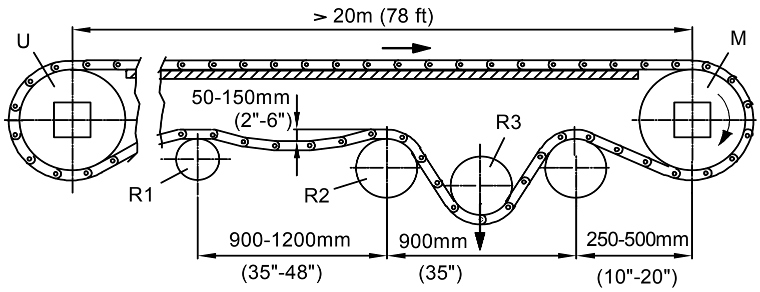


Admissible speeds of long conveyors:

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)*

Gravity take-up

For heavily loaded long belts and/or high speed 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.



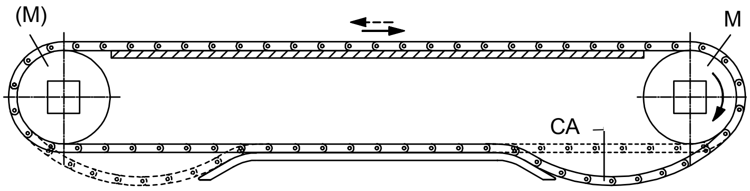
Recommended tensioner weight:

Belt type	Tensioner weight per m belt
for 2" belts	30 kg *(20 lb/ft)*
for 1" and 0.5"	15 kg *(10 lb/ft)*

Horizontal Conveyors – Drive Concepts

Common head drive

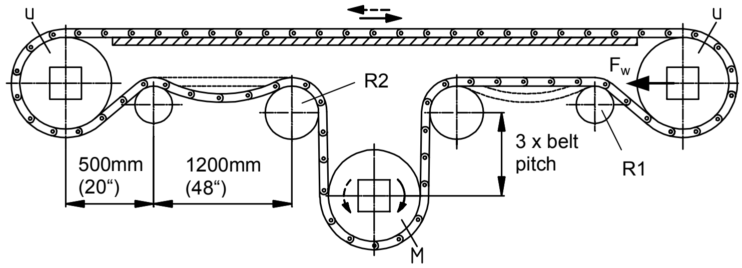
Slider support on return way, or rollers alternatively.



- **Uni-directional drive**
  One motor (M) at conveyor end, pull action (driving sprockets are pulling the belt). Catenary sag (CA) only on driving side needed (see also page 90).
- **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

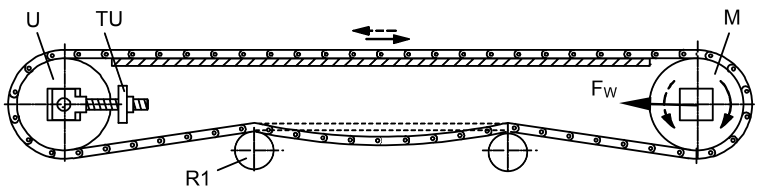
Only one motor (M) placed in the middle of the belt return. This system works well for bi-directional conveyors. In case of high loads a gravity take-up may be necessary for positive sprocket engagement. Optional solutions: pneumatic or spring loaded tensioning device.



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 90).

Bi-directional head drive (push/pull action)

It is possible to apply one head drive motor for bi-directional reversible driving.



For reverse driving (push action = pusher conveyor) the **belt tension on the return way is 1.2 times higher than on the transport side.** A screw type take-up (TU) or a pneumatic tensioning device is recommended. The shaft load will increase to: $F_W = 2.2 \cdot F'_E$ (see also calculation guide page 88)

Support rollers and backbending diameter

Belt type	diameter for support rollers R1 (min)		diameter for gravity take-up and center drive rollers R2, R3 (min.)		backbending radius of sliding shoes for elevators SH (min.) *	
	mm	*inch*	mm	*inch*	mm	*inch*
M1220	75	*3*	90	*3.5*	150 / 600*	*6 / 24**
M1233	50	*2*	75	*3*	150 / 600*	*6 / 24**
Series M2500	50	*2*	100	*4*	150 / 600*	*6 / 24**
M2540	50	*2*	100	*4*	150 / 600*	*6 / 24**
M3840	100	*4*	150	*6*	150 / 600*	*6 / 24**
Series M5000	100	*4*	150	*6*	150 / 600*	*6 / 24**

* as large as possible; with side guards min. radius 600 mm *(24")*

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 wearstrips.

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 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 are positioned at the lower end of the belt (see also separate design recommendations).

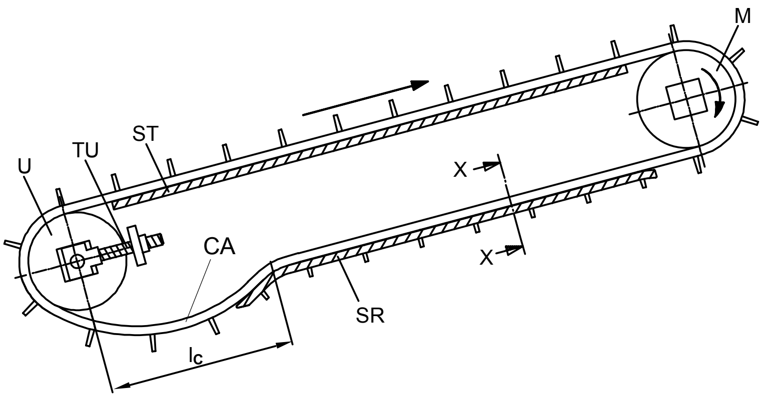
SH The radius of **hold down and support shoes** has to be ≥ 150 mm *(6")*. The radius should however be selected at the largest possible. For belts equipped with side guards the minimum shoe radius (back flexing radius) has to be 600 mm *(24")*.

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.**

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).

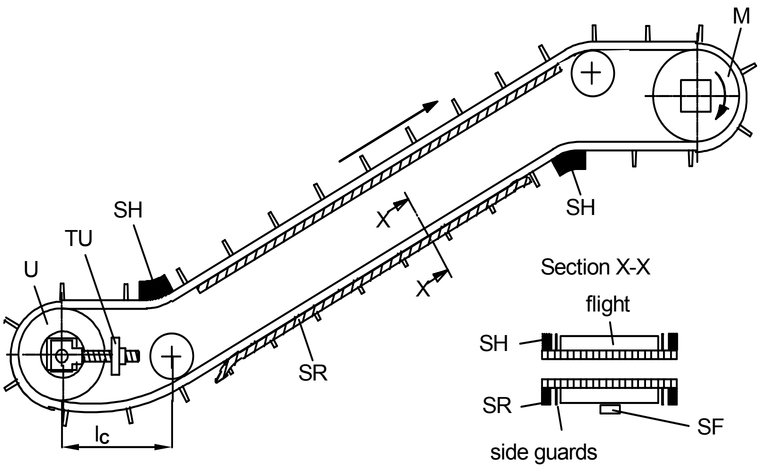


Example of inclined conveyor with horizontal end sections

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)

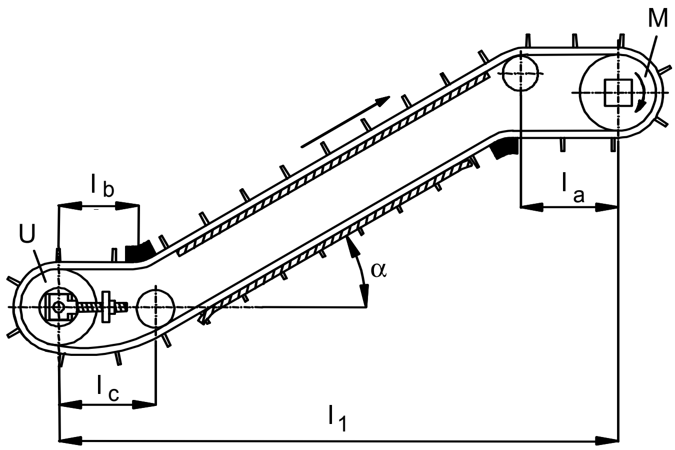
Elevators are usually equipped with flights. Therefore for backbending of Z-conveyors hold-down shoes (SH) or rollers are used at the belt edge only. A hold down device in the center of the belt, acting from the top, is only possible by leaving a gap in center of the flight row. In most cases this is however 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

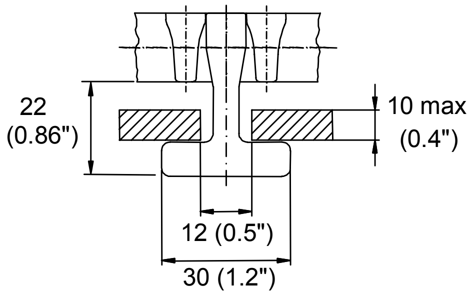
The precise calculation of the allowable belt width would be very complex. Therefore a simplified general rule for dimensioning and design of the conveyor frame is provided:

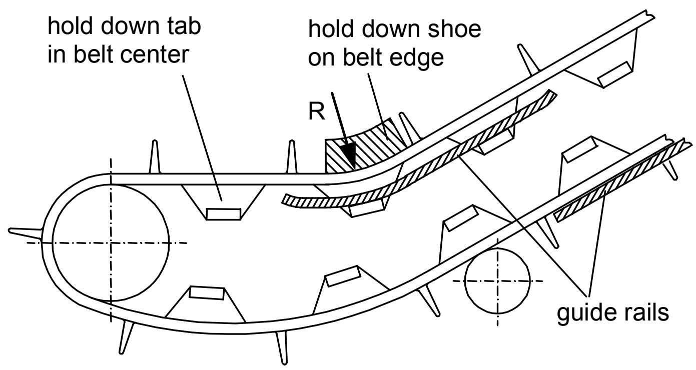


Max belt widths b_o mm *(inch)*	2" belts		1" belts		0.5" belts	
	belt load < 50%	belt load 50 – 100%	belt load < 50%	belt load 50 – 100%	belt load < 50%	belt load 50 – 100%
l_b ≤ 800 mm *(32")* (ev.self adjusting belt tensioner needed!)	1500 *(59)*	1000 *(39)*	1200 *(47)*	800 *(32)*	1000 *(39)*	700 *(28)*
l_b = 800 – 2000 mm *(32" - 78")* (longer sect. l_b not recommended	1200 *(47)*	800 *(32)*	1000 *(39)*	600 *(24)*	800 *(32)*	500 *(20)*

b) Z-conveyors with center hold-down device M5000V01

This special module is available for 2" belts (see also Product Data Sheet). It may be installed at any position of the belt. For belt widths larger 2 m two tracks are recommended. For guides use steel strips with HDPE lining or similar. Min. back-bending radius R = 300 mm *(12")* or 600mm *(24")* with side guards.





Catenary sags for elevators

For proper engagement of the sprockets on the drive shaft (head drive on upper conveyor 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 length. The position of the catenary sag is depending on the inclination angle α, friction value between belt and return base and length 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

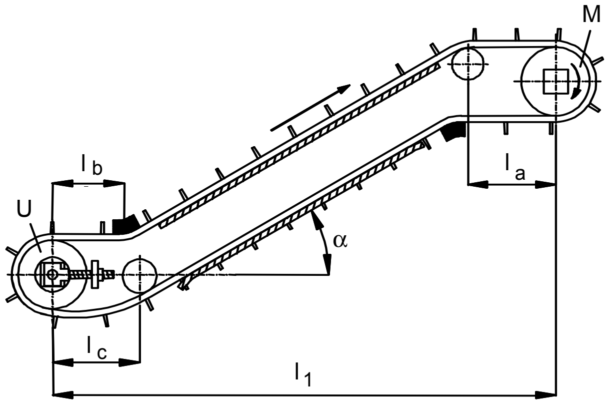
Condition A:

$l_c \geq 900$ mm and $l_a \leq 900$ mm
(must always be fullfilled)

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, or 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 and place the catenary sag on the upper end.
For all other cases contact the Habasit Representative.

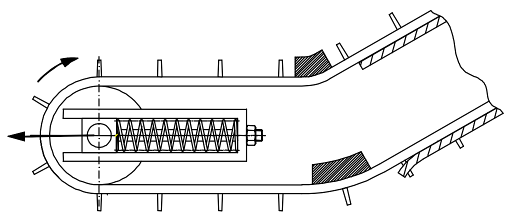


Standard conception: Catenary sag on lower end

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 adjustement 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 selfadjusting tensioner device. This can be a soft spring type, gasloaded spring or pneumatic tensioner type.
The optimal lay out 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 force should be as low as possible, but high enough to overcome eventual friction forces of the belt on its return way, straigthen it and 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 2" belts	30 kg *(20 lb/ft)*
for 1.5" radius belt	30 kg *(20 lb/ft)*
for 1" and 0.5"	15 kg *(10 lb/ft)*



Radius Belts

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 require 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:

$$\mathbf{R_{min} = Q \bullet b_0}$$

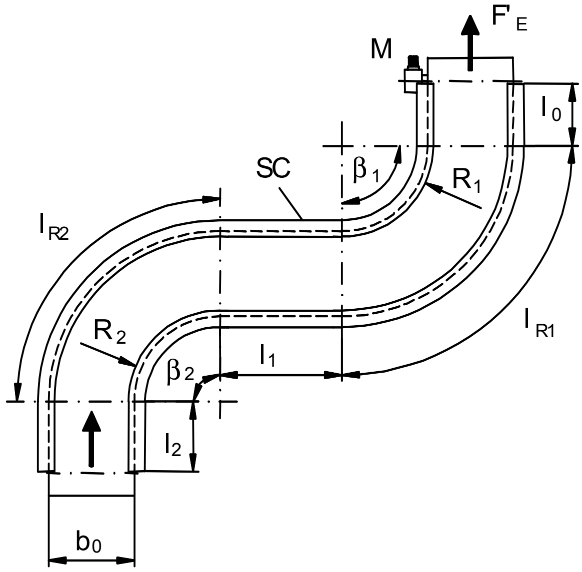
For M2540 and M3840: Q = 2.2

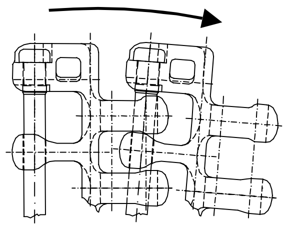
For best running conditions it is advisable to design the curves R of the conveyor near to the minimum radius.

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 • b_0 with a minimum of 1 m (*3 ft.*). For different requirements please contact the Habasit representative.

l_1 A minimum straight section of 2 x belt widt h (2 • b_0) is required between turns in opposite directions. 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 • b_0 is required.





Collapse factor

It is typical for the design of radius belts, that the collapse factor is smaller for very small belt widths b_o and increases until it is almost constant abovea belt width of approx 1000 mm *(40")*. The accurate collapse factor for Habasit Radius belts can be calculated as follows:

Q = 2.25*(1-K/bo)

K is a typical value for each belt design. For M2540: K = 20; for M3840: K = 30

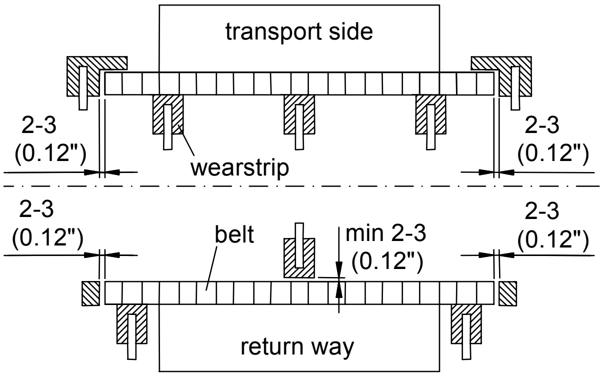
b_o	mm	200	250	300	350	400	450	500	550	600	650	700	750	800	850	etc.
	inch	*8*	*10*	*12*	*14*	*16*	*18*	*20*	*22*	*24*	*26*	*28*	*30*	*32*	*34*	*etc.*
Q	M2540	2.03	2.07	2.10	2.12	2.14	2.15	2.16	2.17	2.18	2.18	2.19	2.19	2.19	2.2	etc
	M3840	1.9	1.98	2.03	2.06	2.08	2.10	2.12	2.13	2.14	2.15	2.15	2.16	2.17	2.17	etc

Hold down devices

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 tab modules are used instead of hold down guides. 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 un-interrupted over the complete belt length. The material used for edge guides need to be low friction in contact with the particular belt material. Generally UHMW PE can be recommended.
On the return way hold down devices are needed as well. An economic solution is shown on the illustration beside. Also hold down edge guides can be used as for the top side.



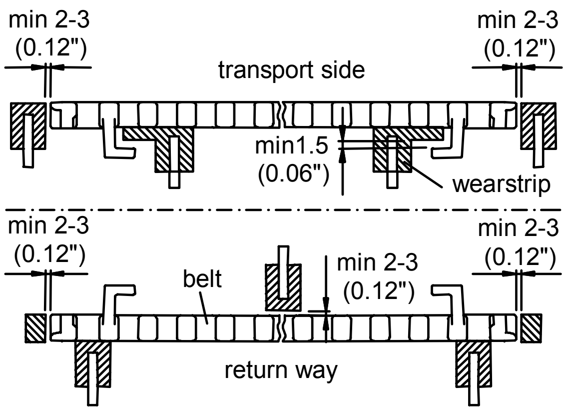
Hold down guides for belt with flights. Belts without flights follow the same design

Belts with hold down tabs (hook modules)

Belts with hold down tabs are used for all applications where products must be moved transversally over the belt edge (side transfer). The use of hold down tabs is also conditional for the application of side guards (see also Data Sheet side guards in this manual).

High speed applications

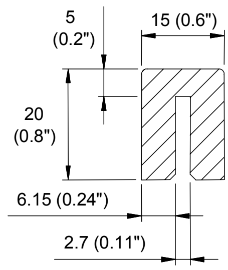
For speeds > 40 m/min it is recommended to use prelubricated materials for radius guides. To keep the temperature low, prefer guide material with best possible heat conduction properties (eg. PA prelubricated).
For further information and other dimensions see Design Guide Slider Support Systems.

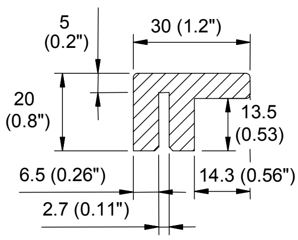


Hold down tabs

Note

The hold down 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.





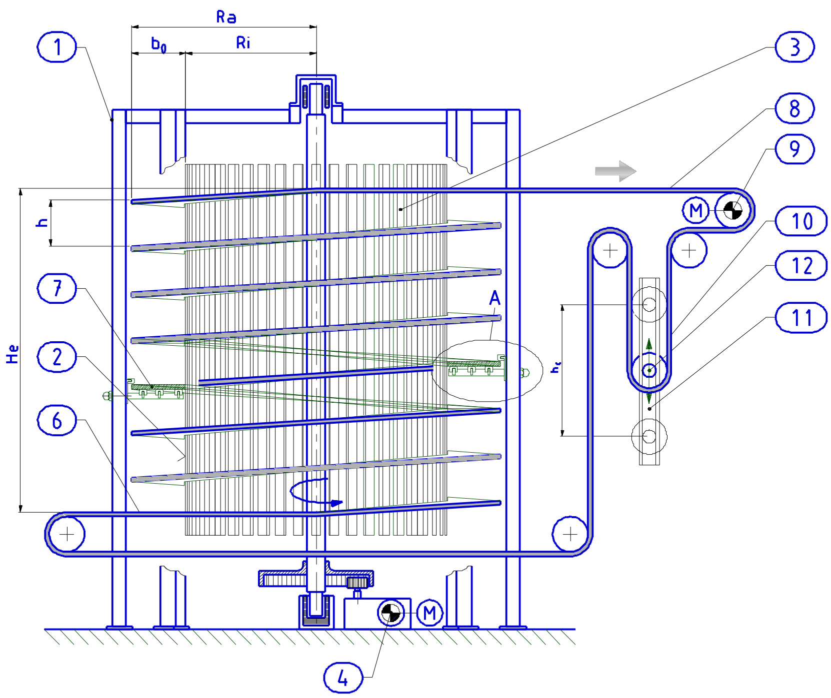
Spiral Conveyors

Habasit radius belts are well suitable for the application with spiral conveyors. Typical processes are heating, proofing, drying, cooling, 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 the Habasit spiral specialist.

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
- Reduced coefficient of friction between belt and cage
- Lower power consumption

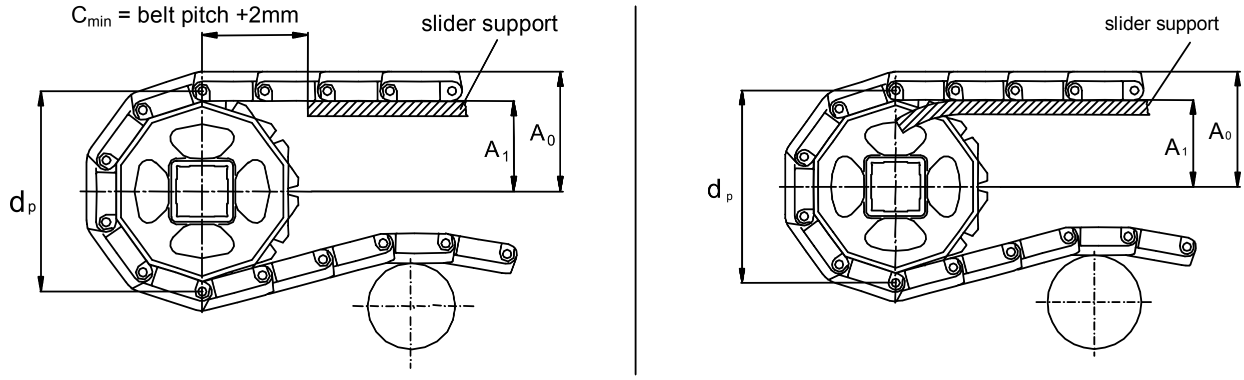
Side view of a typical spiral conveyor



1	Structure assembled with – columns and – beams	**7**	Radius belt
2	Drum or cage	**8**	Out-run
3	Cage bars	**9**	Belt drive (Take up drive)
4	Drum drive (or cage drive or primary drive)	**10**	Return path
6	In-run	**11**	Take up and Take up tower
		12	Dancer roller

Sprocket Evaluation

Dimensional requirements for installation



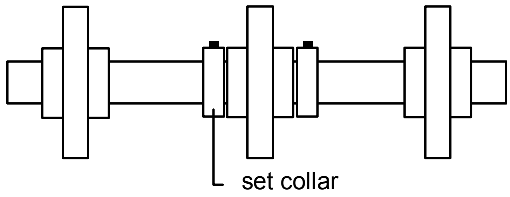
Belt pitch, sprocket type	Sprocket teeth	Polygon effect	Pitch Ø d_p		A_1 ±1 mm (effective)		A_0 ±1 mm (effective)					
			mm	*inch*	mm	*inch*	Standard thickness mm	*inch*	Special mm	*inch*	Raised rib mm	*inch*
0.5"							**M1220 / 33**					
M12S10	10	4.9 %	41.2	*1.6*	16.1	*0.63*	26.1	*1.03*				
M12S15	15	2.2 %	62.4	*2.5*	26.7	*1.05*	36.7	*1.44*				
M12S24	24	0.9 %	99.2	*3.9*	45.1	*1.78*	55.1	*2.17*				
M12S28	28	0.6 %	116.5	*4.6*	53.8	*2.12*	63.8	*2.51*				
M12S36	36	0.4 %	149.8	*5.9*	70.4	*2.77*	80.4	*3.17*				
1"							**M2520 / 30 / 33**		**M2510 / 11**		**M2531**	
M25S07	7	11 %	59.4	*2.3*	24.7	*0.97*	34.7	*1.37*	35.7	*1.41*	40.7	*1.60*
M25S08	8	7.6 %	66.7	*2.6*	28.3	*1.12*	38.3	*1.51*	39.3	*1.55*	44.3	*1.75*
M25S10	10	4.9 %	82.5	*3.3*	36.3	*1.43*	46.3	*1.82*	47.3	*1.86*	52.3	*2.06*
M25S12	12	3.4 %	98.6	*3.9*	44.3	*1.74*	54.3	*2.14*	55.3	*2.18*	60.3	*2.37*
M25S18	18	1.5 %	146.9	*5.8*	68.4	*2.69*	78.4	*3.09*	79.4	*3.13*	84.4	*3.32*
M25S20	20	1.2 %	163.0	*6.4*	76.5	*3.01*	86.5	*3.41*	87.5	*3.44*	92.5	*3.64*
1" radius							**M2540**					
M25S07	7	11 %	59.4	*2.3*	24.7	*0.97*	35.7	*1.41*				
M25S08	8	7.6 %	66.7	*2.6*	28.3	*1.12*	39.3	*1.55*				
M25S10	10	4.9 %	82.5	*3.3*	36.3	*1.43*	47.3	*1.86*				
M25S12	12	3.4 %	98.6	*3.9*	44.3	*1.74*	55.3	*2.18*				
M25S18	18	1.5 %	146.9	*5.8*	68.4	*2.69*	79.4	*3.13*				
M25S20	20	1.2 %	163.0	*6.4*	76.5	*3.01*	87.5	*3.44*				
1.5" radius							**M3840**					
M38S08	8	7.6 %	101.9	*4.0*	42.0	*1.65*	60.0	*2.36*				
M38S12	12	3.4 %	150.0	*5.9*	66.0	*2.60*	84.0	*3.31*				
M38S16	16	1.9 %	198.2	*7.8*	90.1	*3.55*	108.1	*4.26*				
2"							**M5010 / 11 / 13 / 14 M5030 / 33**				**M5031**	
M50S06	6	13.4 %	102.1	*4*	43.0	*1.70*	59.1	*2.32*			67.1	*2.64*
M50S08	8	7.6 %	133.4	*5.3*	58.7	*2.31*	74.7	*2.94*			82.7	*3.26*
M50S10	10	4.9 %	165.2	*6.5*	74.6	*2.94*	90.6	*3.57*			98.6	*3.88*
M50S12	12	3.4 %	197.2	*7.8*	90.6	*3.57*	106.6	*4.20*			114.6	*4.15*
M50S16	16	1.9 %	261.5	*10.3*	122.7	*4.83*	138.8	*5.46*			146.8	*5.78*

Sprocket installation, general
(see also Product Data Sheets)

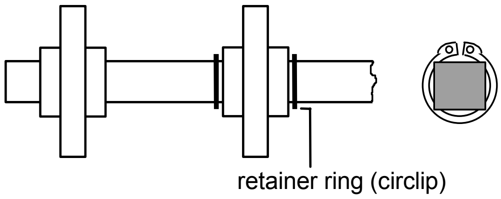
In order to allow the belt to expand/contract, only the center sprocket on each shaft is fixed. For shafts with 2 sprockets, the sprocket on the drive side is fixed. Various locking methods are possible:

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

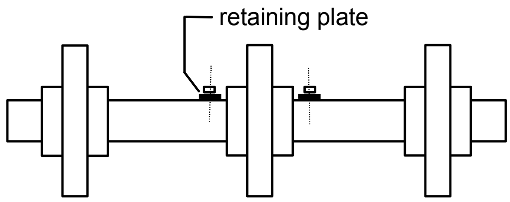
There should be a gap of 0.3 mm *(0.01″)* between sprocket hub and retaining device. All devices must be securely fastened.



Type: Set screws and set collars



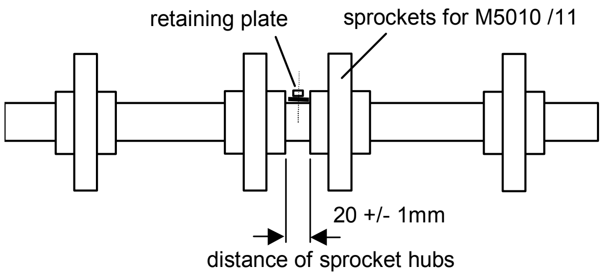
Type: Retainer rings



Type: Retaining plate

Tracking of M5010, M5011, M5013, M5014

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, eg. 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 in a fixed distance by one center fixing plate of 20 mm (*0.79″*) width.

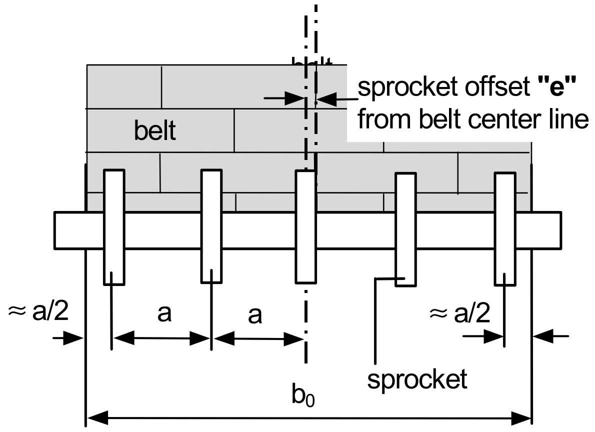


Positioning and spacing of sprockets

The number of sprockets (n) must be evaluated from the respective Table of the Product Data Sheet (see also Calculation Guide page 89). Sprocket spacing see illustration and table.

The center tracking sprocket has to be installed either in the middle of the belt or offset. The middle sprockets of **0.5" belts are always in the belt center**. For other belt pitches, the offset value "e" is established as follows:

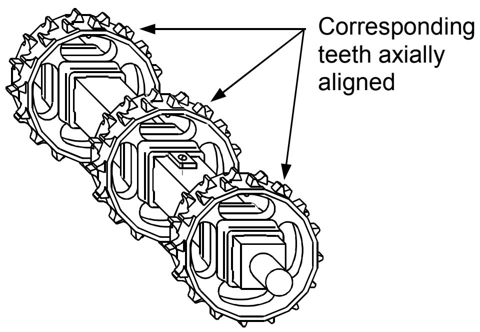
Divide the belt width by the link increment (see formulas in table). The result will be either an even or an odd number. These numbers are the criteria for offset or no offset, see table below.

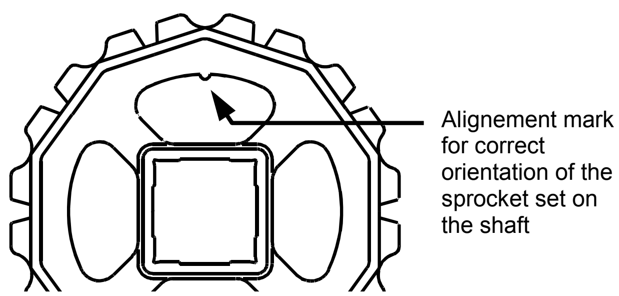


Belt pitches	Sprocket distances a	Formula	Result of formula	offset "e" mm	Remarks
0.5"	multiple of 16.66 mm			0	no offset for all belt widths
1"	multiple of 16.66 mm	$\frac{b_0}{16.66}$	equal number (2, 4, 6..)	8.3	offset to the right or left side
			odd number (3, 5, 7...)	0	no offset
2"	multiple of 18.75 mm	$\frac{b_0}{18.75}$	equal number (2, 4, 6..)	0	no offset (all standard width uncut)
			odd number (3, 5, 7…)	9.4	offset to the right or left side
radius belt 1"	multiple of 16.66 mm	$\frac{b_0}{16.66}$	equal number (2, 4, 6..)	4.2	offset **to the right** in running direction
			odd number (3, 5, 7...)	4.2	offset **to the left** in running direction
radius belt 1.5"	multiple of 25 mm	$\frac{b_0}{25}$	equal number (2, 4, 6..)	6.3	offset **to the left** in running direction
			odd number (3, 5, 7...)	6.3	offset **to the right** in running direction

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 are furnished with an alignment mark (see illustration right side below). 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 are not furnished with alignement marks.





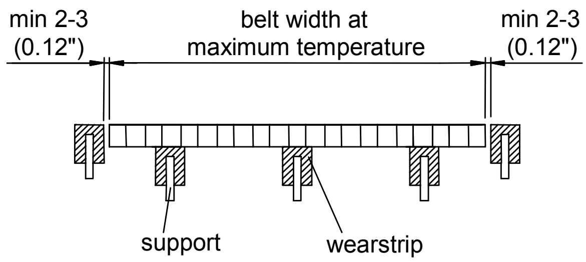
Slider Support Systems

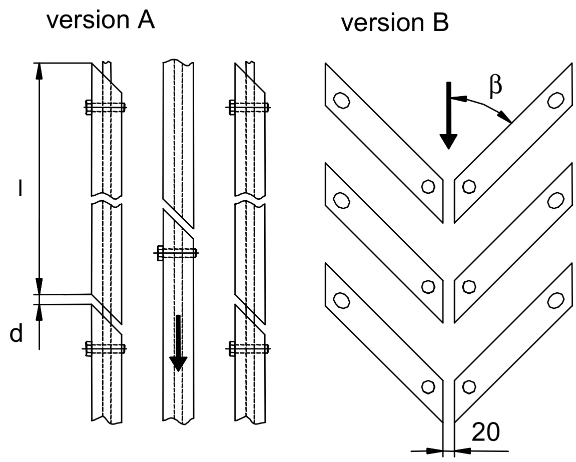
Various design versions are possible. The following are commonly used:

A The parallel wearstrip 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.

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

For straight running belts:





The supports consist of strips made from high density polyethylene, other suitable low wearing plastics or metal, see also material data pages 9 and 97.

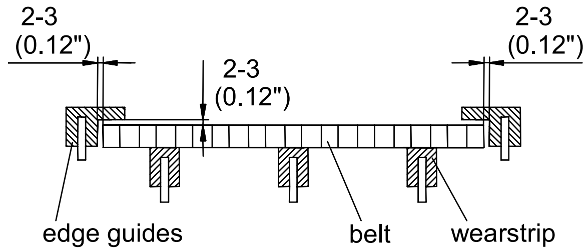
For **proposed number of wearstrips see Product Data Sheets**. For both versions A and B it is important to allow for thermal expansion or contraction of the strips. Formula to calculate the necessary clearance d:

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

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 / HDPE	0.14	0.20
PA6, PA6.6	0.12	0.12
PA6.6 prelubricated	0.06	0.06

For radius belts:

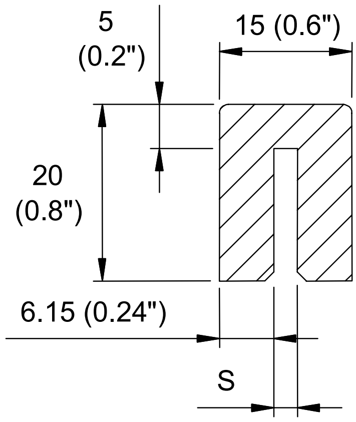


Radius belts running around curves are radially pressed against the inner guide rail of the curve. Since the conveyors usually cannot be built at very high geometrical accuracy, the belt may tend to flip over at high loads or angles > 90°. At the inner edge the belt may move upwards while it is radially 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, see illustration above. If the product is larger than the belt width or if side transfer over the belt edge is required, hold down tab modules are used instead of hold down guides. See also Product Data Sheets.

Wearstrips and guiding profiles

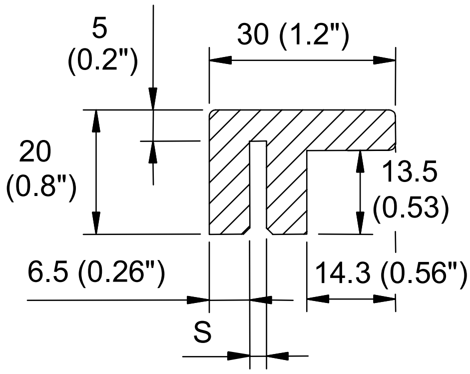
Habasit offers various wearstrips made from high molecular weight polyethylene (UHMW or HDPE and pre-lubricated UHMW). This material provides low friction between belt and support. Ask for separate literature.
For high abrasive conditions Stainless Steel, POM, Nylon PA6 or pre-lubricated compounds (eg Nylatron) are recommended.

The **U-shaped profiles** (MB-01) are commonly used as wear strips for slider supports, fitted onto a simple metal strip of approx. 2.5 mm *(0.1")* thickness



MB-01-A

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

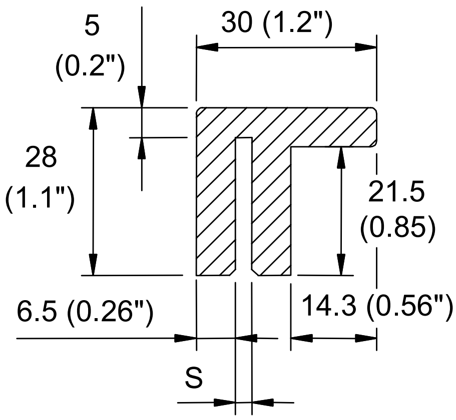


MB-02-A, MB-02-B

Type	S	
	mm	*inch*
MB-01-A	2.7	*0.11*
MB-01-B	3.1	*0.12*
MB-02-A	2.7	*0.11*
MB-02-B	3.1	*0.12*
MB-03-A	2.7	*0.11*
MB-03-B	3.1	*0.12*

High speed applications

For speeds > 40 m/min it is recommended to use prelubricated materials (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 (eg. Nylatron)
For PP Belts: POM or PA prelubricated

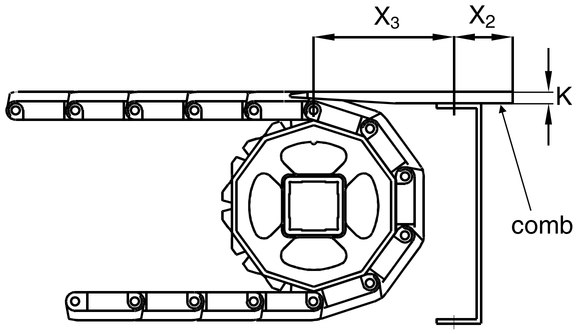


MB-03A, MB-03-B

Product Transfer Systems

Finger plate (comb) installation

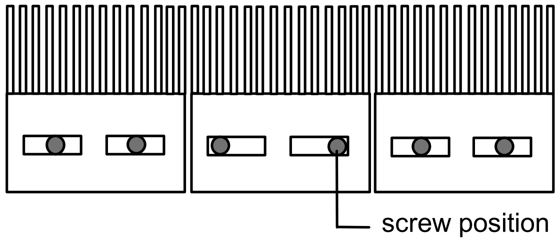
Main dimensions and instructions for finger plates see Product Data Sheet. The plates are furnished with slots. Special bushings and screws are delivered with the plates which allow free lateral movement for compensation of thermal expansion or contraction of the belt. For belt width up to 300 mm, the plates can be firmly fixed.



	Comb 2"		Comb 1"	
	mm	*inch*	mm	*inch*
X_2	50	*2*	50	*2*
X_3	100 – 110	*4 – 4.3*	80 – 90	*3.2 – 3.5*
K	10	*0.4*	10	*0.4*

Dead plates for product transfer

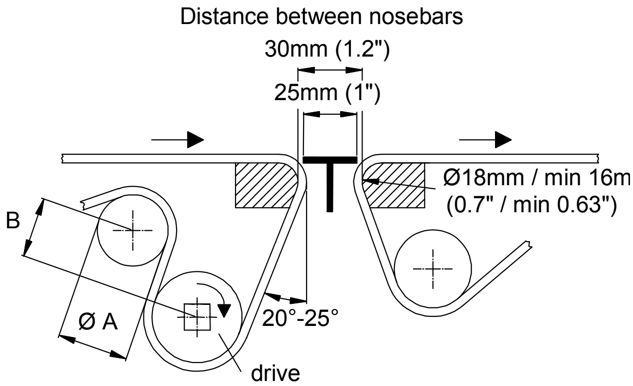
Dead plates are used for product transfer at the conveyor ends of flat top and flush grid belts. The discharge end should be adjusted to 1 mm *(0.04")* below the belt surface and the infeed end 1 mm *(0.04")* above the belt surface. The gap (X_5) varies during belt movement, but should be as small as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



Edge transfer for Minipitch Belts M1220, M1233

The minipitch belts M1220 and M1233 are perfectly suitable for small idling roller diameters or "nose bars". The frame dimensioning has to follow the specifications of the illustration below.

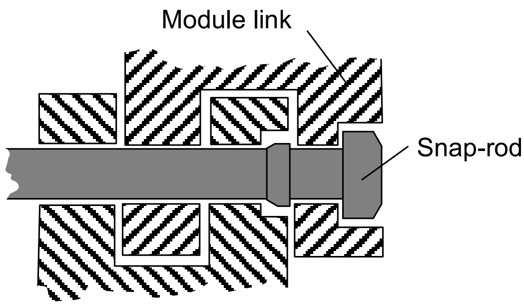
A:	Min.backbending-roller diameter	M1220	90 mm *(3.5")*
		M11233	75 mm *(3")*
B:	Min. straight belt section between drive and snub-roller		50 mm *(2")*



Pivot Rods

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 applications. Contact Habasit.

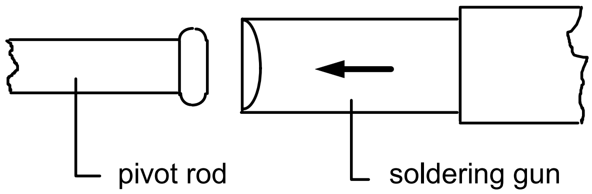


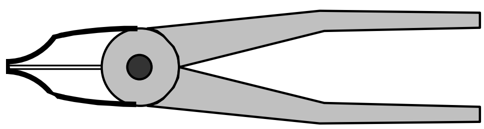
Pivot rod installation

Every ordered belt is assembled at Habasit and ready for installation.

For all belt styles Habasit Snap-Rods are available. They are easy to install and need no special tools. For maintenance the rods can be removed and reinstalled again. This must be done with care to avoid damaging the rod or module link.

As optional solution, for particular belts and applications headless pivot rods are delivered. For rod retaining the rod ends are secured with a heat-formed "mushroom head" after installation. For this purpose a simple soldering gun with specially shaped tip is used. To remove the installed rod, the "mushroom head" is cut using a slim shaped side cutter.





Belt Calculations Procedure

For abbreviations, glossary of terms and conversion of units see Tables in appendix.

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 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 in 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]	81
	▼		
2	Calculate the **adjusted tensile force (belt pull) F'_S** multiplying with the adequate service factor of your application, taking in account frequent start/stops, direct or soft start drive.	$F'_S = F'_E \cdot c_S$ [N/m]	84
	▼		
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]	85
	▼		
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]	87
	▼		
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]	88 89
	▼		
6	Establish the effective **belt length and catenary sag dimensions**, taking in 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]	91 90
	▼		
7	Calculate the required **driving power**	$P_M = F'_S \cdot b_0 \cdot v / 60$ [W]	92
	▼		
8	Check the **chemical resistance** of the belt material selected for your specific process	Table of chemical resistance	93
	▼		
9	Check your **conveyor design**, if it fulfills all calculated requirements		

1. Effective Tensile Force (Belt Pull) F'E

(Symbols see page 100)

Horizontal straight belt without accumulation

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

Horizontal straight belt with accumulation, simplified

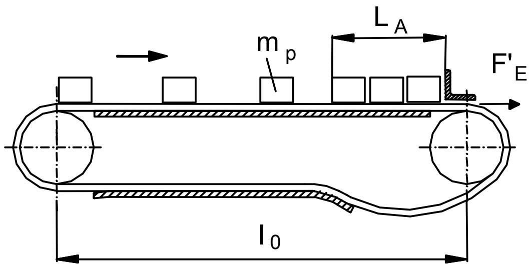
$$F'_E = [\,(2\,m_B + m_P)\,l_0 \cdot \mu_G + m_P \cdot \mu_P \cdot l_a\,]\,g \;\; [N/m]$$

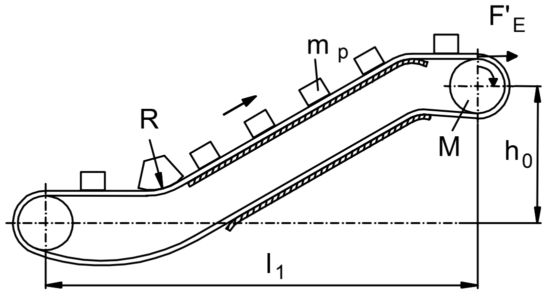
Inclined conveyor without accumulation

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

Inclined conveyor with accumulation, simplified

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





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 in general 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 praxis 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 accumulation product load per m^2 is known, and for more accurate calculation it is proposed to replace $\mathbf{m_P}$ in the term $\mathbf{m_P \cdot \mu_P \cdot l_a}$ by $\mathbf{m_{Pa}}$.

The following formula result:

Horizontal straight belt with accumulation

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

Inclined conveyor with accumulation

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

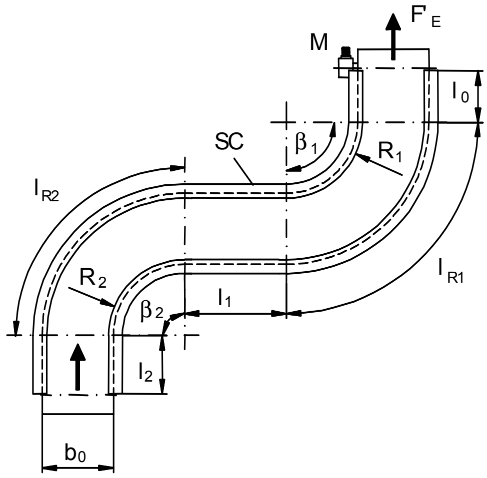
F'_E	=	Effective tensile force [N/m]
m_B	=	Weight of belt [kg/m^2]
m_P	=	Weight of conveyed product [kg/m^2]
m_{Pa}	=	Weight of accumulated product [kg/m^2]
μ_G	=	Coefficient of friction belt to slider support
μ_P	=	Coefficient of friction belt to product
l_0	=	Conveying length [m]
l_a	=	Length of accumulation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

values for μ_G, μ_P see page 97

Radius belt

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. For calculation of Radius belts please contact the Habasit representative.

The following formula for 1 and 2 curves are simplified They shall give an idea of the calculation process. However calculation with the PC programm is strongly recommended.



Formula for 2 identical curves and identical friction

$$F'_E = \{ (m_B + m_P)(l_0 + l_{R1}) + c_R (m_B + m_P)(l_1 + l_{R2}) + c_R^2 [(m_B + m_P) l_2 + m_B (l_2 + l_{R2})] + c_R^3 \bullet m_B (l_1 + l_{R1}) + c_R^4 \bullet m_B \bullet l_0 \} \mu_G \bullet g \quad [N/m]$$

Formula for 1 curve

$$F'_E = \{ (m_B + m_P)(l_0 + l_{R1}) + c_R [(m_B + m_P) l_1 + m_B (l_1 + l_{R1})] + c_R^2 \bullet m_B \bullet l_0 \} \mu_G \bullet g \quad [N/m]$$

m_B, m_P = Weight of belt, conveyed product [kg/m²]

g = Conversion factor mass to force (9.81 m/s²)

l_x = Length [m]

c_R = $e^{\mu R \bullet \beta}$ (for 90°: average value c_R = 1.55)

μR = Coefficient of friction belt against belt guide in curve (average value used 0.28)

β = Angle of curve (for 90°: $\beta = \pi/2$)

Admissible tensile forces (F_{adm}) for radius belts (see also page 87)

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 (see Product Data Sheets, value for curve). Above value F'_E has to be multiplied with the belt width.

Additional compensation of the specific radius belt conditions is made by use of a service factor c_S, see Table chapter "Adjusted Tensile Force (adjusted belt pull) F'_s" page 84.

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

F_{SR} = Absolute tensile force [N]

F'_E = Effective tensile force [N/m]

b_0 = Belt width [m]

c_s = Service factor (see page 84)

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 praxis 1 to 2 curves are often used. For long radius belts it is advisable to place the curve as near to the belt end as possible. This way the belt pull at the outer curve edge is minimized.

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

Belt material	Condition	UHMW	HDPE	PA6, PA6.6	Stainless steel
Polypropylene	dry wet (water)	0.13 0.11	0.10 0.09	0.30 –	0.30 0.30
Polyethylene	dry wet (water)	0.25 0.25	not recommended	0.23 –	0.14 0.14
Polyacetal	dry wet (water)	0.10 0.10	0.08 0.08	0.20 –	0.18 0.18
Polyamide	dry	0.14	0.14	–	0.19

Coefficient of friction between belt and product, μ_P

Belt material	Condition	Glass	Metal	Plastic (PET)	Card-board
Polypropylene	dry wet (water)	0.19 0.17	0.32 0.30	0.17 0.15	0.22 –
Polyethylene	dry wet (water)	0.10 0.08	0.13 0.11	0.10 0.08	0.15 –
Polyacetal	dry wet (water)	0.15 0.13	0.20 0.18	0.18 0.15	0.20 –
Polyamide	dry	0.17	0.19	0.12	0.17

Note

The friction values listed in the above Tables are valid for clean conditions. The values may be 2 to 3 times higher under dirty conditions.

The values for glass are valid for new material. Recycled glass can be rough and usually has higher friction values.

2. Adjusted Tensile Force (adjusted Belt Pull) F'_S

(Symbols see page 100)

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

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.

Operating condition Note: Drive with soft start is recommended and is conditional for frequent start/stop and start up with full load.	**Service factor c_S** Standard straight belts and straight inclines without backbending Standard head drive (pulling drive)	 Pusher drive (uni- and bi-directional)	 Center drive (uni- and bi-directional)	 Minipitch with nose bar head side	 both ends	 Radius belt, curves up to 90° Standard head drive (pulling drive)	 Center drive
Start-up prior to loading	1	1.4	1.2	1.6	2	1.6	1.8
Frequent start/stop during process (more than once per hour)	add 0.2	add 0.2	add 0.2	add 0.2	add 0.2	add 0.2	add 0.2
Elevators with back- / down-bending (Z-conveyors)	add 0.6	add 0.6	add 0.6	not applicable		add 0.6	add 0.6
Speed greater 30 m/min	---	---	---	add 0.2	add 0.2	add 0.2	add 0.2

3. Admissible Tensile Force F'_{adm}

(Symbols see page 100)

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.

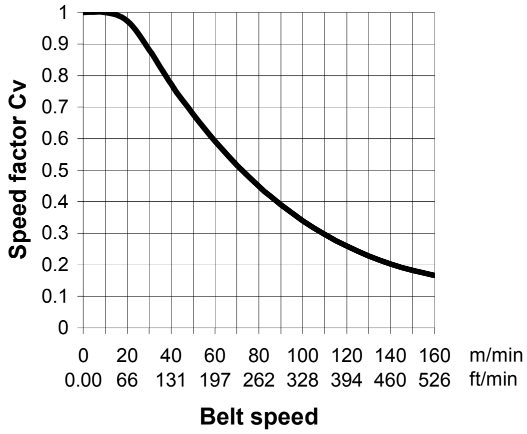
$F'_{adm} = F'_N \cdot c_T \cdot c_V$ [N/m]

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)

For Radius belt calculations the absolute tensile forces are applied (N), see also Calculation Guide for radius belts page 82.

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



Belt length and sprocket / roller size - Influence on lifetime

The calculation with c_v is not taking into account the influence of the conveyor length and sprocket / roller sizes used. These design features are influencing the life time, because the number and angle of link rotation is 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.

Cosequently the life time increses / reduces with the same relation. For the lifetime the lengthening of the belt is a main criterion. General rule:
The maximum **allowable belt lengthening is approx. 3%** of the belt length after running in (1 hour). When this value is reached, the belt should be exchanged. The lifetime cannot easily be predicted since the speed of wear in the links and consequently the lengthening is much depending on the process and environment conditions (dust, sand and other contaminations).

Influence of the design concept on the life time

Since every hinge movement (link rotation) causes additional friction and wear, it is obvious that every additional bending around roller or guide reduces the lifetime of the belt. This is particularly also the case for conveyors with center drives.

Temperature factor c_T

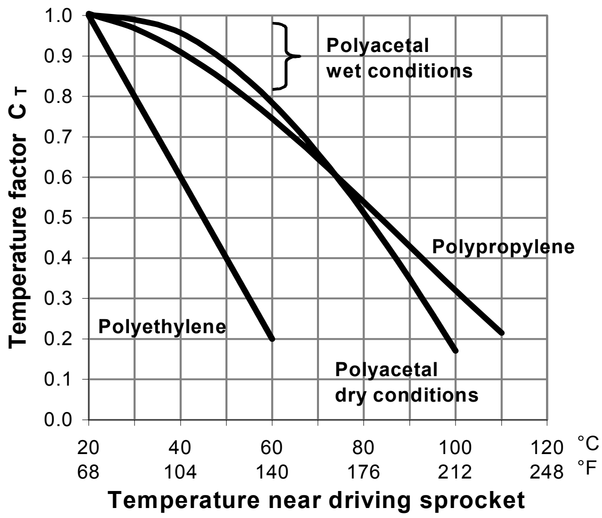
The measurable breaking strength (tensile test) of Polypropylene, Polyacetal and Polyethylene increases at temperatures below 20 °C *(68 °F)*. At the same time other mechanical properties are reduced at low temperatures. For this reason follows:

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

Admissible temperature ranges

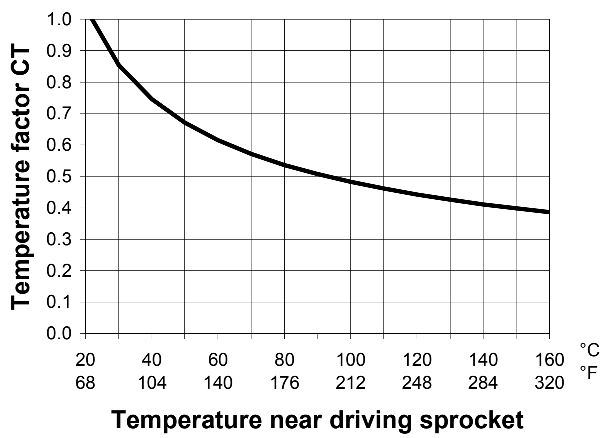
	°C	°F
Polypropylene	5 – 105	*40 – 220*
Polyethylene	-70 – 65	*-94 – 150*
Polyacetal	-40 – 90	*-40 – 195*
Polyamide	-46 to +130 °C (short-term +160 °C)	*-50 to +266 °F (short-term +320 °F)*

Standard materials



Special materials

Medium High Temperature PA (Polyamide)



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 belt page 82.

Radius belts

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

Radius belts

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

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]
F'_E = Effective tensile force [N/m]
b_0 = Belt width [m]
c_s = Service factor (see page 84)

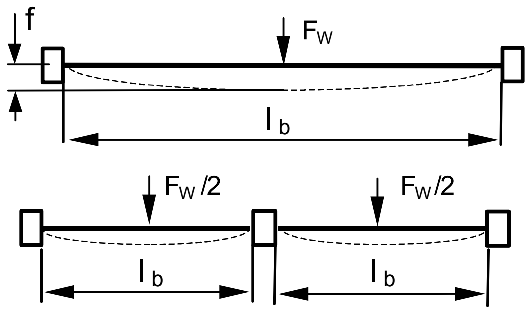
5. Dimensioning of Shafts

(Symbols see page 100)

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

- Max. shaft deflection under full load (F_W): $\mathbf{f_{max}}$ **= 2.5 mm *(0.1")***. 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").

Shaft deflection



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

3 bearings: $f = 1/3072 \cdot F_W \cdot l_b^3 / (E \cdot I)$ [mm]

For uni-directional head drives: $F_W = F'_S \cdot b_0$
For bi-directional center drives: $F_W = 2 \cdot F'_S \cdot b_0$
For bi-directional head drives: $F_W = 2.2 \cdot F'_S \cdot b_0$

b_0 = belt width [m]

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

Values of E (N/mm²):
Carbon Steel: 206'000 N/mm²
Stainless Steel: 195'000 N/mm²
Aluminum: 70'000 N/mm²

Shaft size		Inertia I	
mm	*inch*	mm⁴	*inch⁴*
∅ 20	*∅ 3/4*	7'850	*0.0158*
∅ 25	*∅ 1*	19'170	*0.05*
□ 25	*□ 1*	32'550	*0.083*
∅ 40	*∅ 1.5*	125'660	*0.253*
□ 40	*□ 1.5*	213'330	*0.42*
∅ 60	*∅ 2.5*	636'170	*1.95*
□ 60	*□ 2.5*	1'080'000	*3.25*
∅ 90	*∅ 3.5*	3'220'620	*7.5*
□ 90	*□ 3.5*	5'467'500	*12.5*

Table "Inertia"

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: $T_{adm} = \tau_{adm} \cdot \pi \cdot d_W^3 / 16 \cdot 10^{-3}$

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/mm²]
for carbon steel approx. 60 N/mm²
for stainless steel approx. 90 N/mm²
for aluminium-alloy approx. 40 N/mm²

d_W = shaft diameter [mm]

Shaft ∅ (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	*3'3781*
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}

6. Dimensioning of Sprockets

All necessary information for selection of the suitable sprocket is given in the Product Data Sheet.

The number of sprockets needed for the driving shaft of your application can be calculated with the below Formula. The resulting number of sprockets should preferably be uneven (center sprocket fixed for tracking) but this is not conditional. For safety the calculated number should be rounded up, not down.

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

n_{max} (sprocket) = b_0 / min. sprocket spacing

n_{max} (sprocket) = b_0 / min. 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]

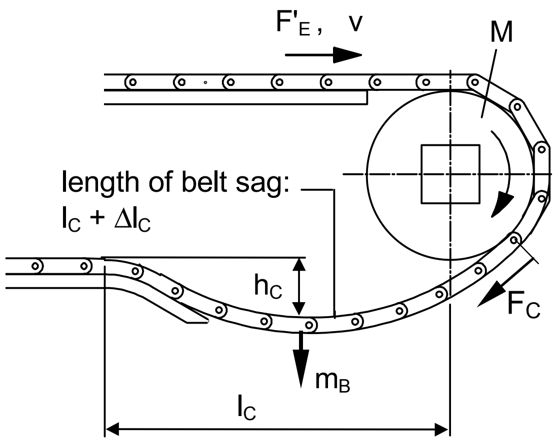
The finally selected number of sprockets should be in between the min. and the max. number of sprockets.

Sprocket for belt type		2"	1,5" radius	1"	0.5"
max. spacing of sprockets	mm	150	125	100	100
	inch	*6*	*5*	*4*	*4*
min. spacing of sprocket	mm	56.25	50	33.3	33.3
	inch	*2.2*	*2*	*2*	*2*
F_{max} (max.load per sprocket)	N	1700	1700	1000	800
	lb	*382*	*382*	*225*	*180*

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 applies 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.

The calculation of the catenary sag is more of general interest than needed for design. The experience shows that the sag of the dimensions proposed on pages 65 – 66 provides the belt tension needed for proper engagement of the sprockets.



Belt tension of catenary sag:

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

F'_C	=	Belt tension of catenary sag [N]
l_C	=	Height of the sag [m]
h_C	=	Length of the sag [m]
m_B	=	Weight of belt [kg/m^2]
g	=	Conversion factor mass to force (9.81 m/s^2)

Example:

For l_C = 1 m, m_B = 10 kg/m^2, h_C = 122 mm,
we get: F'_C = 100 N/m (≈ 10 kp/m)

8. Effective Belt Length

(Symbols see page 100)

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.

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

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

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 (l_g) is the total belt length equal 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 and will be corrected during installation by removing single module rows.

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 65 to 66. 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.

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

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*
Polyacetal	0.09	*0.00060*
Polyamide	0.12	*0.00078*

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.

For efficiency of the selected drive and 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]

Chemical Resistance of Belt and Wearstrip Materials

The data presented in the following Table are based on the information given by the raw material manufacturers and suppliers.

Code: ■ = good resistance ▼ = limited use □ = not resistant (not to be used)

Designation of chemical	Polypropylene (PP) 20 °C (70 °F)	Polypropylene (PP) 60 °C (140 °F)	Polyethylene (HDPE or UHMWE) 20 °C (70 °F)	Polyethylene (HDPE or UHMWE) 60 °C (140 °F)	Acetal (POM) 20 °C (70 °F)	Acetal (POM) 60 °C (140 °F)	Polyamid (PA) 20 °C (70 °F)	Polyamid (PA) 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	■	■	■	■	■	■	■	
Copper Comp.	■	■	■	■			▼	
Corn Oil	■	■	■	■	■	■	■	

Designation of chemical	Polypropylene (PP)		Polyethylene (HDPE or UHMWE)		Acetal (POM)		Polyamid (PA)	
	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)*
Cottonseed Oil	■	■	■	■	■	■	■	
Cresol	■	■	■	▼			□	□
Cyclohexane	■	▼	□	□			■	
Cyclohexanol	■	▼	▼	□			■	
Cyclohexanone	■	▼	□	□			■	
Detergents	■	■	■	■	■	■ (black)	■	
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 – 3 7%	■	■	■	▼	■	■		
Formic Acid – 85 %	■	▼	■	■			▼	□
Freon			■	■	▼	▼		
Fuel Oil # 2	■	▼	■	□	▼	▼	■	■
Fruit Juices	■	■	■	■	■		■	
Furfural	▼	▼	▼	□			■	
Gasoline	▼	□	■	□	■	■	■	■
Glucose	■	■	■	■	■	■		
Glycerol	■	■					■	■
Heptane	□	□	▼ (black)	□	■ (black)	■ (black)	■ (black)	■ (black)
Hexane	■	▼	□	□	■ (black)		■ (black)	■ (black)
Hydrobromic Acid – 50 %	■	■	■	■			□	□
Hydrochloric Acid – 35 %	■	■	■	■	□	□	□	□
Hydrochloric Acid – 10 %	■	■	■	■	□	□	□	□
Hydrofluoric Acid – 35 %	■	■	■	■	□	□	□	□
Hydrogen Peroxide – 3 %	■	■	■	■	■	■	▼	▼
Hydrogen Peroxide – 90 %	▼	▼	■	▼	▼	□	□	□
Hydrogen Sulfide	■	■	■	■			■	■
Igepal – 50%	■	■			■	▼		
Iodine – Crystals	■	■	▼	▼	□	□	□	□
Isooctane	□	□	■				■	■
Isopropyl Alcohol	■	■	■	■	■	■	■	■
Jet Fuel	▼	□	▼	▼	■	■	■	■
Kerosene	▼	□	▼	▼	■	■		
Lactic Acid	■	■	■	■			▼	□

Designation of chemical	Polypropylene (PP) 20 °C (70 °F)	Polypropylene (PP) 60 °C (140 °F)	Polyethylene (HDPE or UHMWE) 20 °C (70 °F)	Polyethylene (HDPE or UHMWE) 60 °C (140 °F)	Acetal (POM) 20 °C (70 °F)	Acetal (POM) 60 °C (140 °F)	Polyamid (PA) 20 °C (70 °F)	Polyamid (PA) 60 °C (140 °F)
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	■	■	■	■	□	□	□	□
Phenol – 5 %	■	■	■	■	□	□	□	□
Phosphoric Acid – 30 %	■	■	■	■	▼	□	□	□
Phosphoric Acid – 85 %	■	■	■	■	□	□	□	□
Photographic Solutions	■	■	■	■			■	
Plating Solutions	■	■	■	■				
Potassium Comp.	■	■	■	■	■	■	▼	
Potassium Hydroxide	■	■	■	■	■	■	▼	
Potassium Iodide (3 % Iodine)	■	■	■	■				
Potassium Permanganate	■	▼	■	■			□	□

Designation of chemical	Polypropylene (PP) 20 °C *(70 °F)*	Polypropylene (PP) 60 °C *(140 °F)*	Polyethylene (HDPE or UHMWE) 20 °C *(70 °F)*	Polyethylene (HDPE or UHMWE) 60 °C *(140 °F)*	Acetal (POM) 20 °C *(70 °F)*	Acetal (POM) 60 °C *(140 °F)*	Polyamid (PA) 20 °C *(70 °F)*	Polyamid (PA) 60 °C *(140 °F)*
Silver Cyanide	■	■						
Siver Nitrate	■	■	■	■				
Sodium Comp.	■	■	■	■				
Sodium Chlorite	■	▼	■	■			□	□
Sodium Hydroxide	■	■	■	■	■	■	□	□
Sodium Hydroxide – 60 %	■	■	■	■	■	■	□	□
Sodium Hypo-chlorite (5 % Cl)	■	▼	■	▼	□	□	▼	
Stearic Acid	■	▼	■	■	▼		■	■
Sulfamic Acid – 20 %	■	■			□	□		
Sulfate Liquors	■	■						
Sulfur	■	■	■	■			■	■
Sulfur Chloride	■							
Sulfur Dioxide	■	■	■	■	□	□	▼ (black)	▼ (black)
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	□	□	□	□	■	■	■	■

General Material Data

Criteria	Unit	PP Polypropylene (Homopoly.)	PE Polyethylene (HDPE, UHMW)	POM Polyacetal (Copoly.)	PA6, PA6.6 Polyamide	Carbon steel	Stainless steel
Density	g/cm^3	0.90	0.94	1.42	1.14	7	7
E-module	N/mm^2	1'500	800-1'100	3'200	1400 – 2'000	206'000	195'000
Tensile Strength	N/mm^2	30	24	70	40 – 65	350 – 550	800 – 900
Melting pt.	°C	165	135	166	223 – 263	1'500	1'400
Linear coeff. of thermal expansion	(mm/m • °C)	0.13	0.20	0.09	0.12	0.011	0.010 – 0.016
	(in/ft • °F)	*0.00087*	*0.00133*	*0.00060*	*0.00078*	*0.00073*	*~ 0.0009*
Ball Hardness	N/mm^2	60	38	114	70 – 90		

Coefficient of Friction between Belt and Wearstrips / Product (μ_G, μ_P)

Belt material	Condition	Belt against wearstrips (μ_G)				Belt against product (μ_P)			
		UHMW	HDPE	PA6, PA66	Stainless steel	Glass	Metal	Plastic (PET)	Cardboard
Polypropylene	dry wet (water)	0.13 0.11	0.11 0.09	0.30 –	0.30 0.30	0.19 0.17	0.32 0.30	0.17 0.15	0.22 –
Polyethylene	dry wet (water)	0.25 0.25	not recom.	0.23 –	0.14 0.14	0.10 0.08	0.13 0.11	0.10 0.08	0.15 –
Polyacetal	dry wet (water)	0.10 0.10	0.08 0.08	0.20 –	0.18 0.18	0.15 0.13	0.20 0.18	0.18 0.15	0.20 –
Polyamide	dry	0.14	0.14	–	0.19	0.17	0.19	0.12	0.17

Trouble Shooting Guide

➔ Tracking problems

Possible cause	**Proposed measures**
Sprockets are not "timed" correctly	If the total number of teeth are not divisable 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 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.
Missplice in belt	Inspect belt for a missplice.

➔ 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 for the recommended "A" and "C" dimensions (Design Guide).
Sprockets not timed correctly	If the total number of teeth are not divisable 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.
Incorrect number of sprockets	Check to see if the minimum number of recommended sprockets are used. Too few sprockets will cause premature sprocket wear.
Sprockets not timed correctly	If the total number of teeth are not divisable 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 for the recommended "A" and "C" dimensions.
Locked sprocket on drive or idle 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 recom-mended catenary sag is present.

➔ 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 wearstrip material	Check material specifications to ensure that the optimal material is used. Call Habasit technical service for a recommendation.
Incorrect wearstrip 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 headed on both ends (first generation till end 2000)	Replace rod and secure its ends with soldering gun (fuse rod head).
Rods not properly seated in snap-in position (second generation after Jan 2001)	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.

List of Abbreviations

1. Symbols for Calculations

Term	Symbol	Metric value	Imperial value
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
Conversion factor mass (kg) to force (N)	g	9.81 m/s^2	–

Term	Symbol	Metric value	Imperial value
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 / m^2 (weight of belt / m^2)	m_B	kg/m^2	lb/sqft
Mass of product/m^2 (weight of prod. / m^2)	m_P	kg/m^2	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

2. Symbols for Illustrations

Term	Symbol	Metric value	Imperial value
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
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
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		

Term	Symbol	Metric value	Imperial value
Belt thickness	S	mm	inch
Side guides radius belt (holding down rails)	SC	–	–
Wear strip for support of flights on return way	SF	–	–
Slider shoe for hold down or support of belt	SH	–	–
Slider support return side	SR	–	–
Slider support transport side	ST	–	–
Take-up device (tensioning device)	TU	–	–
Idling shaft	U	–	–
Width of transfer plate (Finger plate)	W	mm	inch
Length of transfer plate (finger plate)	W_L	mm	inch

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)

Glossary of Terms

Term	Explanation	Habasit symbol
Accumulation conveyors	Conveyors that collect temporary product overflows.	
Accumulation length (distance)	Distance of product accumulation in running direction of the belt.	l_a
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 eventual 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	Conveying length measured between the centers of driving and *idling* shafts.	l_0
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 excessiv 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).	
Carryway	*Slider support* (belt support) with *wear strips* or *slider bed.*	**ST, SR**
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.	
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	

Term	Explanation	Habasit symbol
Flat top belt	Flat top belt with 0% open area and a variety of reverse sides, eg. smooth (M5010) or grid-like reinforcement (eg. 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.	
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).	
HDPE	High density Polyethylene: used for *wear strips* (*slider support*) and side guides.	**HDPE**
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 the belt from lifting of the base in the curve.	
Idling shafts	Shaft at the belt end opposite to the driving shaft. It is normally equipped with *sprockets* or alternatively for shorter belts flat drums can be used.	
Indent	Space at belt edge free of flight or rubber lining.	
Mass of belt per m^2 (belt weight per m^2)	The belt mass (weight) is added to the product mass per m^2 for calculation of the friction force between belt and slider frame.	$\mathbf{m_B}$
Mass of product per m^2 (product weight per m^2)	Conveyed product weight as expected to be distributed over the belt surface; calculated average load per m^2.	$\mathbf{m_P}$
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.	
Polyacetal	Thermoplastic material with high strength and low coefficient of friction. Temp.-range -40 ° to +90 °C *(-40 to +195 °F)*. Spec. gravity 1.42 gr/cm³.	**POM**
Polyethylene	Thermoplastic material, relatively soft, well suitable for low temperature applications. Very good fatigue resistance and high impact strength. Temp.-range -50 ° to +65 °C *(-95 to +150 °F)*. Spec. gravity 0.94 gr/cm³.	**PE**
Polypropylene	Thermoplastic material with good cost/performance relation (material for most of the common conveying applications) Good chemical resistance. Temp.-range +5 ° to +105 °C *(+40 to +220 °F)*. Spec. gravity 0.9 gr/cm³.	**PP**
Radius belt	Belt suitable for running around curves (radius applications) with a minimum inside radius of 2.2 times the belt width.	

Term	Explanation	Habasit symbol
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 eventual heavy running conditions (start/stop, inclination).	c_S
Side guards	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 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_V
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 or exceptionally from 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
UHMW (UHMWPE)	Ultra high molecular weight Polyethylene: used for *wearstrips* (*slider support*) and side guides.	**UHMW**
USDA	United States Department of Agriculture. US federal agency which had defined requirements for equipment which may be in contact with meat, dairy and poultry.	**USDA**
Wearstrip	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).