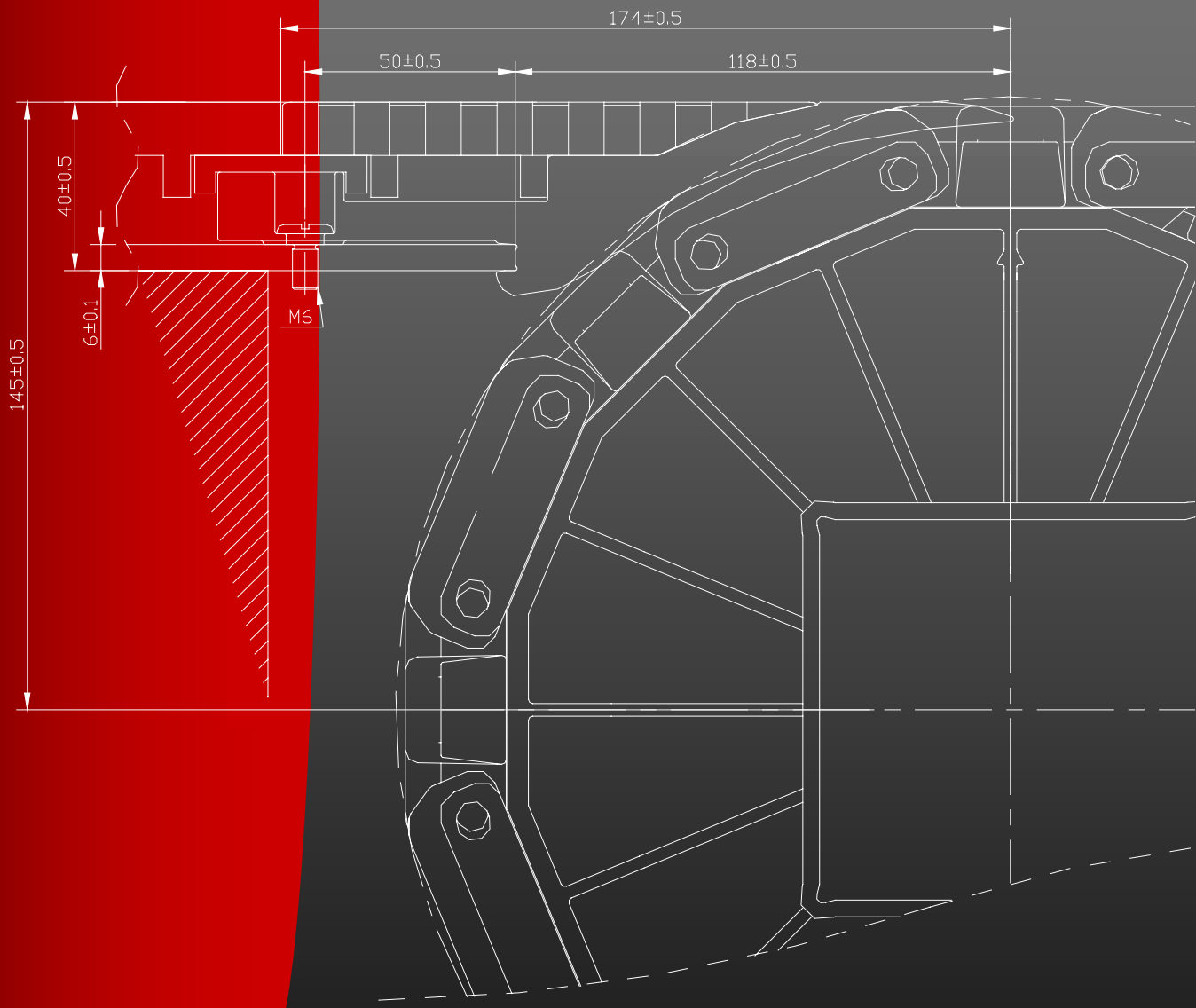
Engineering Manual



Rexnord

2005

Index & Introduction

Rexnord FlatTop Engineering Manual
This Engineering Manual has been developed to help you with the need for specific engineering information. It can be a source of information when a new conveyor has to be designed. This Manual can also be used as a reference book when a conveyor is going to be modified, during an overhaul or for troubleshooting.

All guidelines in this booklet are given to our best knowledge and are believed to be reliable, based on experience. As circumstances vary from case to case, we will always be glad to answer your questions, when you are not sure if the information given applies to your situation. When you need more information about a specific subject, please don't hesitate to contact Rexnord or your nearest Rexnord distributor.

MCC cannot take responsibility for imperfections, damage or injuries due to wrong conveyor design, poor installation or improper use of our products made with or without reference to the information in this manual. We do not pretend to be complete. We appreciate suggestions from your side which can be helpful to improve this Engineering Manual.

Rexnord FlatTop Europe.

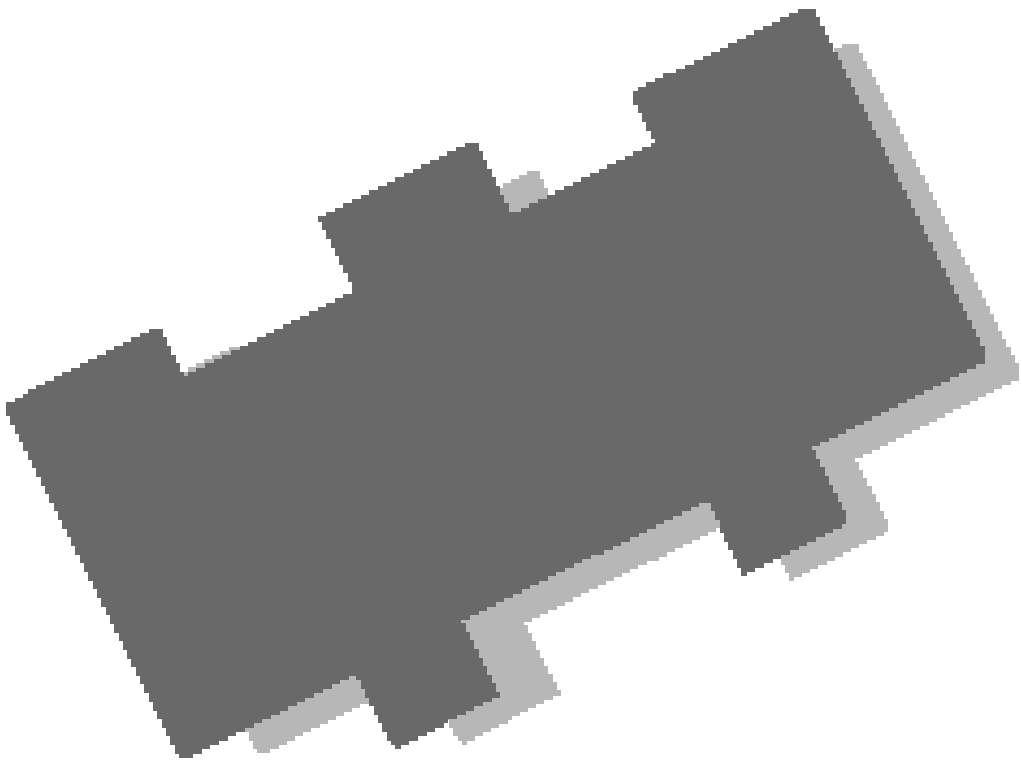
MCC Slatband Chains Engineering

MCC Modular Belts Engineering

MCC Sideflexing Belts

Appendix (Technical Bulletins & Material Info Sheets)

MCC Slatband Chains Engineering

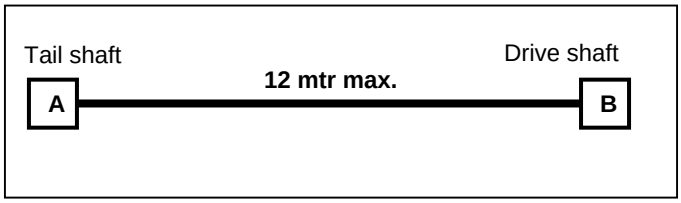


Conveyor Design

Straight running configuration

The length of a conveyor is not unlimited. There is a certain maximum length for each application. The limits are depending on factors like chain- or belt type, lubrication, kind of product, load. The exact maximum conveyor lenth can be calculated with the readily available calculation programme.

Generally for straight running conveyors we recommended a Max. tracklength of 12 mtrs.

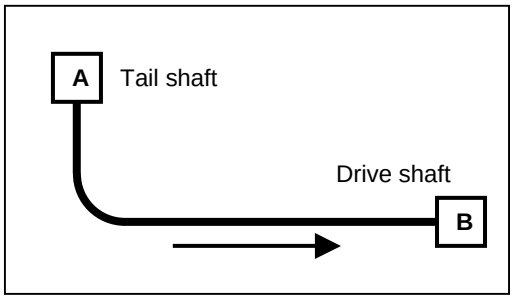


Shorter conveyors are built to obtain lower backline pressure by means of better control facilities. The chainspeeds can be controlled using frequency controlled drives. When for instance one conveyor runs full, the chainspeed of the preceding conveyor can then slowly be decreased. Pasteurisers, warmers and coolers can require longer tracklengths.

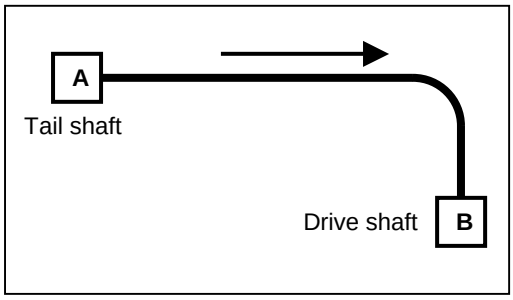
Side flexing configuration

When planning a side-flexing conveyor layout, the designer must consider the following factors that affect chain life:

- ✓ Minimize the number of corners whenever possible
- ✓ When conveying from point A to point B, design the conveyors so that the drive is positioned furthest from the last corner (see drawing), resulting in lower chain tension and maximizing chain life



Preferred



Avoid

Maximum chain speed slatband chains

Chain material and type	Maximum speed (m/min)		
	Dry	water	Water & soap
Steel chains			
Straight	50	70	130
Magnetflex®	30	40	130
Plastic chains			
Straight run	80	100	180
Sideflex, tab	*) Check PV-limit	60	120
Magnetflex®	*) Check PV-limit	90	180
CC-chains	*) Check PV-limit	60**	80**

*) PV-Limit

Maximum speed values depend on the PV-value of the curve, which represents a combination of pressure and velocity with a specific limit.

**) Contact Technical Support for higher speeds

Abrasive conditions or exceeding the speed, results in increased wear, and a decrease in working load.

Conveyor Design

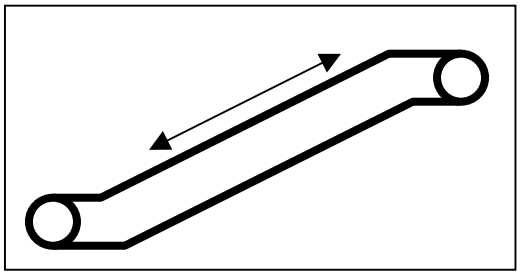
Slip stick / Pulsating effects

Slip-stick is caused by the difference between static friction and dynamic friction. Slip-stick effects can cause a pulsating chain operation.

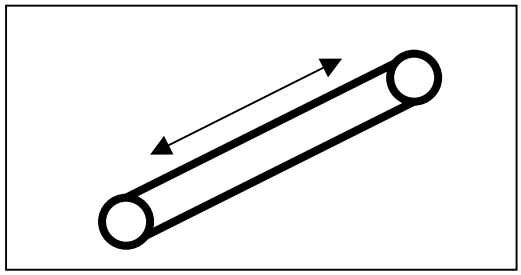
We have the experience that with long, low speed conveyors, the chance of a pulsating operation increases.

Inclining / declining conveyor configuation

Slatband chains can be used on in- or declined conveyors which are basically constructed in the same way as level conveyors. Main concern is to avoid that the products slide down or tip. Conveyors can be constructed with a level in/outfeed section, see below.



✓ **Level in/outfeed**



✓ **No in/oufeed**

In case the inclined/declined conveyor is equipped with a Magnetflex curve, we recommend a minimum level section of 1 mtr. This eliminates the chance the chain is lifted out of the curve.

Max. possible angle

The maximum possible angle is depending on several factors: Coefficient of friction between chain and product; acceleration/deceleration; product stability and external factors like durt or debris. Below a general table is shown with maximum angles determined by chain friction.

Maximum angles inclines / declines		
Chaintype	**Lubricated**	**Dry running**
Steel chains	4º	8º
Plastic chains	2.5º	4.5º
Rubbertop chains	9º	20º
Variations can vary due to actual circumstances.		

Conveyor Design

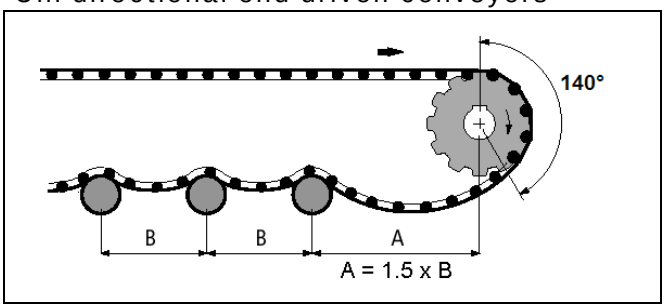
Uni-directional end drive conveyors

Bi-directional conveyors with end drive

Bi-directional covneyors with cente drive

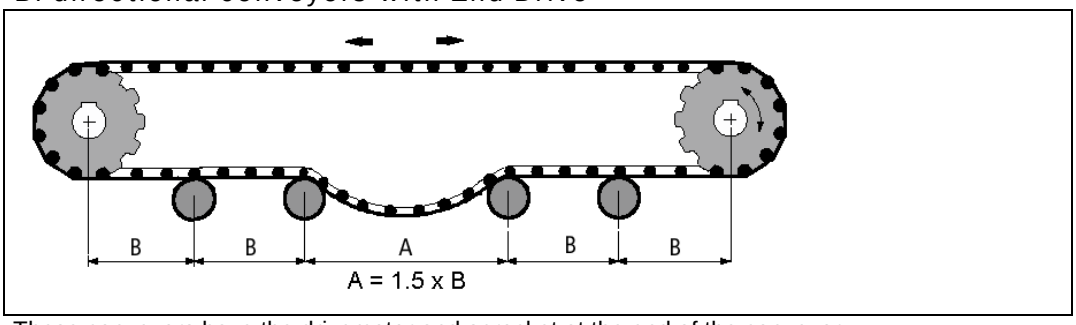
Drive construction inclines

Uni-directional end driven conveyors



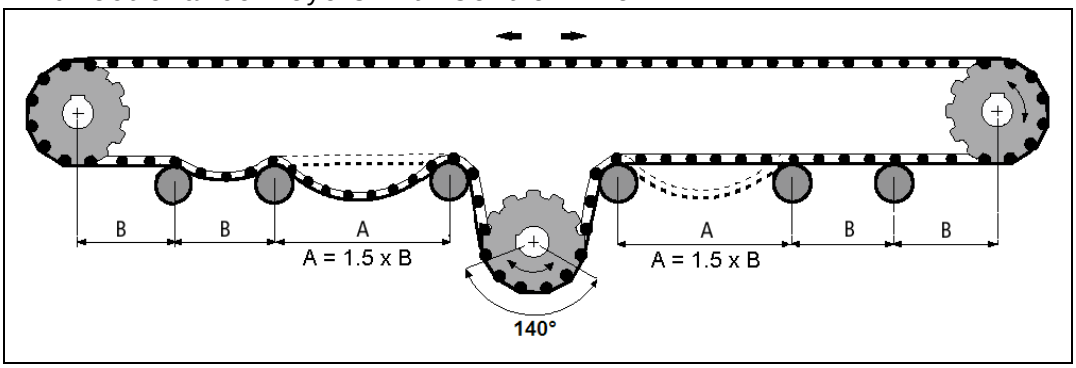
These conveyors have the drivemotor and sprocket at the end of the conveyor

Bi-directional conveyors with End Drive



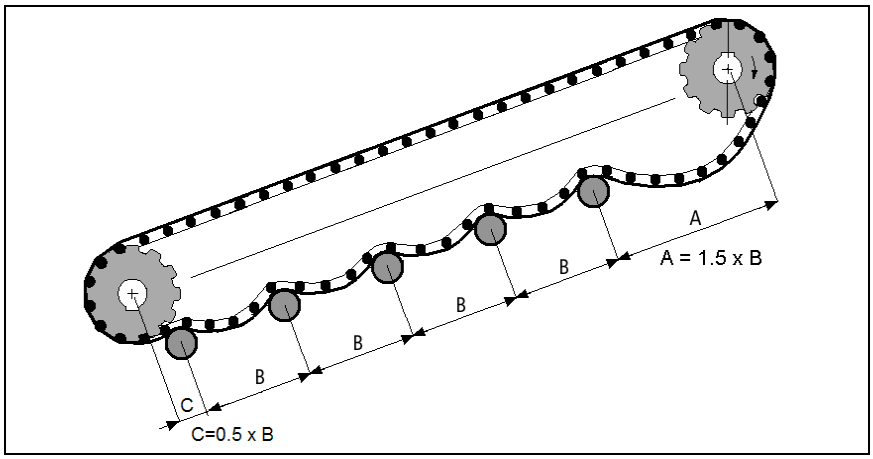
These conveyors have the drivemotor and sprocket at the end of the conveyor

Bi-directional conveyors with Centre Drive



These conveyor can have a small end roller to reduce the transfer area

Drive constructions inclines



Conveyor Design

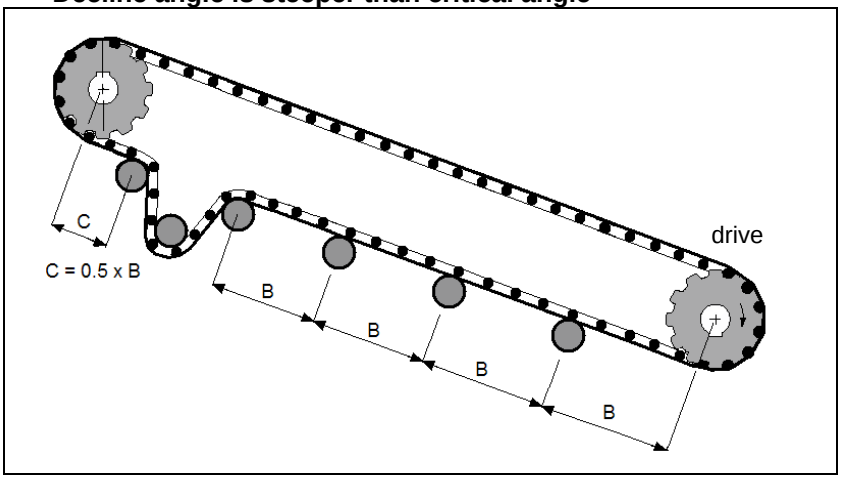
Drive constructions declines

Declined conveyors have the drive at the upper- or at the lower side of the conveyer. This position depends on the friction between the chain/belt and the upperpart, and also on the preferred angle of the decline. See explanation below to determine where the position of the drive should be.

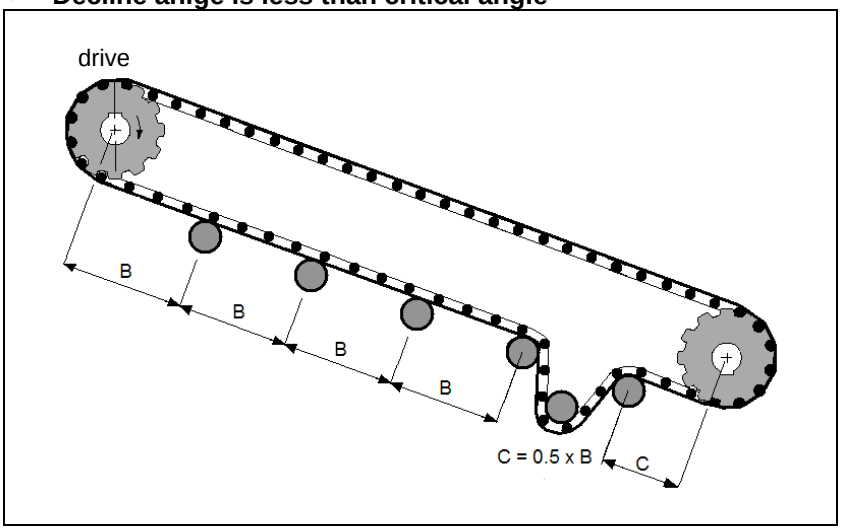
Calculate the critical angle (∠ critical) with:

Tan (∠critical) = Friction between chain - wearstrips

✓ **Decline angle is steeper than critical angle**



✓ **Decline anlge is less than critical angle**



Please note that a gravity tensioner is recommended for declined conveyors

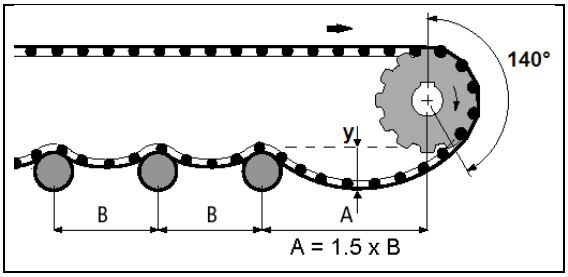
Most MCC chains have a preferred running direction, which is shown on the underside.

Wrap around angle

Recommended wrap angle on sprockets is: **140° +/- 10°.**
When the wrap angle is too small, the sprocket will not be able to transfer the load to the chain anymore causing the chain/belt to jump on the sprockets. When the wrap angle is too big, the chain/belt can stick to the sprocket.

Catenary sag

It is recommended to create a catenary sag just behind the sprocket which provides a complete discharge of the chainload and ensures proper running.



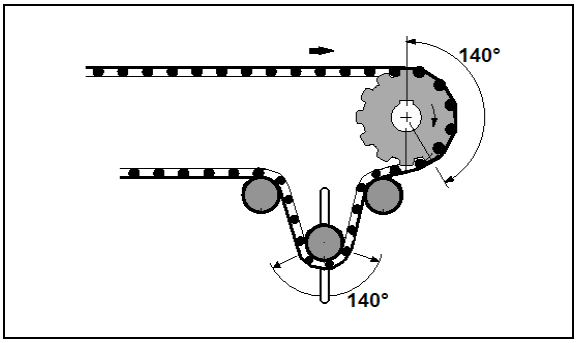
type	A (mm)	B (mm)	Vertical sag Y(mm)
Slatband	700	500	50-125
Crate chains	700	N/A[1)]	100-300
LBP-chains	700	400[2)]	50-100

[1)] Use flat returnpart for CC-series chains

[2)] Use guide shoes/flat return for LBP chains

The right vertical catenary sag can usually be obtained automatically by just pulling both ends together and mounting them together. Note the chain can elongate due to strain and wear of the pins and hinge eyes. Therefore it is important to check and adjust the catenary regularly.

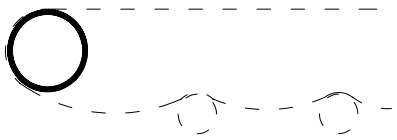
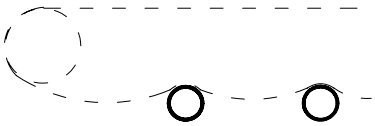
Tensioner construction



A tensioner construction is only necessary if the conveyor design does not allow for a proper catenary sag. A tensioner can also be used with declined conveyors, but in all other cases it is not recommend to tension the chain/belt.

The tensioner roller/sprocket can be fixed on an arm or move up and down in slots in the conveyor sideplates. This will bring constant tension, independent of length differences in the chain.

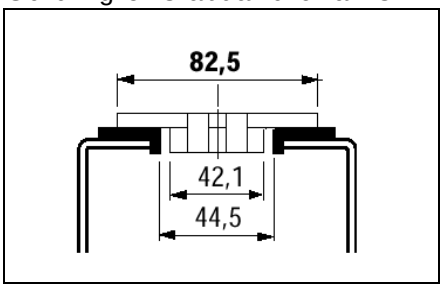
Roller diameter for slatband chains

Chaintype	Slatband chains	LBP chains	CC chains
Idler rollers 	> 100mm	>100mm	100mm
Return rollers 	60-100mm	Guideshoes are recommended	60-100mm
Backflex rollers 	300mm	Not recommended	120mm

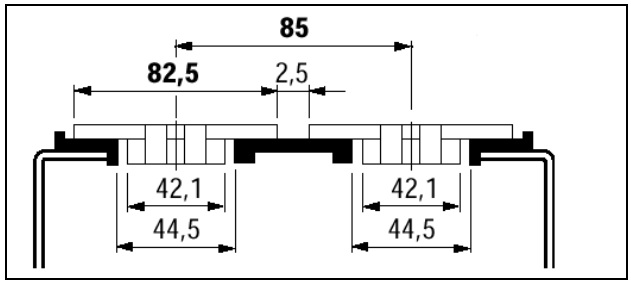
The recommended roller diameters in the table are an indication. The width of the conveyor is not taken into account. The diameter of the shaft should be large enough to avoid deflection of the roller. At the same time it is recommended not to exceed the maximum diameter, because the roller friction may be too high to be set in motion by the belt.

Conveyor Design

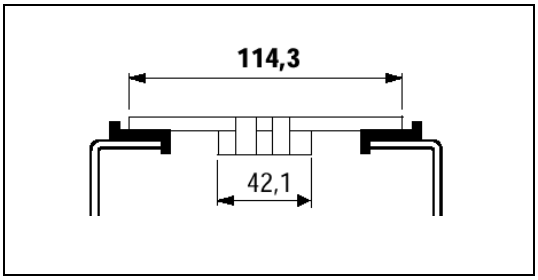
Guiding of slatband chains



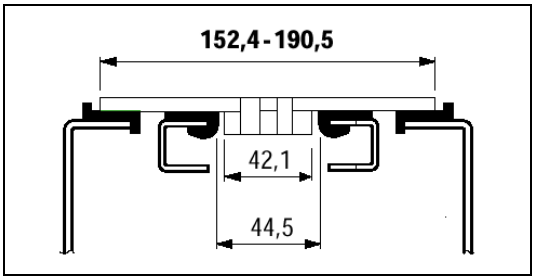
Guiding of single 3.25” chains



Guiding of multiple 3.25” chains

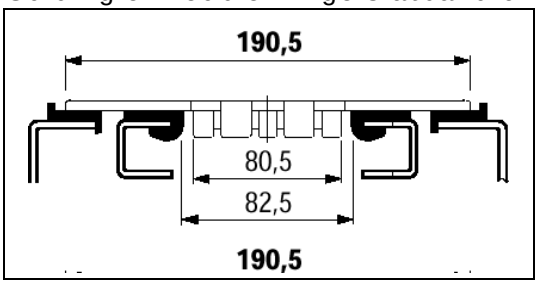


Guiding of 4.5” plastic chains

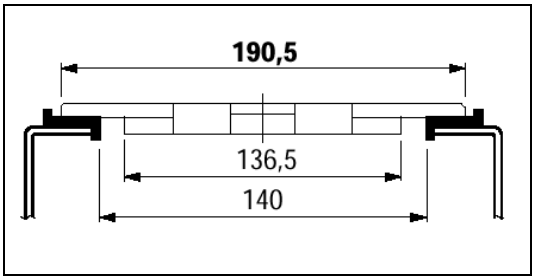


Guiding of 6”-7.5” plastic chains

Guiding of Double Hinge slatband chains

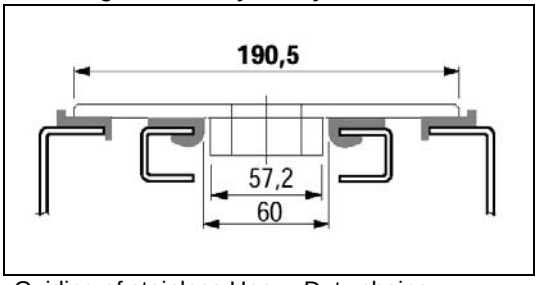


Guiding of stainless double hinge chains

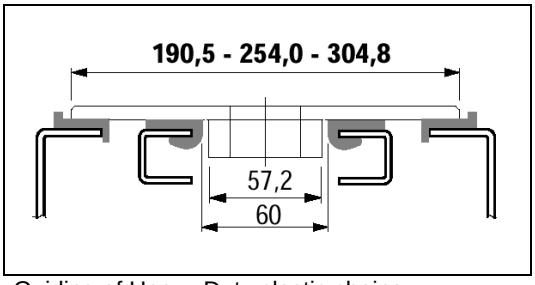


Guiding of plastic double hinge chains

Guiding of Heavy Duty slatband chains



Guiding of stainless Heavy Duty chains



Guiding of Heavy Duty plastic chains

Wearstrip Materials

Metal wearstrips

Metal wearstrips can be used in most situations using plastic chains and are strongly recommended in abrasive environments.

Stainless steel:

- Recommended for abrasive conditions due to avoiding of dirt embedding in the wearstrips;
- Recommended for plastic chains/belts in dry environments with speeds > 60m/min;
- Cold rolled stainless steel with a hardness of at least 25 Rc and a surface finish of maximum 1.6 µm is recommended;
- Best results can be achieved by using stainless steel AISI 431 (Werkstoff-Nr. 1.4057 material;
- AISI 304 (Werkstoff-Nr. 1.4301) is not recommended as wearstrip material.

Plastic wearstrips

Friction is low compared to steel wearstrips. Two types of plastic are suitable to be used as a wearstrip material.

UHMWPE:

- Most common used wearstrip material with extreme low friction;
- Excellent resistance against many chemicals;
- Virtually no moisture absorption, therefore very suitable for lubricated lines;
- Good dimension stability;
- Reduces some of the noise conveyors produce;
- Suitable for dry running conveyors with speeds up to 60 m/min;
- Extruded quality 1000 grade UHMWPE is recommended.

Polyamide:

- Relatively high moisture absorption which makes the material expand;
- Polyamide is also used with additives to reduce the coefficient of friction;
- Suitable for dry running high speed conveyors.

Recommended wearstrip materials

Wearstrip material	Steel chains		Plastic chains	
	Dry	Lubr.	Dry	Lubr.
UHMWPE	+	+	+ [1)]	+ [2)]
Polyamide	+/-	-	+/-	-
Stainless steel	-	-	+	+

\+ Recommended
+/- Satisfactory
\- Not recommended
1) Up to 60 m/min in non abrasive conditions
2) Only in non abrasive conditions

It is not recommended to use the same material for the wearstrip and chain.

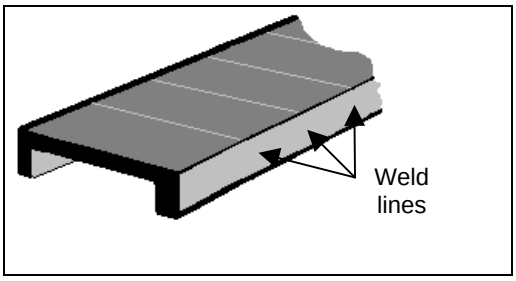
Conveyor Design

UHMWPE Wearstrip Installation

RAM-extruded wearstrips

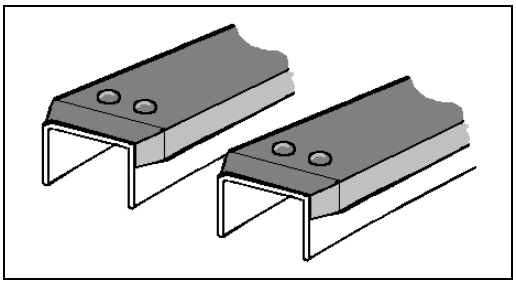
We recommend to use RAM-extruded wearstrips. Main benefits of RAM-extruded UHMWPE wearstrips is that less debris will embed in the material in comparison to worm extruded or machined UHWMPE. This will results in less chain/beltwear.

Ram-extruded wearstrips can be recognized by weld lines which occur with each ram stroke, see drawing.



Chamfering of wearstrips

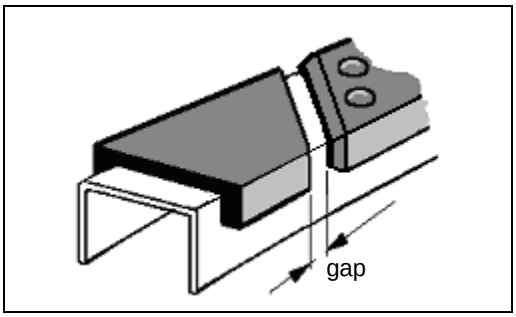
Wearstrips should always be chamfered at the beginning of the strip where they are fixed. Chamfering reduces the risk of chain-obstruction resulting in a smooth operation.The wearstrips should be chamfered at the sides and at the top.



Splitting the wearstrips

On straight sections with a length of more than 3 metres, or for high (40º - 70ºC) application temperatures, we recommend to divide the wearstrip into several sections, because of the thermal expansion of the strips.

It is recommended to cut the wearstrips at 45º angles to provides smooth chain/ belt transfers. Make sure only the infeed side of the wearstrip is fixed to the conveyor frame to avoid bulging of the wearstrips.



The gap depends on the expected elongation due to e.g. thermal expansion, see drawing.

Calculation example

For MCC 1000 UHMWPE material the expansion coefficient is 0.2 mm/m/ºC. A temperature increase of 20ºC would elongate a 3 meter wearstrip with:

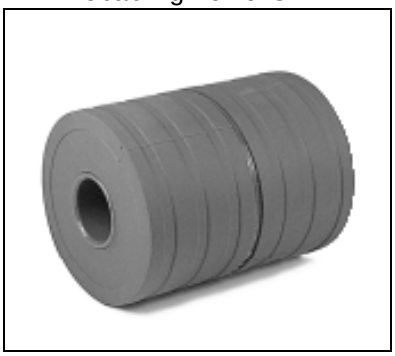
20ºC * 3mtr * 0.2=12 mm

In this case, the gap between the wearstrips should be a bit larger than 12 mm.

We recommend a maximum wearstrip length of 6mtr. with UHWMPE wearstrips.

Chain return construction

Rotating rollers

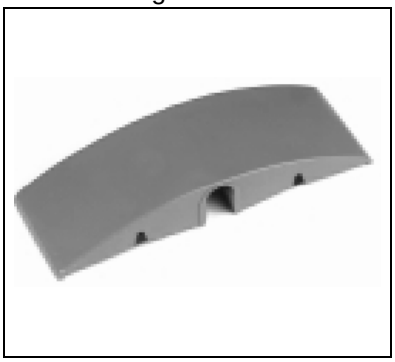


- ✓ Reduced wear
- ✓ Simple construction.
- ✓ Good accessibility
- ✓ Ejection of debris in the returnpart by the movement of the chain.

- ✓ Only point contact between chain and roller.
- ✓ Small rollers may cause a rattling sound.

Rollers should rotate freely therefore, rollers with rubber cover are recommended

Fixed guideshoes

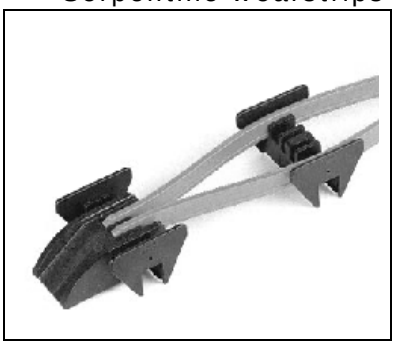


- ✓ Good accessibility
- ✓ Simple construction.
- ✓ Ejection of debris in the returnpart by the movement of the chain.
- ✓ Suitable for LBP chains/belts.

- ✓ Risk of uneven wear chainsurface
- ✓ Only point contact between chain and guide shoe.
- ✓ High friction.

Minimum guide shoe radius is 200 mm.

Serpentine wearstrips



- ✓ Full support of the chain over the length of the conveyor.
- ✓ Reduced noise in returnpart.
- ✓ Recommended in high speed lines with slatband chains

- ✓ Less favourable accessibility for maintenance.
- ✓ Less possibility to absorb elongation.
- ✓ Uneven wear of the chain/belt when not supported over entire width.
- ✓ Higher friction.

Material used for wearstrips should be UHMWPE. A roller can be used for the infeed onto the serpentine wearstrips

MCC Slatband Chains Engineering

Chain return construction

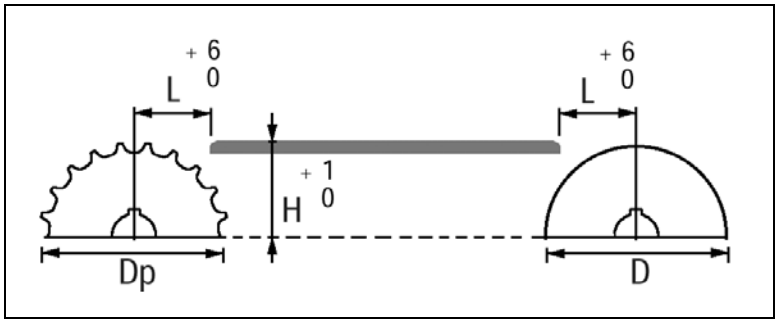
Fixed guideshoes

Serpentine wearstrips

Conveyor Design

Position sprocket - wearstrips

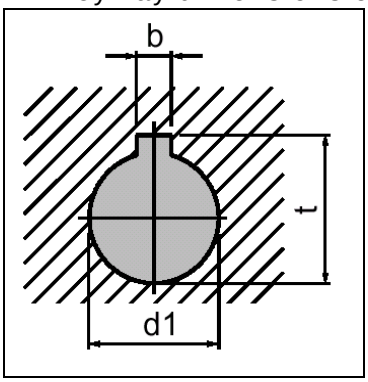
When the chain enters the sprocket, it tends to raise and fall slightly (chordal action). For this reason the sprockets should be mounted in such a way that its highest point is no higher than the top of the wearstrips. The frond edges of the wearstrips should be bevelled to allow smooth and free running of the chain. The distance from the end of the wearstrip to the sprocket shaft centerline should equal dimension L, otherwise the wearstrip will interfere with the free articulation of the chain as it enters the sprockets.



Chain type	Drive sprocket H (mm)	L mm
Steel chains, SH, SWH	$\frac{Dp}{2}$ + 3.2	38.1
SHD	$\frac{Dp}{2}$ + 2.4	38.1
SHP, SRH, RH(D), RHM(D)	$\frac{Dp}{2}$ + 3.5	38.1
HDS, HDF, HDFM	$\frac{Dp}{2}$ + 4.7	38.1
PR	$\frac{Dp}{2}$ - 12.0	50.0
CC-600	$\frac{Dp}{2}$ - 14.3	63.5
CC-1400	$\frac{Dp}{2}$ - 19.0	82.5

Idler Drum H (mm)	L mm
$\frac{Dp}{2}$	38.1
$\frac{Dp}{2}$	38.1
$\frac{Dp}{2}$	38.1
$\frac{Dp}{2}$	38.1
$\frac{Dp}{2}$	50.0
$\frac{Dp}{2}$	63.5
$\frac{Dp}{2}$	82.5

Keyway dimensions of MCC sprockets



d1 (mm)	b (mm)	t (mm)
25mm	8	28.3
30mm	8	33.3
35mm	10	38.3
40mm	12	43.3
45mm	14	48.8
50mm	14	53.8
60mm	18	64.4

d1 (inch)	b (inch)	t (inch)
1"	1/4	1 1/8
1 1/4"	1/4	1 3/8
1 1/2"	3/8	1 9/16
1 3/4"	3/8	1 15/16
2"	1/2	2 1/4

MCC Slatband Chains Engineering

Shafts

Shaft tolerances

Bearings

Fix sprockets with lowest speed

Shafts

In all situations stainless steel is recommended for shaft material. Metaloxydes that come from a rusty shaft are extremely abrasive and would therefore reduce the wearlife of the conveyor components. It is also important to use shafts with a sufficient hardness and a smooth surface. The shaft diameter depends on the conveyor load and its width. For slatband chain sprockets round shafts are used.

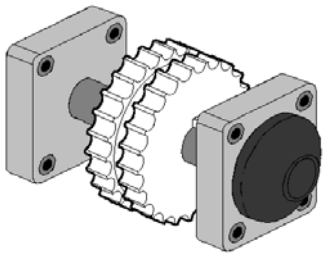
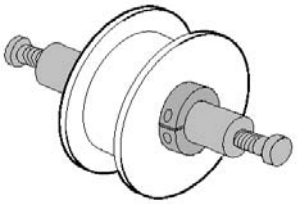
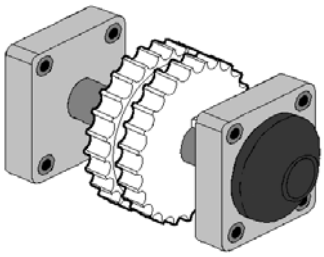
Maximum deflection of the shaft must not exceed 2 mm. Depending on the load and shaftlength, it can be necessary to use a larger diameter shaft or an extra bearing in the middle of the shaft to reduce the shaft deflection.

Shaft tolerances

It is important that the tolerance of the shaft meets the specifications of the sprocket, so the sprocket can slide over the shaft at all times. In combination with all MCC sprockets the following shaft specifications are required, depending on the shaft diameter.

Dimension (mm)	Shaft tolerance (mm)	Idler shaft surface finish (µm)
Round shaft		
< Ø 90	max h 9 (ISO)	0.8
> Ø 90	Max h 11 (ISO)	1.2

Bearings

Drive sprocket	**Idler**	
	drum	**sprocket**
		
Shaft with keyway equipped with bearings	Fixed idler shaft without keyway. The idler drum rotates freely on the shaft. Suitable for lower speed < 30mtr/min dry run < 60mtr/min well lubricated	Idler shaft with keyway equipped with bearings for higher conveyor speed > 30mtr/min dry run > 60mtr/min well lubricated In poluted area's an idler shaft with bearings is recommended.

Before selecting bearings, check which chemicals will be present. Also check if dust and water are present. Sealed bearings have a better protection against dust. Also use bearings with high mechanical and heat resistance for a longer wearlife of the construction.

Make sure the edges of the shaft are rounded off to ease assembly and to avoid damage to the rubber parts of the bearing sealing units.

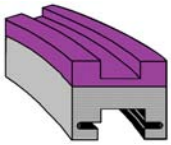
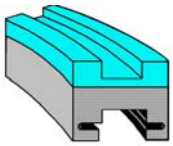
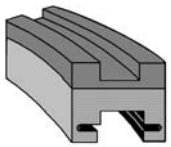
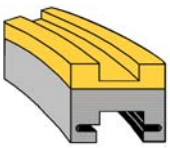
Fix sprockets with lowest speed

When the speed of the idler sprockets on the same shaft is different, we recommend fixing the sprocket with the lowest speed to the shaft. This way the relative speed difference which occurs between the shaft and the other idler sprockets is as low as possible and the fixed idlers will not drive the slower moving idlers. This case all other idler sprockets must be able to rotate independently.

Conveyor Design

Magnetflex® curve materials

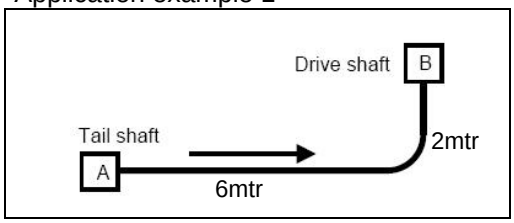
Magnetflex® curves are available in several materials, each for specific applications, see below.

Curve	Colour	Properties & Applications	Notes
Combi A		High grade UHMWPE for good wear and abrasion resistance. Suitable for most applications with steel and plastic chains.	Lubricated or dry running
Combi L		High grade special UHMWPE for improved wear and abrasion resistance and very low noise Suitable for medium to high speed conveyors for steel and plastic chains	Lubricated or dry running
Combi S		Special polyamide for high PV limits and optimum wear resistance. Suitable for dry running high speed conveyors equipped with plastic chains. Also suitable for abrasive conditions.	Dry running only
Combi G		Special UHMWPE with ceramic additives for superior abrasion resistance For abrasive conditions with stainless steel chains	Lubricated or dry running
Return part material is MCC 1001 UHMWPE, return guide shoe material is MCC 1000 UHMWPE			

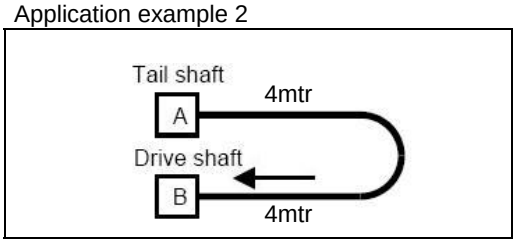
Curve material selection example

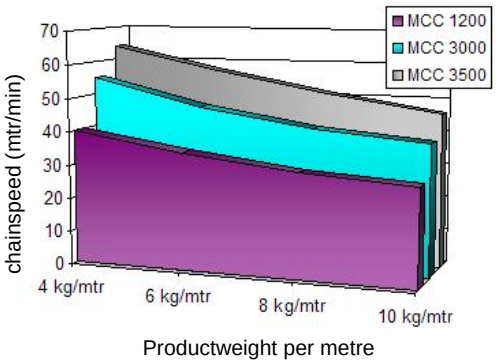
- ✓ RHM 325 XL chain
- ✓ Conveying cans
- ✓ UHMPWE wearstrips & return rollers
- ✓ 12 tooth sprocket
- ✓ Single track conveyor
- ✓ Dry running
- ✓ Running completely full
- ✓ 100% accumulation possible

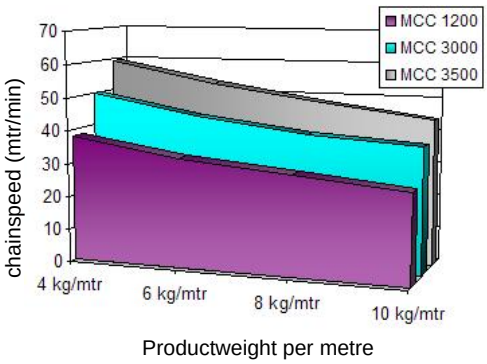
Application example 1



Application example 2



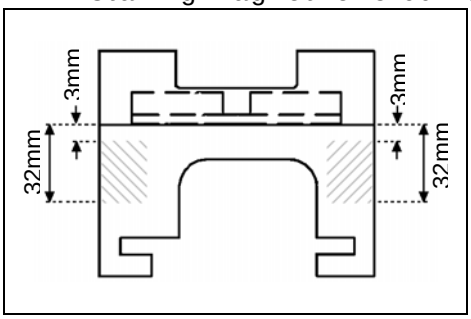




Curve installation

For Magnetflex® curves, the following installation recommendations should be taken into account.

Installing Magnetflex® curves

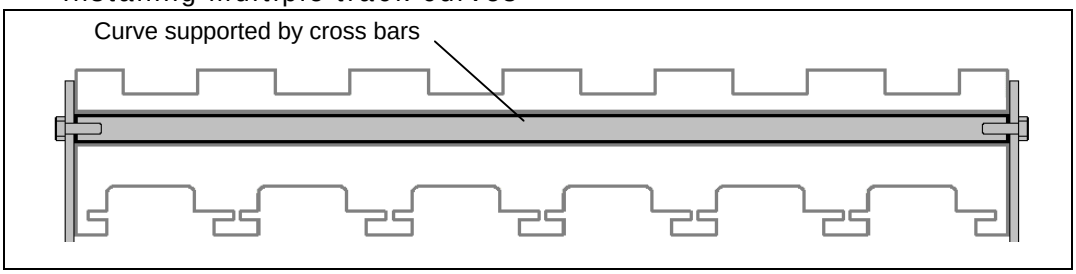


Magnetflex® curves are mounted to the conveyor frame using inserts in the curve returnpart. The upperpart is fixed to the returnpart with screws.

It is important to take care of the position of the inserts. Magnetflex® curves should only be drilled in the underpart, taking the dimensions into account shown in the drawing.

Note: Always check returnpart for protruding bolts, which could obstruct the chain.

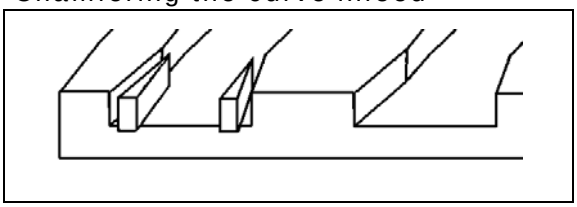
Installing multiple track curves



For multiple track curves (>500mm) we recommend to support the curve upperpart and the curve returnpart with cross bars.

Note: make sure the curve is mounted level, and the conveyor frame is positioned level

Chamfering the curve infeed

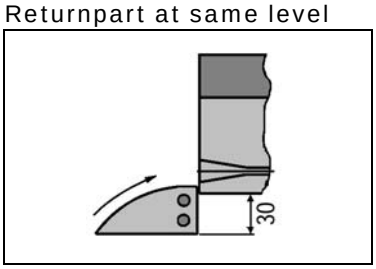


All upperpart infeed sides should be chamfered to ensure a smooth running of the chains. Make sure the chamered parts stay vertical. The chamfering of the curves has to be done only at the infeed sides.

Magnetflex® guide shoe installation

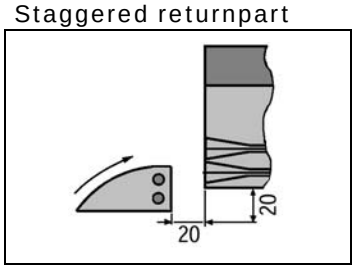
The MCC return guideshoes helps the chain run into the returnpart. The return guideshoe has to be mounted at the infeed side of the return part of the curve.

Returnpart at same level



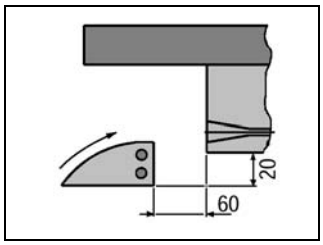
Returnpart guideshoe should be mounted against infeed of underpart, with underside of the guideshoe 30 mm lower than the curve underside.

Staggered returnpart



Curves with a track pitch of less than 89 mm, feature a staggered returnpart. Returnpart should be mounted 20 mm off the curve infeed.

1050/1055 chainbelts



The infeed shoe should be positioned 20 mm below the curve infeed, at distance of 60 mm.

Conveyor Design

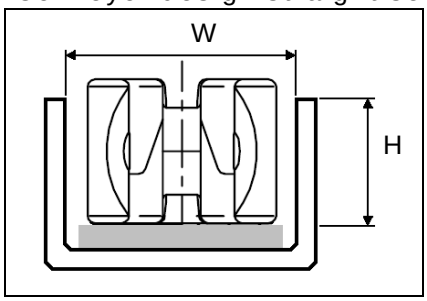
Case Conveyor chains

Case conveyor chains are available in different types. Plastic Case Conveyor chains have been designed to convey heavy crates, boxes and kegs and the open design is very suitable for dirty conditions and easy cleaning.

Properties	**CC600**	**CC631**	**CC1400**	**CC1431**
Pitch [mm]	63.5	63.5	83	83
Max. working load [N]	3950	3950	6500	6500
Tabs	with/without	with	with/without	with
Height of links [mm]	28.6	31.8	38	43

Note: CC-chains have a preferred running direction, which is indicated on the chains. The pins can be mounted only in one direction ("in") and dismounted only one direction ("out"). CC-chains should not be tensioned in the returnpart.

Conveyor design straight sections

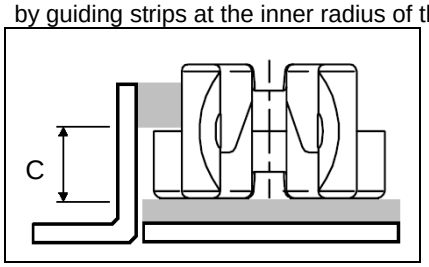


Chaintype	W (mm)	H (mm)
CC600	45	20
CC600TAB	58	20
CC631TAB	58	20
CC1400	53	24
CC1400TAB	69	24
CC1431	69	24

Please check wearstrip recommdations for best wearstrip choice

Conveyor design corners

Curves for CC chains should be made open to allow debris to fall down. The chains can be secured by guiding strips at the inner radius of the curve.

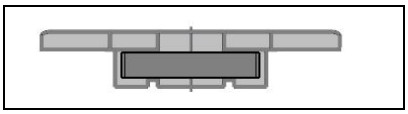


Chaintype	C
CC600TAB	19.5
CC631TAB	19.5
CC1400TAB	21
CC1431TAB	21

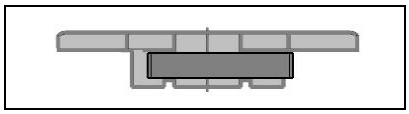
Please check wearstrip recommdations for best wearstrip choice

Installation of slatband chains

- Chains can be installed using a hammer and a punch.

- 

Pins should be positioned exactly in the middle of the hinge eyes.



Wrong assembly. If pins stick out the chain can jam.

- Pins in plastic chains should have the knurl on the same side, and this knurled side should be put in the chain last. D-style pins have no direction preference.
- Check running direction, since the chain should always be driven at the fixed hinge eyes. Running direction is shown at the underside of the chain.
- Do not tension the chain when installing. Tensioning will result in a higher chainlaod and more wear of components. During installation the proper tension is manually achieved.

Chain inspection & maintenance

A good condition of the line can be maintained when people recognise signs of initial wear/ failure and react accordingly. Following aspects are of importance during regular check-up.

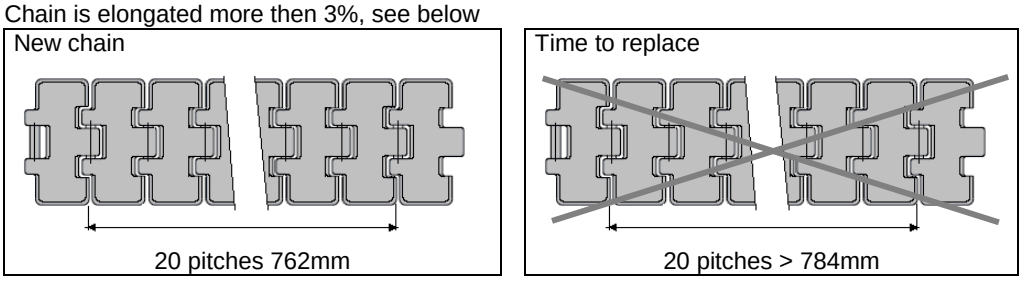
- Check the condition of the chain regularly, and replace links which are damaged. Important in this matter is to try to find the cause of the damaged links. Wear patterns or damage on a chain can often lead you to a problem area elsewhere in the conveyor.
- Check the amount of catenary sag and remove links or modules when the catenary of the chains exceeds prescriptions. Remember catenary grows during full load.
- Check if the returnrollers turn freely, repair or replace if not.
- In case of lubrication check if the lubrication system operates properly.
- Check carryways and wear strips for excessive wear or peculiar wear patterns.
- Check positions of transfer plates and check the fingerplates for broken/ worn parts and repair or replace if necessary.

Conveyor Design

Chain replacement

We recommend to replace slatband chains, if the following is the case:

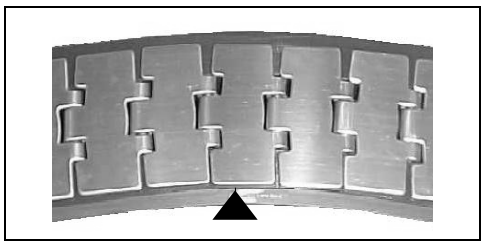
- ✓ Chain is elongated more then 3%, see below



- ✓ The thickness of the topplate of the slatband chain is reduced to 2.0 mm
- ✓ The surface becomes unflat or very rough due to (uneven) wear, especially in applications where product handling is critical. Also replace if the side of the hinge of sideflexing chains wears away and exposes the pin.
- ✓ The chain jumps on the sprocket
- ✓ It is also important to look at the position of the chain in the productionline. Chains that run on a pressureless inliner, have to be replaced all at once. If only one chain is replaced there will be a chance of unacceptable height differences, which could result in products topping over

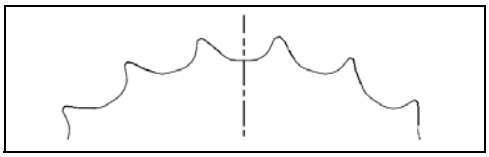
Magnetflex® replacement

- ✓ Replacement is recommended if uneven wear patterns, and unacceptable wear of the track are found. The chain can easily be lifted out of the curve for inspection.
- ✓ The chain reaches the inside of the curve, see picture. In multiple track curves, check if the wearrate is similar in all tracks. It is also important that the wear of the curve groove still shows a straight angle of 90º with the horizontal surface



Sprocket & idler replacement

- ✓ The teeth show a hookshape, which obstructs the chain. Also replace sprockets when teeth are damaged or when chain jumps on the sprocket.

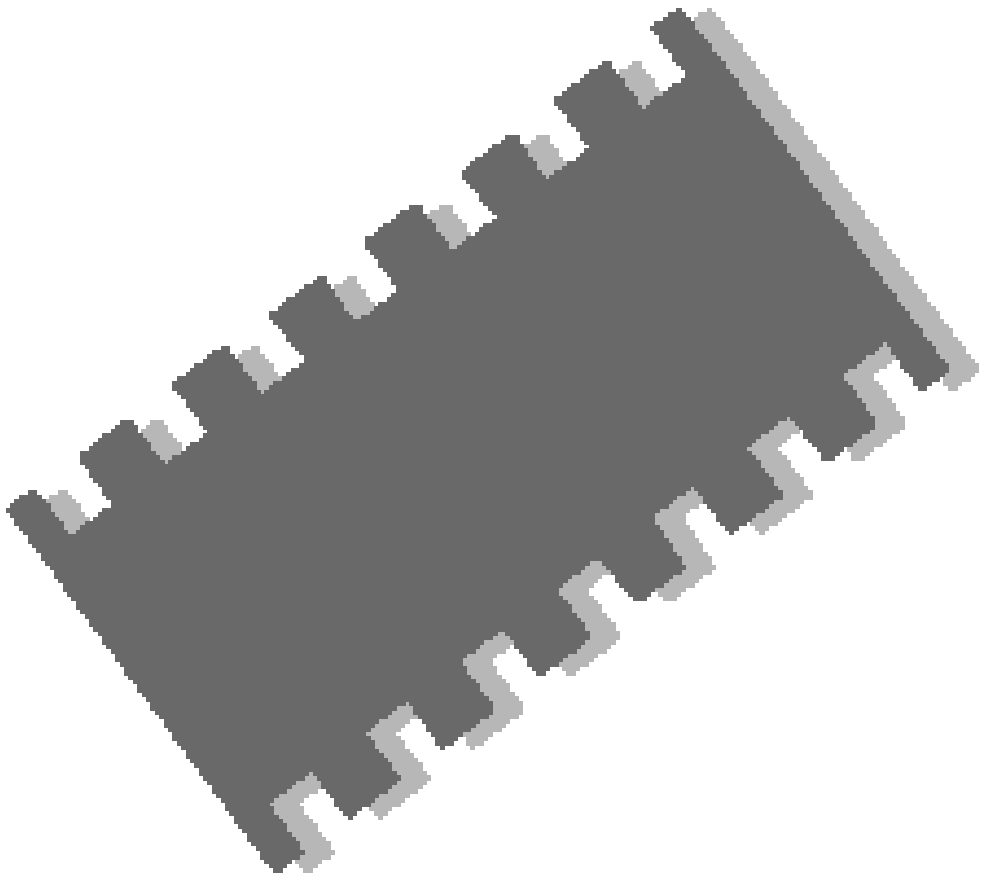


- ✓ The idler is oscillating on the shaft, because of a worn bore
- ✓ If chain is replaced due to elongation, always install new sprockets!

Wearstrip replacement

- ✓ When chains are replaced always replace the wearstrips.
- ✓ Dirt or debris is embedded in the wearstrip material in unacceptable amounts

MCC Modular Belts Engineering

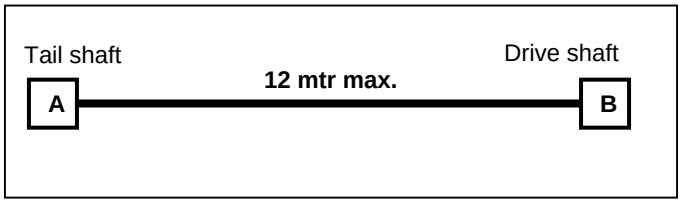


Conveyor Design

Straight running configuration

The length of a conveyor is not unlimited. There is a certain maximum length for each application. The limits are depending on factors like chain- or belt type, lubrication, kind of product, load. The exact maximum conveyor lenth can be calculated with the readily available calculation programme.

Generally for straight running conveyors we recommended a Max. tracklength of 12 mtrs.

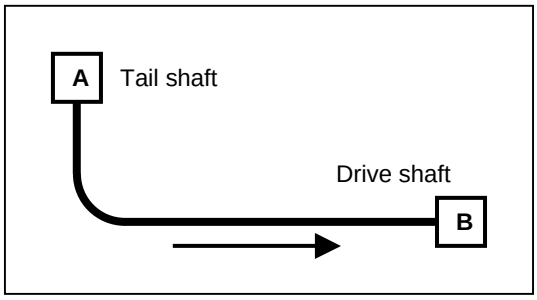


Shorter conveyors are built to obtain lower backline pressure by means of better control facilities. The chainspeeds can be controlled using frequency controlled drives. When for instance one conveyor runs full, the chainspeed of the preceding conveyor can then slowly be decreased. Pasteurisers, warmers and coolers can require longer tracklengths.

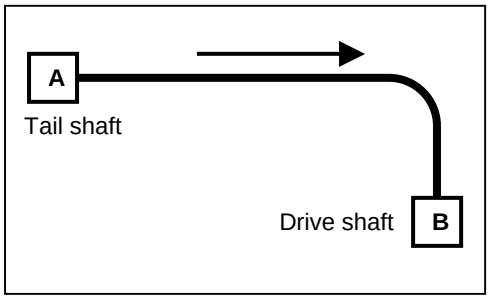
Side flexing configuration

When planning a side-flexing conveyor layout, the designer must consider the following factors that affect chain life:

- ✓ Minimize the number of corners whenever possible
- ✓ When conveying from point A to point B, design the conveyors so that the drive is positioned furthest from the last corner (see drawing), resulting in lower chain tension and maximizing chain life



Preferred



Avoid

Maximum chain speed modular belts

Chain material and type	Maximum speed (m/min)		
	Dry	water	Water & soap
XLG	80	100	180
AS	60	N/A	N/A
XP & NP	30	40	80
LBP	60	60	60
Supergrlp	60	60	60
RBP flexbelts	40) [1]	40) [1]	40) [1]

*) PV-Limit

Maximum speed values depend on the PV-value of the curve, which represents a combination of pressure and velocity with a specific limit.

Abrasive conditions or exceeding the speed, results in increased wear, and a decrease in working load.

Slip stick/pulsating effects

Inclining / declining conveyor configuation

Max. possible angle

Conveyor Design

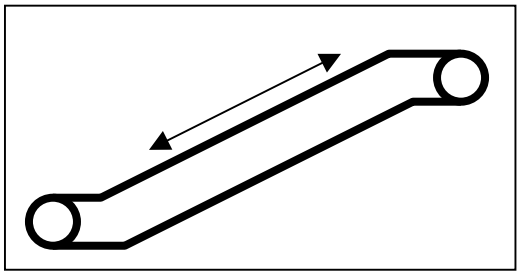
Slip stick / Pulsating effects

Slip-stick is caused by the difference between static friction and dynamic friction. Slip-stick effects can cause a pulsating chain operation.

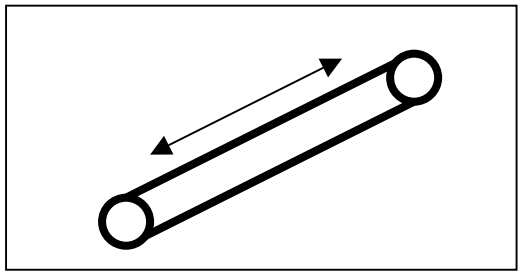
We have the experience that with long, low speed conveyors, the chance of a pulsating operation increases.

Inclining / declining conveyor configuation

Slatband chains can be used on in- or declined conveyors which are basically constructed in the same way as level conveyors. Main concern is to avoid that the products slide down or tip. Conveyors can be constructed with a level in/outfeed section, see below.



✓ **Level in/outfeed**



✓ **No in/oufeed**

In case the inclined/declined conveyor is equipped with a Magnetflex curve, we recommend a minimum level section of 1 mtr. This eliminates the chance the chain is lifted out of the curve.

Max. possible angle

The maximum possible angle is depending on several factors: Coefficient of friction between chain and product; acceleration/deceleration; product stability and external factors like durt or debris. Below a general table is shown with maximum angles determined by belt friction.

Maximum angles inclines / declines		
Chaintype	**Lubricated**	**Dry running**
Plastic modular belts	2.5º	4.5º
Rubbertop belts	9º	20º
Variations can vary due to actual circumstances.		

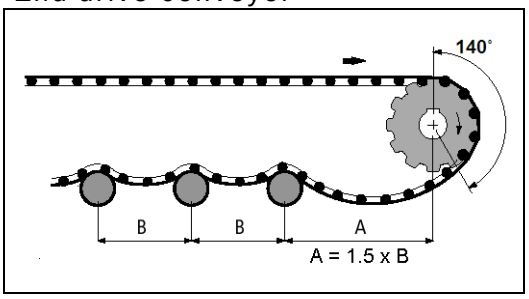
Conveyor Design

Uni-directional conveyors
End-drive conveyor
End-drive conveyor & snub roller
Uni-directional centre-drive conveyor
Bi-directional conveyors with end drive (low load)
Bi-directional conveyors with end drive (high load)

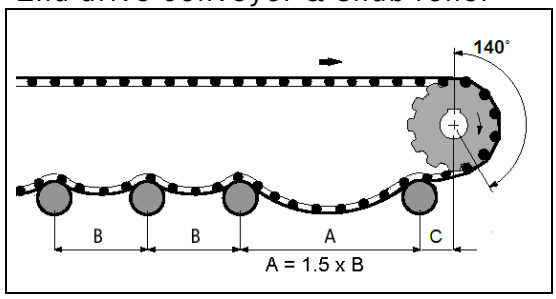
Uni-directional conveyors

These conveyors have the drivemotor and sprocket at the end of the conveyor.

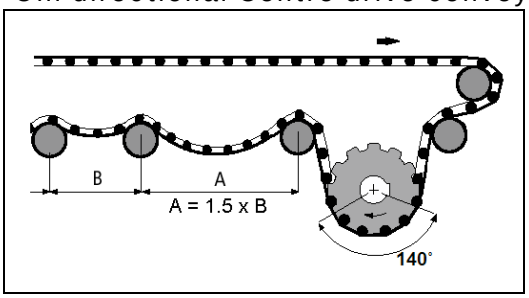
End-drive conveyor



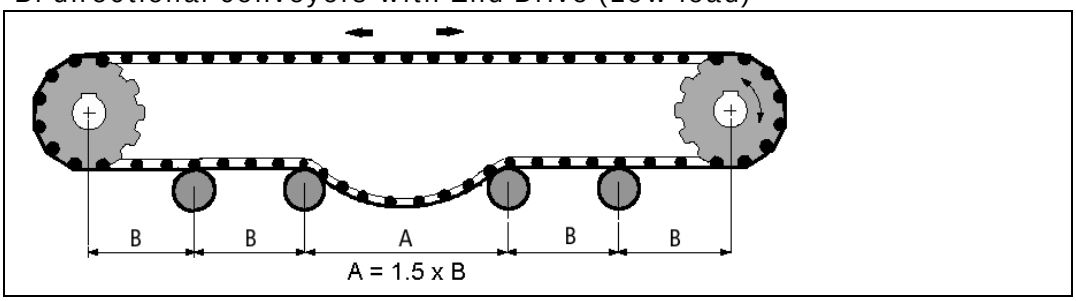
End-drive conveyor & snub roller



Uni directional Centre-drive conveyor

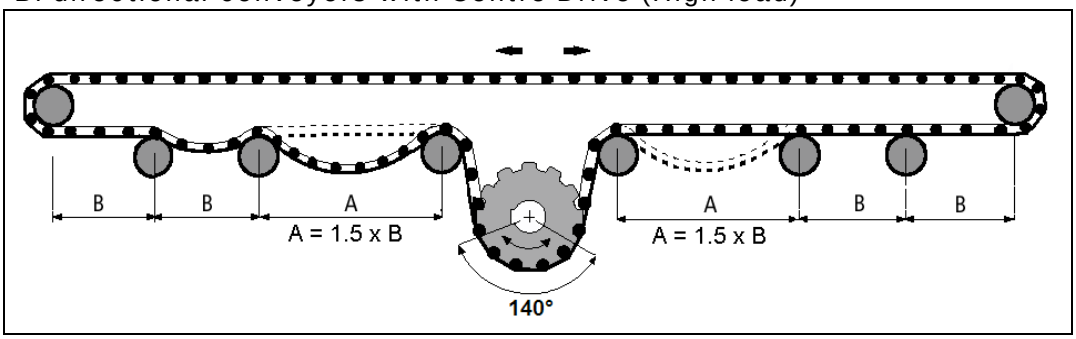


Bi-directional conveyors with End Drive (Low load)



These conveyors have the drivemotor and sprocket at the end of the conveyor

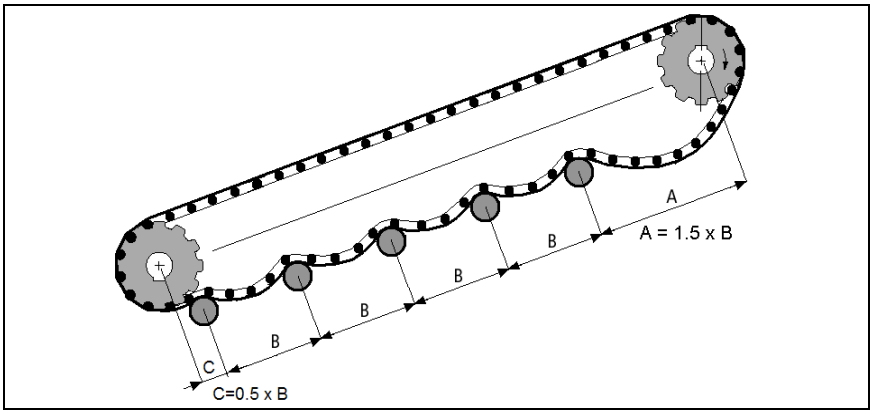
Bi-directional conveyors with Centre Drive (High load)



These conveyors can have a small end roller to reduce the transfer area

Conveyor Design

Drive construction inclines



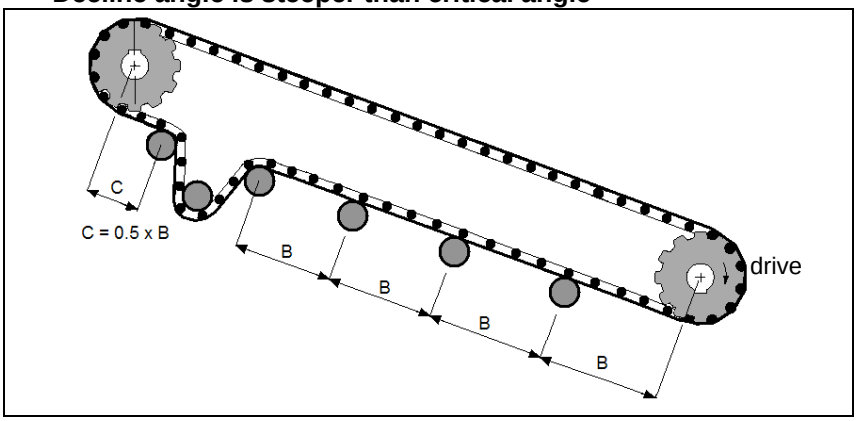
Drive construction declines

Declined conveyors have the drive at the upper- or at the lower side of the conveyer. This position depends on the friction between the chain/belt and the upperpart, and also on the preferred angle of the decline. See explanation below to determine where the position of the drive should be.

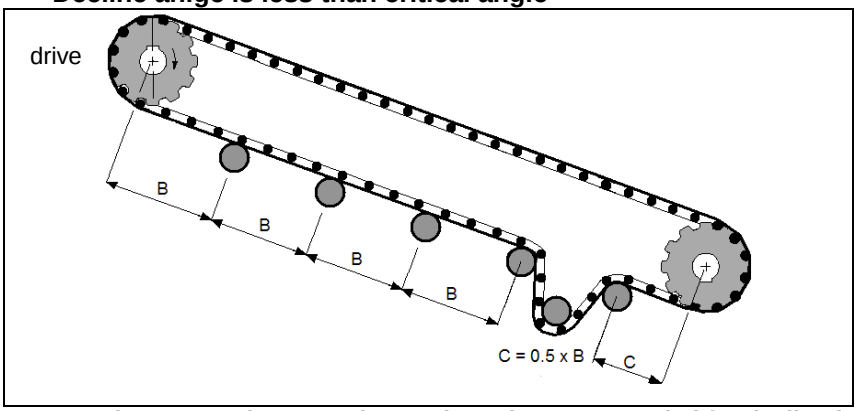
Calculate the critical angle (∠ critical) with:

Tan (∠critical) = Friction between chain - wearstrips

✓ **Decline angle is steeper than critical angle**



✓ **Decline anlge is less than critical angle**



Note: Please note that a gravity tensioner is recommended for declined conveyors

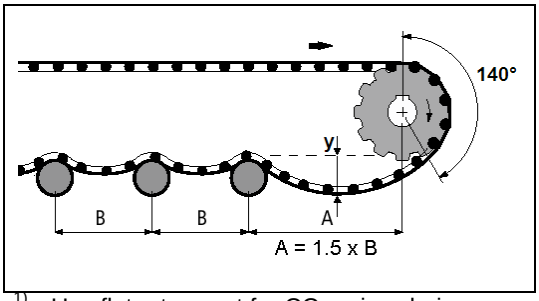
Conveyor Design

Wrap around angle

Recommended wrap angle on sprockets is: **140º +/- 10º.**
When the wrap angle is too small, the sprocket will not be able to transfer the load to the chain anymore causing the chain/belt to jump on the sprockets. When the wrap angle is too big, the chain/belt can stick to the sprocket.

Catenary sag

It is recommended to create a catenary sag just behind the sprocket which provides a complete discharge of the chainload.

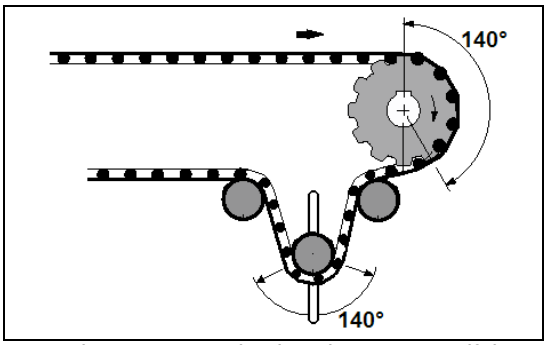


type	A (mm)	B (mm)	Vertical sag Y(mm)
500-series	700	500	50-125
505-series	700	500	50-125
1500-series	900	600	50-125
1000-series	700	500	50-125
1005-series	700	500	50-125
1255-series	600	500	50-125
2000-series	1250	750	100-200

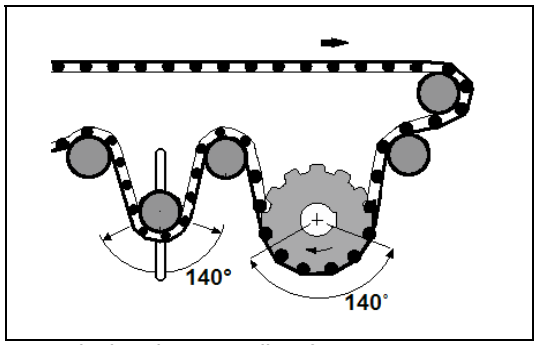
1) Use flat returnpart for CC-series chains
2) Use guide shoes or flat return for LBP chains
For 2500-series see Engineering manual Pasteurisers / warmers / coolers

The right vertical catenary sag can usually be obtained automatically by just pulling both ends together and mounting them together. Only for large 2000- and 2500-series belts tensioners have to be used during installation. The catenary sag will increase due to elevated temperatures. Furthermore, the chain or belt can elongate due to strain and wear of the pins and hinge eyes. Therefore it is important to check and adjust the catenary regularly.

End drive with tensioner



Centre drive with tensioner

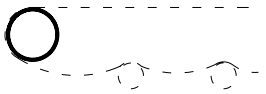
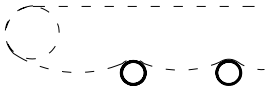


A tensioner construction is only necessary if the conveyor design does not allow for a proper catenary sag due to lack of space. A tensioner can also be used with declined conveyors, but in all other cases it is not recommend to tension the chain/belt.

NOTE: The tensioner roller/sprocket can be fixed on an arm or move up and down in slots in the conveyor sideplates.

Conveyor Design

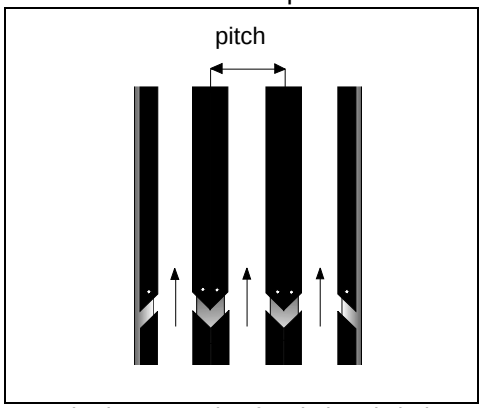
Roller diameter for slatband chains

Belttype	500-series	505-series	1500-series	1000-series	1005-series	1255-series	2000-series	2500-series
	All dimensions in mm							
Idler rollers 	>25	>30	>19	>50	>50	>60	> 100	>150
Return rollers 	30-100	60-100	60-100	60-100	60-100	60-100	60-120	70-120
Backflex rollers 	>30	> 30	>40	>60 RR >100	> 60	> 80	>100 RR >120	N/A

The recommended roller diameters in the table are an indication. The width of the conveyor is not taken into account. The diameter of the shaft should be large enough to avoid excessive deflection of the roller. At the same time it is recommended not to exceed the maximum diameter, because the roller friction may be too heavy to be set in motion by the belt.

Wearstrip spacing belts

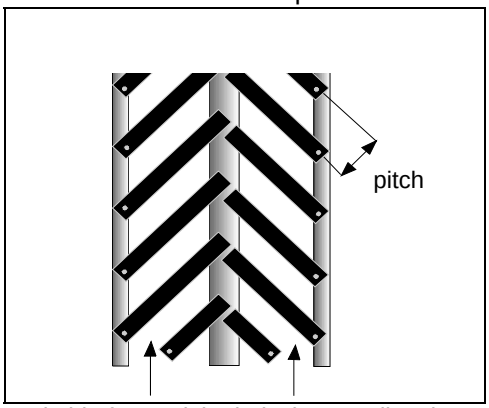
Parallel wearstrips



Standard construction for slatband chains and modular (Positrack) belts.

Recommended for bi-directional conveyors (wearstrips should be chamfered at both sides) and for belts with Positrack guiding.

Chevron wearstrips

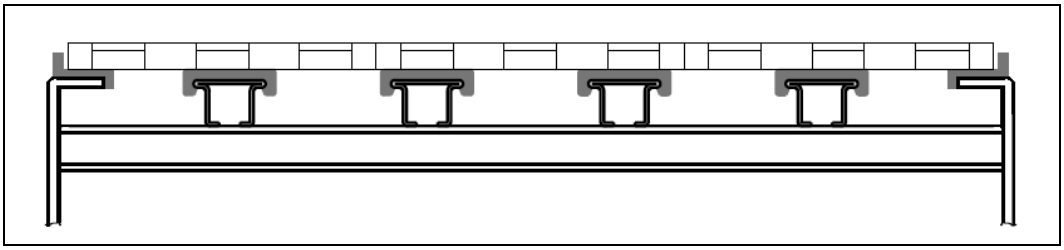


Suitable for modular belts but not directly suitable for belts with Positrack. An extra parallel guiding strip makes Positrack possible.

Best construction regarding even belt wear.

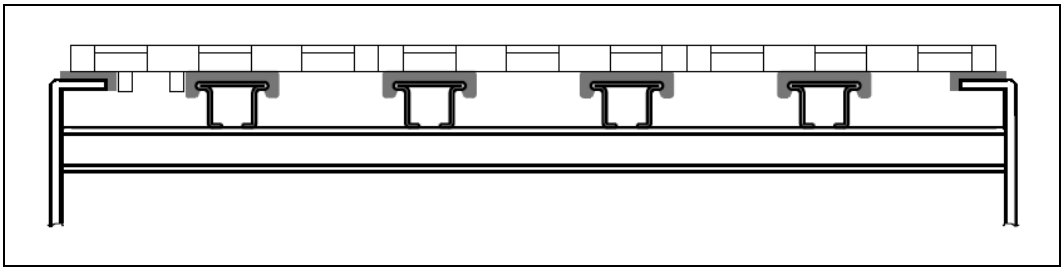
Conveyor Design

Belts without Positrack



Belts without Positrack should be guided at the side of the belt. Make sure there is sufficient clearance for thermal expansion.

Positrack belts



Belts equipped with Positrack lugs should be guided at these lugs only.

Belt return

Modular belts can be returned on rollers, guideshoes or serpentine wearstrips, as shown below.

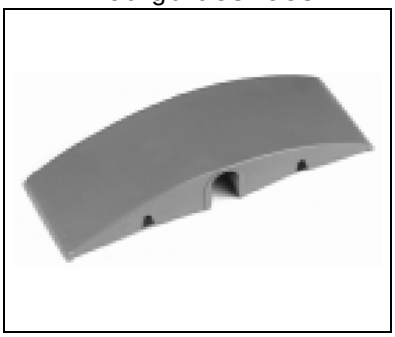
✓ Rotating rollers

- ✓ Reduced wear
- ✓ Simple construction.
- ✓ Good accessibility

- ✓ Only point contact between chain/ belt and roller. - small rollers may cause a rattling sound.

Rollers should rotate freely therefore, rollers with rubber cover are recommended.

✓ Fixed guideshoes



- ✓ Good accessibility
- ✓ Simple construction.
- ✓ Suitable for LBP chains/belts.

- ✓ Risk of uneven wear chainsurface
- ✓ Only point contact between chain and guide shoe.
- ✓ High friction

Minimum guide shoe radius is 200 mm.

Conveyor Design

Wearstrip materials

Metal wearstrips

Metal wearstrips can be used in most situations using plastic belts and are strongly recommended in abrasive environments.

Stainless steel:

- Recommended for abrasive conditions due to avoiding of dirt embedding in the wearstrips;
- Recommended for plastic chains/belts in dry environments with speeds > 60m/min;
- Cold rolled stainless steel with a hardness of at least 25 Rc and a surface finish of maximum 1.6 µm is recommended;
- Best results can be achieved by using stainless steel AISI 431 (Werkstoff-Nr. 1.4057 material;
- AISI 304 (Werkstoff-Nr. 1.4301) is not recommended as wearstrip material.

Plastic wearstrips

Friction is low compared to steel wearstrips. Two types of plastic are suitable to be used as a wearstrip material.

UHMWPE:

- Most common used wearstrip material with extreme low friction;
- Excellent resistance against many chemicals;
- Virtually no moisture absorption, therefore very suitable for lubricated lines;
- Good dimension stability;
- Reduces some of the noise conveyors produce;
- Suitable for dry running conveyors with speeds up to 60 m/min;
- Extruded quality 1000 grade UHMWPE is recommended.

Polyamide:

- Relatively high moisture absorption which makes the material expand;
- Polyamide is also used with additives to reduce the coefficient of friction;
- Suitable for dry running high speed conveyors.

Recommended wearstrip materials

Wearstrip material	Plastic modular belts	
	Dry	Lubr.
UHMWPE	+	+
Polyamide	+/-	-
Stainless steel	+	+

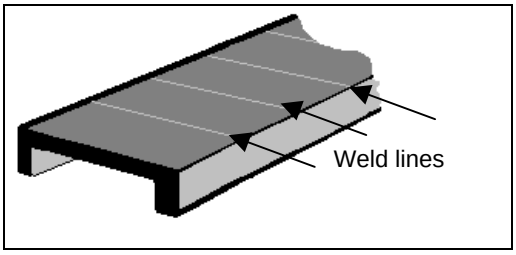
+	Recommended
+/-	Satisfactory
-	Not recommended
1)	Up to 60 m/min in non abrasive conditions
2)	Only in non abrasive conditions

UHMWPE Wearstrip Installation

RAM-extruded wearstrips

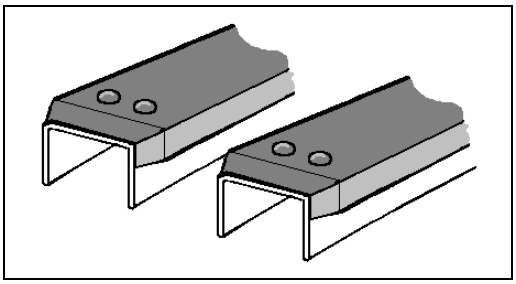
We recommend to use RAM-extruded wearstrips. Main benefits of RAM-extruded UHMWPE wearstrips is that less debris will embed in the material in comparison to worm extruded or machined UHWMPE. This will results in less beltwear.

Ram-extruded wearstrips can be recognized by weld lines which occur with each ram stroke, see drawing.



Chamfering of wearstrips

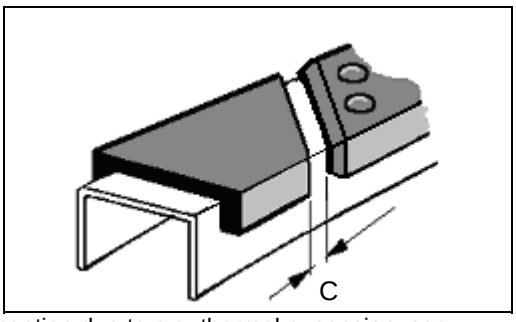
Wearstrips should always be chamfered at the beginning of the strip where they are fixed. Chamfering reduces the risk of chain-obstruction resulting in a smooth operation.The wearstrips should be chamfered at the sides and at the top.



Splitting the wearstrips

On straight sections with a length of more than 3 metres, or for high (40º - 70ºC) application temperatures, we recommend to divide the wearstrip into several sections, because of the thermal expansion of the strips.

It is recommended to cut the wearstrips at 45º angles to provides smooth chain/ belt transfers. Make sure only the infeed side of the wearstrip is fixed to the conveyor frame to avoid bulging of the wearstrips.



The size of clearance depends on the expected elongation due to e.g. thermal expansion, see drawing.

Calculation example

For MCC 1000 UHMWPE material the expansion coefficient is 0.2 mm/m/ºC. A temperature increase of 20ºC would elongate a 3 meter wearstrip with:

20ºC * 3mtr * 0.2=12 mm

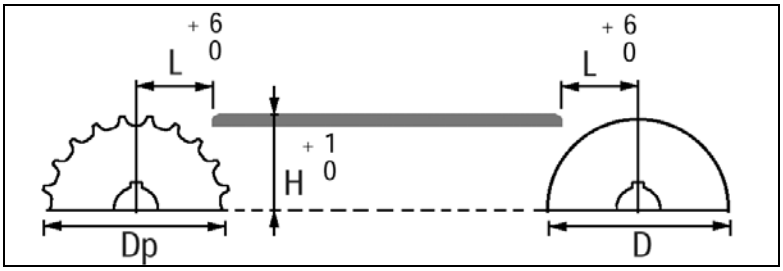
In this case, the gap between the wearstrips should be a bit larger than 12 mm.

We recommend a maximum wearstrip length of 6mtr. with UHWMPE wearstrips.

Conveyor Design

Position sprocket - wearstrips

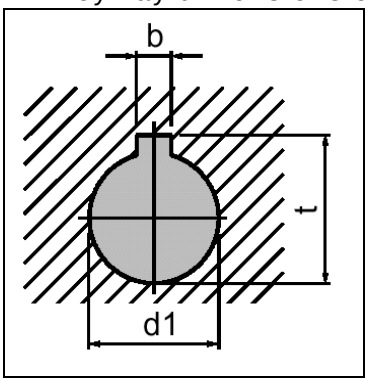
When the chain enters the sprocket, it tends to raise and fall slightly (chordal action). For this reason the sprockets should be mounted in such a way that its highest point is no higher than the top of the wearstrips. The front edges of the wearstrips should be bevelled to allow smooth and free running of the chain. The distance from the end of the wearstrip to the sprocket shaft centerline should equal dimension L, otherwise the wearstrip will interfere with the free articulation of the chain as it enters the sprockets.



Belt type	Drive sprocket H (mm)	L mm
500-series	$\frac{Dp}{2}$ -4.35	12.7
505-series	$\frac{Dp}{2}$ -6.35	12.7
1500-series	$\frac{Dp}{2}$ -4.95	15
1000-series	$\frac{Dp}{2}$ -4.35	25.4
1005-series	$\frac{Dp}{2}$ -6.35	25.4
1255-series	$\frac{Dp}{2}$ -6.35	32.0
2000-series	$\frac{Dp}{2}$ -8.0	50.8
2500-series	$\frac{Dp}{2}$ -11.3	63.5
1050-chainbelt	$\frac{Dp}{2}$ +3.5	25.4
1055-chainbelt	$\frac{Dp}{2}$ +3.4	25.4

Idler roller H (mm)	L mm
$\frac{Dp}{2}$	12.7
$\frac{Dp}{2}$	12.7
$\frac{Dp}{2}$	15
$\frac{Dp}{2}$	25.4
$\frac{Dp}{2}$	25.4
$\frac{Dp}{2}$	32.0
$\frac{Dp}{2}$	50.8
$\frac{Dp}{2}$	63.5
$\frac{Dp}{2}$	25.4
$\frac{Dp}{2}$	25.4

Keyway dimensions of MCC sprockets



d1 (mm)	b (mm)	t (mm)
25mm	8	28.3
30mm	8	33.3
35mm	10	38.3
40mm	12	43.3
45mm	14	48.8
50mm	14	53.8
60mm	18	64.4

d1 (inch)	b (inch)	t (inch)
1"	1/4	1 1/8
1 1/4"	1/4	1 3/8
1 1/2"	3/8	1 9/16
1 3/4"	3/8	1 15/16
2"	1/2	2 1/4

MCC Modular Belts Engineering

Round shafts

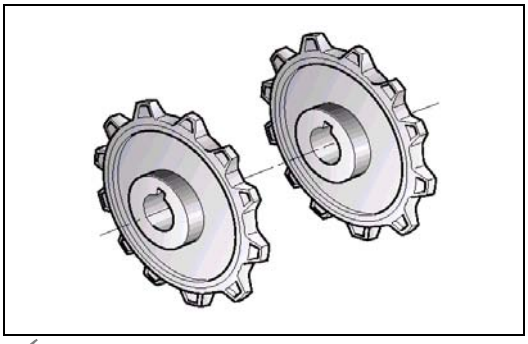
Square shafts

Shafts

Shaft tolerances

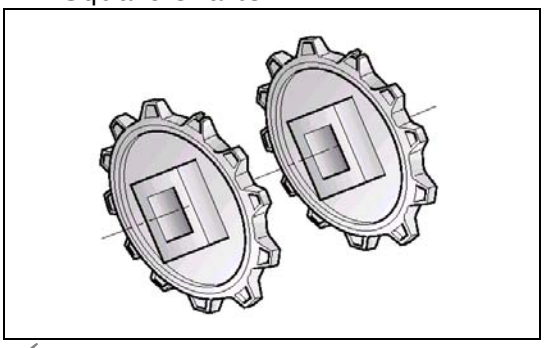
Belts with Positrack

Round shafts



- ✓ More readily available
- ✓ Usually straighter than square shafts
- ✓ Easier to install
- ✓ Shafts are ready to accommodate bearings

Square shafts



- ✓ More rigid than round shafts of the same size (less torsion & deflection).
- ✓ No keyway preparation is required
- ✓ Larger drive surface results in a better load transfer

Shafts

In all situations stainless steel is recommended for shaft material. Metaloxydes that come from a rusty shaft are extremely abrasive and would therefore reduce the wearlife of the conveyor components. It is also important to use shafts with a sufficient hardness and a smooth surface. The shaft diameter depends on the conveyor load and its width.

NOTE: Maximum deflection of the shaft must not exceed 2 mm. Depending on the load and shaftlength, it can be necessary to use a larger diameter shaft or an extra bearing in the middle of the shaft to reduce the shaft deflection.

Shaft tolerances

It is important that the tolerance of the shaft meets the specifications of the sprocket, so the sprocket can slide over the shaft at all times. In combination with all MCC sprockets the following shaft specifications are required, depending on the shaft diameter.

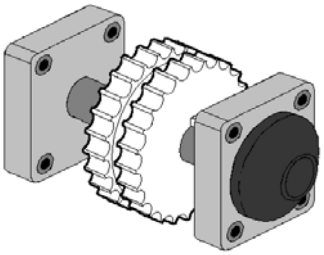
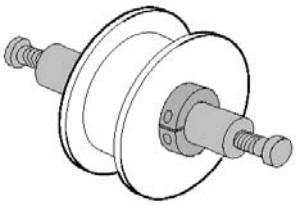
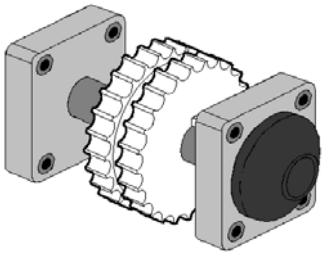
Dimension (mm)	Shaft tolerance (mm)	Idler shaft surface finish (µm)
Round shaft		
< Ø 90	max h 9 (ISO)	0.8
> Ø 90	max h 11 (ISO)	1.2
Square shafts		
40 x 40	+ 0 / - 0.16	0.8
90 x 90	+ 0 / - 0.5	1.6
120 x 120	+ 0 / - 0.5	1.6

Belts with Positrack

If belts with Positrack® lugs are used, are sprockets should be able to move sideways on the shaft. If belts without Positrack are used, the centre sprockets should be fixed.

Conveyor Design

Bearings

Drive sprocket	Idler	
	Sprocket or drum	sprocket
		
Shaft with keyway equipped with bearings	Fixed idler shaft without keyway. The idler drum rotates freely on the shaft. Suitable for lower speed < 30mtr/min dry run < 60mtr/min lubricated	Idler shaft with keyway equipped with bearings for higher conveyor speed. In poluted area's an idler shaft with bearings is also recommended

Before selecting bearings, check which chemicals will be present. Also check if dust and water are present. Sealed bearings have a better protection against dust. Also use bearings with high mechanical and heat resistance for a longer wearlife of the construction.

Make sure the edges of the shaft are rounded off to ease assembly and to avoid damage to the rubber parts of the bearing sealing units.

Fixing all sprockets

When the speed of all idler sprockets on the shaft is the same, e.g. on a wide belt conveyor, we recommend to fix all idlers on a shaft with bearings. This way there is no difference in velocity between the shaft and the sprockets and no wear of the idlers will occur.

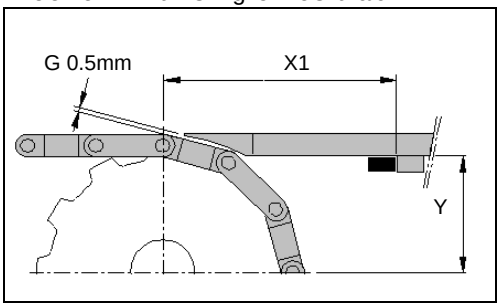
Fix sprocket with lowest speed

When the speed of the idler sprockets on the same shaft is different, we recommend fixing the sprocket with the lowest speed to the shaft. This way the relative speed difference which occurs between the shaft and the other idler sprockets is as low as possible and the fixed idlers will not drive the slower moving idlers.

Freeflow transfers

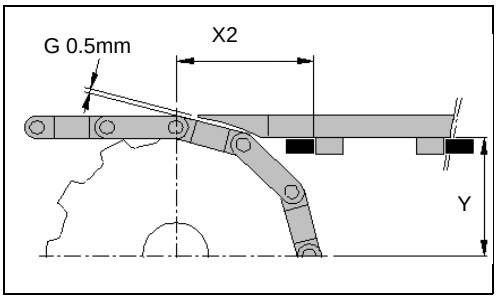
Freeflow is a system of integrated, tapered flights at the edge of the belt which allows for smooth 90º transfers without deadplates resulting in a self clearing construction. The MCC Free Flow system is always equipped with the MCC Positrack system which ensures an optimum tracking of the belt at the 90º Freeflow transfer.

Freeflow with single Positrack



From:	To:	Z teeth	X1 [mm]	Y [mm]
FFGP 1000	FG(P) 500	16	90.6	27.9
		28	92.1	52.6
FFTP 1000 FFGP 1000	FT(P) 1000 FG(P) 1000	12	91.5	44.3
		18	93.5	67.9
		20	95.0	75.6

Freeflow with double Positrack

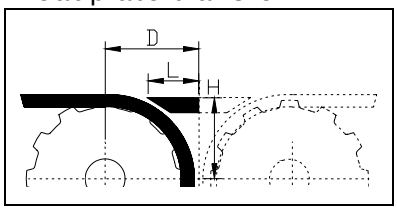


From:	To:	Z teeth	X2 [mm]	Y [mm]
FFGP 1000	FG(P) 500	16	58.5	27.9
		28	60.0	52.6
FFTP 1000 FFGP 1000	FT(P) 1000 FG(P) 1000	12	59.0	44.3
		18	61.5	67.9
		20	63.0	75.6
FFTP 1005	FT(P) 1000	12	75.4	40.7
		18	77.7	64.8
		20	78.5	72.8
FFTP 1005	FT(P) 1005	13	76.0	46.7
		18	77.9	66.8
		21	79.0	78.9

In order to be able to adjust dimensions X and G, we recommend making the returnshaft adjustable in X- and Y- direction within a range of some millimetres.

Conveyor Design

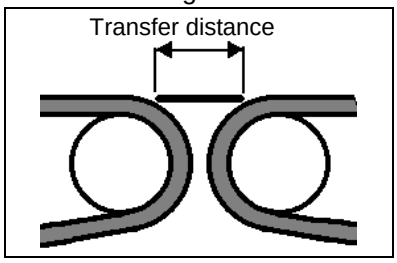
Deadplate transfer



Mass handling an pack handling conveyors with head to tail transfers use less floorspace then side transfers. A disadvantage is that the deadplates may cause products to stop. Minimum widths of deadplates can be calculated with the data below.

Chain/ Belt type	Roller/ Sprocket	L	D	H
500-series	25 mm	11.0	23.5	21.1
	16 teeth	21.5	38.5	35.0
505-series flexbelt	30 mm	16.5	30.1	27.5
	28 teeth	38.0	65.0	60.0
1500-series	19mm nosebar	9.6	20.2	17.7
	7 teeth	9.6	22.2	20.9
1000-series	50 mm	19.5	38.0	33.5
	12 teeth	33.5	57.0	52.5
1000-series Super Grip	50 mm	23.7	41.5	38.2
	12 teeth	33.5	57.0	52.5
1005-series XLG	50 mm	24	44.0	37.5
	13 teeth	44.3	64.5	57.9
1005-series LBP	50 mm	36.7	55.8	52.5
	13 teeth	58.9	77.5	72.3
1005-series Super Grip	50 mm	24	44.0	40.0
	13 teeth	44	64.5	60.4
1255-series Flexbelt	60 mm	34	47.6	42.5
	8 teeth	36.5	49.4	47.8

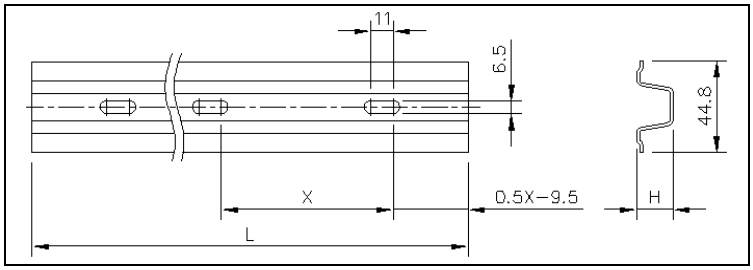
Self clearing transfer



We experienced that a deadplate length of less then 0.6 * product base diameter will result in a continuous flow of products.

Fingerplate transfers

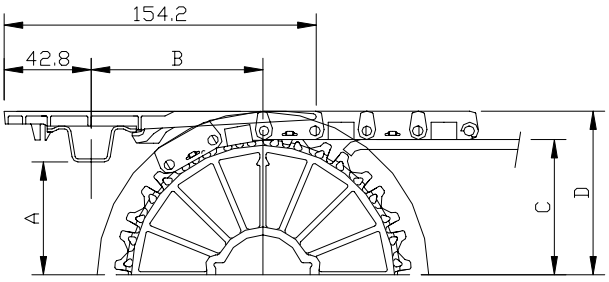
Fingerplate transfers ensure a trouble-free transfer of products from and to the raised rib belts. Rexnord has developed a unique Click-Comb system, which makes it possible to click the combs onto a special Omega style bar, providing a smooth product transfer. RR 1000-series and RR-2000 series Finger combs are clicked onto a special profile. This way, it is easy to install and remove the fingerplates and system can expand and move freely. The profile is mounted on a base profile with M6 screws.



1000-series	2000-series
X = 85.0mm	X = 76.2mm
H = 18mm	H = 15mm

The length of the profile must be somewhat longer than the nominal width of the belt to accommodate expansion and the movement of the combs.

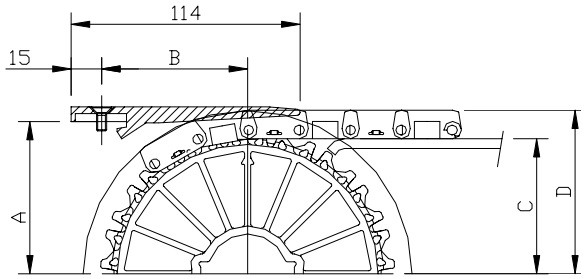
Finger transfer RR 1000-series



Nr. of teeth	Dp	A	B	D
12	98.1	33.2	75	44.3
16	130.2	76.6	80	60.6
18	146.3	56.8	85	67.9
20	162.4	64.5	90	75.6

Fingerplate transfer for 1000-series belts are available in two widths (85 or 170 mm). For 1000-series belts in Anti Static material, the Fingerplates are also available in AS material.

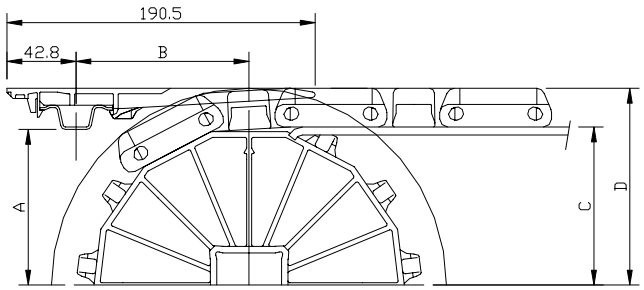
Finger transfer RR 1000-series narrow



Nr. of teeth	Dp	A	B	D
12	98.1	51.5	80	44.3
16	130.2	76.6	80	60.6
18	146.3	75.7	80	67.9
20	162.4	83.7	80	75.6

Please note that the finger transfers are screw-on type.

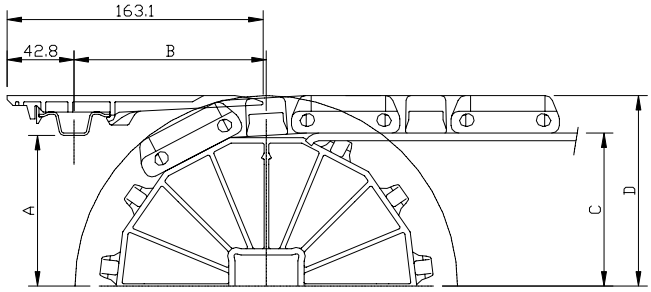
Finger transfer RR 2000-series in general conditions



Nr. of teeth	Dp	A	B	D
10	164.4	72.3	110	73.7
12	196.4	88.4	114	89.8
13	212.2	96.5	116	97.9
16	260.4	120.6	122	122.0

For RR 2000-series belt, a 190 mm long fingerplate is used in general applications.

Finger transfer RR 2000-series for glass applications



Nr. of teeth	Dp	A	B	D
10	164.4	72.3	122.3	73.7
12	196.4	88.4	122.3	89.8
13	212.2	96.5	122.3	97.9
16	260.4	120.6	122.3	122.0

For glass handling applications, this special fingerplate features shorter and wider fingers.

For the 1000/2000-series fingerplates, a minimum gap of 2 mm next to the fingertransfer plates is recommended. This gap is necessary for easy removal of the fingerplates for replacement.

Installtion of modular belts

500-series

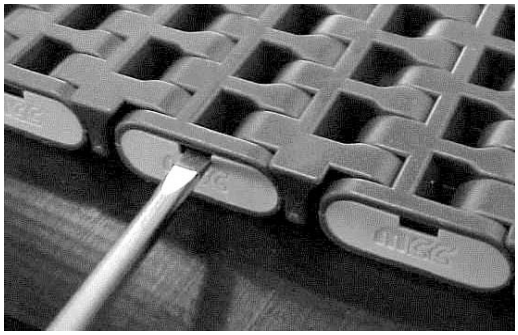
505-series

1000-series

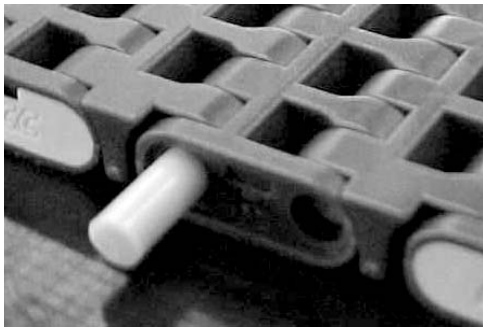
Conveyor Design

Installation of modular belts

500-series



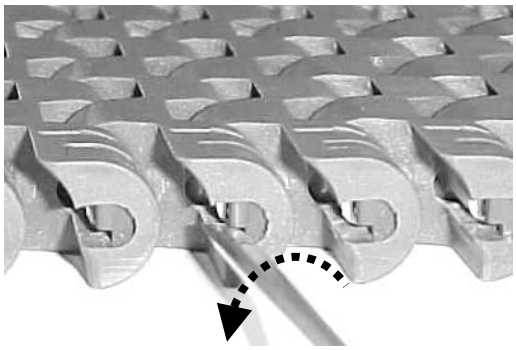
Place screwdriver in rectangular hole.



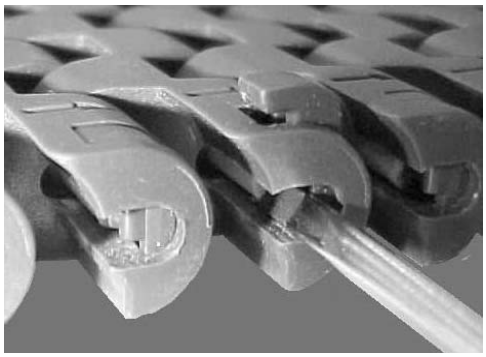
Push screwdriver to remove the clip.

Note: 500-series belt s have a specific running direction, indicated by the arrow at the bottom.

505-series



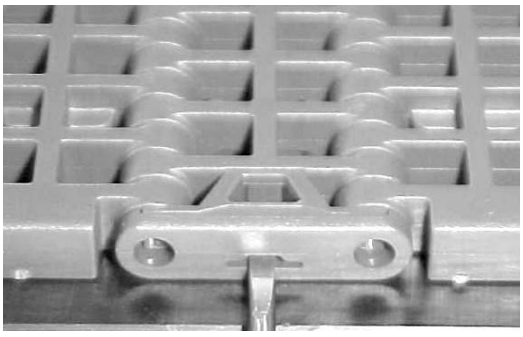
Turn screwdriver counter clockwise to remove clip.



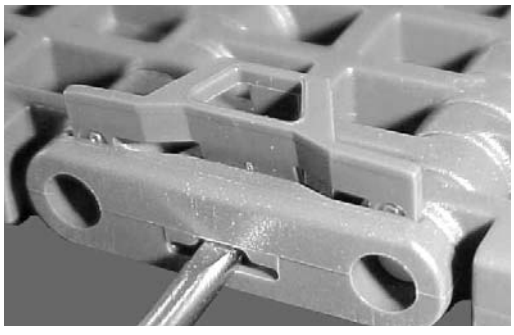
Place screwdriver between clip and belt end.

Please note that 505-series belt s have a specific running direction, indicated by the arrow at the bottom.

1000-series



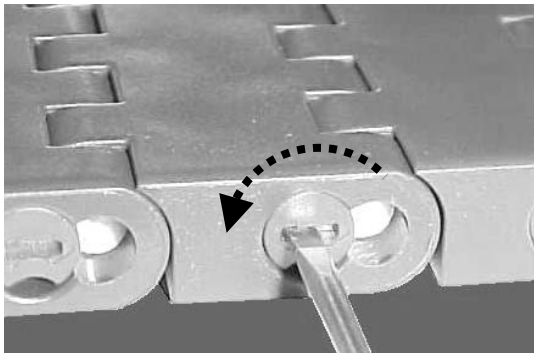
Place screwdriver in rectangular hole.



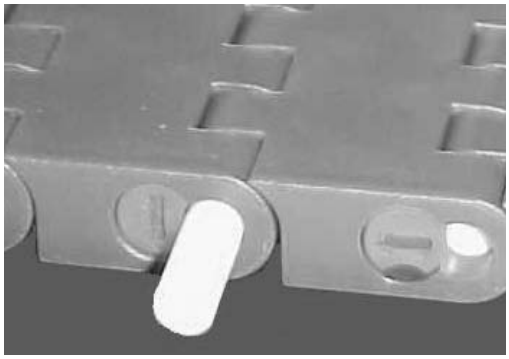
Remove open clip by pushing the screwdriver in.

Installation of modular belts

1005-series

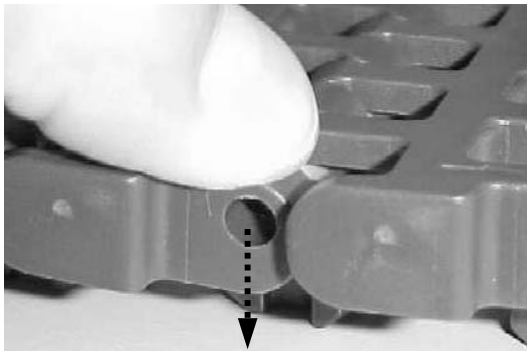


Place screwdriver in oblong hole of the clip.

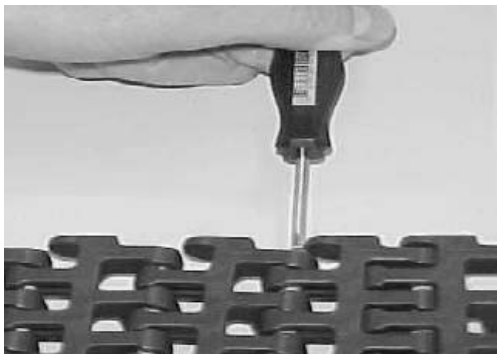


Turn clip counter clock wise to open it.

1255-series belt

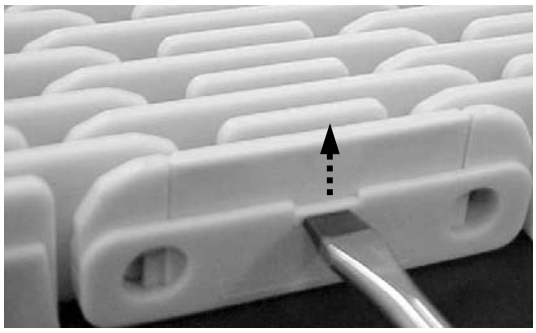


Lift belt out of tracks, and position belt on the lugs. Now, push one belt module downwards.

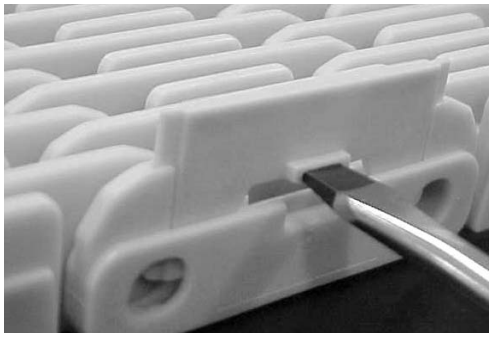


Place screwdriver in opposite end hole and push pin out.

2000-series belt



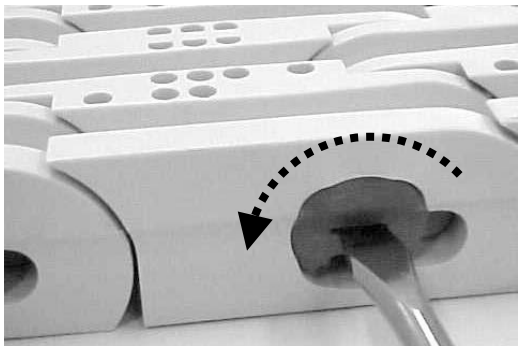
Place screwdriver in rectangular hole.



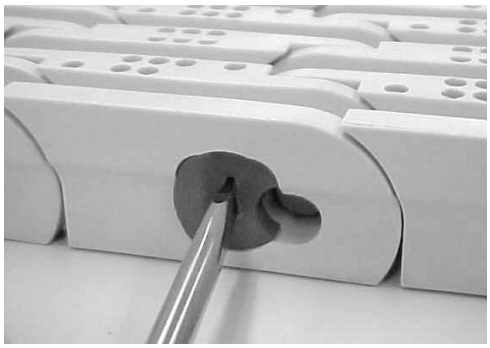
Remove open clip by pushing and turning screwdriver.

Conveyor Design

2500-series belts



Place screwdriver in the oblong hole of the round clip.



Turn clip counter clock wise to open it.

Inspection of modular belts

A good condition of the line can be maintained when people recognise signs of initial wear/ failure and react accordingly. Following aspects are of importance during regular check-up.

- ✓ Check the condition of the chain/ belt regularly, and replace links/ modules which are damaged. Important in this matter is to try to find the cause of the damaged links/ modules. Wear patterns or damage on a chain or belt can often lead you to a problem area elsewhere in the conveyor.
- ✓ Check the amount of catenary sag and remove links or modules when the catenary of the chains exceeds prescriptions. Remember catenary could be larger under load.
- ✓ Check if the returnrollers turn freely, repair or replace if not;
- ✓ Remove dirt and debris which is stuck in the grid of the belt or inbetween the chain/ belt and the conveyor construction.
- ✓ In case of lubrication check if the lubrication system operates properly.
- ✓ Check carryways and wear strips for excessive wear or peculiar wear patterns.
- ✓ Check positions of transfer plates and check the fingerplates for broken/ worn parts and repair or replace if necessary.

Note: **It is very important to replace damaged modules in plastic belts and links in plastic chains as soon as possible since small damage could lead to bigger damage if it is not repaired. If any damage is found such as pieces of plastic broken off, or a wear pattern at the side of the belt, the cause of the problem should be located.**

Cleaning instructions

To be able to keep production lines running at highest efficiency, cleaning is most important.

Cleaning should include the removal of grease, dirt, dust and bacteria from the chain/ belt and the components. Cleaning is importance because it gives the following results:

- ✓ Disinfecting results in a hygienic system
- ✓ Products will be cleaner when they are packed
- ✓ Reduction of friction between chains/belts and products results in less tipping products and less wear.
- ✓ Removal of abrasive particles for longer wear life and components.

Note: It is recommended always to flush the chain/ belts with plenty of water after having the chains/ belts cleaned, to remove the cleaning agent from the conveyor.

Cleaning dry running conveyors

With dry running conveyors there is no continuous cleaning like with lubricated conveying. All products (beer or lemonade) spilled on the chain/ belt will result in pollution of the containers, increasing the friction, and the risk of products toppling over.

Therefore dry running conveyors should be cleaned even more frequently than lubricated chains. How often depends very much on the circumstances, e.g. when sweet liquids are bottled and spilled, it might be necessary to clean every time the line stops for a few hours.

Cleaning plastic belts

Basically, cleaning of plastic belts is not different from cleaning plastic chains. Again, the chemical resistance of the materials against the cleaning agents must be checked beforehand.

Flat Top belts have to be cleaned from the top and underside. Flush Grid and Raised Rib belts can be cleaned very effectively, due to the open area. Water can be sprayed through the belt to clean it.

When wide belts are cleaned at a high temperature (e.g. in a pasteurizer), there must be enough space for expansion

Conveyor Design

Belt replacement

- Belts have to be replaced if the thickness of the belts is reduced unacceptably. In the table below guidelines are shown regarding replacement criteria.

Belt type	Max wear (mm)	
	Surface	Bottom
500-series	1 mm	1 mm
1500-series	1 mm	1 mm
505-series	1.5 mm	1.5 mm
1000-series	1 mm	1 mm
1005-series	1.5 mm	1.5 mm
1255-series	1.5 mm	1.5 mm
2000-series	2 mm	2 mm
2500-series	3 mm	3 mm

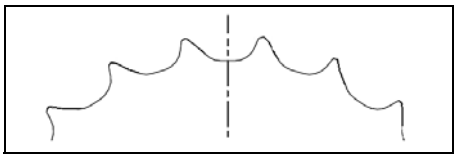
- In practice, the product handling will dictate whether the surface wear is acceptable or not. If wear at the top or bottom surface results in product tippage, replacement is eminent.

- 3% elongation of the pitch, is the ultimate elongation limit of belts. Further elongation causes the belt jumping on the sprockets under load.

Note: When replacing chains or belts always replace the wearstrips, the sprockets and idlers as well

Sprocket & idler replacement

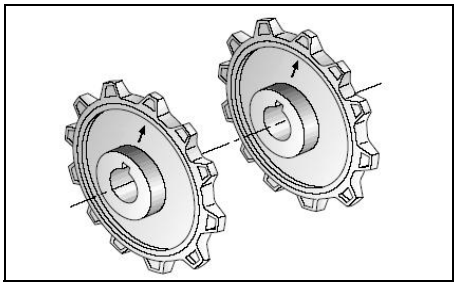
- The teeth show a hookshape, which obstructs the chain. Also replace sprockets when teeth are damaged or when chain jumps on the sprocket.



- The idler is oscillating on the shaft, because of a worn bore

- If belt is replaced due to elongation, always install new sprockets!

Note: When replacing sprockets on multiple track conveyors, make sure all sprockets are mounted in the same position on the shaft.

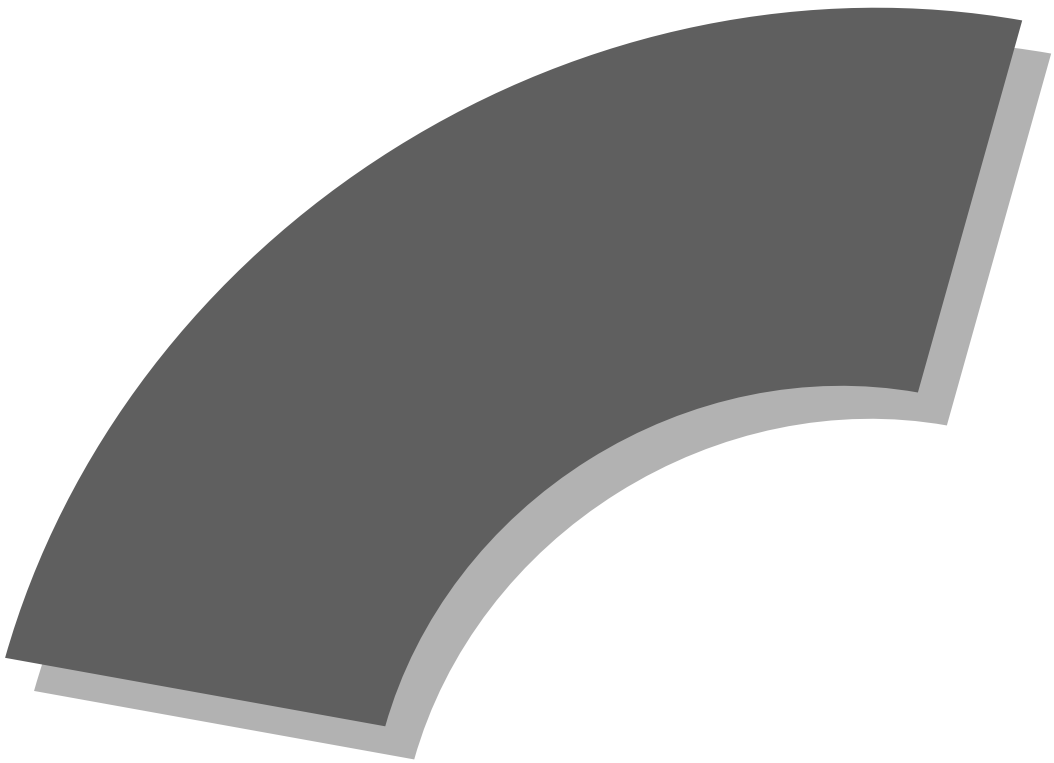


Wearstrip replacement

- When chains are replaced always replace the wearstrips.

- Dirt or debris is embedded in the wearstrip material in unacceptable amounts

MCC Sideflexing Belts Engineering



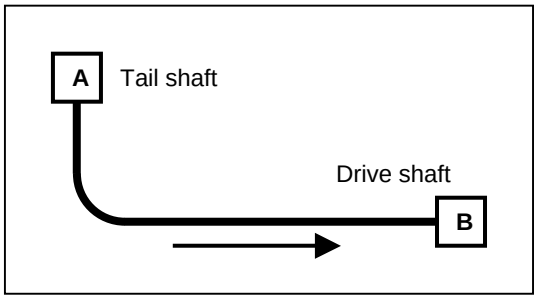
Sideflexing Belts

Basic design considerations

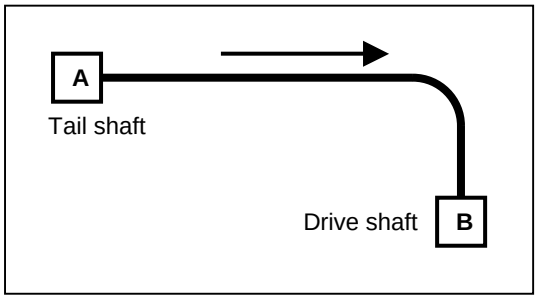
Side flexing configuration

When planning the side-flexing conveyor layout, the designer must consider the following factors that affect chain life:

- Minimize the number of corners in each conveyor whenever possible
- When conveying from point A to point B, design the conveyors so that the last curve is positioned furthest from the last drive (see drawing), resulting in lower chain tension and maximizing chain life



Preferred

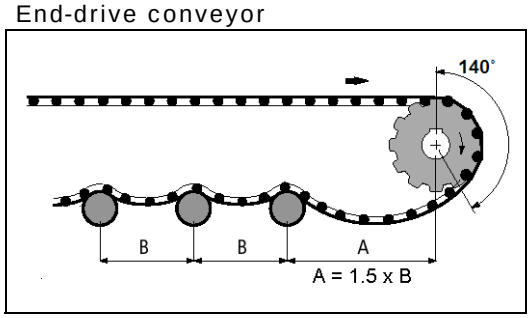


Avoid

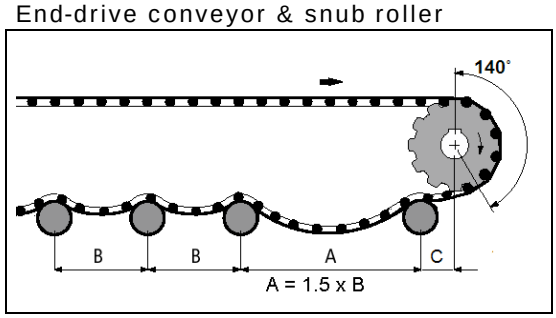
End drive construction

These conveyors have the drivemotor and sprocket at the end of the conveyor.

End-drive conveyor

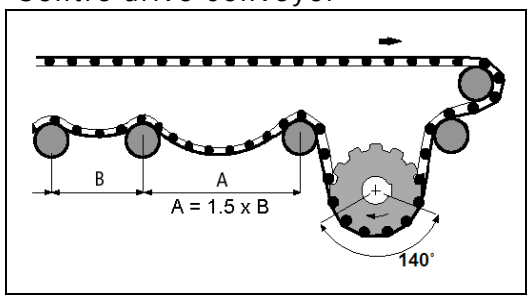


End-drive conveyor & snub roller



C should be 150-250mm

Centre-drive conveyor



Wrap around angle

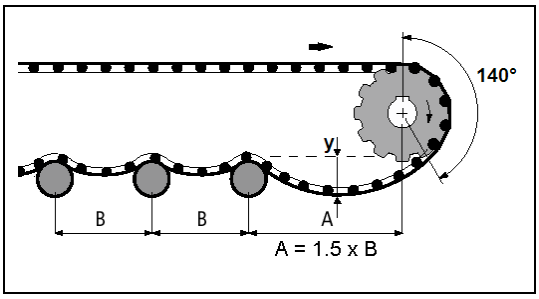
Recommended wrap angle on sprockets is: **140° +/- 10°.**
When the wrap angle is too small, the sprocket will not be able to transfer the load to the chain anymore causing the chain/belt to jump on the sprockets. When the wrap angle is too big, the chain/belt can stick to the sprocket.

Basic design considerations
Side flexing configuation
End drive construction
Centre drive conveyor
Wrap around angle

Sideflexing Belts

Catenary sag

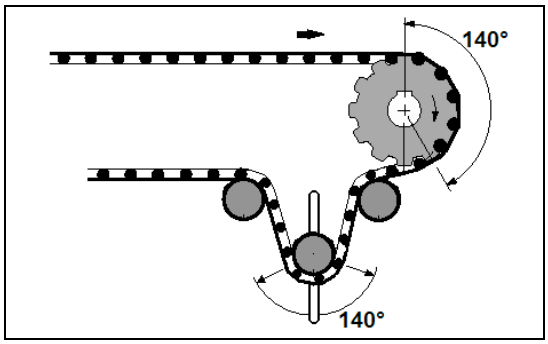
It is recommended to create a catenary sag which provides a complete discharge of the beltload.



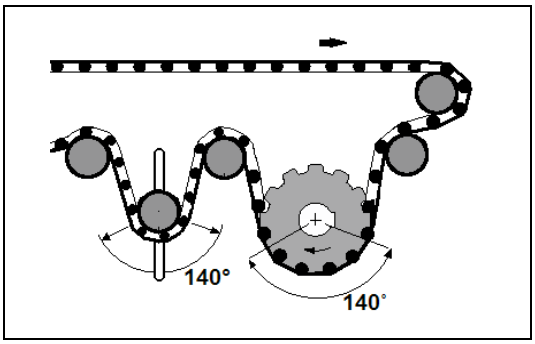
type	A (mm)	B (mm)	Vertical sag Y(mm)
505-series	700	500	50-125
1255-series	600	500	50-125
1265-series	600	500	50-125
1275-series	600	500	50-125
1285-series	600	500	50-125

The right vertical catenary sag can usually be obtained automatically by just pulling both ends of the belt together and connecting them. The catenary sag will increase due to elevated temperatures. Furthermore, the belt can elongate due to strain and wear of the pins and hinge eyes. Therefore it is important to check and adjust the catenary regularly.

End drive with tensioner



Centre drive with tensioner

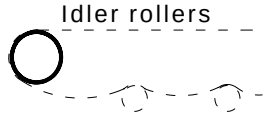
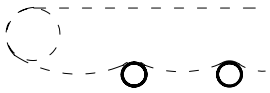


A tensioner construction is only necessary if the conveyor design does not allow for a proper catenary sag due to lack of space. A tensioner can also be used with declined conveyors, but in all other cases it is not recommend to tension the chain/belt.

NOTE: The tensioner roller/sprocket can be fixed on an arm or move up and down in slots in the conveyor sideplates.

Sideflexing Belts

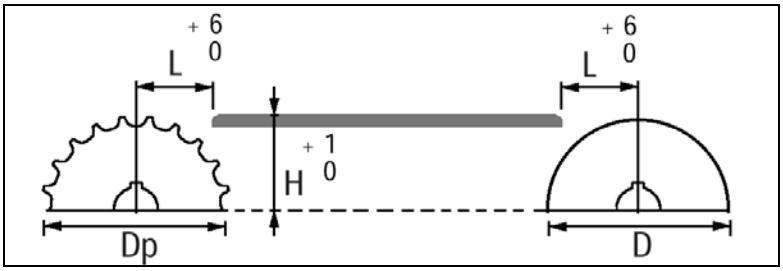
Roller diameter for sideflexing belts

Belttype	505-series	1255-series	1265-series	1275-series	1285-series
	All dimensions in mm				
Idler rollers 	>30	>60	>70	>60	>70
Return rollers 	60-100	60-100	60-100	60-100	60-100
Backflex rollers 	> 30	> 80	> 80	> 80	> 80

The recommended roller diameters in the table are an indication. The width of the conveyor is not taken into account. The diameter of the shaft should be large enough to avoid excessive deflection of the roller. At the same time it is recommended not to exceed the maximum diameter, because the roller friction may be too heavy to be set in motion by the belt.

Position sprocket - wearstrips

When the belts enter the sprocket, it tend to raise and fall slightly (chordal action). For this reason the sprockets should be mounted in such a way that their highest point is no higher than the top of the wearstrips. The front edges of the wearstrips should be bevelled to allow smooth and free running of the chain. The distance from the end of the wearstrip to the sprocket shaft centerline should equal dimension L, otherwise the wearstrip will interfere with the free articulation of the chain as it enters the sprockets.

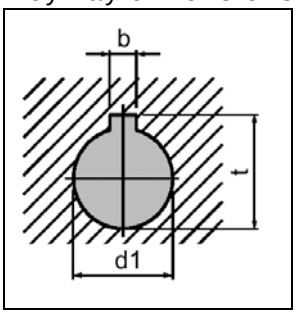


Belt type	Drive sprocket H (mm)	L mm
505-series	$\frac{Dp}{2}$ -6.35	12.7
1255-series	$\frac{Dp}{2}$ -6.35	32.0
1265-series	$\frac{Dp}{2}$ -6.35	32.0
1275-series	$\frac{Dp}{2}$ -6.35	32.0
1285-series	$\frac{Dp}{2}$ -6.35	32.0

Idler roller H (mm)	L mm
$\frac{Dp}{2}$	12.7
$\frac{Dp}{2}$	32.0
$\frac{Dp}{2}$	32.0
$\frac{Dp}{2}$	32.0
$\frac{Dp}{2}$	32.0

Sideflexing Belts

Keyway dimensions of MCC sprockets



d1 (mm)	b (mm)	t (mm)
25mm	8	28.3
30mm	8	33.3
35mm	10	38.3
40mm	12	43.3
45mm	14	48.8
50mm	14	53.8
60mm	18	64.4

d1 (inch)	b (inch)	t (inch)
1"	1/4	1 1/8
1 1/4"	1/4	1 3/8
1 1/2"	3/8	1 9/16
1 3/4"	3/8	1 15/16
2"	1/2	2 1/4

Wearstrip materials

Stainless steel wearstrips

Can be used in most situations using plastic belts and are strongly recommended in abrasive environments.

- Recommended for abrasive conditions due to avoiding of dirt embedding in the wearstrips;
- Recommended for plastic chains/belts in dry environments with speeds > 60m/min;
- Cold rolled stainless steel with a hardness of at least 25 Rc and a surface finish of maximum 1.6 µm is recommended;
- Best results can be achieved by using stainless steel AISI 431 (Werkstoff-Nr. 1.4057 material; soft AISI 304 (Werkstoff-Nr. 1.4301) is not recommended as wearstrip material.

UHMPWE wearstrips

Friction is low compared to steel wearstrips. Two types of plastic are suitable to be used as a wearstrip material.

- Most common used wearstrip material with extreme low friction;
- Excellent resistance against many chemicals;
- Virtually no moisture absorption, therefore very suitable for lubricated lines;
- Good dimension stability;
- Reduces some of the noise conveyors produce;
- Suitable for dry running conveyors with speeds up to 60 m/min;
- Extruded quality 1000 grade UHMWPE is recommended.

Recommended wearstrip materials

Wearstrip material	Plastic modular belts	
	Dry	Lubr.
UHMWPE	+	+
Polyamide	+/-	-
Stainless steel	+	+

\+ Recommended
+/- Satisfactory
\- Not recommended
1) Up to 60 m/min in non abrasive conditions
2) Only in non abrasive conditions

Belt return

For sideflexing belts we recommend to use rotating rollers for the returnpart.Reduced wear.

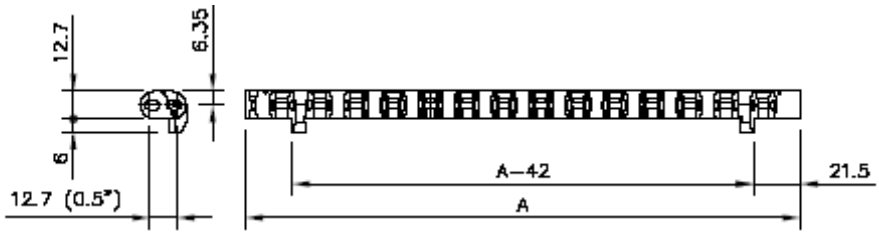
- Simple construction.
- Good accessibility

- Only point contact between chain/ belt and roller. –
- small rollers may cause a rattling sound.

Rollers should rotate freely therefore, rollers with rubber cover are recommended.

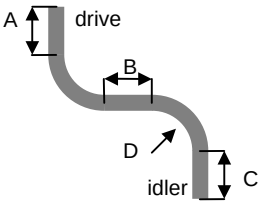
RBP 505-Series

Beltstyle RBP 505-series



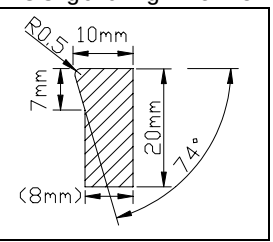
Minimum backflex diameter: 30mm
Minimum end roller diameter: 30mm

Lay-out Guidelines



A	Minimum straight section drive side 750mm with normal drive, 500mm width gravity tensioner.
B	Minimum straight inbetween 2 curves (S-bend) 1.5 * beltwidth
C	Minimum straight section idler side 500mm
D	Minimum inside radius 2 * beltwidth

MCC guiding Profile RBP 505-series

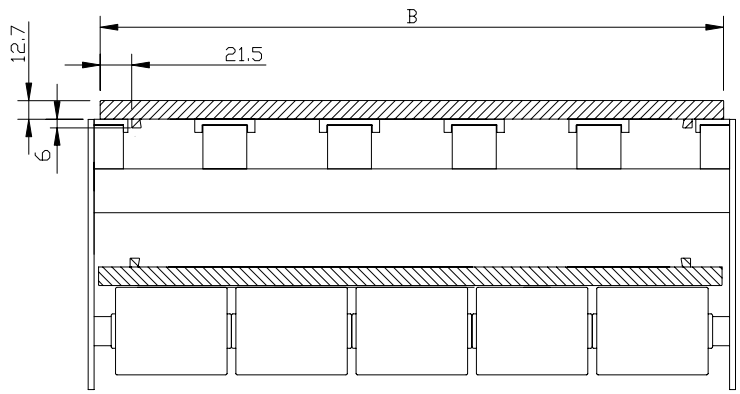


The MCC guiding profile should be used to guide the belt through the curve. Material of the guiding strip is MCC 3500 special polyamide, which offers low friction and high wear resistance.

Codenr. 800.00.01 in length is 2 mtr

Straight section RBP 505-series

Below a cross section drawing is shown with recommended straight section construction



Curve section
RBP 505-series

Sprocket position
RBP 505-series

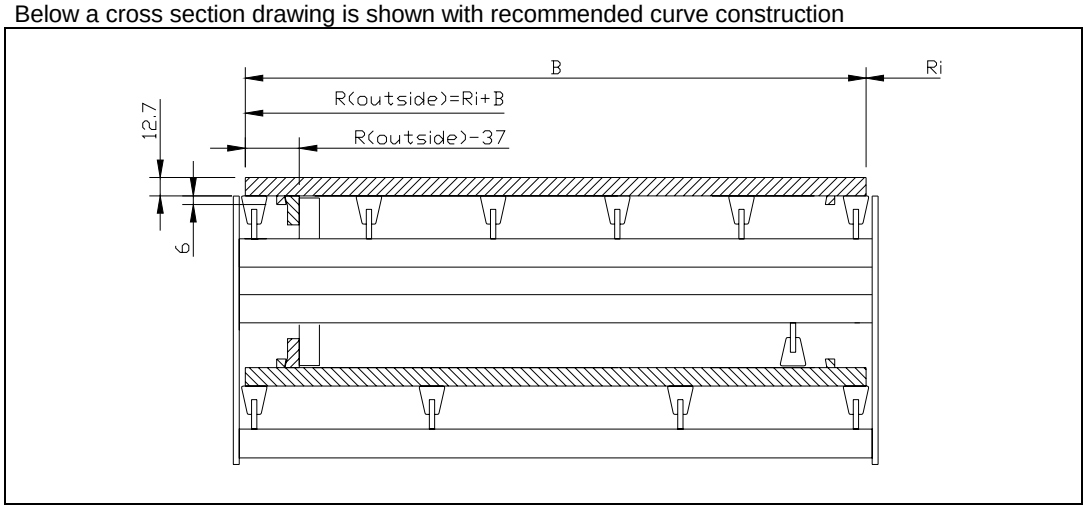
Roller dimension
RBP 505-series

Additional notes

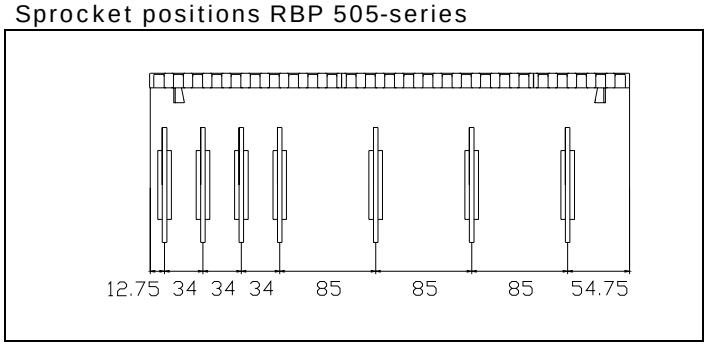
RBP 505-Series

Curve section RBP 505-series

Below a cross section drawing is shown with recommended curve construction

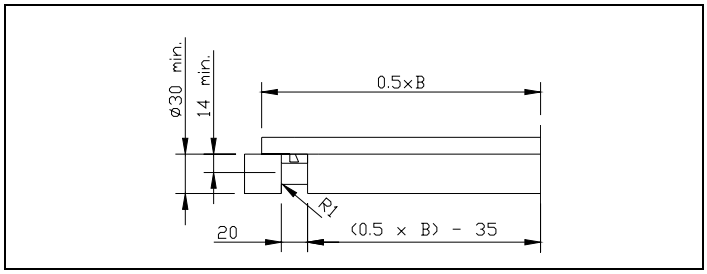


Sprocket positions RBP 505-series



Beltwidth	Nr. of sprockets	
	Drive	Idler
170 mm	4	2
255 mm	5	3
340 mm	6	4
425 mm	7	5
510 mm	8	6
595 mm	9	7
680 mm	10	8

Roller dimension RBP 505-series



Rollers should rotate freely at all times, therefor we strongly recommend to equip the rollers with bearings.

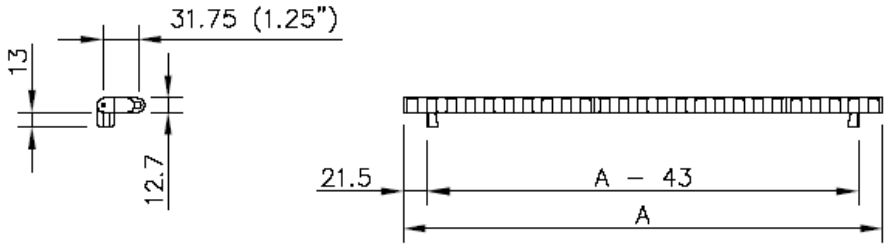
*) For high loads (>500 N) or wide belts (>510 mm) use bigger shaft diameter and/ or support the shaft in the centre

Additional Notes

- Complete machined UHMPWE curves including curve profiles are available in any anlge and for any belt width.
- Please note that the catenary sag can increase under load. Make sure the belt cannot catch against the sideframe in the returpart taking increased catenary into account.

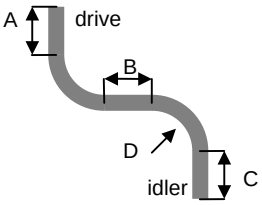
RBP 1255-Series

Beltstyle RBP 1255-series



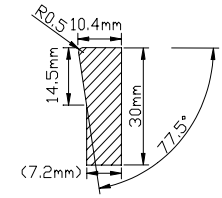
Minimum backflex diameter: 60mm
Minimum end roller diameter: 60mm

Lay-out Guidelines



A	Minimum straigth section drive side 750mm with normal drive, 500mm width gravity tensioner.
B	Minimum straight inbetween 2 curves (S-bend) 1.5 * beltwidth
C	Minimum straight section idler side 500mm
D	Minimum inside radius 2 * beltwidth

MCC guiding Profile RBP 1255-series

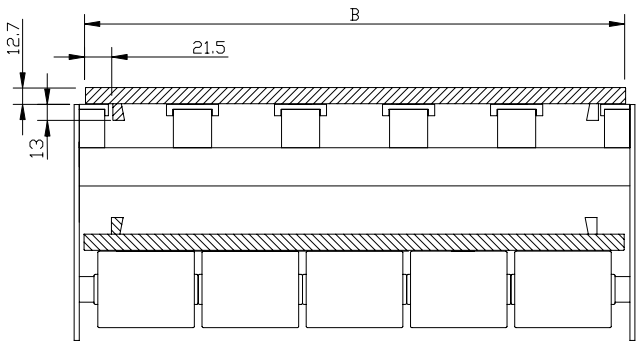


The MCC guiding profile should be used to guide the belt through the curve. Material of the guiding strip is MCC 3500 special polyamid, which offers low friction and high wear resistance.

Codenr. 800.00.10 in length is 1.8 mtr

Straight section RBP 1255-series

Below a cross section drawing is shown with recommended straight section construction



Curve section RBP 1255-series

Sprocket positions RBP 1255-series

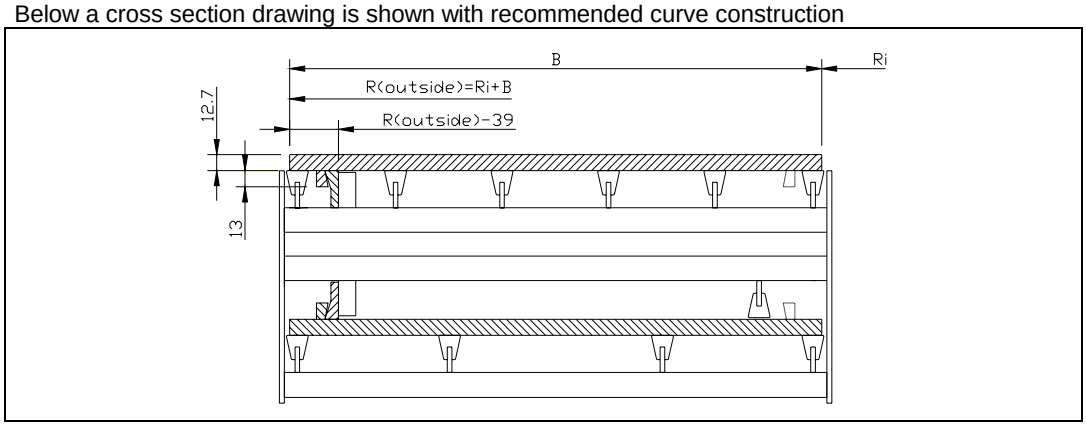
Roller dimension

Additional notes

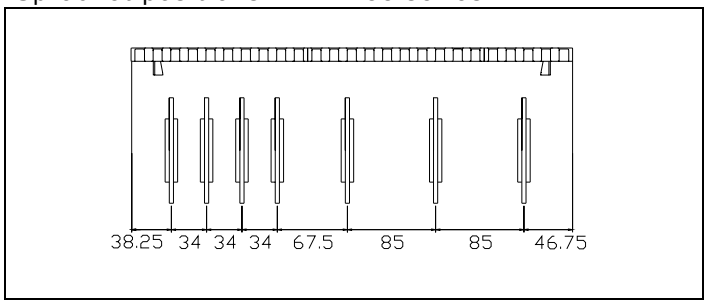
RBP 1255-Series

Curve section RBP 1255-series

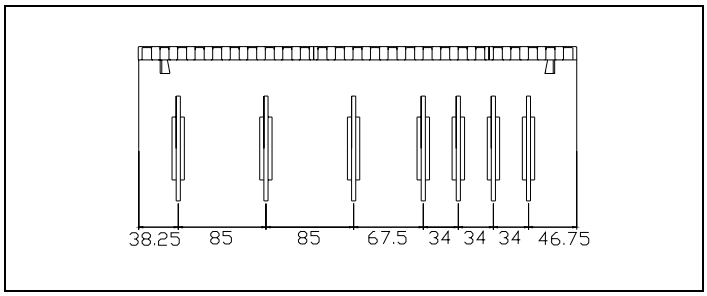
Below a cross section drawing is shown with recommended curve construction



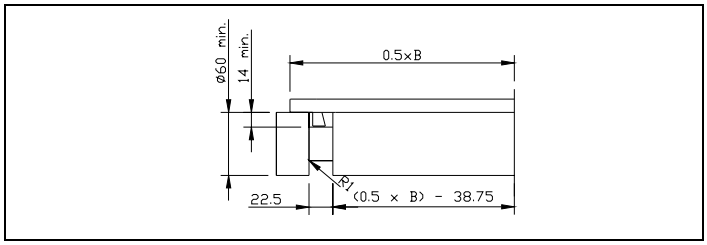
Sprocket positions RBP 1255-series



Beltwidth	Nr. of sprockets	
	Drive	Idler
170 mm	3	2
255 mm	5	3
340 mm	6	4
425 mm	7	5
510 mm	8	6
595 mm	9	7
680 mm	10	8



Roller dimension RBP 1255-series



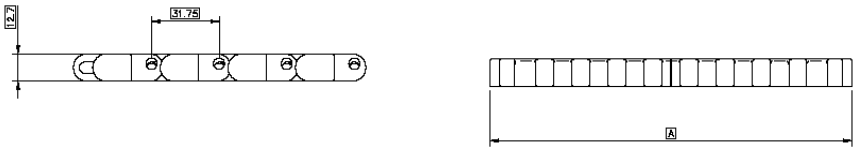
Rollers should rotate freely at all times, therefor we strongly recommend to equip the rollers with bearings.

Additional Notes

- Complete machined UHMWPE cruves including curve profiles are available in any angle and for any beltwidth

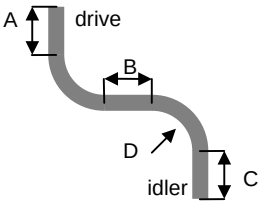
RB 1255-Series

Beltstyle RB 1255-series



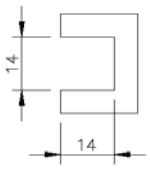
Minimum backflex diameter: 60mm
Minimum end roller diameter: 60mm

Lay-out Guidelines



A	Minimum straigth section drive side 750mm with normal drive, 500mm width gravity tensioner.
B	Minimum straight inbetween 2 curves (S-bend) 1.5*beltwidth
C	Minimum straight section idler side 500mm
D	Minimum inside radius 2 * beltwidth

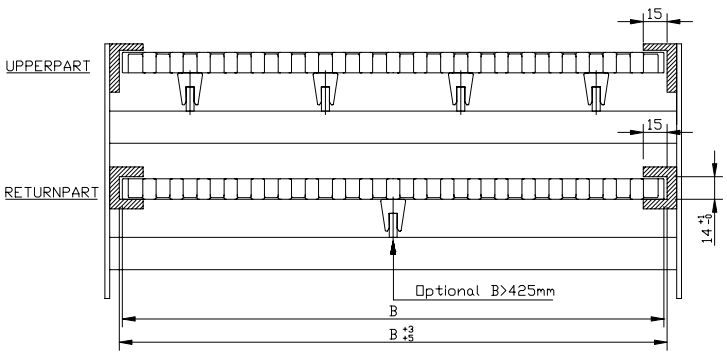
Recommended guiding Profile dimensions for RB 1255-series



The guiding profile should be used to guide the belt through the curve. Recommended material of the guiding strip is MCC 3500 special polyamid, which offers low friction and high wear resistance. UHMWPE can also be used.

Straight section RB 1255-series

Below a cross section drawing is shown with recommended straight section construction



Curve section
RB 1255-series

Sprocket
positions RB
1255-series

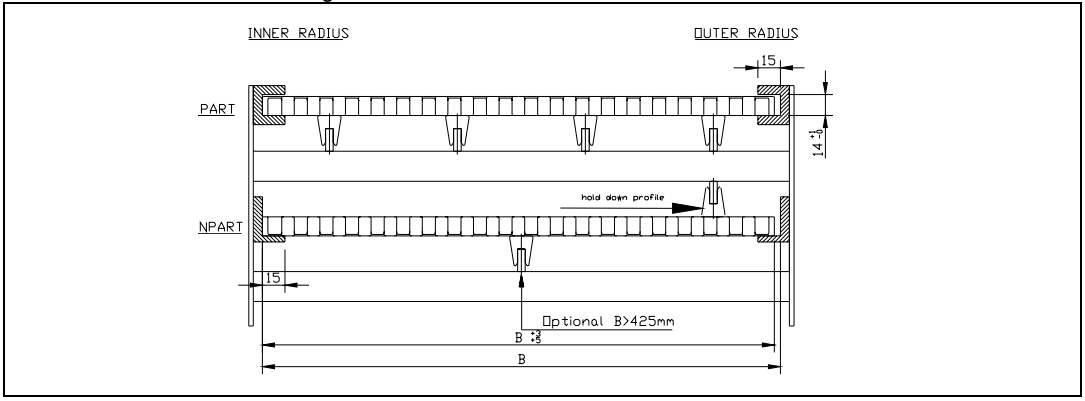
Roller dimension

Additional notes

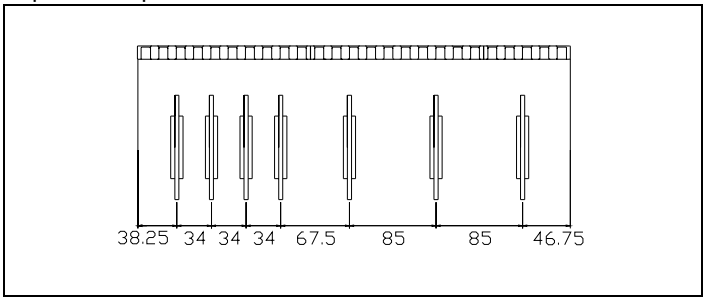
RB 1255-Series

Curve section RB 1255-series

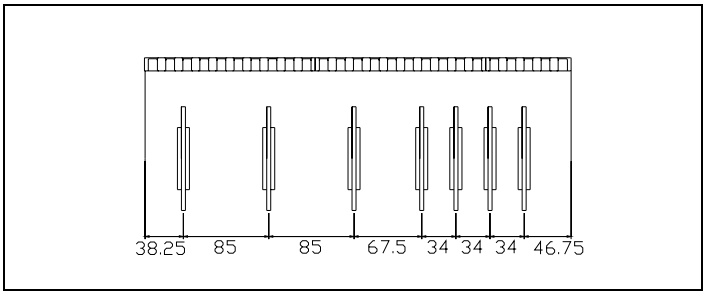
Below a cross section drawing is shown with recommended curve construction



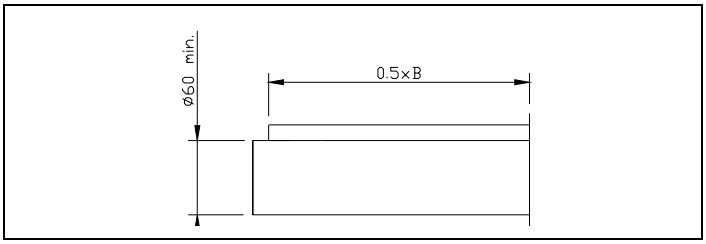
Sprocket positions RB 1255-series



Beltwidth	Nr. of sprockets	
	Drive	Idler
170 mm	3	2
255 mm	5	3
340 mm	6	4
425 mm	7	5
510 mm	8	6
595 mm	9	7
680 mm	10	8



Roller dimension RB 1255-series

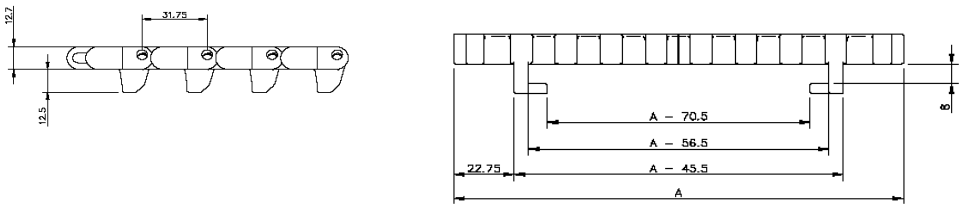


Rollers should rotate freely at all times, therefor we strongly recommend to equip the rollers with bearings.

Additional Notes

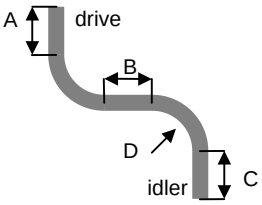
RBT 1255-Series

Beltstyle RBT 1255-series



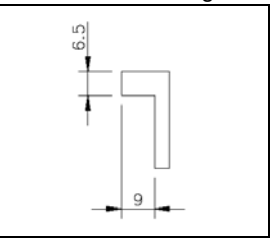
Minimum backflex diameter: 60mm
Minimum end roller diameter: 60mm

Lay-out Guidelines



A	Minimum straigth section drive side 750mm with normal drive, 500mm width gravity tensioner.
B	Minimum straight inbetween 2 curves (S-bend) 1.5*beltwidth
C	Minimum straight section idler side 500mm
D	Minimum inside radius 2 * beltwidth

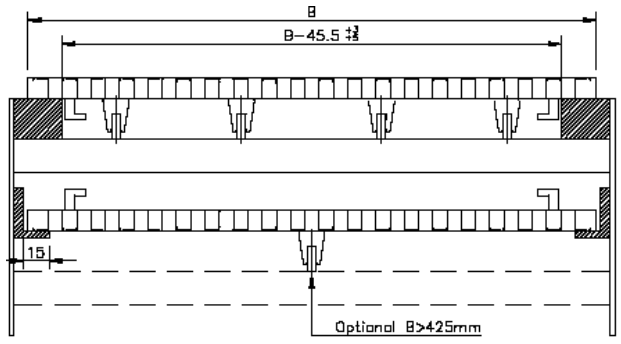
Recommended guiding Profile dimensions for RBT 1255-series



The MCC guiding profile should be used to guide the belt through the curve. Material of the guiding strip is MCC 3500 special polyamid, which offers low friction and high wear resistance.

Straight section RBT 1255-series

Below a cross section drawing is shown with recommended straight section construction

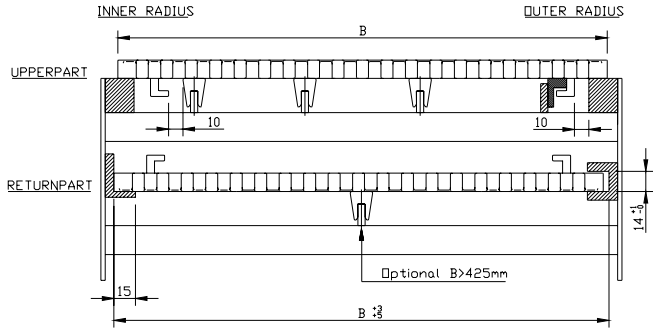


*) For the returnpart, also rotating rollers can be used.

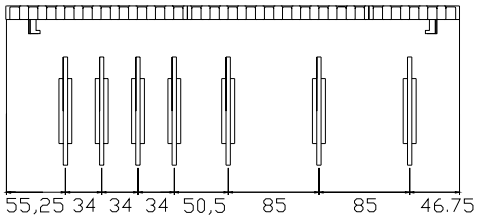
RBT 1255-Series

Curve section RBT 1255-series

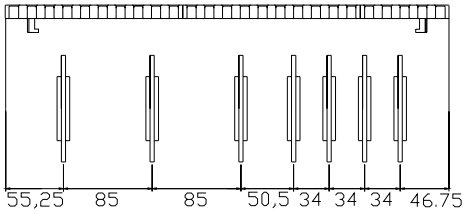
Below a cross section drawing is shown with recommended curve construction



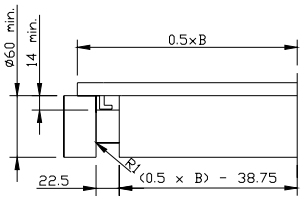
Sprocket position RBT 1255-series



Beltwidth	Nr. of sprockets	
	Drive	Idler
170 mm	3	2
255 mm	5	3
340 mm	6	4
425 mm	7	5
510 mm	8	6
595 mm	9	7
680 mm	10	8



Roller dimension RBT 1255-series



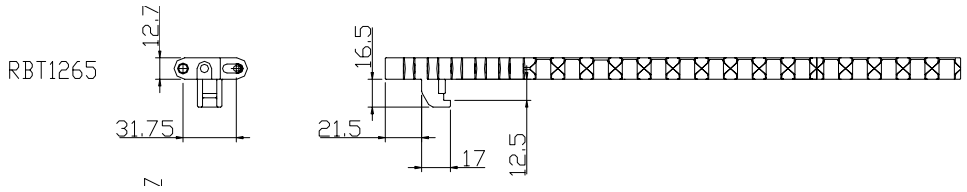
Rollers should rotate freely at all times, therefor we strongly recommend to equip the rollers with bearings.

Additional Notes

- Complete machined UHMWPE cruves including curve profiles are available in any angle and for any beltwidth

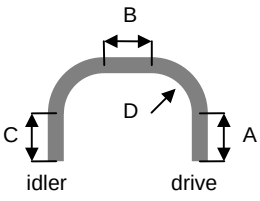
RBT 1265-Series

Beltstyle 1265-series



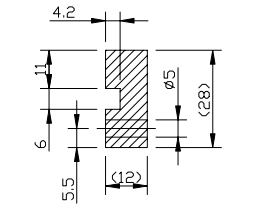
Minimum backflex diameter: 60mm
Minimum end roller diameter: 70mm

Lay-out Guidelines



A	Minimum straigth section drive side 750mm with normal drive, 500mm width gravity tensioner.
B	Minimum straight inbetween 2 curves (No S-bend!) No minimum straight needed
C	Minimum straight section idler side 500mm
D	Minimum inside radius 2 * beltwidth

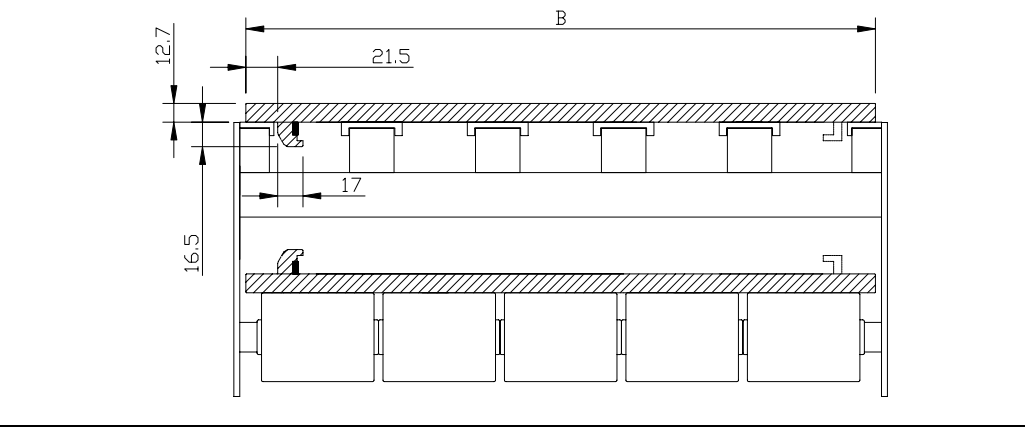
MCC guiding Profile 1265-series



The MCC guiding profile should be used to guide the belt through the curve. Material of the guiding strip is MCC 3500 special polyamid, which offers low friction and high wear resistance.

Straight section 1265-series

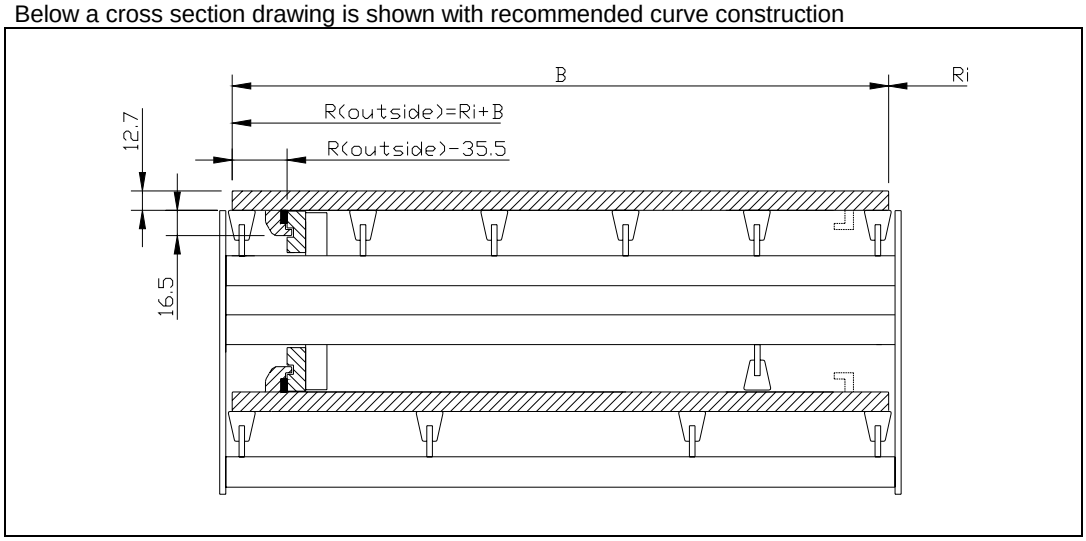
Below a cross section drawing is shown with recommended straight section construction



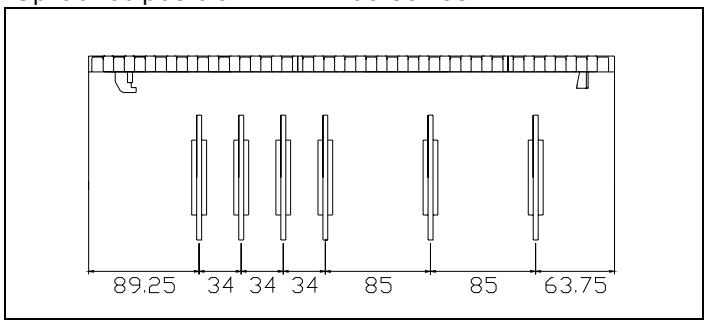
RBT 1265-Series

Curve section 1265-series

Below a cross section drawing is shown with recommended curve construction

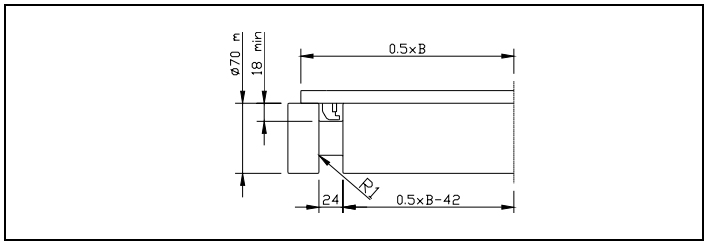


Sprocket position RBT 1265-series



Beltwidth	Nr. of sprockets	
	Drive	Idler
170 mm	3	2
255 mm	4	3
340 mm	5	4
425 mm	6	5
510 mm	7	6
595 mm	8	7
680 mm	9	8

Roller dimension 1265-series



Rollers should rotate freely at all times, therefor we strongly recommend to equip the rollers with bearings.
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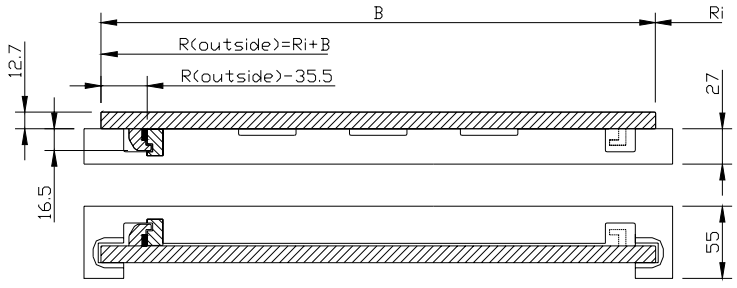
*) For high loads (>500 N) or wide belts (>510 mm) use bigger shaft diameter and/ or support the shaft in the centre

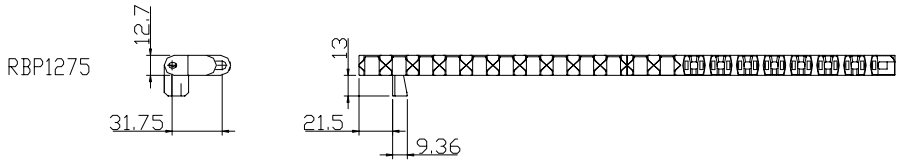
Additional Notes

- Complete machined UHMWPE cruves including curve profiles are available in any angle and for any beltwidth



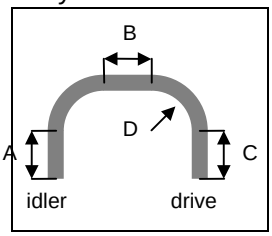
RBP 1275-Series

Beltstyle RBP 1275-series



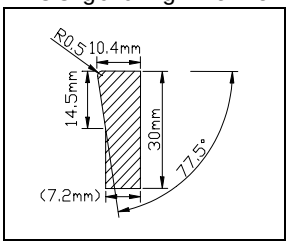
Minimum backflex diameter: 60mm
Minimum end roller diameter: 60mm

Lay-out Guidelines



A	Minimum straigth section drive side 750mm with normal drive, 500mm width gravity tensioner.			
B	Minimum straight inbetween 2 curves (No S-bend!) No minimum straight needed			
C	Minimum straight section idler side 500mm			
D	Minimum inside radius (min R)			
	Beltwidth	Min. radius	Beltwidth	Min. radius
	255	300	680	860
	340	400	765	1020
	425	500	850	1200
	510	600	935	1350
	595	720	1020	1500

MCC guiding Profile RBP 1275-series

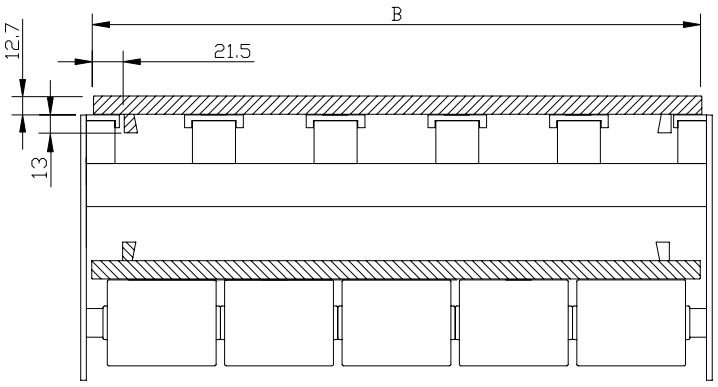


The MCC guiding profile should be used to guide the belt through the curve. Material of the guiding strip is MCC 3500 special polyamid, which offers low friction and high wear resistance.

Codenr. 800.00.10 in length is 1.8 mtr

Straight section RBP 1275-series

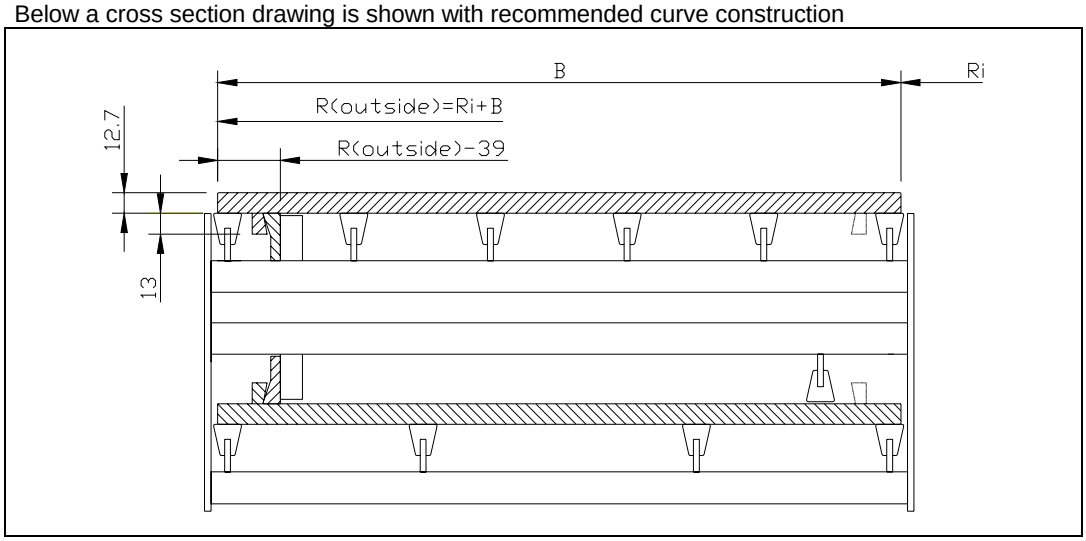
Below a cross section drawing is shown with recommended straight section construction



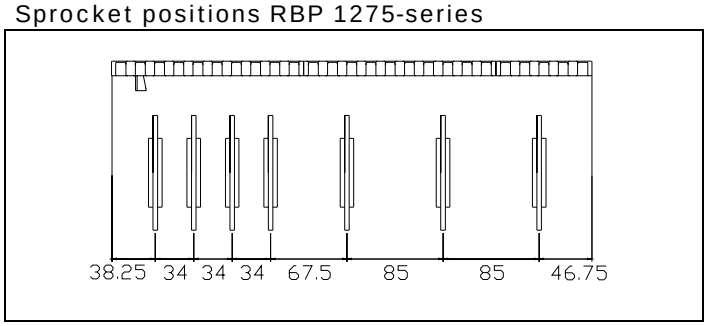
RBP 1275-Series

Curve section RBP 1275-series

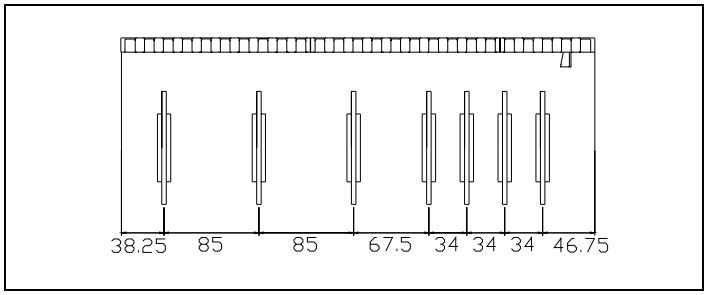
Below a cross section drawing is shown with recommended curve construction



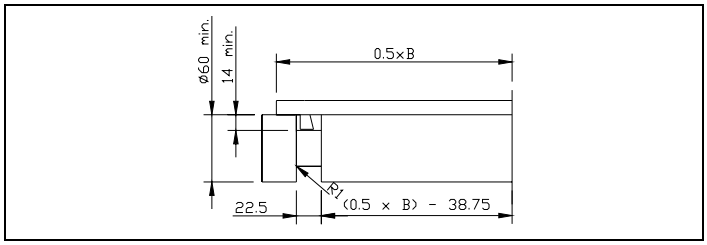
Sprocket positions RBP 1275-series



Beltwidth	Nr. of sprockets	
	Drive	Idler
170 mm	3	2
255 mm	5	3
340 mm	6	4
425 mm	7	5
510 mm	8	6
595 mm	9	7
680 mm	10	8



Roller dimension RBP 1275-series



Rollers should rotate freely at all times, therefor we strongly recommend to equip the rollers with bearings.
.

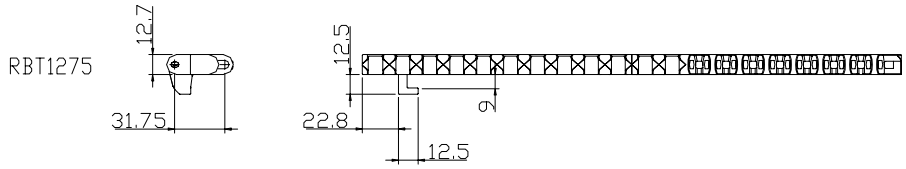
*) For high loads (>500 N) or wide belts (>510 mm) use bigger shaft diameter and/ or support the shaft in the centre

Additional Notes

We recommend to use the MCC machined corner tracks, which allows a simple design and a trouble free operation.

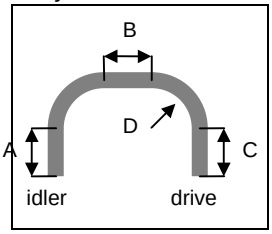
RBT 1275-Series

Beltstyle RBT 1275-series



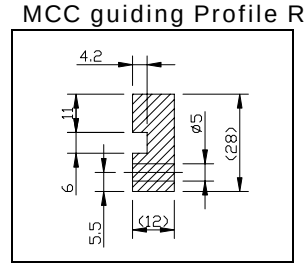
Minimum backflex diameter: 60mm
Minimum end roller diameter: 60mm

Lay-out Guidelines



A	Minimum straigth section drive side 750mm with normal drive, 500mm width gravity tensioner.			
B	Minimum straight inbetween 2 curves (No S-bend!) No minimum straight needed			
C	Minimum straight section idler side 500mm			
D	Minimum inside radius (min R)			
	Beltwidth	Min. radius	Beltwidth	Min. radius
	255	300	680	860
	340	400	765	1020
	425	500	850	1200
	510	600	935	1350
	595	720	1020	1500

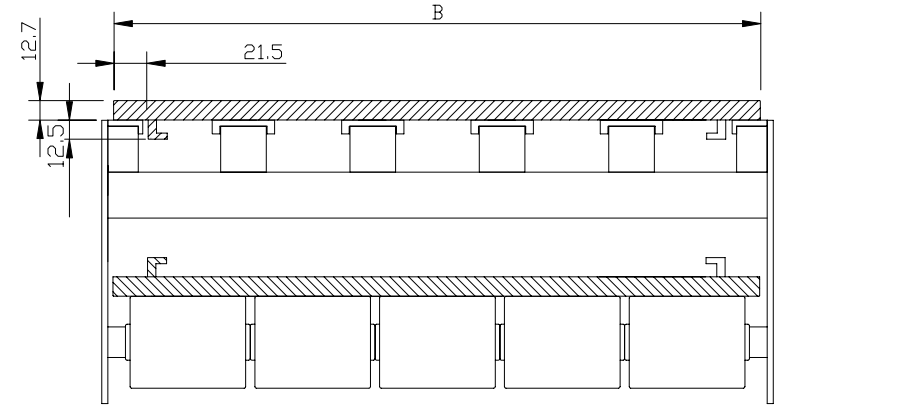
MCC guiding Profile RBT 1275-series



The MCC guiding profile should be used to guide the belt through the curve. Material of the guiding strip is MCC 3500 special polyamid, which offers low friction and high wear resistance.

Straight section RBT 1275-series

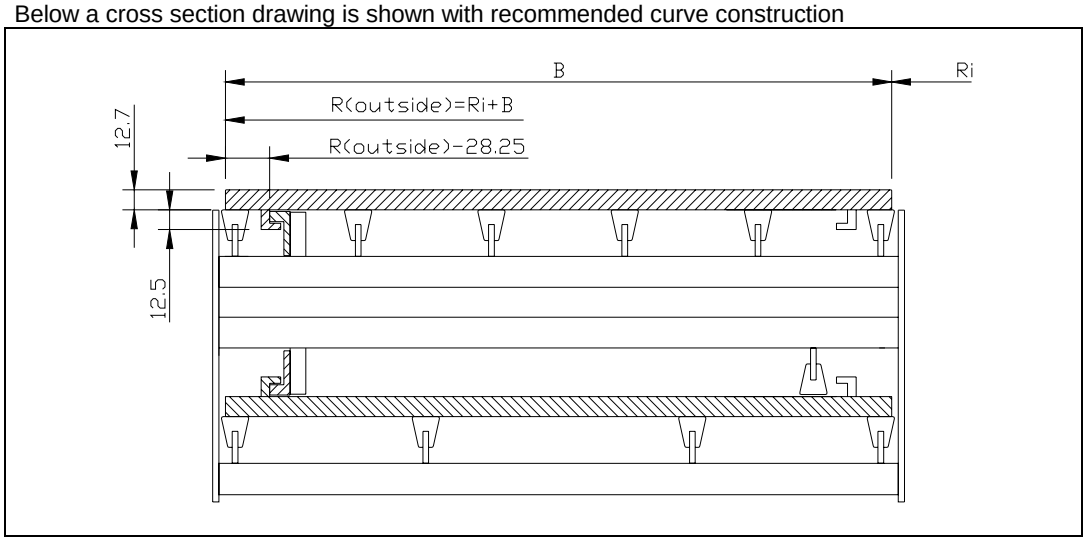
Below a cross section drawing is shown with recommended straight section construction



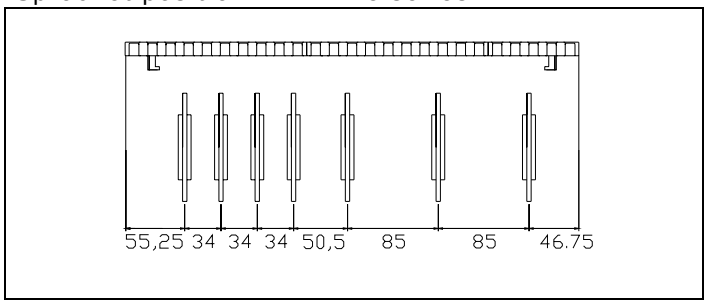
RBT 1275-Series

Curve section RBT 1275-series

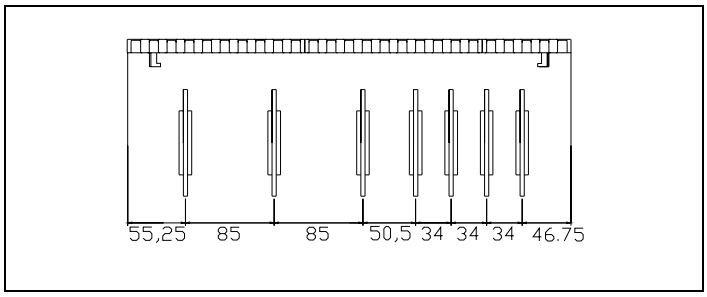
Below a cross section drawing is shown with recommended curve construction



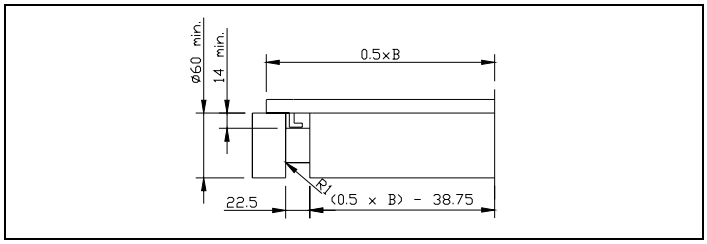
Sprocket position RBT 1275-series



Beltwidth	Nr. of sprockets	
	Drive	Idler
170 mm	3	2
255 mm	5	3
340 mm	6	4
425 mm	7	5
510 mm	8	6
595 mm	9	7
680 mm	10	8



Roller dimension 1275-series



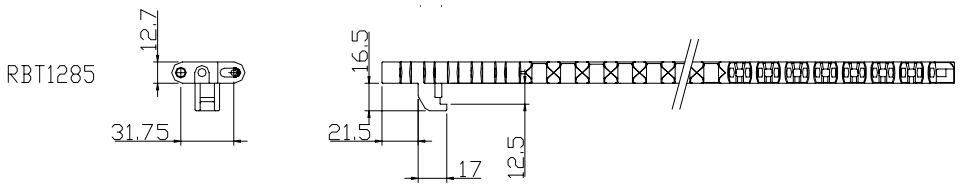
Rollers should rotate freely at all times, therefor we strongly recommend to equip the rollers with bearings.
.

*) For high loads (>500 N) or wide belts (>510 mm) use bigger shaft diameter and/ or support the shaft in the centre

Additional Notes

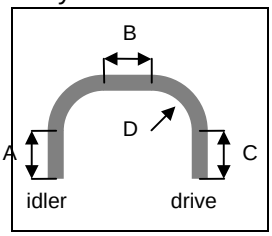
RBT 1285-Series

Beltstyle RBT 1285-series



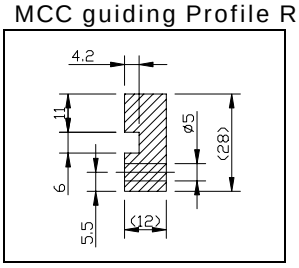
Minimum backflex diameter: 60mm
Minimum end roller diameter: 70mm

Lay-out Guidelines



A	Minimum straigth section drive side 750mm with normal drive, 500mm width gravity tensioner.			
B	Minimum straight inbetween 2 curves (No S-bend!) No minimum straight needed			
C	Minimum straight section idler side 500mm			
D	Minimum inside radius (min R)			
	Beltwidth	Min. radius	Beltwidth	Min. radius
	425	500	765	1020
	510	600	850	1200
	595	720	935	1350
	680	860	1020	1500

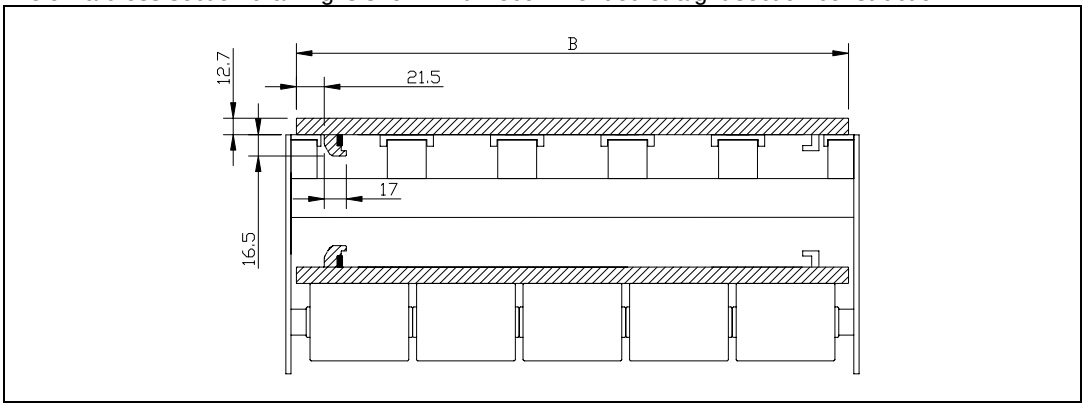
MCC guiding Profile RBT 1285-series



The MCC guiding profile should be used to guide the belt through the curve. Material of the guiding strip is MCC 3500 special polyamid, which offers low friction and high wear resistance.

Straight section RBT 1285-series

Below a cross section drawing is shown with recommended straight section construction



Curve section
RBT 1285-series

Sprocket
positions RBT
1285-series

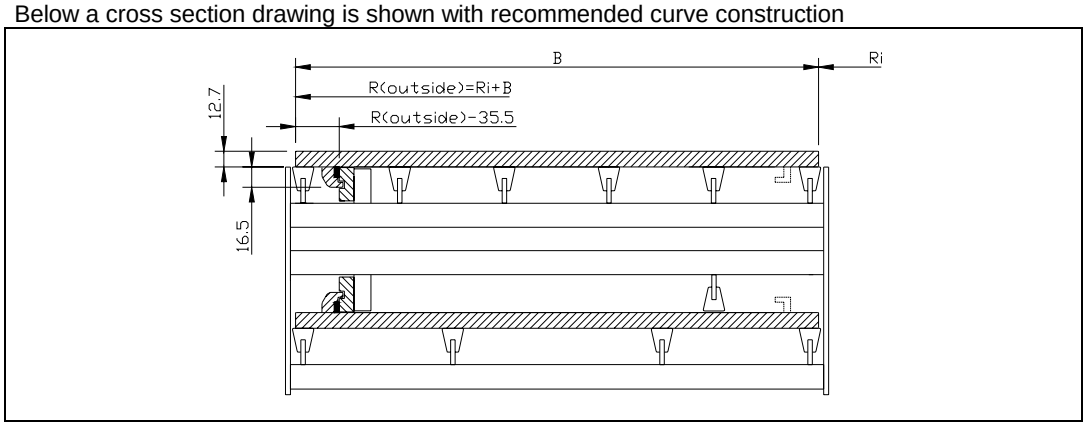
Roller dimension

Additional notes

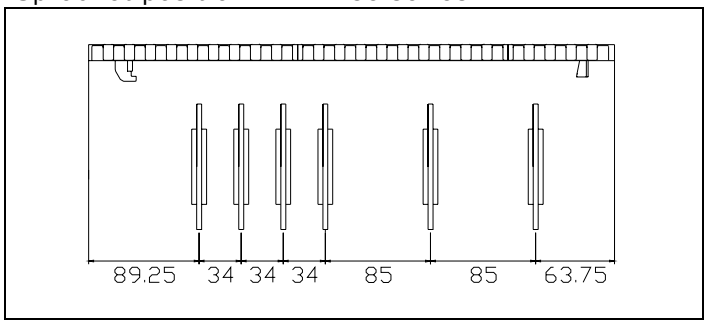
RBT 1285-Series

Curve section RBT 1285-series

Below a cross section drawing is shown with recommended curve construction

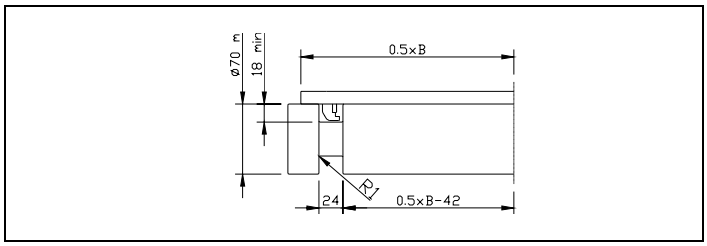


Sprocket position RBT 1285-series



Beltwidth	Nr. of sprockets	
	Drive	Idler
170 mm	3	2
255 mm	4	3
340 mm	5	4
425 mm	6	5
510 mm	7	6
595 mm	8	7
680 mm	9	8

Roller dimension RBT 1285-series



Rollers should rotate freely at all times, therefor we strongly recommend to equip the rollers with bearings.

Additional Notes

- Complete machined UHMWPE cruves including curve profiles are available in any angle and for any beltwidth

Sideflexing Belts

Installation instructions

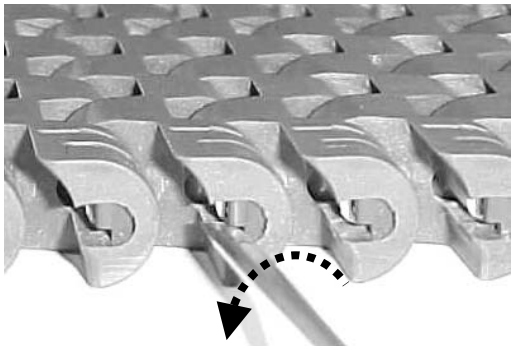
505-series

1255-series

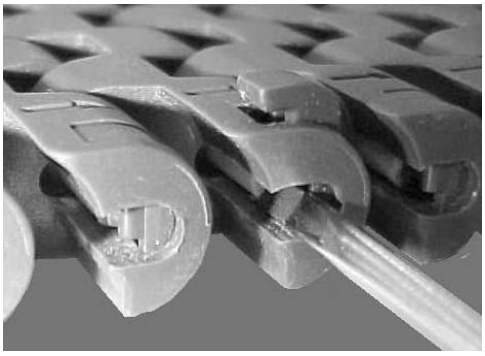
1265-series

Installation instructions

505-series



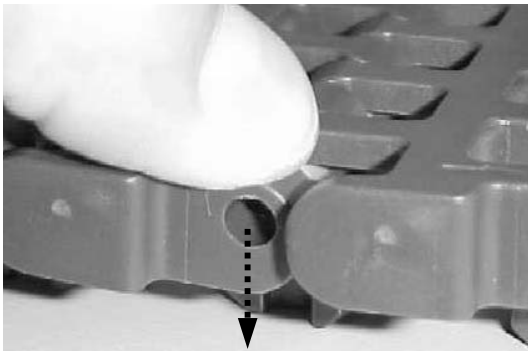
Turn screwdriver counter clockwise to remove clip.



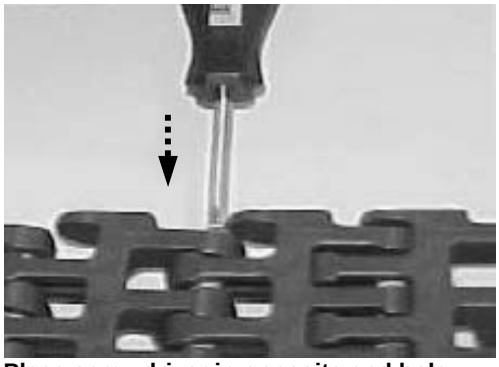
Place screwdriver between clip and belt end.

Please note that 505-series belts have a specific running direction, indicated by the arrow at the bottom.

1255-series belt

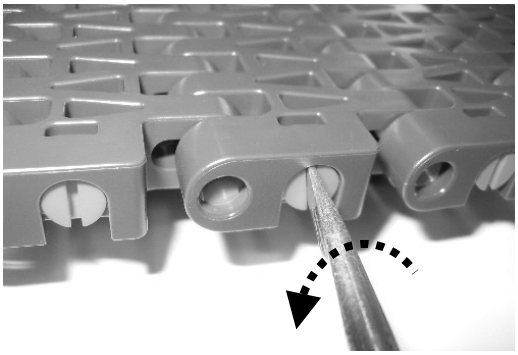


Lift belt out of tracks, and position belt on the lugs. Now, push one belt module downwards.

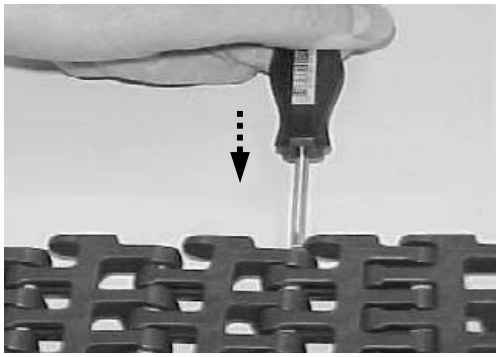


Place screwdriver in opposite end hole and push pin out.

1265-series belt



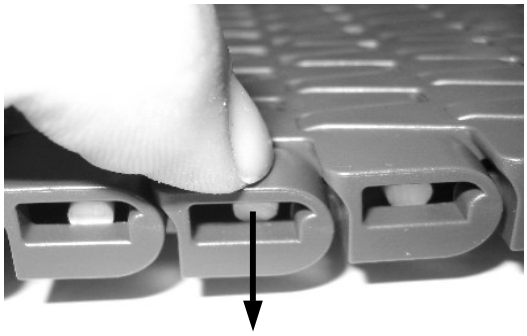
Turn screwdriver counter clockwise to open clip.



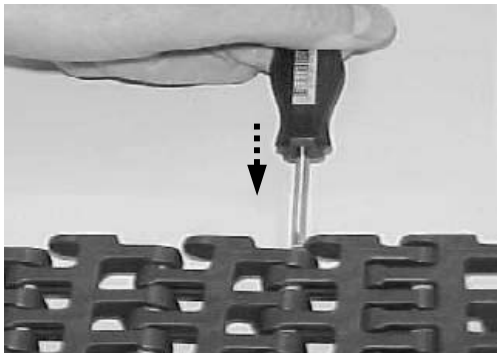
Place screwdriver in opposite end hole and push pin out.

Sideflexing Belts

1275-series belt

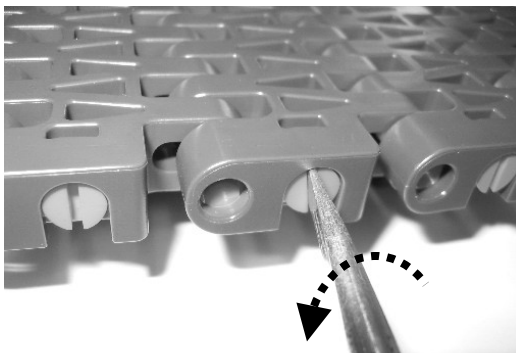


Lift belt out of tracks. Now, push one inner belt module downwards.

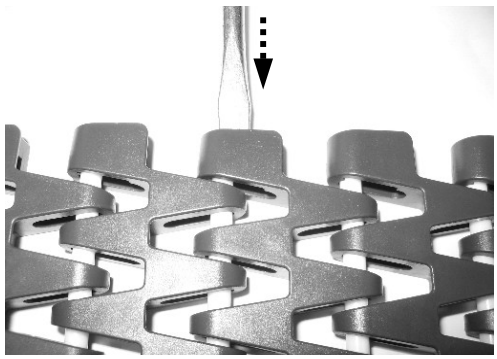


Place screwdriver in opposite end hole and push pin out.

1285-series belt



Turn screwdriver counter clockwise to open clip.



Place screwdriver in opposite end hole and push pin out.

Appendix

10-Series

10 series

Brief Description

AISI 430 (Werkstoff-Nr. 1.4016) special 17% chrome stainless steel for improved corrosion resistance, wearlife and strength

Primary Components

AISI 430

General Information

Prefix	Material	Temperature (°C)			FDA
		Min	max		
			dry	wet	
10	Wear resistant stainless steel	-70	+400	+120	yes

Friction Factors Between Material and Product

Operating Condition	Product Material						
	Glass	Crates	Plastic	Carton	Metal	Alu cans	Pet
Dry	0.35	0.30	0.30	0.45	0.40	0.40	0.31
Water	0.30	0.23	0.23	-	0.35	0.35	0.24
Soap & Water	0.15	0.12	0.12	-	0.15	0.15	0.17

Friction Factors Between Material and Wearstrips

Operating Condition	UHMWPE	MCC 1000	MCC 1200	Steel	Polyamid
Dry	0.30	0.30	0.30	0.40	0.30
Water	0.22	0.23	0.23	0.35	0.23
Soap & Water	0.15	0.12	0.12	0.15	0.12

Additional Notes

60-Series

Brief Description

Special chrome-nickel stainless steel for excellent sliding properties, improved corrosion resistance, long wearlife and high strength

Primary Components

Special Alloy

General Information

Prefix	Material	Temperature (°C)			FDA
		Min	max		
			dry	wet	
60	Special Alloy	-70	+400	+120	

Friction Factors Between Material and Product

Operating Condition	Product Material						
	Glass	Crates	Plastic	Carton	Metal	Alu cans	Pet
Dry	0.35	0.30	0.30	0.45	0.40	0.40	0.31
Water	0.30	0.23	0.23	-	0.35	0.35	0.24
Soap & Water	0.15	0.12	0.12	-	0.15	0.15	0.17

Friction Factors Between Material and Wearstrips

Operating Condition	UHMWPE	MCC 1000	MCC 1200	Steel	Polyamid
Dry	0.30	0.30	0.30	0.40	0.30
Water	0.22	0.23	0.23	0.35	0.23
Soap & Water	0.15	0.12	0.12	0.15	0.12

Additional Notes

66-Series

66 series

Brief Description

Special chrome-nickel stainless steel for excellent sliding properties, improved corrosion resistance, long wearlife and high strength

Primary Components

Special Alloy

General Information

Prefix	Material	Temperature (°C)			FDA
		Min	max		
			dry	wet	
66	Special Alloy	-70	+400	+120	yes

Friction Factors Between Material and Product

Operating Condition	Product Material						
	Glass	Crates	Plastic	Carton	Metal	Alu cans	Pet
Dry	0.35	0.30	0.30	0.45	0.40	0.40	0.31
Water	0.30	0.23	0.23	-	0.35	0.35	0.24
Soap & Water	0.15	0.12	0.12	-	0.15	0.15	0.17

Friction Factors Between Material and Wearstrips

Operating Condition	UHMWPE	MCC 1000	MCC 1200	Steel	Polyamid
Dry	0.30	0.30	0.30	0.40	0.30
Water	0.22	0.23	0.23	0.35	0.23
Soap & Water	0.15	0.12	0.12	0.15	0.12

Additional Notes

This chain is equipped with special wear resistant rods to significantly reduce chain elongation

10-Series

18 series

Brief Description

AISI 304 (Werkstoff-Nr. 1.4301) 18/8 chrome-nickel stainless steel for maximum corrosion resistance, long wearlife and high strength

Primary Components

AISI 304

General Information

Prefix	Material	Temperature (°C)			FDA
		Min	max		
			dry	wet	
18	Corrosion resistant stainless steel	-70	+400	+120	yes

Friction Factors Between Material and Product

Operating Condition	Product Material						
	Glass	Crates	Plastic	Carton	Metal	Alu cans	Pet
Dry	0.35	0.30	0.30	0.45	0.40	0.40	0.31
Water	0.30	0.23	0.23	-	0.35	0.35	0.24
Soap & Water	0.15	0.12	0.12	-	0.15	0.15	0.17

Friction Factors Between Material and Wearstrips

Operating Condition	UHMWPE	MCC 1000	MCC 1200	Steel	Polyamid
Dry	0.30	0.30	0.30	0.40	0.30
Water	0.22	0.23	0.23	0.35	0.23
Soap & Water	0.15	0.12	0.12	0.15	0.12

Additional Notes

60-Series

45 series

Brief Description

AISI 4140 (Werkstoff-Nr. 1.7225) through hardened carbon steel for high strength and abrasion resistance, long wearlife and high strength

Primary Components

AISI 4140

General Information

Prefix	Material	Temperature (°C)			FDA
		Min	max		
			dry	wet	
60	Through hardened carbon steel	-70	+180	-	

Friction Factors Between Material and Product

Operating Condition	Product Material						
	Glass	Crates	Plastic	Carton	Metal	Alu cans	Pet
Dry	0.35	0.30	0.30	0.45	0.40	0.40	0.31
Water	0.30	0.23	0.23	-	0.35	0.35	0.24
Soap & Water	0.15	0.12	0.12	-	0.15	0.15	0.17

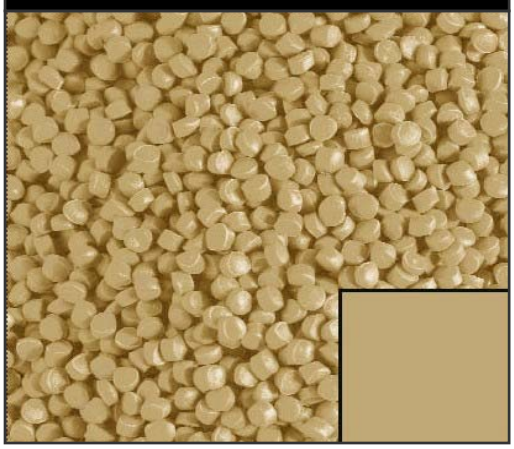
Friction Factors Between Material and Wearstrips

Operating Condition	UHMWPE	MCC 1000	MCC 1200	Steel	Polyamid
Dry	0.30	0.30	0.30	0.40	0.30
Water	0.22	0.23	0.23	0.35	0.23
Soap & Water	0.15	0.12	0.12	0.15	0.12

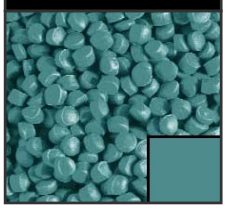
Additional Notes

Not suitable to run in wet environments

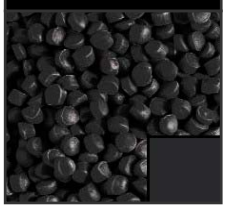
XL



XLG



XLA



Brief Description

Internally lubricated, extra low friction polyacetal for improved wearlife and strength

Primary Components

Polyacetal

General Information

Prefix	Material	Temperature (°C)			FDA
		Min	max		
			dry	wet	
XL	Extra low friction polyacetal	-40	+80	+65	yes
XLG	Extra low friction polyacetal	-40	+80	+65	yes
XLA	Extra low friction polyacetal	-40	+80	+65	yes

Friction Factors Between Material and Product

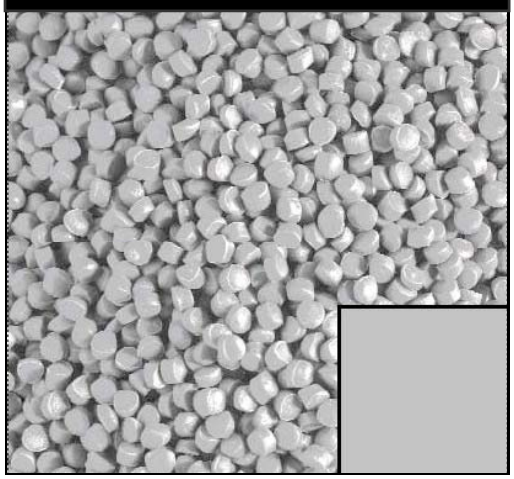
Operating Condition	Product Material						
	Glass	Crates	Plastic	Carton	Metal	Alu cans	Pet
Dry	0.18	0.19	0.19	0.3	0.20	0.22	0.23
Water	0.15	0.13	0.13	-	0.15	0.15	0.10
Soap & Water	0.10	0.08	0.08	-	0.10	0.10	0.08

Friction Factors Between Material and Wearstrips

Operating Condition	UHMWPE	MCC 1000	MCC 1200	Steel	Polyamid
Dry	0.18	0.18	0.18	0.20	0.19
Water	0.13	0.13	0.13	0.15	0.13
Soap & Water	0.08	0.08	0.08	0.10	0.08

Additional Notes

PS



Brief Description

Platinum Series PS material is a specially formulated material especially suited for high speed conveying.

Primary Components

High speed, Platinum Series internally lubricated acetal (POM)

General Information

Prefix	Material	Temperature (°C)			FDA
		Min	max		
			dry	wet	
PS	Extra low friction polyacetal	-40	+82	+66	yes

Friction Factors Between Material and Product

Operating Condition	Product Material						
	Glass	Crates	Plastic	Carton	Metal	Alu cans	Pet
Dry	0.13	0.19	0.16	0.23	0.18	0.18	0.16
Water	0.12	0.13	0.15	-	0.16	0.14	0.15
Soap & Water	0.10	0.08	0.14	-	0.13	0.12	0.14

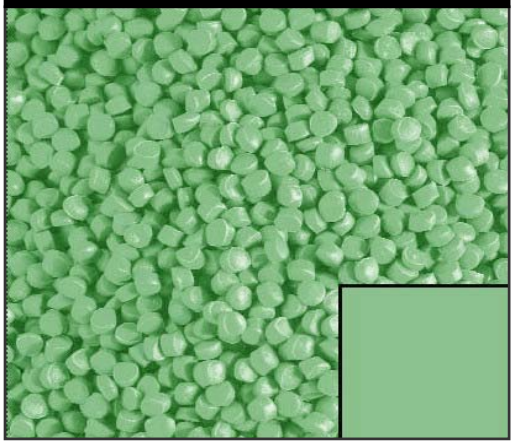
Friction Factors Between Material and Wearstrips

Operating Condition	UHMWPE	MCC 1000	MCC 1200	Steel	Polyamid
Dry	0.18	0.18	0.18	0.20	0.19
Water	0.13	0.13	0.13	0.15	0.13
Soap & Water	0.08	0.08	0.08	0.10	0.08

Additional Notes

High speed conveying increases the wear rate of conveyor chains. PS material can decrease this high speed wear as much as 5 times. Low coefficients of friction reduce product backline pressures and minimize pulsations.

XP



YP

Brief Description

Wear resistant polypropylene with excellent long term heat stability and very good chemical resistance

Primary Components

Polypropylene

General Information

Prefix	Material	Temperature (°C)			FDA
		Min	max		
			dry	wet	
XP	Wear resistant polypropylene	+4	+104	+104	
YP	Wear resistant polypropylene	+4	+104	+104	

Friction Factors Between Material and Product

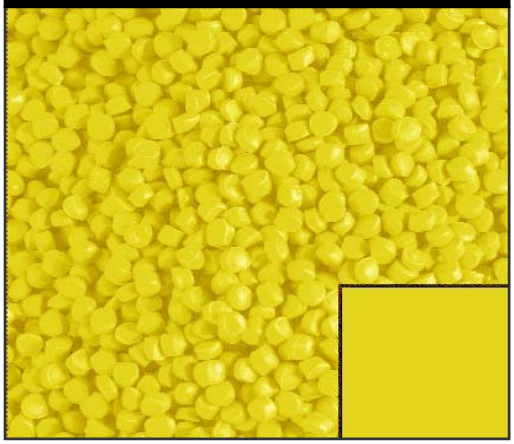
Operating Condition	Product Material						
	Glass	Crates	Plastic	Carton	Metal	Alu cans	Pet
Dry	0.25	0.26	0.26	0.39	0.26	0.30	0.30
Water	0.19	0.15	0.15	-	0.15	0.13	0.13
Soap & Water	0.10	0.10	0.10	-	0.10	0.10	0.10

Friction Factors Between Material and Wearstrips

Operating Condition	UHMWPE	MCC 1000	MCC 1200	Steel	Polyamid
Dry	0.23	0.23	0.23	0.28	0.25
Water	0.15	0.15	0.15	0.19	0.15
Soap & Water	0.10	0.10	0.10	0.13	0.13

Additional Notes

YPR



Brief Description

Wear resistant polypropylen with excellent long term heat stability and very good chemical resistance

Primary Components

Reinforced Polypropylene

General Information

Prefix	Material	Temperature (°C)			FDA
		Min	max		
			dry	wet	
YPR	Reinforced	+4	+104	+104	

Friction Factors Between Material and Product

Operating Condition	Product Material						
	Glass	Crates	Plastic	Carton	Metal	Alu cans	Pet
Dry	0.25	-	0.26	-	0.26	0.30	-
Water	0.19	-	0.15	-	0.15	0.13	-
Soap & Water	0.10	-	0.10	-	0.10	0.10	-

Friction Factors Between Material and Wearstrips

Operating Condition	UHMWPE	MCC 1000	MCC 1200	Steel	Polyamid
Dry	0.23	-	-	0.28	-
Water	0.15	-	-	0.19	-
Soap & Water	0.10	-	-	0.13	-

Additional Notes

AS

Brief Description

Polyacetal with improved electrical conductive properties, reducing the build up of static electricity

Primary Components

Polyacetal

General Information

Prefix	Material	Temperature (°C)			FDA
		Min	max		
			dry	wet	
AS	Electrically conductive polyacetal	-40	+80	-	yes

Friction Factors Between Material and Product

Operating Condition	Product Material						
	Glass	Crates	Plastic	Carton	Metal	Alu cans	Pet
Dry	0.18	0.19	0.19	0.3	0.20	0.22	0.23
Water	0.15	0.13	0.13	-	0.15	0.15	0.10
Soap & Water	0.10	0.08	0.08	-	0.10	0.10	0.08

Friction Factors Between Material and Wearstrips

Operating Condition	UHMWPE	MCC 1000	MCC 1200	Steel	Polyamid
Dry	0.18	0.18	0.18	0.20	0.19
Water	0.13	0.13	0.13	0.15	0.13
Soap & Water	0.08	0.08	0.08	0.10	0.08

Additional Notes

Chemical	10& 60 series material		18-series material		XP Poly-Propylene		Polyacetal		YPR Poly-Propylene		Polyetylene		Polyamide		Polyester (CRS)		PBT	
	20°		20°	60°	20°	60°	20°	60°	20°	60°	20°	60°	20°	60°	20°		20°	60°
Acetic Acid	-		+	+	+	+	-	-	+	+/-	+	+/-	-	-			-	-
Acetic Acid (5%)	+		+	+	+	+	+	-	+	+	+	+	+	+	+		+	+/-
Acetone	+		+	+	+	+	+/-	-	+/-	+/-	+	+	+		+		+	-
Alcohol (All types)	+		+	+	+	+	+	+/-	+	+	+	+	+		+		+	
Alum			+	+	+	+			+	*	+	+	+	+				
Aluminium chloride			-	-	+	+			+	+	+	+	+	+				
Ammonia	+		+	+	+	+	-	-	+		+	+	+		-		+/-	-
Amyl Acetate			+	+	-	-			+		+/-	-	+					
Aniline	+		+	+	+	+	-	-	+	+/-	+	-	-	-				
Aqua regia			-	-	-	-	-	-	+	+/-	-	-	-	-				
Battery Acid	-		-	-	+	+	-	-					-	-	-			
Beer	+		+	+	+	+	+	+	+		+	+	+	+	+			
Benzene	+/-		+	+	+/-	-	+	+/-	-		+/-	-	+					
Benzoic acid			+	+	+	+	-	-	+		+	+	-	-				
Beverages			+	+	+	+	+	+	+	+	+	+	+	+				
Bleach	-		+/-	-	+		-	-			+	*	+		+/-			
Borax			+	+	+	+			+		+	+						
Boric acid	+/-		+	+	+	+	-	-	+	-	+	+	+	+				
Brake fluid			+	+	+	*	+	+					+				+	+
Brine (10%)	-		+/-	-	+	*	+/-	-	+/-		+		+	+				
Bromine (liquid/fumes)			-	-	-	-	-	-	+/-	+/-			-	-				
Calcium chloride	-		-	-	+	+			+	+	+	+	+				+	+
Carbon dioxide			+	+	+	+			+	+	+	+	+					
Carbon tetrachloride	+		+	*	-	-	+		-	-	-	-	+		+			
Chlorine gas			+	+	-	-	-	-	-		-	-	-	-				
Chlorine (liquid)	-		-	-	-	-	-	-	-		-	-	-	-				
Chloroform	+/-		+	+	-	-	-	-	-		-	-	-	-			-	-
Chlorosulphonic Acid			+/-	-	-	-	-	-	-		-	-	-	-				
Chromic acid (80%)			-	-	-	-	-	-	+/-		-	-	-	-				
Citric acid	+/-		+/-	-	+	+	-	-	+		+	+	+	+			+	+/-
Citric acid 10%	+		+	+	+	+	+/-	-	+	+	+	+	+	+	+			
Cyclohexane			+	+	-	-			+/-		+	-	+					
Ethyl ether			+	+	+		+		+/-				+					
Ferric Chloride			-	-	+	+	+/-	-	+		+	+	+	+				
Formaldehyde (40%)	+		+	+	+	+	+		+		+	+/-	+		+			
Formic acid (2%)	+/-		+	+	+	+/-	-	-	+		+	+	-	-	+		+	+/-
Formic acid (85%	-		+	+	+	+/-	-	-	+		+	+	-	-	+/-			
Fruit juices	+		+	+	+	+	+	+	+	+	+	+			+			
Gasoline	+		+	+	+/-	-	+	+/-	+/-		+	-	+	+	+		+	
Gelatine			+	+	+	+			+		+	+/-	+					
Glucose			+	+	+	+			+		+	+						
Glycerin	+		+	+	+	+	+			+	+	+	+		+		+	+
Hydrobromic acid (50%)			-	-	+	+	-	-		+	+	+	-	-				
Hydrochloric acid	-		-	-	+	+	-	-	+		+	+	-	-			-	-
Hydrochloric acid (10%)	-		-	-	+	+	-	-	+	+	+	+		-	-		+	+/-
Hydrofluoric acid (40%)			-	-	+	+	-	-	+	+	+	+	-	-				
Hydrogen peroxide	+/-		+	+	+	+/-	-	-			+	+	-	-	+/-			
Hydrogene peroxide (3%)	+		+	+	+	+	+	-	+/-		+	+	-	-	+			
Hydrogen sulphide			+	+	+	+	-	-	+		+	+	+					
Iodine crystals			+	*	+	+	+/-	-					-	-				
Kerosine			+	+	+/-	-	+	+	+	+/-	+/-	-	+				+	+
Lactic acid	+/-		+	-	+	+	-	-	+		+	+	-	-	+			
Lead acetate			+	+	+	+			+		+	+	+	+				
Linseed oil			+	+	+	+	+	+	+		+	+	+					
Lubricating oil			+	+	+	+/-	+	+		+	+	+/-	+					
Magnesium chloride			+/-	-	+	+	+/-	-	+		+	+	+					
Malic acid (50%)			+	+	+	+	-	-	+		+	+						
Margarine			+	+	+	+	+	+	+		+	+	+	+				
Mercury	+/-		+	+	+	+			+		+	+	+					
Methyl ethyl ketone			+	+	+	+/-	+		+/-		-	-	+					

+ Resistant
+/- Limited resistance
- Not resistant

Chemical	10& 60 series material		18-series material		XP Poly-Propylene		Polyacetal		YPR Poly-Propylene		Polyetylene		Polyamide		Polyester (CRS)		PBT	
	20°		20°	60°	20°	60°	20°	60°	20°	60°	20°	60°	20°	60°	20°		20°	60°
Methylene chloride	+/-		+/-	-	+/-	-	-	-	+/-		-	-	+					
Milk	+		+	+	+	+	+	+	+		+	+	+	+	+			
Motor oil			+	+	+	+/-	+	+		+	+	+/-	+				+	+
Nickel chloride			+	+/-	+	+			+		+	+	-	-				
Nitric acid (25%)	+/-		+	+	+	+	-	-	+/-	+/-	+	+	+/-	-	+		+	+/-
Nitric acid (50%)	-		+	+	+/-	-	-	-	+/-	-	+	+/-	-	-			-	-
Oil, animal	+		+	+	+	+	+	+	*	*	+	+	+		+		+	+
Oil, mineral	+		+	+	+	+/-	+	+		+	+	+/-	+		+		+	+
Oil, vegetable	+		+	+	+	+	+	+	+		+	+	+		+		+	+
Oleic acid	+/-				+				+	-			+					
Oxalic acid			-	-	+	-	-	-	+		+	+	+/-	-				
Ozone			+	+	+/-	-	-	-			+/-	-	-	-				
Paraffin			+	+	+	+	+	*			+	+	+				+	+
Phathalic acid (50%)					+	+	-	-			+	+	-	-				
Phenol			+	+	+	+	-	-		+	+	+	-	-			-	-
Phosphoric acid			+	+/-	+	+	-	-		+	+	+	-	-				
Phosphoric acid (25%)	+/-		+	+	+	+	-	-	+		+	+	-	-	+		+	+/-
Phosphoric acid (50%)	-		+	+	+	+	-	-	+		+	+	-	-				
Photographic Solutions			+	+	+	+	+				+	+	+					
Potassium hydroxide	+		+	+	+	+	-	-	+		+	+	-	-	+		+	+
Seawater	-		+	+/-	+	+	+	+	+	+	+	+	+	+/-	+			
Silicic acid			+	+	+	+					+	+						
Silver nitrate			+	+	+	+			+		+	+	+					
Soap and water	+		+	+	+	+	+	+		+	+	+	+	+			+	+
Sodium Carbonate	+		+	+	+	+	+		+		+	+	+	+			+	+
Sodium chloride	+/-		+	+	+	+/-	+	+/-			+	+	+	+	+			
Sodium chloride, solution									+	+							+	+
Sodium hydroxide			-	-	+	+	-	-			+	+	+	+			-	-
Sodium hydroxide (10%)	+		+	+	+	+	+/-	+/-	+	+	+	+	+	+			+/-	-
Sodium hydroxide (20%)	+		+	+	+	+	-	-	+	+	+	+	+	+			+/-	-
Sodium hydroxide (40%)	+		+	+	+	+	-	-	+	+	+	+	+/-	+/-	+/-		-	-
Sodium hydroxide (60%)			+/-	+/-	+	+	-	-	+	+	+	+	+/-	+/-			-	-
Sod. hypochloride (5% Cl)	-		+/-	+/-	+	+/-	-	-			+		+/-	+/-	+/-		+	+
Sodium hypochlorite (5%)	-								+	+/-							+	+/-
Softdrinks	+		+	+	+	+	+	+			+	+	+	+	+			
Stannic Chloride			-	-	+	+	-	-	*	+	+	+	+	+				
Sugar			+	+	+	+	+	+	*	+	+	+	+	+				
Sulphur			+	+	+	+			+		+	+						
Sulphur dioxide (dry)			+	+	+	+	-	-	+		+	-	+					
Sulphur dioxide (wet)			-	-	+	+	-	-	+		+	-	+					
Sulphuric acid (3%)	-		+	-	+	+	+/-	+/-	+	+	+	+	+	+	+		+	+/-
Sulphuric acid (10%)	-		-	-	+	+	-	-		+	+	+	+	+			+	/
Sulphuric acid (50%)	-		-	-	+	+	-	-	+	+	+	+	-	-			+/-	-
Sulphuric acid (75%)	-		-	-	+	+/-	-	-	+	+	+	+/-	-	-			-	-
Sulphuric acid (fuming)	-		-	-	-	-	-	-			-	-	-	-				
Tannic acid			+	+	+	+	*	*	+		+	+	+	+/-				
Tartaric acid	+		+	+	+	+	+	+	+		+	+	+	+				
Toluene	+		+/-	+/-	-	-	+/-	-	+/-	+/-	-	-	+	+	+		+	-
Transformer oil			+	+	+	+/-	+	+	+/-	-	+	+/-	+				+	+
Turpentine	+		+	+	+/-	-	+		+/-	-	+/-	-					+	
Urea	+		+	+	+	+	+	+	+		+	+	+		+			
Vegetable juices	+		+	+	+	+	+		+	+	+	+	+	+	+			
Vinegar	+		+	+	+	+	+		+		+	+	+		+			
Washing powder			+	+	+	+	+				+	+	+				+	+
Wine	+		+	+	+	+	+	+	+		+	+	+	+	+			
Whiskey	+		+	+	+		+				+		+		+			
Xylene	+		+	+	-	-			+/-	+/-	-	-	+		+		+	-
Zinc chloride			+/-	-	+	+			+		+	+	+/-	-				

\+ Resistant
+/- Limited resistance
\- Not resistant

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BRAZIL
Rexnord Correntes Ltda.
Sao Leopoldo - RS
Phone: 55.51.579.8022
Fax: 55.51.579.8029

CANADA
Rexnord Canada Ltd.
Scarborough, Ontario
Phone: 1.416.297.6868
Fax: 1.416.297.6873

CHINA
Rexnord China
Shanghai, China
Phone: 86.21.62701942
Fax: 86.21.62701943

EUROPE
Rexnord FlatTop Europe b.v.
s-Gravenzande, Netherlands
Phone: 31.174.445111
Fax: 31.174.445222

Rexnord Marbett, S.r.L.
Correggio (RE), Italy
Phone: 39.0522.639333
Fax: 39.0522.637778

Rexnord NV/SA
Mechelen, Belgium
Phone: 32.70.22.33.66
Fax: 32.70.22.33.67

LATIN AMERICA
Rexnord International, Inc.
Milwaukee, Wisconsin
Phone: 1.414.643.3000
Fax: 1.414.643.3222

MEXICO
Rexnord S.A. de C.V.
Queretaro, Qro.
Phone: 52.442.218.5000
Fax: 52.442.218.1090

SINGAPORE
Rexnord International, Inc.
Singapore City, Singapore
Phone: 65.6338.5622
Fax: 65.6338.5422

UNITED STATES
Eastern Service Center
Atlanta, Georgia
Phone: 1.770.431.7200
Fax: 1.770.431.7299

Central Service Center
Grove City, Ohio
Phone: 1.614.675.1800
Fax: 1.614.675.1898

Southern Service Center
Arlington, Texas
Phone: 1.817.385.2800
Fax: 1.817.385.2873

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