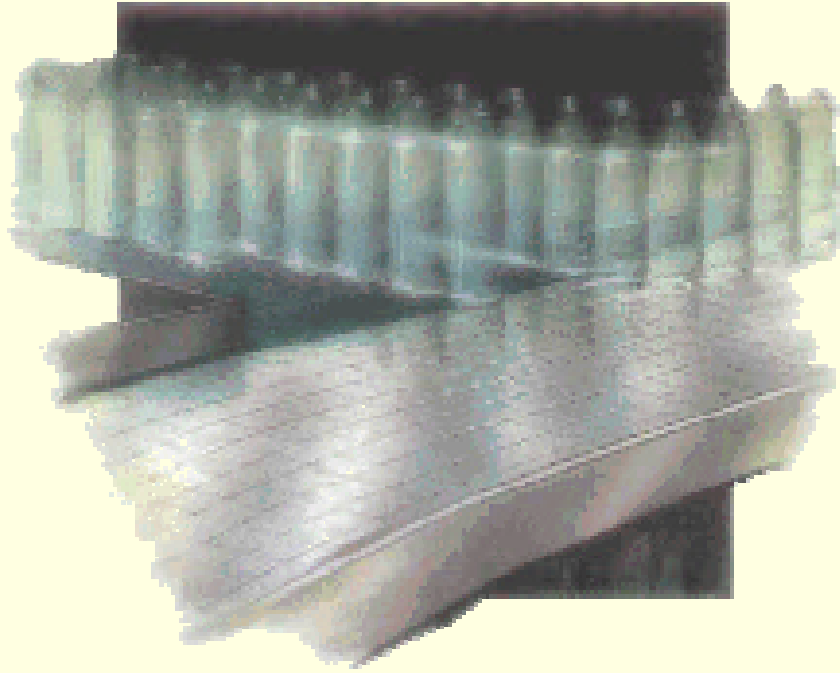


ENGINEERING MANUAL



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SPECIFIC APPLICATIONS

INSTALLATION & MAINTENANCE

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MATERIAL INFORMATION



Steel slatband chains

Plastic slatband chains

MCC modular belts

Modular belt programme

10-series

17% chrome stainless steel

Slat material (werkstoff-nr)	AISI 431 (1.4057)
Pin material (werkstoff-nr)	AISI 431 (1.4057)
Corrosion resistance	+
Wear resistance	+
Flatness	+
Hardness (HB)	> 220
Magnetic	Yes

General applications and mass conveying. Slideline version for pressureless inliners with stable products.

18-series

18/8 chrome-nickel steel

Slat material (werkstoff-nr)	AISI 304 (1.4301)
Pin material (werkstoff-nr)	AISI 304 (1.4301)
Corrosion resistance	++
Wear resistance	+
Flatness	+
Hardness (HB)	> 220
Magnetic	No

Maximum corrosion resistance.
Chemical and preserve industry applications.

45-series

Through hardened carbon steel

Slat material (werkstoff-nr)	AISI 4140 (1.7225)
Pin material (werkstoff-nr)	AISI 1045 (1.0503)
Corrosion resistance	-
Wear resistance	++
Flatness	+
Hardness (HB)	> 415
Magnetic	Yes

Extreme wear resistance suitable for heavy abrasive, dry applications (e.g. glass handling).

60-series

Special chrome-nickel stainless steel

Slat material	Special Alloy
Pin material (werkstoff-nr)	AISI 431 (1.4057)
Corrosion resistance	+
Wear resistance	++
Flatness	++
Hardness (HB)	> 285
Magnetic	Yes

Superior sliding properties. Slideline for high speed pressureless inliners with critical products. Suitable for applications where sliding properties, flatness and wear resistance are very important.

XL-material

Low friction Polyacetal

Pin material (werkstoff-nr)	AISI 431 (1.4057)
Chemical resistance	+
Wear resistance	++
Colour	Light brown

High strength, wear resistant and low friction, suitable for general applications and high speed lines conveying critical products.

NC-material

Wear resistant Polyacetal

Pin material (werkstoff-nr)	AISI 431 (1.4057)
Chemical resistance	+
Wear resistance	++
Colour	White

Wear resistant chain, suitable for food and dairy-industry.

CRS-material

Polyester

Pin material (werkstoff-nr)	AISI 304 (1.4301)
Chemical resistance	++
Wear resistance	+
Colour	White

Chemical resistant material for applications where chemicals are involved.

AS-material

Electrically conductive Polyacetal

Pin material (werkstoff-nr)	AISI 431 (1.4057)
Chemical resistance	+
Wear resistance	+
Colour	Black

Electrically conductive chain, suitable for applications where build up of static electricity must be avoided in non lubricated applications.

LBP-material

Polyacetal with plastic rollers

Pin material (werkstoff-nr)	AISI 431 (1.4057)
Chemical resistance	+
Wear resistance	+
Colour chain	Anthracite
Colour rollers	Aubergine

Wear resistant, extra low friction XLA-polyacetal with special selflubricating additives for applications where packs accumulate.

SG-material

PBT with elastomere

Pin material (werkstoff-nr)	AISI 431 (1.4057)
Chemical resistance	+
Wear resistance	+
Colour chain	Anthracite
Colour rubbertop	Aubergine

Chains for inclined and declined conveyors, and also suitable as stop belts.

XLG-material

Low friction Polyacetal

Pin material	Polypropylene
Exceptions	505: Reinforced plastic PBT for: 1255, RR narrow 1000, FT/FG 1000 84mm, 1005-series
Colour	Green Blue

High strength material with low friction properties

XP-material

Polypropylene

Pin material	Polypropylene
Colour	Light green

High temperature and chemically resistant

NP-material

Polypropylene

Pin material	Polypropylene
Colour	White

High temperature and chemically resistant, natural colour

XP-Supergrip

Polypropylene

Pin material	Polybutylterephtalat (PBT)
Colour	Light green & black

High friction for inclines/declines

PG-Supergrip

PBT

Pin material	Polypropylene
Colour	Green blue & black

High strength/high friction for high speed inclines/declines

AS-material

Polyacetal

Pin material	Polypropylene
Colour	Black

Improved electrical conductive properties, reducing the build up of static electricity.

XLA-material

Polypropylene

Pin material	Polybutylterephtalat (PBT)
Colour	Anthracite

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

YP-material

Polypropylene

Pin material	Polypropylene
Colour	yellow


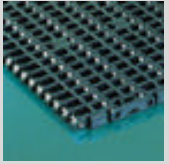


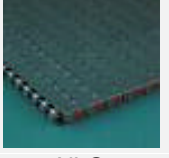


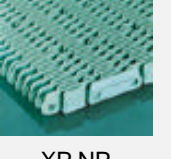
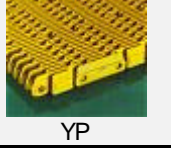
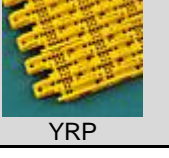
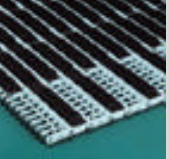



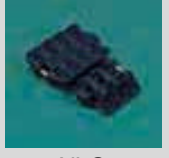
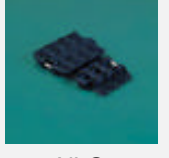


Long term heat stability
Superior chemically resistance

YPR-material

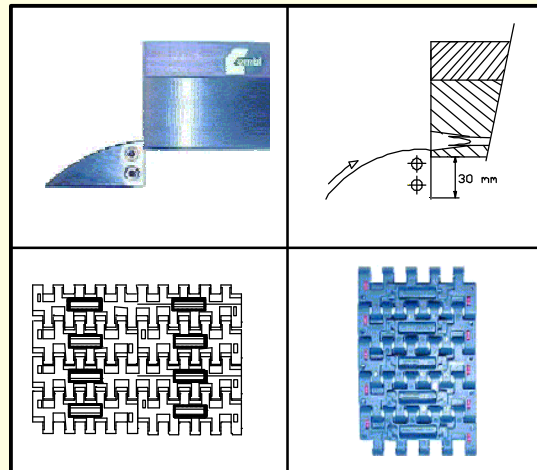
Reinforced Polypropylene

Pin material	Reinforced polypropylene
Colour	yellow

Extremely wear resistant
High strength
Excellent chemically resistant

		0.5"	1"	1" HD	1.25"	2"	2.5"
Flush Grid		FG 500 	FG 1000 			FG 2000 	
	Material	XLG	XLG XP AS			XP NP	
Flat Top			FT 1000 	FT 1005 		FT 2000 	
	Material		XLG XP AS	XLG		XP NP	
Raised Rib			RR 1000 			RR 2000 	
	Material		XLG XP AS			XP NP	
Pasteurizer						RRHD 2000 	SR 2500 
	Material					YP	YRP
Supergrip			SG 1000 	SG 1005 			
	Material		XP PG	PBT			
LBP				LBP 1005 			
	Material			XLA			
Sideflexing		RBP 505 	FTM/FGM 1050 	FTM 1055 	RBP 1255 		
	Material	XLG	XLG	XLG	XLG		
Sideflexing					RBT 7956 		
	Material				XLG		

DESIGN GUIDELINES



Drive construction & catenary sag

Conveyor rollers & wearstrips

Wearstrips & returnpart

Sprockets & idlers

Shafts & bearings

Guiderail construction

Positrack belts & applications

Side transfers & deadplate transfers

Freeflow transfers & finger transfers

Fingertransfers

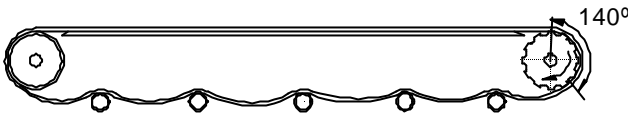
Finger transfer construction SR 2500

Magnetflex curves

Drive construction

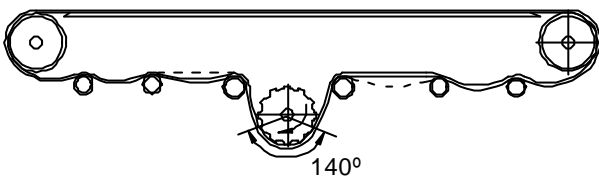
The drive position in a conveyor can be placed in several positions, and conveyors can be uni- or bi-directional.

■ End-driven conveyor



These conveyors have the drive construction on one end of the conveyor.

■ Centre-driven conveyor



Centre-drive conveyors are used when space is not sufficient for the drive construction or the catenary sag. This construction is also used for bi-directional conveyors.

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

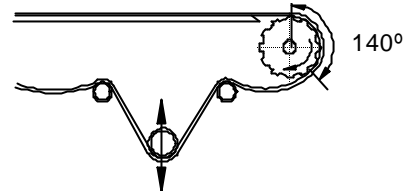
Wrap around angle

Recommended wrap angle on sprockets is: $140^\circ \pm 10^\circ$. 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.

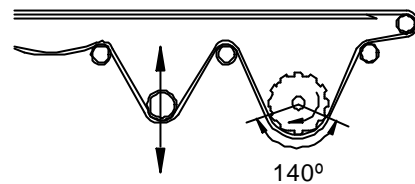
Tensioner construction

If the catenary sag does not bring enough tension in the returnpart of the chain/ belt tensioner can put more tension in the return part, through its weight.

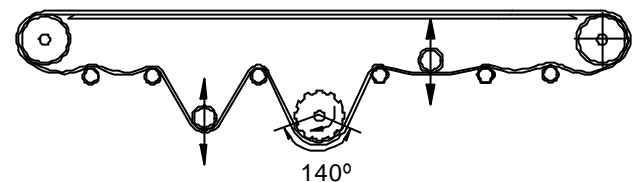
■ End drive with tensioner



■ Centre drive with tensioner



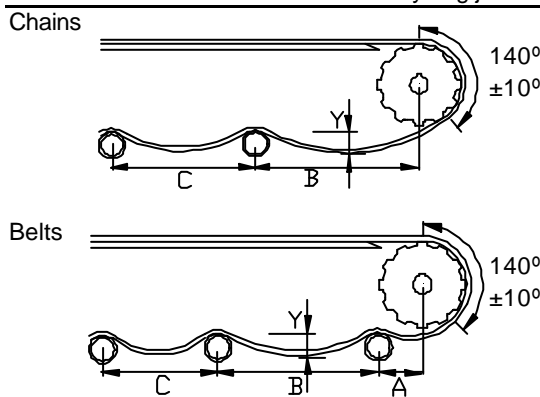
■ Bi-directional centre drive with tensioner



- ✓ For belts a roller can be used, which should be able to rotate freely and move up and down. Tensioner roller/sprocket can be fixed on an arm or move up and down in slots in the conveyor sideplates.

Catenary sag

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



Chain/ belt type	A (mm)	B (mm)	C (mm)	Vertical sag Y (mm)
Chains	N/A	450	500-600	50-125
Crate chains	N/A	N/A ¹⁾	N/A ¹⁾	100-300
LBP-chains	N/A	400 ²⁾	400-500 ²⁾	50-100
500-series	250	600	500-600	50-125
505-series	250	600	500-600	50-125
1000-series	250	750	500-600	50-125
1005-series	250	750	500-600	50-125
1255-series	250	600	500-600	50-125
2000-series	500	1250	1000-1250	100-200
2500-series	Consult MCC for catenary dimensions			

¹⁾ Use flat returnpart for CC-series chains

²⁾ Use guide shoes or 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. 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.

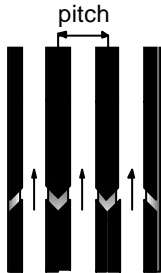
Roller diameter

Roller type:	Chains General (mm)	500-series (mm)	505-series (mm)	1000-series (mm)	1005-series (mm)	1255-series (mm)	2000-series (mm)	2500-series (mm)
<p>Idler rollers</p>	Min. 100	Min. 25	Min. 30	Min. 50	Min. 50	Min. 60	Min. 100	Min. 150
<p>Return rollers</p>	60-100	30-100	60-100	60-100	60-100	50-100	50-120	70-120
<p>Backflex rollers</p>	300	Min. 30	Min. 30	Min. 60 RR. Min 100	Min. 60	Min. 60	Min. 100 RR. Min. 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 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.

Wearstrip construction

Parallel wearstrips

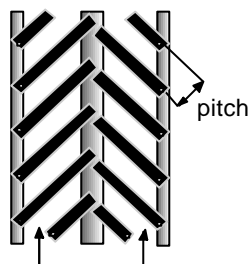


Standard construction for slatband chains and modular (Positrack) belts.

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

- ✓ **Parallel wearstrips should be cut in an 45°-angled V – pattern for smooth transfers. For bi-directional conveyors a brick style transfer is recommended.**

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. Obstruction can be caused by the wearstrip in combination with debris getting stuck in the belt.

Wearstrip spacing (p)

- ✓ **MCC recommends to use 40 mm wide wearstrips**

Wearstrip spacing chains

On multiple track conveyors using 3.25" Single Hinge stainless steel or plastic chains, e.g. on pressureless combiners, the recommended pitch between the wearstrips is 85 mm, using 40 mm wide wearstrips. This also accounts for the 83.8 mm wide slatband chains, reducing the gap inbetween the chains.

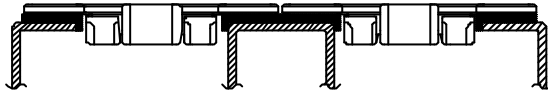
Wearstrip spacing belts

The recommended pitch (P) between the wearstrips for belts, the dimensions (based on 40mm wearstrip width) are shown in the table below.

Recommended pitch (P) of wearstrips		
Belt type	Parallel [mm]	Chevron [mm]
500-series	85-170	85-170/ cos á
505-series	85-170	N/A
1000-series	85-170	85/170 cos á
1005-series	85-170	85/170 cos á
1255-series	85-170	N/A
2000-series	150-250	150/250 cos á
2500-series	250-300	150/250 cos á

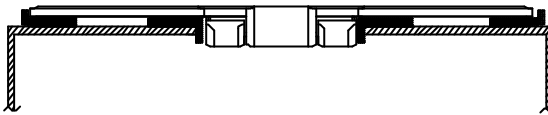
Guiding of Chains & Belts

■ Guiding of slatband chains



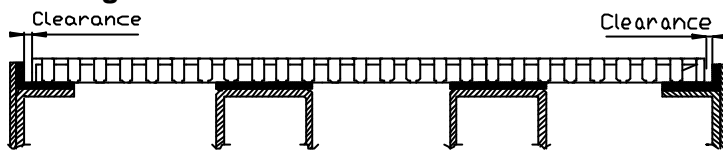
Guide the chain at the hinge eye. This construction reduces the amount of play, and reduces the possibility of sideward movement, resulting in a smoother operation.

■ Guiding wide slatband chains



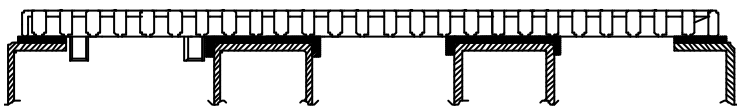
For wider chaintypes (7.5" and wider) the chains should be guided at the hinge and supported at the flights. A full support of the flights is recommended.

■ Guiding of belts without Positrack



Belts without Positrack should be guided at the side of the belt. Make sure there is an amount of clearance for the belt to expand free.

■ Guiding of Positrack belts



Belts equipped with Positrack lugs should be guided at these lugs only. Guiding of belts with Positrack reduces the possibility of sideward moving of the belt.

Metal wearstrips

Metal wearstrips can be used in most situations using plastic chains or 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.

■ Carbon steel:

- Cold rolled carbon steel can be used for abrasive applications, which are absolutely dry; however on dry running conveyors which are not operating continuously, an oxidation skin (rust) can be formed on the wearstrip surface. This could affect the lifetime of the chain;
- Material with a surface finish of max. 1.6 µm can be used.

Plastic wearstrips

Plastic wearstrips are recommended for smooth applications only. 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:

- Similar wear resistance as UHMWPE;
- 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.

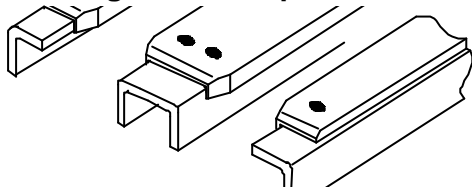
Selection of wearstrip material

Wearstrip material	Steel chains		Plastic chains & Modular belts	
	Dry	Lubr.	Dry	Lubr.
UHMWPE	+	+	+ ¹⁾	+ ²⁾
Polyamide	+/-	-	+/-	-
Stainless steel	-	-	+	+
Carbon 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/ belt**

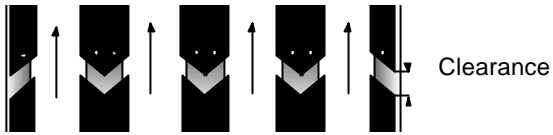
■ Chamfering of wearstrips



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 (40° - 70°C) application temperatures, we recommend to divide the wearstrip into several sections, because of the thermal expansion of the strips. The size of clearance depends on the expected elongation due to e.g. thermal expansion, see drawing.



For MCC 1000 UHMWPE material the expansion coefficient is 0.2 mm/m°C. A temperature increase of 40°C would elongate a 2 meter wearstrip with:

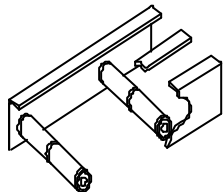
$$40^{\circ}\text{C} \times 2\text{mtr} \times 0.2 = 16 \text{ mm}$$

In this case, the gap between the wearstrips should be a bit larger than 16 mm, e.g. 17 mm.

✓ **It is recommended to cut the wearstrips at double 45° 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.**

Systems of chain / belt support

■ Rotating rollers

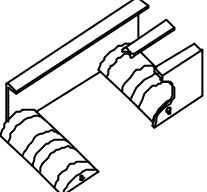


- + Reduced wear
- + Simple construction
- + Good accessibility of returnpart.
- + Ejection of debris in the returnpart by the movement of the chain.

-Only point contact between chain/ belt and roller.

✓ **Rollers must be able to rotate freely at all times. Therefore, rollers with rubber cover are recommended to ensure rotating and reduce noise. Small rollers may cause a rattling sound.**

■ Fixed guideshoes

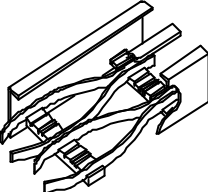


- + Good accessibility
- + Simple construction.
- + Ejection of debris in the returnpart by the movement of the chain.
- + Suitable for LBP chains/belts.

-Risk of uneven wear of the chain/ belt surface.
 -Only point contact between chain and guide shoe.
 -High friction.

✓ **Minimum guide shoe radius is 200 mm.**

■ Serpentine wearstrips



- + Full support of the belt/ 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.

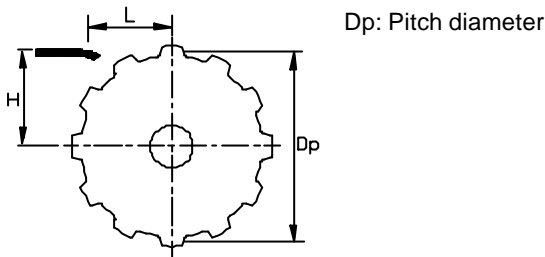
✓ **Material used for wearstrips should be UHMWPE. Factors that deserve extra attention, are the dimensions of catenary sags, which provides a proper tension in the returnpart.**

Sprockets & idlers

Sprockets are available in various bores, square or round, in millimetres or inches. Split sprockets and idlers are easy to assemble by two hexagonal bolts. These are commonly used for easy installation and replacement.

Position of wearstrips

To ensure a proper interaction between the chain/ belt and the sprocket, it is important to position the sprockets at the right height and distance from the wearstrips.

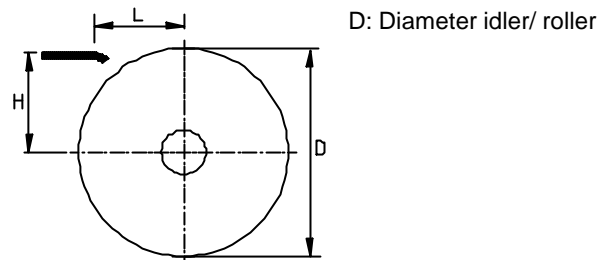


Chain type	$H^{-0/+1mm}$ mm	L mm
Steel chains, SH, SWH	$\frac{Dp}{2} + 3.2$	38.1
SHD	$\frac{Dp}{2} + 2.4$	38.1
SRH, RH, RHD, RHMD	$\frac{Dp}{2} + 3.5$	38.1
HDS, HDF, HDFM	$\frac{Dp}{2} + 4.7$	38.1
PR	$\frac{Dp}{2} - 12.0$	50.0
CC-600	$\frac{Dp}{2} - 14.3$	63.5
CC-1400	$\frac{Dp}{2} - 19.0$	82.5

Belttype	$H^{-0/+1mm}$ mm	L mm
500-series	$\frac{Dp}{2} - 4.35$	12.7
505-series	$\frac{Dp}{2} - 6.35$	12.7
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	$\frac{Dp}{2} + 3.5$	38.1
1055-chainbelt	$\frac{Dp}{2} + 3.4$	38.1

Idler drums – wearstrip position

Like sprockets, the position of the idlers is also important. Idlers should be installed at a specific distance between the centerline of the idler and the top of the wearstrips, which depends on the diameter of the idler.



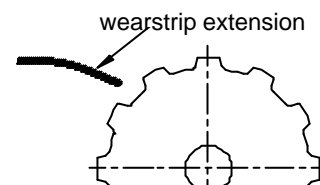
H: Distance from the centreline idler/ sprocket to top of wearstrips is $0.5 * \text{outside diameter}$. Tolerance: $H^{-0/+1mm}$

L: Horizontal spacing should be $1 * \text{pitch of chain/ belt}$

- ✓ For MCC plastic Multiflex chains, take the inside diameter of the idler drums for calculating the distance.

Chamfering of wearstrips

Very important is the fact that the wearstrips have to be chamfered at this side of the conveyor, in order to assure a troublefree infeed of the chains into the upperpart.

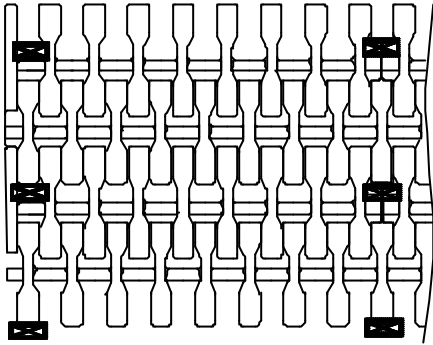


A bent extension of the wearstrips is recommended for chains to ensure a smooth infeed and outfeed of the conveyor upperpart.

Sprocket position

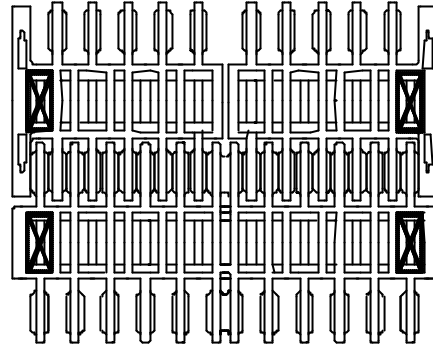
The required number of sprockets on the shafts depends on the load and the belt width. For an easy determination of the required number of sprockets to be used on the drive shaft and the idler shaft we advise to use the MCC calculation programme for chains & belts.

■ 500 – series



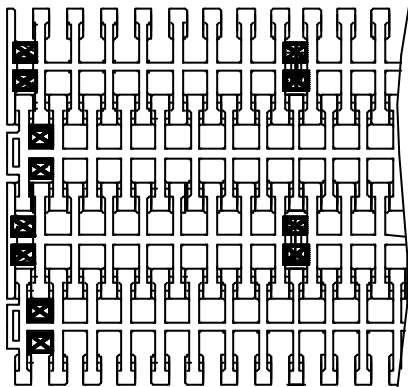
Sprockets can be positioned anywhere except the very outer pockets or at the module transfers.

■ 2000 – series



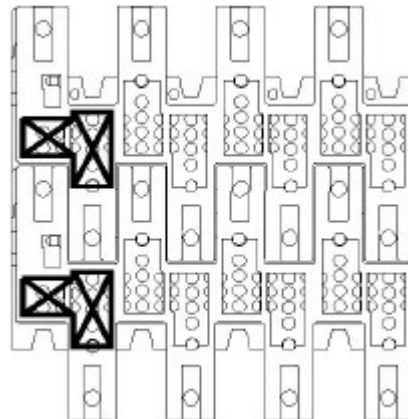
On 2000-series belts, the sprockets can not be placed at the very outer pockets of the belts. Sprockets can be placed inbetween the Positrack lugs.

■ 1000 – series



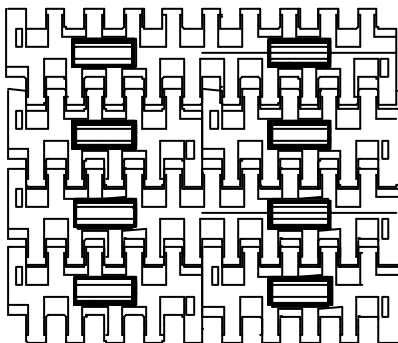
Sprockets can be positioned anywhere except the very outer pockets or at the module transfers.

■ 2500 – series



On 2500 series, the sprockets can not be placed in between the Positrack lugs.

■ 1005 – series



Sprockets can only be placed in fixed positions at one pocket each 85 mm.

Shafts

In all situations stainless steel is recommended for shaft material. Metaloxides 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. MCC recommends to use a shaft with a hardness of > 25 HRC.

For sprockets driving chains, usually round shafts are used. For belts, round or square shafts can be used.

■ 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
- No keyway preparation is required
- Larger drive surface results in a better load transfer

- ✓ **Maximum deflection of the shaft must not exceed 2 mm. Depending on the load and shaftlength, it can be necessary to use 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.

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

Bearings

Drive shafts always require keywayed sprockets on a shaft with roller bearings. Idler drums/sprockets can rotate freely on a static idler shaft without bearings at speeds up to 30 m/min without lubrication and up to 60 m/min when lubricated.

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

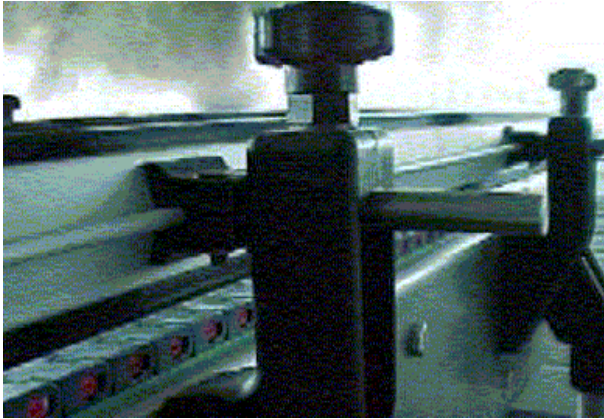
When the speed of all idler sprockets on the shaft is the same, e.g. on a wide belt conveyor, we recommend to fix all idlers on a shaft with bearings. This way there is no difference in velocity between the shaft and the sprockets and no wear of the idlers will occur.

■ Fixing the 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.

Guiderail construction

To avoid products from falling of the conveyor, usually a guiderail system is used. A guiderail system mainly consists of profiles which are in contact with the products and brackets to mount these profiles to the conveyor frame.

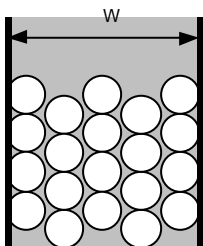


Guiderails can be made of stainless steel or aluminium. In order to protect the products, an additional plastic profile is often used to cover the stainless steel or aluminium profile. This also gives the advantage of noise reduction and lower friction.

- ✓ **To create hygienic constructions, stainless steel guiderails are used more often, without additional plastic profiles. This way the construction can be cleaned better.**

Adjustment of guiderail system

A guiderail system can only be appropriate when the conveyor builder takes care of the distance between both guiderails and the height of the guiderails. With the formula below, the distance (W) can be calculated.



$$W = (nr - 1) * D * 0.866 + D + 5$$

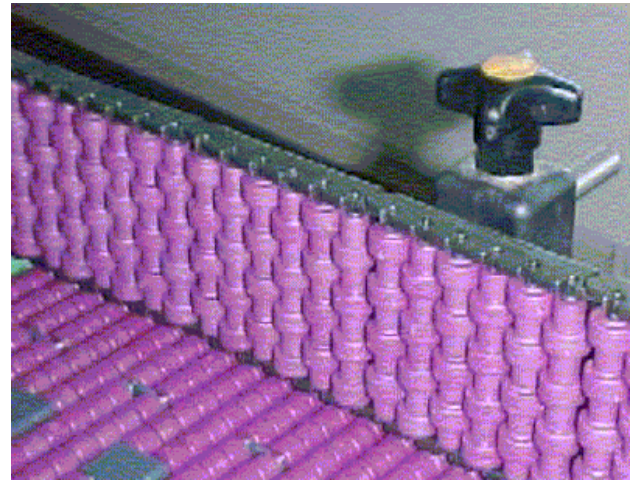
W = distance between two guiderails
 Nr = number of rows of products
 D = diameter product

When the actual distance between two guiderails deviates considerably from the calculated value, the products will not show a 60 loading pattern. This could result in an extremely high backline pressure.

Regarding the height of the guiderails, there are two considerations:

1. The space between chains/belts and guiderails should be sufficient to let dirt and debris through.
2. The point of contact between product and guiderail should be lower than the centre of gravity of the product, for else the products could topple over. This is especially important for unstable products.

Roller guides



MCC programme contains guiderails with rollers. These guiderail systems are used to prevent the products from being damaged on e.g. accumulation conveyors.

Advantages roller guiding:

- + Avoid damage to products, mainly labels
- + Lower backline pressure on accumulation conveyors
- + Smoother product handling on combiners
- + Optimum running of inclined conveyors

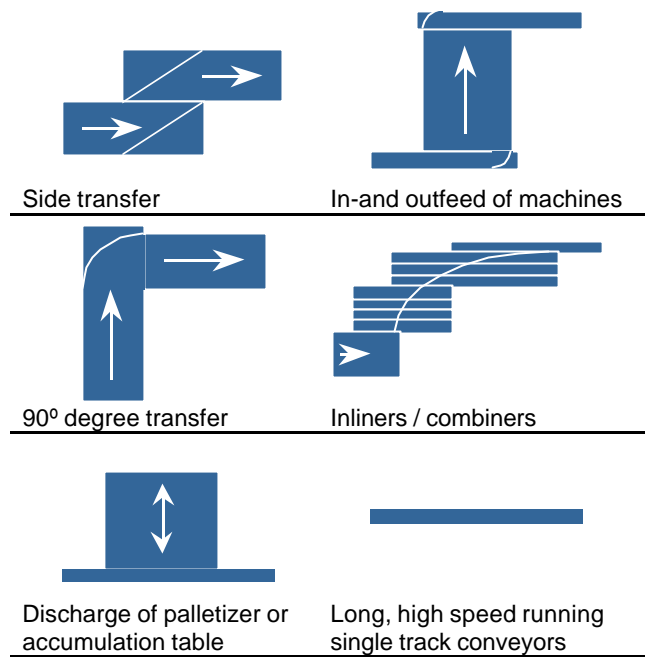
Positrack belts & applications

MCC Positrack system

Positrack is the name of a guiding system that guides the belts on the bottom side by means of lugs at the underside of the belts.

- + The belts are positively guided without the need for additional installation of profiles on the conveyor side. These profiles are a possible trap for debris and jamming;
- + Only one standard conveyor construction can be used for both slatband chains and belts;
- + The space between belts can accurately be adjusted and maintained.

The Positrack system is applicable at all positions in the line where the product flow differs from the running direction of the belt, and also on long, high speed running single track conveyors see drawings.



Positrack position & design

When a small space between multiple Positrack belts is required, it is recommended to use an adjustable wearstrip construction in order to create a small gap inbetween the belts.

505/1255- series Flexbelts



Single Positrack both sides

Double Positrack lugs on outside of the belt, both positioned 21.5 mm from outsides.

500- series belts



Single Positrack one side

Guiding of belt in one direction, therefore an additional guiding might be needed at transfers. Make sure the Positrack is installed on the preferred side of the belt

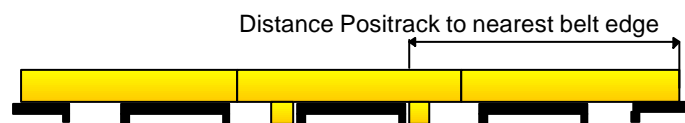
1000/1005-series belts



Double Positrack one side

Make sure the Positrack is installed on the preferred side of the belt. Guiding of belt in both directions, total width of lugs is 42.1mm. Suitable for single track and wide conveyors

2000/2500- series belts



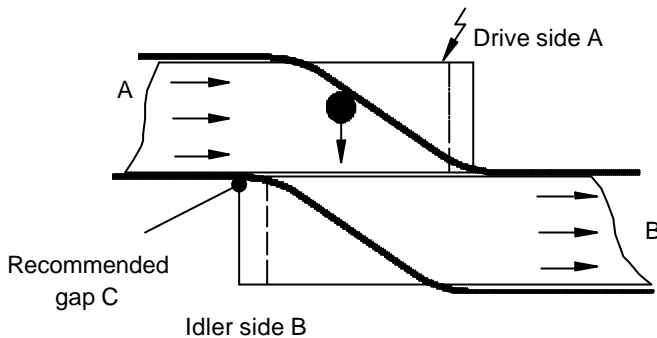
Centre Positrack

Controlled equal expansion in both directions.

- ✓ With Positrack constructions, always take the thermal expansion direction of the belt into account. Make sure clearance is enough to provide for proper running and tracking.

Side transfers

Depending on product type, side transfers are the best and most simple way of transferring. Unlike head to tail transfers, side transfers reduce risk of tipping products. This construction can be used for both single- and multiple-track conveyors.



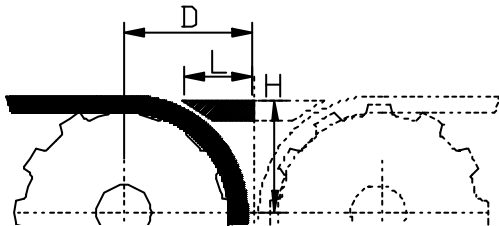
For side transfers, chains/belts should have an excellent flatness. The conveyor should be flat and the gap between the chains/belts should be as small as possible. Finally guiderail adjustment should be done properly to ensure smooth product handling.

If side transfers are used with belts, the following aspects deserve special attention. Belt A will tend to move towards belt B, because the guide rail forces the products to move sideways. There should always be a small gap between two chains/ belts, to prevent the risk of one chain/ belt climbing upon the outgoing one.

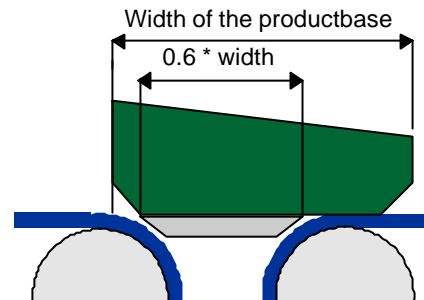
- ✓ **When designing a side transfer using MCC belt, it is strongly recommended to use Positrack on these belts, in order to eliminate the sideways moving of the belt.**

Dead plate transfer

Dead plate transfers are mainly suitable for multiple track conveyors with a mass flow of products. To obtain a continuous product flow, small pitch belts are used in combination with small rollers and deadplates which makes the transfer self clearing.



■ Self clearing transfer



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

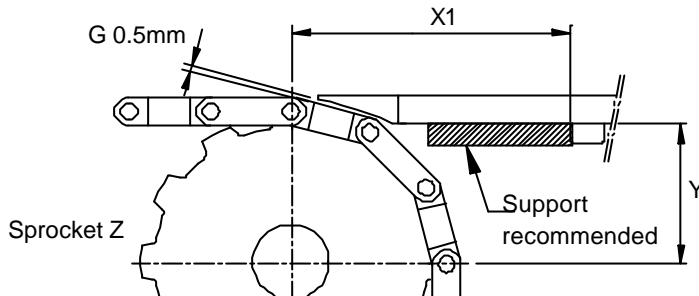
Chain/ Belt type	Roller/ Sprocket	L	D	H
500-series	25 mm	11.0	23.5	21.1
	16 teeth	21.5	38.5	35.0
505-series	30 mm	16.5	30.1	27.5
flexbelt	28 teeth	38.0	65.0	60.0
1000-series	50 mm	19.5	38.0	33.5
	12 teeth	33.5	57.0	52.5
1000-series	50 mm	23.7	41.5	38.2
Super Grip	12 teeth	33.5	57.0	52.5
1005-series	50 mm	24	44	37.5
XLG	13 teeth	44.3	64.5	57.9
1005-series	50 mm	36.7	55.8	52.5
LBP	13 teeth	58.9	77.5	72.3
1005-series	50 mm	24	44	40
Super Grip	13 teeth	44	64.5	60.4
1255-series	60 mm	34	47.6	42.5
Flexbelt	8 teeth	36.5	49.4	47.8

- ✓ **Precautions should be taken to properly install and adjust the deadplates and some adjustments might be necessary to achieve the desired performance.**

Freeflow transfers

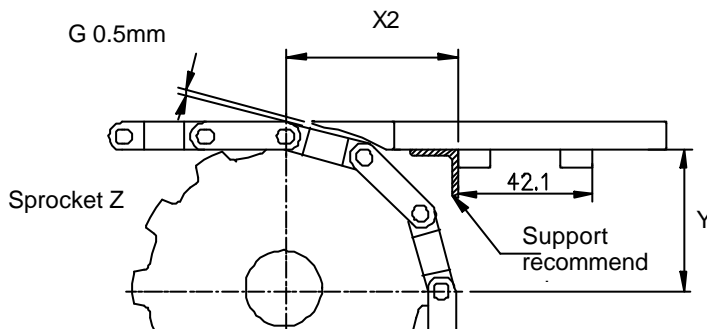
Freeflow is a system of integrated, tapered flights at the edge of the belt which allows for smooth 90° transfers without deadplates resulting in a self clearing construction. The MCC Free Flow system is always equipped with the MCC Positrack system which ensures an optimum tracking of the belt at the 90° 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	FT(P) 1000	12	91.5	44.3
FFGP 1000	FG(P) 1000	18	93.5	67.9
		20	95.0	75.6

Freeflow with double Positrack

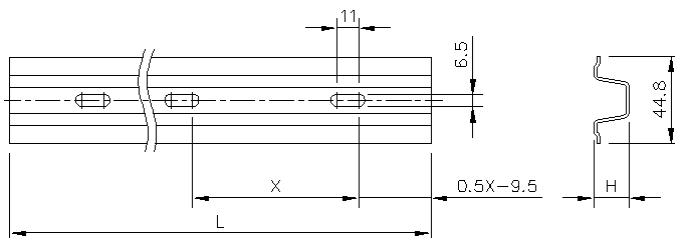


From:	To:	Z teeth	X2 [mm]	Y [mm]
FFGP 1000	FG(P) 500	16	58.5	27.9
		28	60.0	52.6
FFTP 1000	FT(P) 1000	12	59.0	44.3
FFGP 1000	FG(P) 1000	18	61.5	67.9
		20	63.0	75.6
FFTP 1005	FT(P) 1000	12	75.4	40.7
		18	77.7	64.8
FFTP 1005	FT(P) 1005	20	78.5	72.8
		13	76.0	46.7
		18	77.9	66.8
		21	79.0	78.9

✓ 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.

Fingerplate transfers

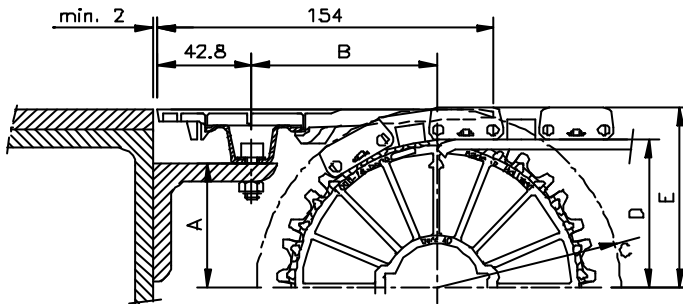
Fingerplate transfers ensure a trouble-free transfer of products from and to the raised rib belts. MCC has developed a unique Click-Comb system, which makes it possible to click the combs onto a special Omega style bar, providing a smooth product transfer. RR 1000-series and RR-2000 series Fingerplate 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 = 85.0 mm	X = 76.2 mm
H = 18 mm	H = 15 mm

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.

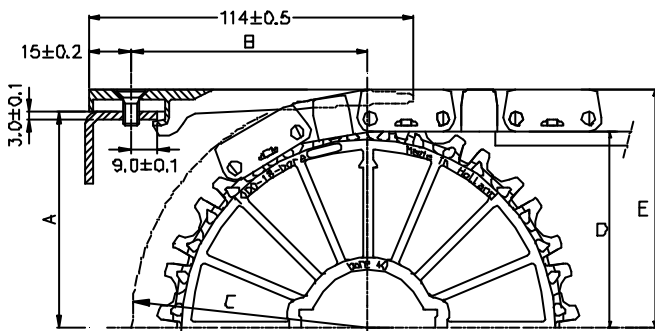
Finger transfer RR 1000-series



Nr. of teeth	Dp	A	B	D	E
12	98.1	33.2	75	44.3	58.6
16	130.2	49.5	80	60.6	74.9
18	146.3	56.8	85	67.9	82.2
20	162.4	64.5	90	75.6	89.9

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.

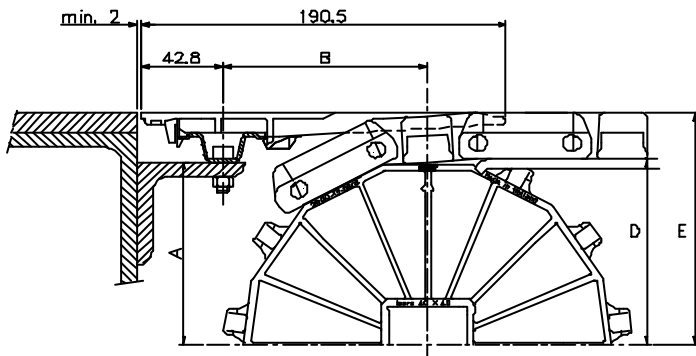
Finger transfer RR 1000-series narrow belts



Nr. of teeth	Dp	A	B	D	E
12	98.1	51.5	80	44.3	58.6
16	130.2	76.6	80	60.6	74.9
18	146.3	75.7	80	67.9	82.2
20	162.4	83.7	80	75.6	89.9

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

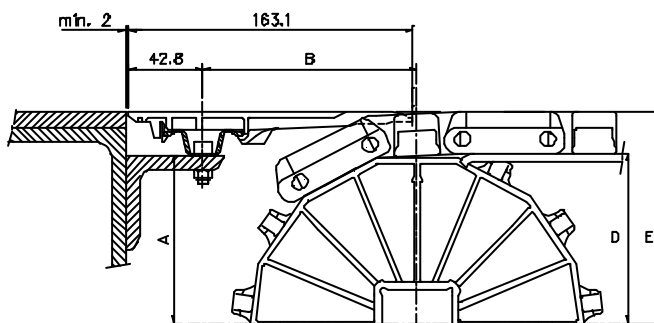
Finger transfer RR 2000-series in general conditions



Nr. of teeth	Dp	A	B	D	E
10	164.4	72.3	110	73.7	97.7
12	196.4	88.4	114	89.8	113.8
13	212.2	96.5	116	97.9	121.9
16	260.4	120.6	122	122.0	146.0

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	E
10	164.4	72.3	122.3	73.7	97.7
12	196.4	88.4	122.3	89.8	113.8
13	212.2	96.5	122.3	97.9	121.9
16	260.4	120.6	122.3	122.0	146.0

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

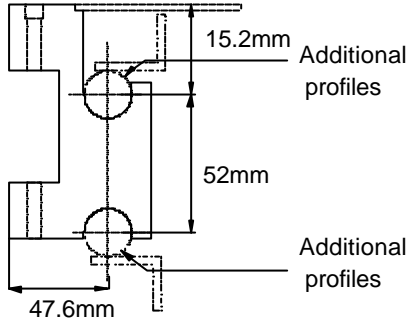
For the 1000/2000-series fingerplates, a minimum gap of 2 mm next to the fingertransfer plates is recommended. This gap is necessary for easy removal of the fingerplates for replacement.

Finger transfer construction SR 2500 belt

2500-series Finger transfers are used for infeed and outfeed of glass pasteurizers. There is a small gap between the fingers, which allows glass to fall through. The system is designed into a way that the fingers are always in contact with the belt, removing broken glass effectively from the belt.

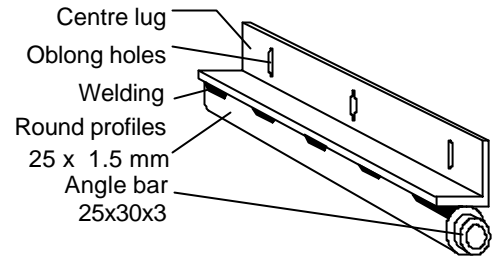
The 2500-series finger transfer consists of separate mounting blocks and replaceable fingers. The mounting blocks are positioned on standard round profiles, allowing easy sliding of the block. The fingers can be replaced individually, with a screwdriver. The fingers are positioned by pushing them into the mounting block.

■ The mounting block



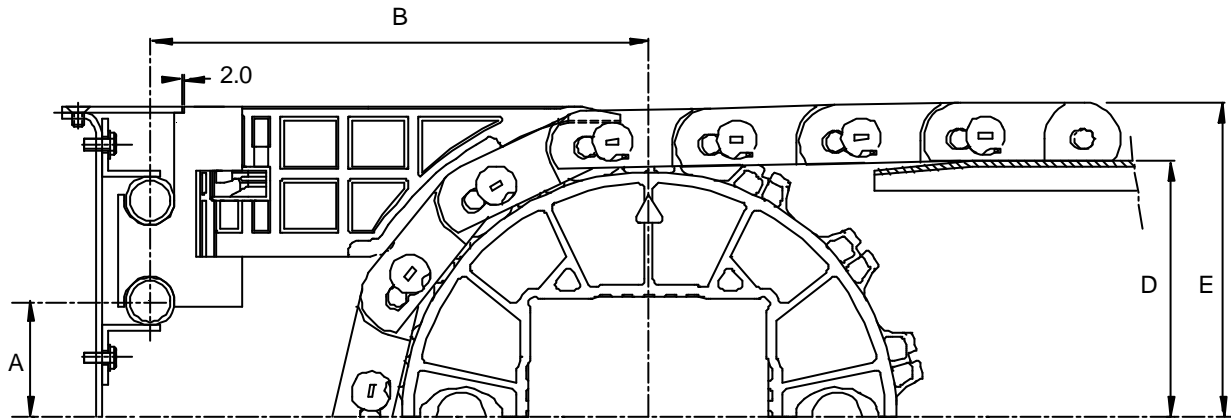
The mounting block can slide over the shafts or pipes, along with the width of the belt, which can vary with temperature changes.

■ Additional mounting guides



This is an example regarding the additional construction for mounting the blocks. It is recommended to make oblong holes for easy height adjustment of the outfeed/ infeed.

Finger transfer SR 2500-series



Sprocket teeth	Dp	A	B	D	E
14	285.4	59.4	254.9	131.6	161.6

Magnetflex® programme & selection

Magnetflex® curves are available in different materials, each for specific applications. In the table below you will find guidelines for the selection of the curve material.

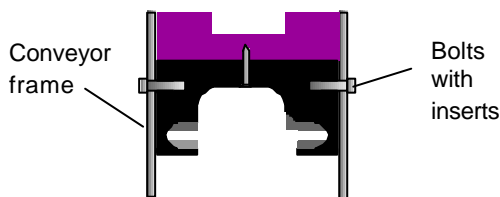
Curve type	Material upper part	Properties	Application
• Combi-A •	MCC 1200 Aubergine UHMWPE	Good wear and abrasion resistance	Suitable for most applications
• Combi-G •	MCC 2000 Green-yellow UHMWPE & ceramic additives	Superior abrasion resistance	Dry and lubricated abrasive conditions, e.g. glass works
• Combi-S •	MCC 3500 Grey Special polyamide	High PV limit Optimum wear resistance	Dry running high speed lines with plastic chains. Check calculation programme for PV limit
CIP-curve	MCC 1200 Aubergine UHMWPE	Built-in nozzles to be connected with existing CIP-system	Self cleaning and optimum hygienic

Return part material of all curves is MCC 1001 UHMWPE
Return guide shoe material is MCC 1000 UHMWPE

Curve installation

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

■ Installing Magnetflex® curves



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

■ Installing 6-track+ curves



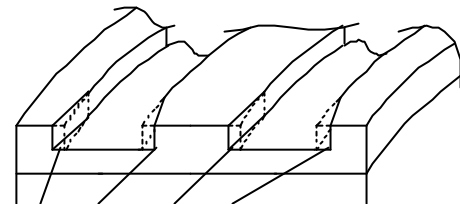
Returnpart supported by metal cross bars

For curves wider than 6 tracks, we recommend to mount the parts separated and to support the curve upperpart and the curve returnpart with cross bars, to guarantee a flat returnpart.

- ✓ **Make sure the curve is mounted level, and the conveyor frame is positioned level.**

Chamfering curves

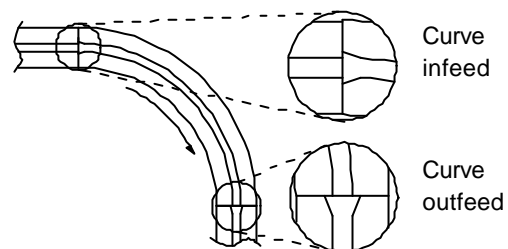
■ Chamfering the curve infeed



Chamfering of curve infeed

All upperpart infeed sides should be bevelled to ensure a smooth running of the chains. Make sure to chamfer the parts at a 90° angle to the horizontal surface.

■ Chamfering positions

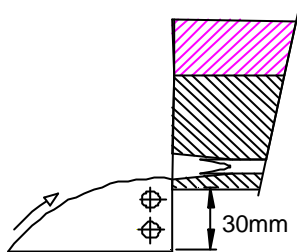


The chamfering of the curves has to be done only at the infeed sides.

Guideshoe position

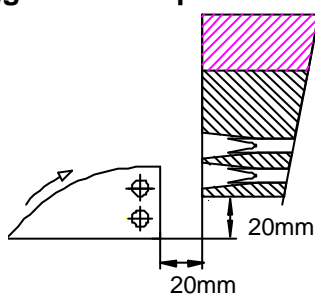
Using MCC return guideshoes assures a troublefree infeed of the chain in the curve returnpart. The return guideshoe should be mounted in the right position can differ.

Returnpart at same level



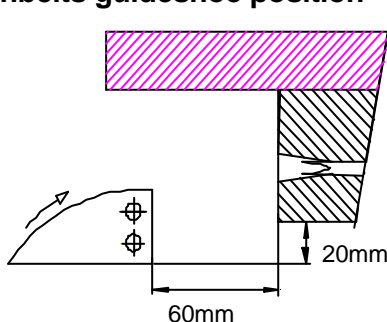
Returnpart guideshoe should be mounted against infeed of underpart, with underside of the guideshoe 30 mm lower than the curve underside.

Staggered returnpart



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

Chainbelts guideshoe position



The 1050- and 1055 chainbelts are suitable to be used with MCC's Magnetflex® curves, because the pins can be attracted by magnets.

Position of the curve infeed differs from the curve infeed of slatband chains, as shown in the drawing. The infeed shoe should be positioned 20 mm below the curve infeed, at a distance of 60 mm.

- ✓ **The return guideshoe has to be mounted at the infeed side of the return part of the curve.**

Drilling area for inserts



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.

- ✓ **Always check returnpart for protruding bolts, which could obstruct the chain.**

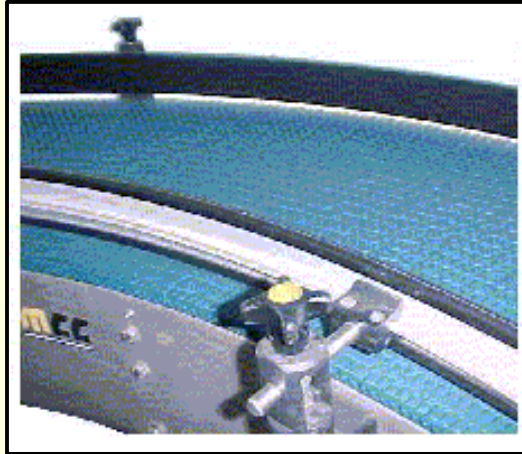
TAB-curves

Besides Magnetflex® curves, also TAB-curves can be used for sideflexing conveyors, in combination with TAB-chains. The installation instructions are basically the same as for Magnetflex curves. The curves should be mounted level, and the curves should be chamfered at the infeed sides.

TAB curves normally run without an infeed shoe. The curves can be one piece, or two pieces with the same returnpart as the upperpart. The one piece curve can be mounted in the same way as Magnetflex® curves with optional inserts in the side of the curve.

Please check MCC catalogue for curve dimensions.

SPECIFIC APPLICATIONS



RBP Sideflexing belts

Inclined & declined conveyors

Accumulation of products

Pasteurizers, warmers, coolers

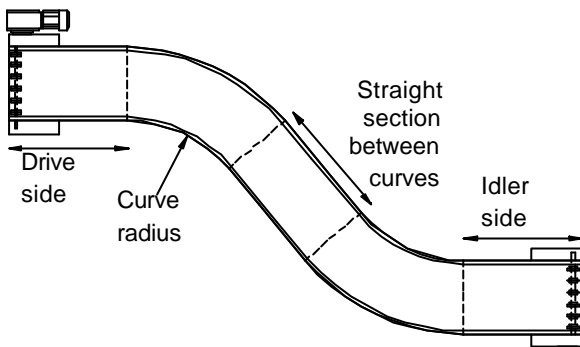
Pressureless combiners

Crate conveyors

Lubrication & dry running conveyors

Reducing noise & static electricity

RBP Layout guidelines



■ **Drive side**

Minimum length with tensioner is 500mm
Minimum length without tensioner is 600 mm

■ **Idler side**

Minimum length 500mm

■ **Curve radius**

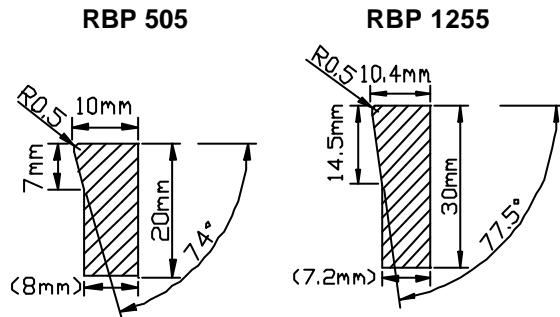
Minimum curve radius is 2 times the beltwidth

■ **Straight section between curves**

S-bends have a minimum straight section of 1.5 times the beltwidth. Curves in same direction have no minimum required straight section.

Guiding profile

The only recommended way to guide sideflexing belts through the curve is the use of the MCC's special machined guiding profile. The profile is machined from MCC 3500 material, providing a suitable material combination with the RBP belt material. For dimensions of the profile, see drawings.

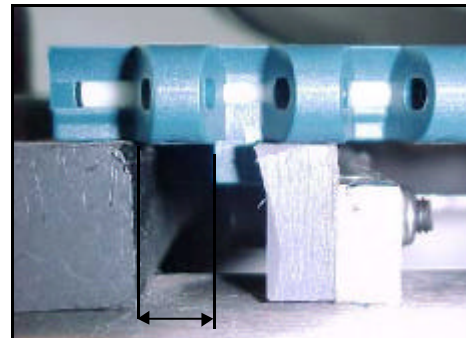


This material combination allows the highest combination of load and speed in the curve. The contact surface of the profile has got a high quality surface finish to provide a smooth contact with the lugs.

Recommended clearance

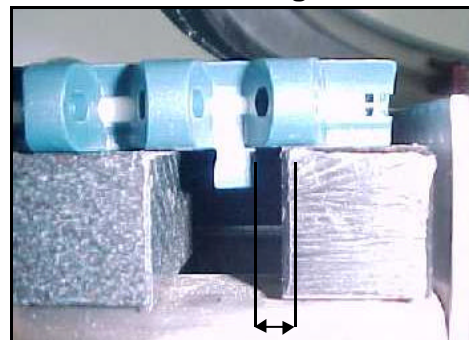
In curves, the belt should be guided by the **outside** Positrack lug only, and the **inside** Positrack lugs should **not** be guided. For recommended clearance of Positrack lugs, please see drawings below.

■ **Outside Positrack lugs**



6.5 mm clearance

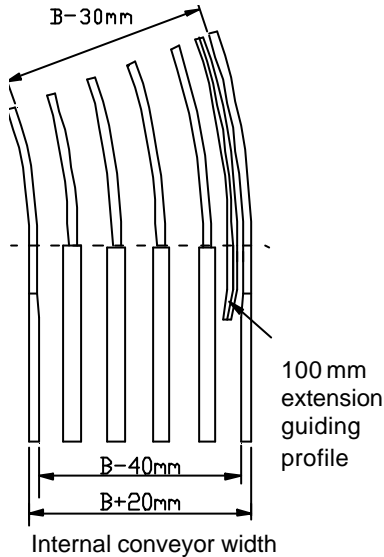
■ **Inside Positrack lugs**



6.5 mm clearance

Upperpart construction

We strongly recommend that the strip extends from the curve into both straight sections with a length of at least 100 mm. Bent the strips to the inside in order to eliminate the chance of catching.



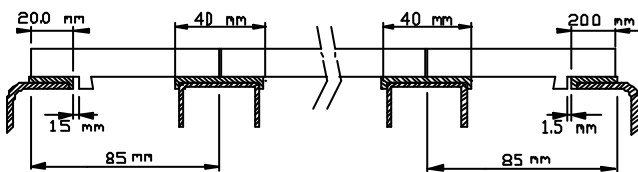
■ Guiding profile

The guiding profile should extend 100mm into the straight section. Make sure the guiding profile ends are bent inwards to ensure smooth in- and outfeed of the belt. Support the guiding strip by a metal profile over the complete length

■ Dimensions internal width

Internal conveyor width	beltwidth+ 20mm
Curve wearstrips	beltwidth- 30mm
Wearstrips straight section	beltwidth- 40 mm

Straight sections



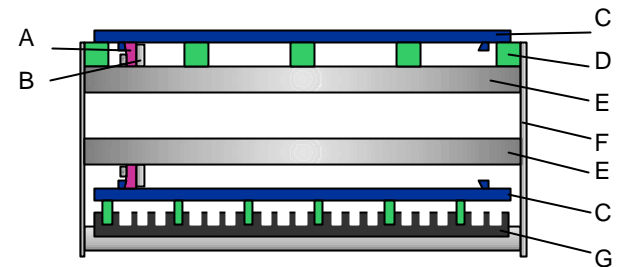
MCC flexbelts are built-up with standard increments of 85 mm. The belt should only be guided at the outside of the Positrack lugs in the straight sections. Do not guide the belt at the outside of the modules. Make sure that the top of all the wearstrips are flush in the complete construction. Free rotating rollers are recommended in the returnpart

✓ **We recommend to make the straight upper part as open as possible, to reduce the friction.**

Cross section RBP modular curve

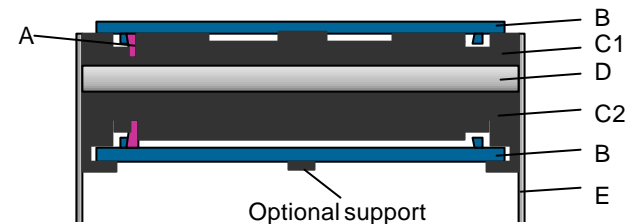
RBP beltcurves type can be built using cross bars, and wearstrips. The MCC guiding profile should be used to guide the belt through the curve. MCC can also supply you with complete machined curves, which are ready for easy installation.

■ Classic belt curve



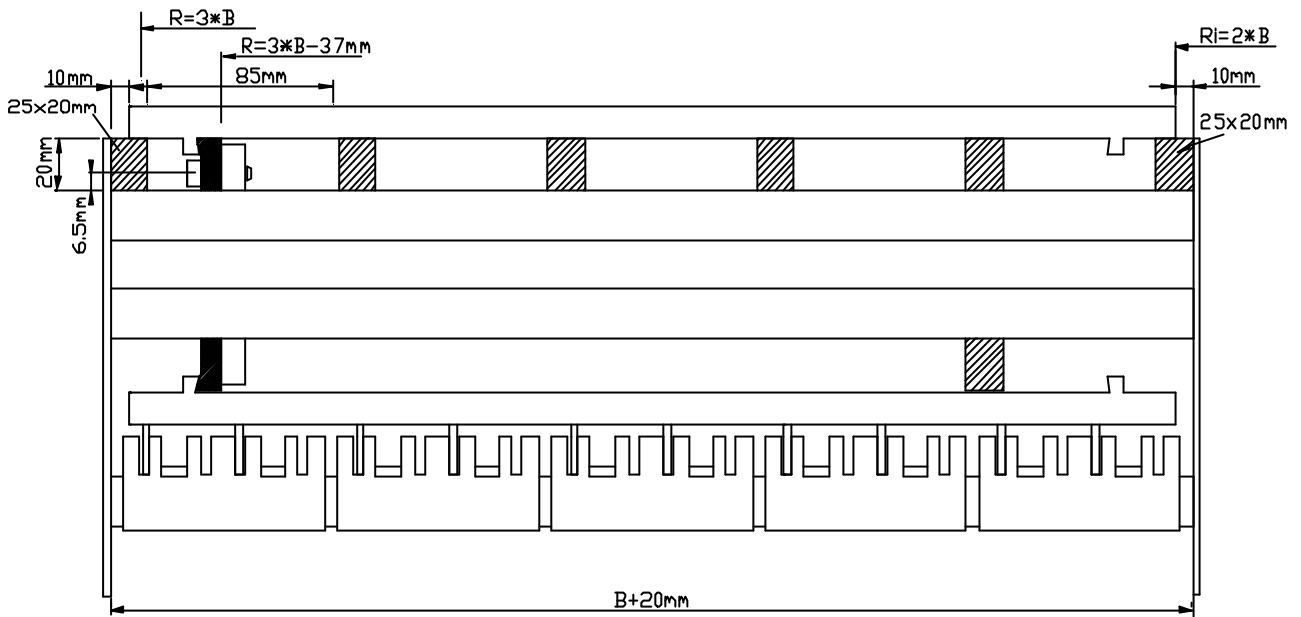
- A: Guiding profile
- B: Steel support strip
- C: Sideflexing belt
- D: Wearstrips
- E: Cross bars
- F: Conveyor sideframe
- G: Serpentine return

■ MCC machined curve section

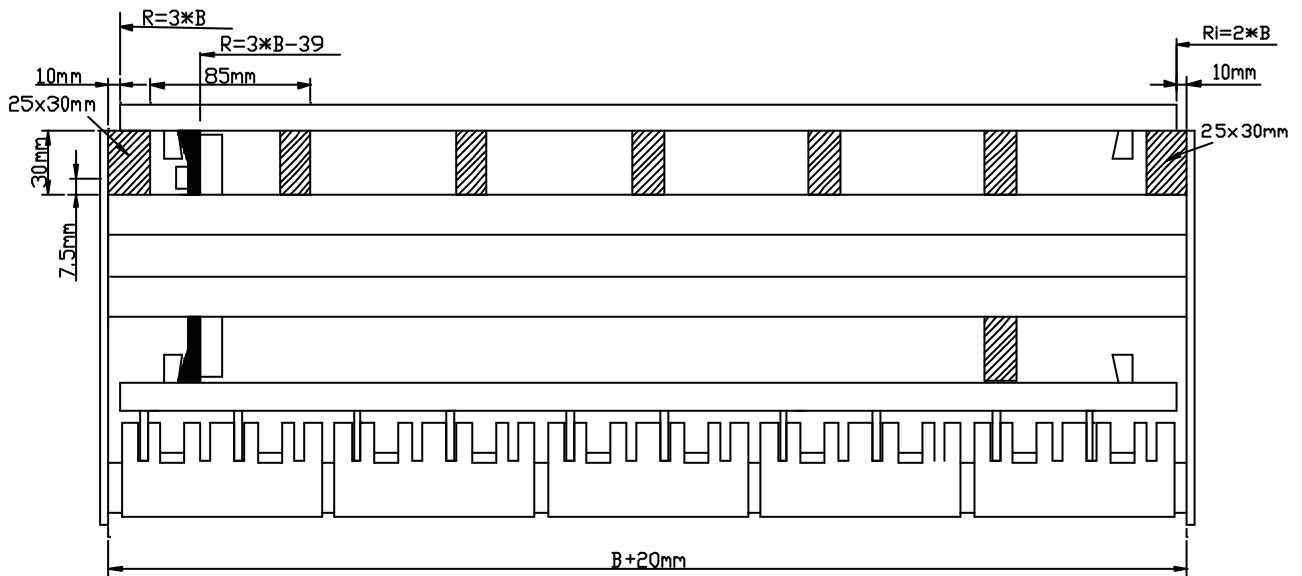


- A: Guiding profile
- B: Sideflexing belt
- C1: Machined curve upperpart
- C2: Machined curve returnpart
- D: Cross bars
- E: Conveyor sideframe

Construction dimensions RBP 505 curve

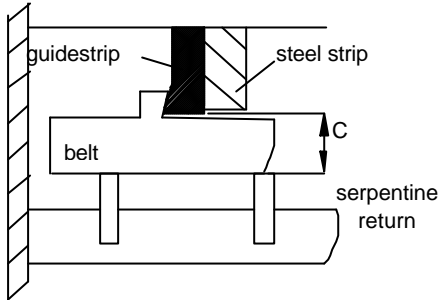


Construction dimensions RBP 1255 curve



Returnpart modular curves

For the return part in a modular curve section we recommend to build an open structure returnpart, e.g. serpentine wearstrip construction. This way dirt and debris cannot get stuck between the belt and its support, and the returnpart has a more favourable accessibility.



505-series: C = 13.5 mm
1255-series: C = 14 mm

When clearance C is too little, the belt will not run smoothly through the returnpart. When the play is too big, only a small area of the Positrack lugs is used for guiding the belt, which results in wear of the lugs.

- ✓ **Recommended angle between cross bar profiles is 15°, in order to eliminate vertical deflection of the serpentine wearstrips in the returnpart.**

Sprockets

Nr. of sprockets at drive side:

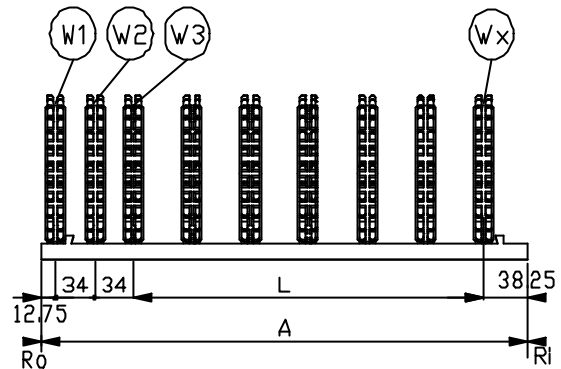
$$(\text{Beltwidth} / 85) + 2 \text{ for curve applications.}$$

Nr. of idler sprockets required:

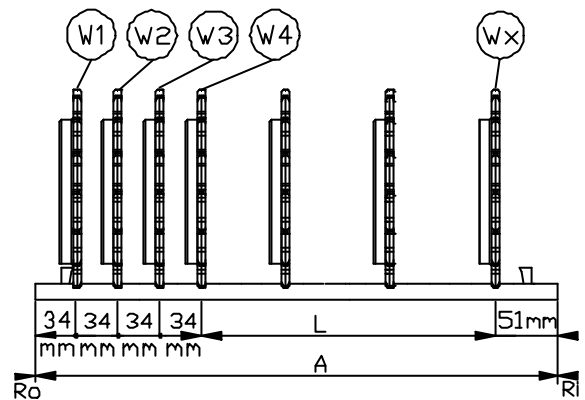
$$(\text{Beltwidth} / 85)$$

For straight running applications only, the number of sprockets may vary, contact our Technical Support department.

505-series



1255-series



A: belt width

Ri: inside radius

Ro: outside radius

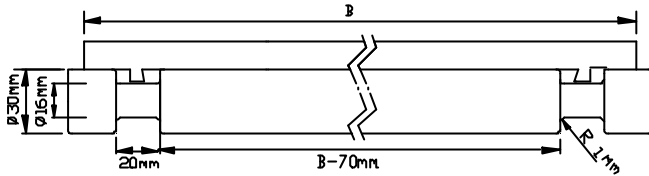
Sprockets W1, W2, W3, W4 and Wx as per drawing.

Other sprockets equally spread.

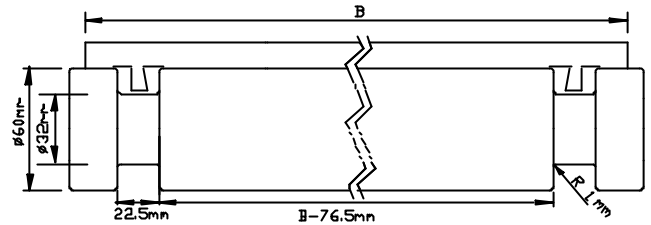
Roller dimensions

Optimum solution for roller construction for flexbelt is to use a wide stainless steel roller. Rollers must have 2 grooves to accommodate the Positrack lugs and also support the belt at the outsides of the Positrack. See drawing below for roller dimensions.

■ 505-series



■ 1255-series



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

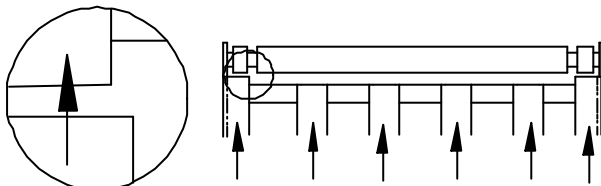
The grooves are not used for tracking the belt, therefore sufficient space for the Positrack lug is important. Using these grooves for tracking the belt can result in lifting the belt lugs on the outside of the roller and seriously damaging the belt. Make sure all shaft edges are rounded off.

✓ **Rollers must be equipped with bearings for smooth running. For roller material, stainless steel is recommended**

Wearstrip – roller transfers

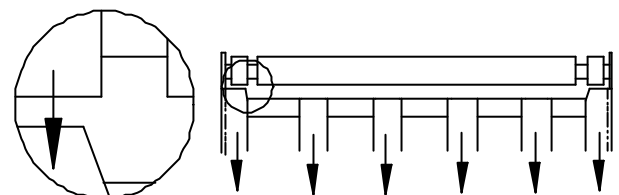
For the construction of the transfers between the wearstrips and the rollers we refer to the drawing below, to achieve the right tracking of the belt. Only the wearstrips are used for tracking the belt on the rollers, not the roller grooves.

■ Drive side



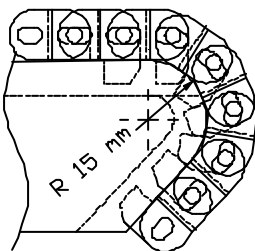
The wearstrips should prevent the Positrack from climbing upon the edge of the roller. The wearstrip must guide the belt onto the roller and the Positrack lugs into the roller grooves.

■ Idler side



The wearstrips should be chamfered to prevent the Positrack lug to catch at the wearstrips.

■ Nose bar profiles for RBP 505



Roller with bearings

- +Longer life
- +No heating up
- +Less belt tension

Nosebar

- +Stability
- +Less complex
- +No deflection

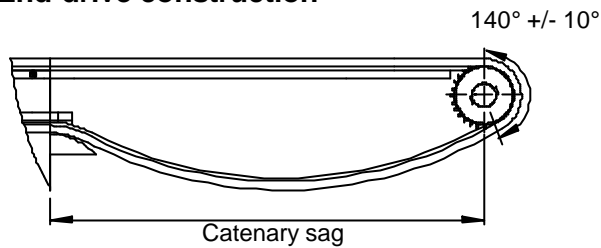
Although MCC prefers rotating rollers, there are situations where nose bars are used at head to tail transfers instead of rotating rollers. In this case the belt turns on a static, nose shaped bar.

Polyamide with self lubricating additives is strongly recommended as nose bar material. This material has a high PV-limit and optimum wear resistance. This is of importance when 505-series flexbelts are operating in dry running lines.

✓ **Make sure the nosebar has grooves to accommodate the Positrack lugs and these grooves should not be used for tracking the belt.**

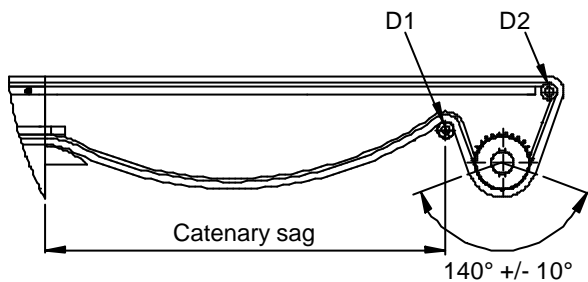
Drive constructions & catenary sag

■ End-drive construction



RBP 505 & 1255: Catenary sag = 600 mm

■ Centre drive without tensioner



RBP 505

Sag = 600mm

D1 = 30mm

D2 = 30mm

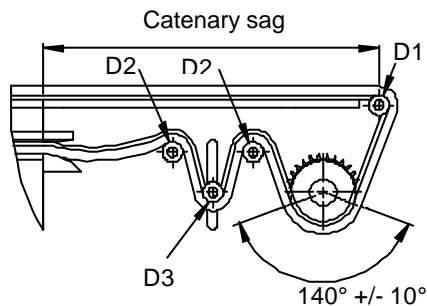
RBP 1255

Sag = 600mm

D1 = 60mm

D2 = 50mm

■ Centre drive with tensioner



RBP 505

Sag = 500mm

D1 = 30mm

D2 = 30mm

D3 = 30mm

RBP 505 tensioner

5 kg/mtr width

RBP 1255

Sag = 500mm

D1 = 60mm

D2 = 50mm

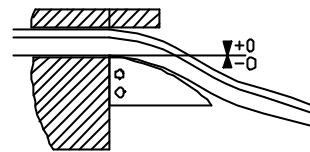
D3 = 60mm

RBP 1255 tensioner

4 kg/mtr width

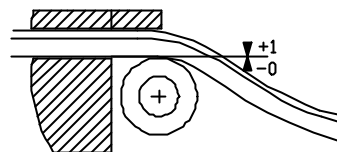
Infeed positioning

■ Curve Infeed shoe



Upperside of guideshoe should be level with the infeed gap of the construction

■ Curve Infeed roller



Top of roller should be about 1 mm above the infeed.

Recommended roller diameter:

RBP 505: 30mm

RBP 1255: 60mm

- ✓ **To drive RBP-series belts, a soft-start or frequency controlled drive is strongly recommended. This prevents the belt from running inconstantly because of the sudden load applied. Also when the belt has to start up under full load, the belt is extended or elongated suddenly when no soft-start is being used. The extra belt length can cause the belt to catch in the conveyor and the belt might lose contact with the drive sprockets.**

Inclines & declines

Slatband chains and belts 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. The maximum possible angle is depending on several factors: Coefficient of friction between chain/belt and product; acceleration/deceleration; product stability; external factors like dust or debris.

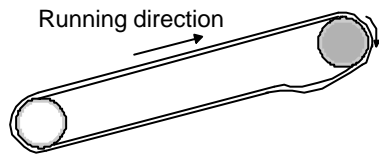
Maximum angles inclines / declines		
Chain type	Lubricated	Dry running
Steel chains	4°	8°
Plastic chains/belts	2.5°	4.5°
Rubbertop chains/belts	9°	20°

Variations can vary due to actual circumstances. For applications with steeper in- or declines, chains/belts with pushers or detainers could be considered.

Drive construction inclines

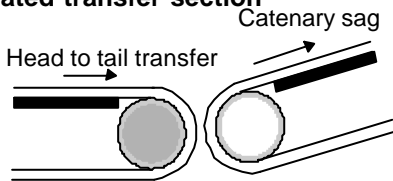
Normally, an inclined conveyor has the drive at the upper end of the conveyor. See drawings below for different inclination constructions.

■ Classic inclined construction



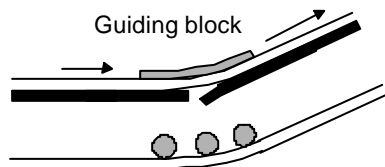
Suitable for inclines up to 5°

■ Separated transfer section



Separated head to tail can be equipped with a deadplate inbetween

■ Integrated transfer section



Chain or belt should be supported at the top to prevent lifting

If the levelled section and the incline are integrated in one conveyor section, the belt should be supported by a guiding profile. For belts with flights or Supergrip, it is possible to support the belt at the indents.

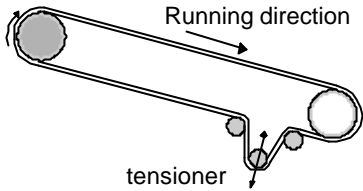
Drive constructions declines

Declined conveyors have the drive at the upper- or at the lower side of the conveyor. 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 (\angle critical) with:

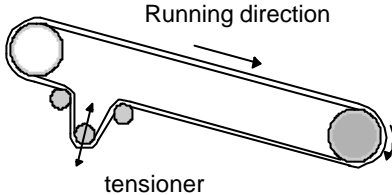
$$\tan(\angle \text{critical}) = \text{Friction between chain - wearstrips}$$

Drive should be at lower end if:
Actual decline angle is less than the critical angle



✓ **Tensioner is recommended**

Drive should be at upper end if:
Actual decline angle is steeper than the critical angle



✓ **Tensioner is recommended**

■ Curves in inclined conveyors

An incline before a curve can be made. After the curve, an inclination should be avoided, because the chain could be lifted out of the curve. A level section of at least 1 meter after the curve is recommended.

■ Curves in declined conveyors

A decline after a curve can be made. Before the curve, a declination should be avoided, because the chains could be lifted out of the curve. In this situation, we recommend to make a straight level section of at least 1 meter before the curve.

✓ **On inclined & declined conveyors, a soft start and a soft stop are always recommended.**

Accumulation of products

On conveyors where product accumulation occurs, the load on the chain/ belt is increased because of the friction between the product and the upperside of the chain or belt. This can result in an unacceptable load on the chain/ belt and also on the products conveyed. Eventually this could lead to product damage, at the underside of even at the sides of the products.

✓ **When using line-control facilities, the accumulation of products can be reduced.**

■ Reducing the backline pressure

Low Backline Pressure (LBP)-series chains or belts, will reduce backline pressure and noise, because of the accumulating rollers on top of the chain/belt. The LBP chains/belts are suitable for smooth and careful handling of multipacks, cardboard boxes and shrinkwrapped products and many more applications in which product damage must be avoided.

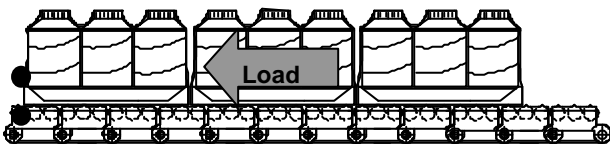
Low noise accumulation rollers:

The rollers that are used for our LBP chains are made of a special, sound absorbing material. It is a very tough and wear resistant material.

Special roller-pin retention:

The roller-pins have a knurled end, just like the hinge pins in MCC plastic chains. This prevents the roller-pins from rotating. Besides, the roller pins are held by special 'snap-in' clips. This way the chainlinks stay flat.

Calculating load on first product



← Conveyor speed →

Load on first product:

(Nr. of products – 1) * productweight * Friction coeff.

see table friction coefficients

LBP Returnpart construction

We recommend to use a flat surface in the returnpart but it is also possible to use guideshoes in the returnpart. Make sure the radius of these guideshoes is larger than the backflex radius of the chain/ belt. So for LBP-chains the minimum radius is 400 mm and for LBP-belts the radius of the guideshoes should be 300 mm minimum.

For the returnpart of LBP chains/ belts, rollers or serpentine wearstrips cannot be used.

For HDF-type LBP chains, it is possible to guide the chain in the returnpart using the tabs. Advantage of this open construction is that dirt can fall through the chain without obstruction in the returnpart.

✓ **The friction coefficient between product and LBP-series chain/ belt is as low as 0.11 Thorough cleaning of LBP-chains is very important. Productspillage (e.g. soft drinks) influence the friction coefficient negatively.**

Pasteurizer belt programme

MCC provides different choices in belts suitable for applications like pasteurizers, warmers or coolers.

■ RR 1000

This belt has a large open area with a small 1" pitch. Suitable for short warmers and coolers for cans and petaloid bottles. The relatively small pitch provides for smooth product transfer and belt operation.

■ RR 2000 XP

Features an open area combined with a maximum support area and optimum temperature and chemical resistance. These belts are cost effective and ideal for use in pasteurizers, warmers and coolers, especially with cans.

■ RRHD 2000YP

Heavy Duty version of RR 2000 XP. Ribs are more robust and reinforced by cross ribs. This belt is much more suitable for glass handling applications with limited glass breakage.

■ SR 2500 YPR

Specially made for use in heavy duty conditions: long, heavily loaded pasteurizers for glass bottles. Also recommended in conditions with high glass breakage rates (up to 0.5%)

Technical properties

Properties	Belt Pitch	Max. working load (N/m)	Temp. range wet (°C)	Open area
RR 1000 XLG	1"	22000	4 - 65	40%
RR 1000 XP	1"	11000	4 - 104	40%
RR(P) 2000 XP	2"	29500	4 - 104	30%
RRHD(P) 2000 YP	2"	29500	4 - 104	27%
SR(P) 2500 YPR	2.5"	47500	4 - 104	20%

General Selection

Properties	RR 1000 XLG	RR 1000 XP	RR(P) 2000 XP	RRHD(P) 2000 YP	SR(P) 2500 YPR
Cans 2-piece	++	++	++	++	+
Cans 3-piece	++	++	++	++	+
Cans & one way glass	-	-	-	++	+
One way PET	++	+	-	-	-
One-way glass	-	-	-	+	++
Return glass	-	-	-	-	++

++ Recommended
 + Suitable
 - not recommended

Sprockets & Shafts

The number of sprockets on the drive shafts depends on the load of the belt. We can calculate exactly how many sprockets are recommended for a certain application.

The sprockets should be able to freely move sideways on the shaft, to be able to follow the expanding or contracting belt. One sprocket per shaft, preferably the centre sprocket, should be fixed on the shaft by means of e.g. retainer rings. Please note that this is not necessary for belts equipped with Positrack lugs.

- ✓ For pasteurizers, warmers and coolers, the use of square shafts is recommended.

Wearstrip construction

For pasteurizers, two different wearstrip materials can be used; UHMWPE or Stainless Steel.

■ UHMWPE

For pasteurizers with a maximum temperature of 80° C in non-abrasive applications (not recommended for glass handling). UHMWPE has a very low coefficient of friction, it provides a favourable belt wearlife in these circumstances and the material is cost effective.

■ Stainless steel

Stainless steel can be used in any pasteurizer at any temperature. It should certainly be used if the temperature is higher than 80° C or if the circumstances are abrasive, like in glass pasteurizers. Stainless steel in a cold rolled quality is recommended.

- ✓ **Polyamide wearstrips are not suitable for humid applications.**

There are two possible ways to support the belt in the upper part: parallel strips in longitudinal direction and strips mounted in a Chevron pattern.

- ✓ **In pasteurizers, a parallel wearstrip construction is recommended, especially when belt is equipped with Positrack lugs.**

Returnpart and drive

Pasteurizers, warmers and coolers are end-driven. As with other conveyors, a proper catenary is required. Due to the large size of the machine, the high loads and the big temperature differences, the elongation of the belt in operation is considerable.

It is important, especially in double deck pasteurizers, to avoid the development of the catenary sag in only one position. It should be spread as much as possible over the entire length of the machine. A certain pre-tension in the belt helps minimizing the catenary. We have developed a special computer programme to help finding the optimum construction. Please consult the Technical Support department for a specific advice.

Fixing center sprockets

To make sure the belt will stay on track on both ends, the center sprocket should be fixed in axial direction onto the shaft, for the drive shaft as well as for the return shaft. This way the belt will always be kept in the middle at both ends of the pasteurizer, while being free to expand and contract at all times. The other sprockets should be able to move freely sideways on the shaft, to be able to follow the expanding or contracting belt. To guide the belt over the full length, upstanding edges at both sides of the belt are possible, however, the thermal width expansion of the belt should be taken into account.

Center Positrack

When belts with Positrack system are used it is no longer necessary to fix a sprocket on the drive and idler shaft. The Positrack lugs provide excellent belt tracking running on a 40 mm wide wearstrip over the full length of the pasteurizer.

For the RR 2000 (including RRHD) and SR2500, center Positrack is available. This special Positrack is used in combination with parallel wearstrips and ensures optimum tracking of the belt by two lugs enclosing the wearstrip in the center of the carryway. This provides proper tracking of the belts without the need of fixed sprockets.

The center Positrack is not always positioned exactly in the middle of the belt, this depends on belttype. When mounting the correct centre wearstrips to guide the Positrack lug, the actual distance of the centre Positrack to the belt edge has to be calculated.

■ Centre Positrack position

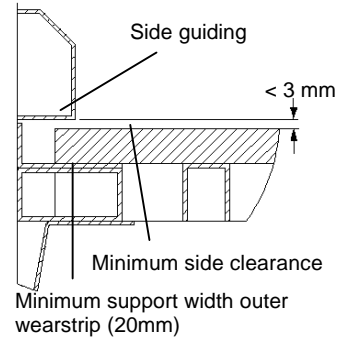
Divide belt width by 3"	
Even Number	Odd number
Position of Positrack lug is 38.1 mm off centre	Position of Positrack lug is in belt centre

- ✓ **Because SR 2500 and RR(HD) 2000 have no specific running direction, it is not important whether the centre Positrack is left- or right of centre.**

Beltwidth & internal width

Below you will find a calculation example for checking the beltwidth and the internal width of the pasteurizer.

Belt type	Thermal expansion coefficient (mm/m/°C)	Production tolerance (%)	Min. support width outer wearstrip (mm)	Min. clearance at both sides (mm)
SR 2500 YPR <2.5mtr. width	0.12	+ 0.3 - 0.4	20	10
SR 2500 YPR 2.5-5 mtr. width	0.12	+ 0.2 - 0.6	20	10
RRHD 2000 YP	0.15	+ 0.3 - 0.5	20	10
RR 2000 XP	0.15	+ 0.2 - 0.5	20	10
RR 1000 XP	0.15	+ 0.0 - 1.0	20	10
RR 1000 XLG	0.12	+ 0.3 - 0.5	20	10



■ Calculating the clearance

Calculation example SR 2500 YPR 3048		
Nominal belt width (20°C):	3048 mm	
Linear coefficient of expansion:	0.12 mm/m/°C	
Maximum temp (boil out!):	90°C	
Tolerance of production:	+ 0.2/ - 0.6%	
Minimum support width outer wearstrip:	20 mm	
Minimum side clearance	10 mm	

Calculation:	<p>Extra width by temperature expansion: $(90^{\circ}\text{C} - 20^{\circ}\text{C}) * 0.12 * 3.048\text{m} = 25.6\text{mm}$</p> <p>Possible variation in width by tolerance of production: $+(3048 * 0.2/ - (3048\text{mm} * 0.6\%)) = + 60\text{mm} / - 18\text{mm}$</p>
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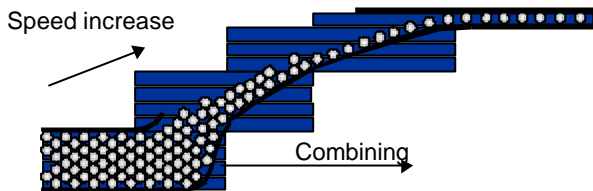
Output for belts without Positrack:	<p>Maximum possible belt width: $3048\text{mm} + 25.6\text{mm} + 6\text{mm} = 3079.6\text{mm}$</p> <p>Minimum possible belt width: $3048\text{mm} - 18\text{mm} = 3030\text{ mm}$</p> <p>Internal width of the pasteurizer must be $3079.6\text{mm} + (2 * 10\text{mm}) = 3099.6\text{ mm}$</p> <p>Width between side guiding: $3099.6 - (((3099.6 - 3030) + 5) * 2) = 2950\text{ mm}$</p> <p>Supposing a worst case scenario where the belt completely slides over to one side of the carryway, than the width of the outer wearstrip must be: $3099.6\text{mm} - 3030\text{mm} + 20\text{mm} = 89.6\text{ mm}$</p>
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Output for belts equipped with Positrack:	<p>Maximum possible belt width: $3048\text{mm} + 25.6\text{mm} + 6\text{mm} = 3079.6\text{ mm}$</p> <p>Minimum possible belt width: $3048\text{mm} - 18\text{mm} = 3030\text{ mm}$</p> <p>Internal width of the pasteurizer must be $3079.6\text{mm} + (2 * 10\text{mm}) = 3099.6\text{ mm}$</p> <p>Width between side guiding: $3099.6 - ((3099.6 - 3030) + 2 * 5) = 3020\text{ mm}$</p> <p>The belt with Positrack will stay in the middle of the carryway, resulting in the following width of the outer wearstrip: $(3079.6\text{mm} - 3030\text{mm}) * \frac{1}{2} + 20\text{mm} = 79.6\text{ mm}$</p>
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✓ **The available width within the pasteurizer will have to lead to a possible nominal beltwidth.**

Pressureless inlining

In different positions of production lines, products have to be brought in a single line in order to be able to feed the products into a machine, e.g. a filler. This is called inlining or combining. After the machine the containers are moved from a single track to a multi track conveyor which is called outlining or deceleration.



A pressureless combiner is a good way to line products in. Designing and adjusting an inliner requires a lot of practical conveyor experience. The inliner is equipped with multi track slatband chains/ belts. The speeds of these tracks are automatically adjusted, depending on the demand of the machine after the inliner. The products are separated by speed differences between the different tracks.

Selection of inliner chain/belt

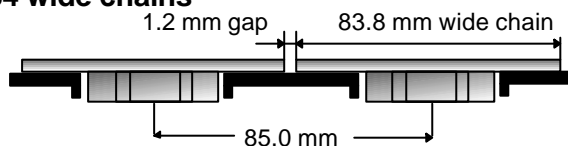
Commonly, pressureless combiners have a pitch of 85 mm. For smooth inliners, the right chain/ belt choice is very important.

Chain/ belt	Return glass	One-way glass	Ref PET	Petaloid	Cans 2 & 3 piece	
					dry	lubr
Steel chain 60-series	■	■	■	□		
Plastic chain XL-series			□	□	□	□
Belt FG 1000 XLG			■		■	■
Belt FT 1000 XLG	□	■	□	■		
Belt FT 1005 XLG 85	■	□	□	□		

■ = recommended
□ = alternative

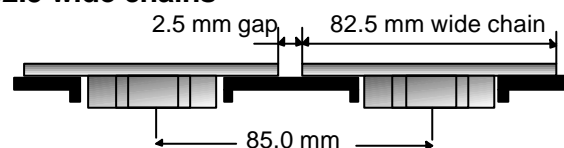
Inliner chains/belts

■ 84 wide chains



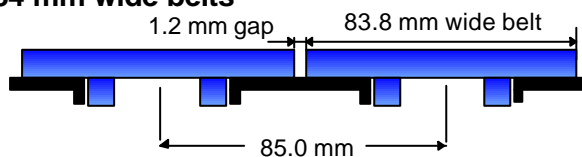
With 83.8 (MCC 84) mm wide chains, and 85 mm wearstrip pitch, the gap between chains is reduced to 1.2 mm. Furthermore this means the conveyor can be standard.

■ 82.5 wide chains



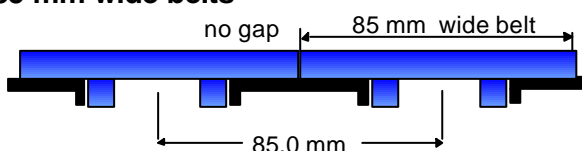
With 82.5 mm wide chains and an 85 mm pitch, the gap between chains is 2.5 mm.

■ 84 mm wide belts



1000-series Positrack belts in 83.8 wide are suitable to run next to each other with a small gap inbetween. Besides the edges have been chamfered for smooth product transfer.

■ 85 mm wide belts



1005-series belts in 85mm wide. These belts run against each other with no gap inbetween.

✓ Although the flush belt edges of 1005-series belts enable two 85 mm belts to run adjacently without a gap at different speeds, it is important to take the temperature conditions, construction tolerances and belt tolerances into consideration.

Crate conveying constructions

Two systems of crate conveying are most common: lubricated stainless steel slatband chains or dry-running plastic case conveyor chains.

Stainless steel chains

Usually, for conveying crates the 7.5" wide stainless steel chains are used. MCC developed chains with the special Heavy Duty design for these applications. It is also possible to construct a crate conveyor with two 3.25" wide chains running side by side. Constructing a case conveyor with stainless steel chains is not different from other conveyors with stainless steel chains.

Plastic Case Conveyor chains

Different types of 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 easiest cleaning.

CC chain type	600	631	1400	1431
Pitch [mm]	63.5	63.5	83	83
Max. working load [N]	3950	3950	6500	6500
Tabs	Option	Yes	Option	Yes
Height of links [mm]	28.6	31.8	38	43

- ✓ **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").**

Conveyor construction design

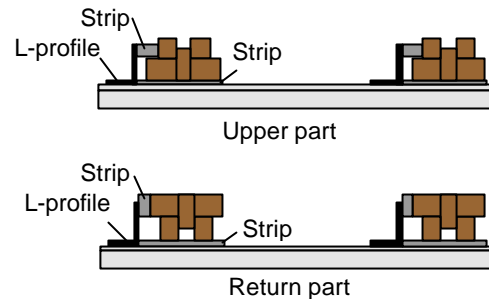
For straight sections of all conveyors with CC-series chains, we recommend to use ferritic stainless steel profiles of a cold rolled quality with a surface finish (Ra-value) of max. 1.6 µm and a minimum hardness of 25 Rc. We have good experiences with stainless steel 431 (werkstoff nr. 1.4057). It is common to use U-profiles to support the chains for the upper and return part.

The recommended construction is to equip the U-profiles with a stainless steel wear strip, which could be replaced after being worn down. The wearstrip should be of the upmentioned quality.

- ✓ **CC chains should not be tensioned in the returnpart.**

Curve design

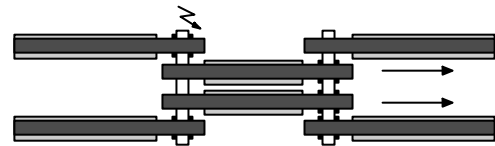
Curves for CC chains should be made open to allow debris to fall down. The chains can be secured by guiding strips at the inner radius of the curve.



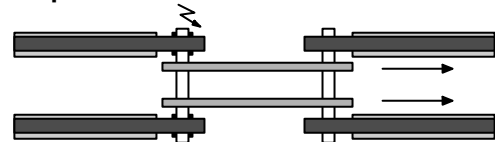
The basic chain support should be made of stainless steel, to prevent dirt to embed in the wear strips. The inside chain guide in the curve can be made of plastic or stainless steel. Plastic strips reduce the noise, stainless steel reduces wear. If stainless steel is chosen, we recommend to use cold rolled steel, as hard as possible with a surface finish (Ra) of maximum 1.6 µm.

Drive transfer constructions

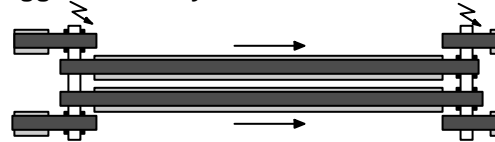
Slave drive construction



Dead plate transfer



Staggered conveyors



Lubrication of CC-chains is not recommended because of the unfavourable distribution of the lubrication in the U-shaped channels. This way the lubrication could act as a wear agent.

Lubrication

The main goal of lubrication is to obtain a lower coefficient of friction between chains/belts and products, resulting in best possible product handling and a better wear life of chains and components. Additionally, lubricants provide continuous cleaning of chains and conveyor parts.

Most commonly used method for lubrication is a central pumping station which meters lubrication under pressure to locations through a piping arrangement. The concentration of lubrication depends on position in the production line. Be sure the lubricant coats both the chain and wearstrip surfaces. This is especially important on sideflexing chains. It is sometimes necessary to apply lubricant at the entrance of the inside curves.

■ Synthetic lubricants

- Concentration is not depending on water hardness;
- Less foam on the conveyor, which makes inspection more easier;
- No slippery factory floors;
- Less bacteria growth.

■ Soap based lubricants

- Best possible lubrication because the lubrication sticks to the chains;
- Feels more greasy;
- High concentration is less critical.

Some problem area's are to be considered using synthetic lubrication, particularly in positions where spillage of beer or softdrinks reduces pH levels and the concentration of the lubricant.

- ✓ **For specific advice about lubrication agents, please contact the supplier of the lubricant.**

■ Lubrication with water only

Lubricating lines with water only may seem a good idea, since it saves the cost of lubricants and at least flushes dirt particles and spoilt product away. However, the reduction in friction is often very limited. Besides, water does not reduce bacteria growth in any way. Water contains calcium (the harder the water, the more calcium it contains) which will form an abrasive deposit on the chain and in the hinge-eyes, reducing the wearlife of the chain. Therefore, we recommend to use lubricants.

Dry running conveyors

In some positions in a bottling or canning line, running without lubrication is possible. MCC has experience with plastic chains and belts in applications with no lubrication. Important aspects of running dry running conveyors are:

- + Savings will be made on investments in lubrication system such as dosing equipment;
- + Elimination of costs of lubricants, clean water and water treatment;
- + Improvement of plant safety due to the elimination of slippery factory floors;
- + No packaging damage caused by wet containers
- Coefficient of friction increases. Lubrication provides the best product handling;
- Extra cleaning may be necessary;
- Extra wear on components
- Chance of slip stick effect under certain conditions;
- Chance of built up of static electricity;
- Higher noise level (sometimes a creaking sound running plastic chains in curves);
- Not possible on high speed running conveyors
- ✓ **It is strongly recommended to clean dry running conveyors regularly. Dirt and debris must be removed by cleaning, in order to keep the friction coefficients between chains/belts optimal.**

Reducing noise

In many countries regulations dictate a certain absolute sound level at a workplace. In general there are three areas where something can be done to reduce the noise level: Machines, conveyors and the building itself.

The highest noise levels on conveyors are the result of unfavourable product handling. Collision of bottles against each other or against guiderails produces noise. Increasingly high speeds of bottling lines result in an increase of the noise level, due to the higher collision speed. Several measures can be taken to reduce the noise level of products.

■ Transfer

A Free Flow transfer is much better than a deadplate transfer, also in terms of noise. However a curve is the optimum solution.

■ Product handling

Bottles should be handled with care, e.g. using zero-pressure combiners bottles will move smoothly into one row, producing less noise. Careful handling is also in the interest of less scuffing and less bottle breakage.

■ Flow control

Good flow control possibilities can be obtained by building conveyors with a certain maximum length. The chainspeed can be controlled by using PLC's and frequency controlled drives. This way, the chainspeed on the preceding conveyor can be decreased, when for instance one conveyor runs full.

■ Material choice

Use plastic sprockets and idlers and use plastic wearstrips in combination with stainless steel chains. Cover guiderails and other components with plastic profiles. In general, plastic materials can result in a decrease of the noise level, compared to metal in contact with glass.

■ Return rollers

When the return part is executed with return rollers, it is recommended to use rollers with a large diameter of +/- 60 mm. The use of small rollers could result in a rattling sound. Rollers with a rubber surface are available. They will contribute to a lower noise level.

Machine builders and building contractors will probably be able to help you with noise abatement for machines and buildings.

Reducing static electricity

In dry applications where products are being conveyed on plastic chains, especially with accumulation, an electrostatical charge can be built up, which might be inconvenient. It can cause attraction of dust and dirt or cause an electrical shock when somebody touches the conveyor or a product. It could also cause disturbance of sensitive control devices. In some cases, the electrostatical charge can even be dangerous. Two types of precautions can be taken:

■ Passive neutralisation

The electrical charge is avoided by grounding the complete conveyor (chains, wearstrips, frame and components).

■ Active neutralisation

A positive electrostatical charge is neutralised by negative ions. An easy method is blowing ionised air over the chain and product.

The best way to eliminate build up of static electricity is using steel chains instead of plastic chains/belts. However this is not always possible. Therefore MCC has Anti Static plastic chain/belt in the programme. This available material is electrically conductive.

✓ **The Anti Static chain/ belt must be used in combination with grounded metal wearstrips.**

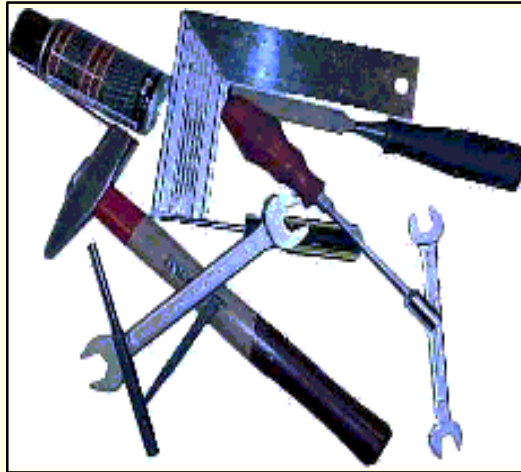
■ The AS-material properties

Properties	AS Polyacetal	DIN 53482 Minimum requirement Anti static material
Surface resistance	$\leq 5 * 10^3 \Omega/\square$	$\leq 10^9 \Omega/\square$
Volume resistance	$\leq 10^3 \Omega.cm$	$\leq 10^8 \Omega.cm$

For belts, 100% anti-static modules can be used, or only 1 or 2 rows per meter. We recommend a 100% anti-static layout in explosive environments. Belts with only 1 or 2 rows per metre are used in applications where a built up of static electricity is just inconvenient..Other precautions are:

- Apply lubrication if possible;
- Use anti-static or metal wearstrips wherever possible ground all metal parts;
- Avoid product accumulation;
- Avoid slip contacts (make sure that idlers and return rollers are rotating freely)

INSTALLATION & MAINTENANCE



Installing chains & belts

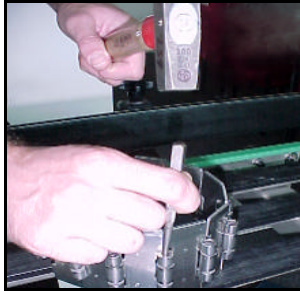
Cleaning instructions

Replacement criteria

Installing MCC chains

When installing the chain, taken the following recommendations into account.

- Chains can be installed with the use of a hammer and a punch.



- Pin should be positioned exactly in the middle, pins which stick out can jam the chain
- Pins in plastic chains should have the knurl on the same side, and this knurled side should be put in the chain last
- Check running direction, since the chain should always be driven at the fixed hinge eyes. Running direction is shown on the chain links.
- Do not tension the chain when installing. Tensioning will result in a higher chainload and more wear of components. During installation the proper tension is manually achieved.

Pin retention 505-series belt

Place screwdriver between clip and belt end.



Turn screwdriver counter clockwise to remove clip.

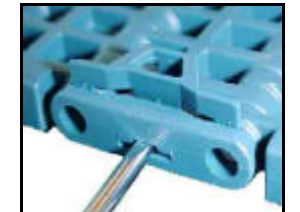


Pin retention 1000-series belt

Place screwdriver in rectangular hole.



Open open clip by pushing and lifting the screwdriver.



Pin retention 500-series belt

Place screwdriver in rectangular hole.

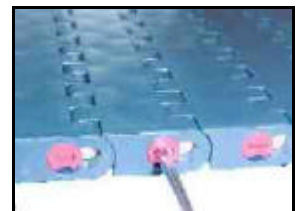


Push screwdriver to remove the clip.



Pin retention 1005-series belt

Place screwdriver in hole of the round clip.

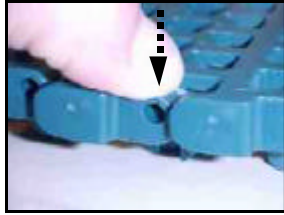


Turn clip counter clockwise to open it.

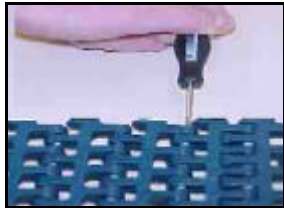


Pin retention 1255-series belt

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.



Pin retention 2000-series belt

Place screwdriver in rectangular hole.

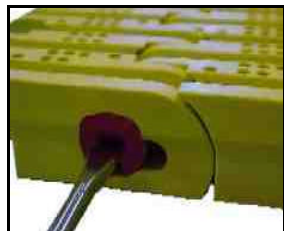


Remove open clip by pushing and turning screwdriver.



Pin retention 2500-series belt

Place screwdriver in the hole of the round clip.



Turn clip counter clock wise to open it.



- ✓ **During installation, please check the running direction of the belt shown on the modules.**

Inspection of chains

A good condition of the line can be maintained when people recognise initial signs of 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.
 - Check if the return rollers 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.
- ✓ **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 important 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 results in longer wear life and components.

- ✓ **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. Products (e.g. 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 conveyors. How often depends very much on the circumstances, e.g. when liqueurs are bottled and spilled, it might be necessary to clean every time the line stops for a few hours.

■ Cleaning stainless steel chains

This type of chain will be lubricated in most cases. Dirt etc. is flushed away continuously. Normally, it is recommended to clean the chain regularly with hot water (max 80°C) or cold water with a cleaning agent to stop and remove any form of bacteria growth.

There are often positions where product (beer or soft drinks) is spilled on the chain. In these positions the lubrication will not function optimally, and a more frequent cleaning could be required, e.g. once every week. It could be necessary to use a brush in addition to the hot water or cleaning agent to remove e.g. broken glass etc.

■ Cleaning plastic chains

For lubricated plastic chains, almost the same counts as for stainless steel chains. But when using cleaning agent attention should be given to its compatibility with the chain material, check table *chemical resistance*. The pH-value of solutions with cleaning agents should not exceed 10 and not be lower than 4.

- ✓ **With respect to cleaning, it is obvious that the Magnetflex® system offers great advantages because the chain can be taken out of the curve and cleaning takes less time than with conventional curve systems.**

■ Cleaning plastic belts

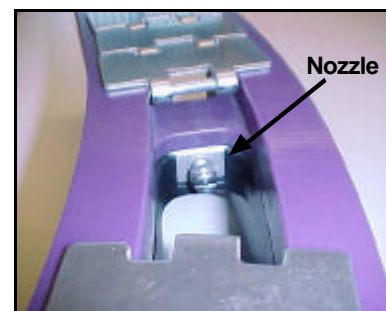
Basically, cleaning of plastic belts is not different from cleaning plastic chains. Again, the chemical resistance of the materials against the cleaning agents must be checked beforehand.

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.

■ CIP-curves

For conveyor systems equipped with a CIP (Cleaning In Place) system, MCC has Magnetflex CIP-curves available, which are fitted with tubes and nozzles that can be hooked up to the CIP-system in the line.



The construction of the curves is very open to achieve very effective cleaning.

Replacement instructions

■ Chain replacement

Chains should be replaced if:

- 2% elongation of the pitch, which is comparable with an elongation of 20 links from 762 mm to 777 mm;
- 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;
- 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 toppling over.

■ 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	Surface	Bottom
500-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

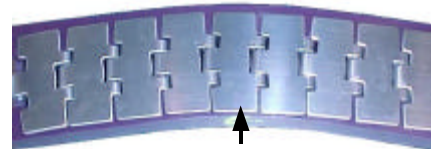
- In practice, the product handling will dictate whether the surface wear is acceptable or not. If wear at the top or bottom surface results in product tippage, replacement is eminent.
- 3% elongation of the pitch, is the ultimate elongation limit of belts. Further elongation causes the belt jumping on the sprockets under load.

✓ **When replacing chains or belts always replace the wearstrips, the sprockets and idlers as well.**

■ Magnetflex® replacement

Magnetflex chains should be replaced when the chains curve shows uneven wear patterns, and unacceptable wear of the curve groove. To check the curve wear, the chain can easily be lifted out of the curve; furthermore replace curves when:

- The chain reaches the inside of the curve, see picture;



Replace curves when chain edges reach the inside of the curve.

- In multiple track curves, check if the wear rate is similar in all tracks. It is also important that the wear of the curve groove still shows a straight angle of 90° with the horizontal surface.

■ Sprocket & idler replacement

Replacement criteria for sprockets and idlers:

- The teeth show a hookformed shape, which inhibits the chain from releasing well from the sprockets;
- Damaged teeth;
- Chain jumps on the sprocket;
- The idler is oscillating on the shaft, because of a worn bore;
- Damaged hub or keyways;
- New installed chain.

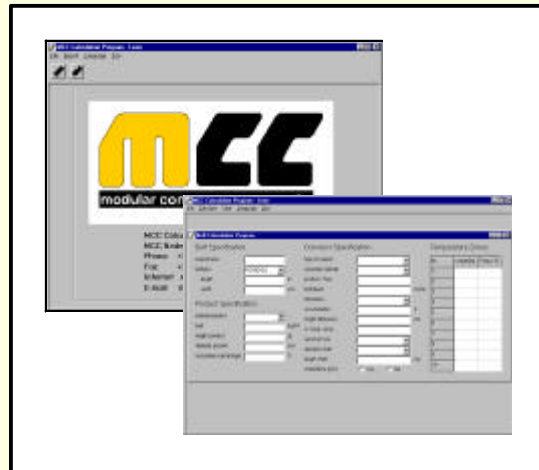
When replacing sprockets on multiple track conveyors, make sure all sprockets are mounted in the same position on the shaft. The chains/ belts have to be in the same position on the sprockets (the arrows shown on all sprockets should be pointing in the same direction). This is especially important for wider belts.

■ Wearstrip replacement

Replacement criteria wearstrips:

- The thickness is decreased with more than 50% of the original thickness
- Dirt or debris is embedded in the wearstrip material in unacceptable amounts;
- Fixing bolts or blind rivets protrude due to wearstrip wear.

TABLES & TROUBLESHOOTING



Chemical resistance

Operating temperatures & friction

Maximum speed & product stability

Conversion table

Calculation questionnaire

Troubleshooting guide

Chemical	10 & 60 series material		18-series material		XP Poly-Propylene		Polyacetal		YPR Poly-Propylene		Polyethylene		Polyamide		Polyester (CRS)		PBT	
	20°	60°	20°	60°	20°	60°	20°	60°	20°	60°	20°	60°	20°	60°	20°	60°	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		Polyethylene		Polyamide		Polyester (CRS)		PBT	
	20°	60°	20°	60°	20°	60°	20°	60°	20°	60°	20°	60°	20°	60°	20°	60°	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			+	+	+	+	+	*			+	+	+	+			+	+
Phthalic 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

Continuous operating temperatures

It is important to check operating temperatures of the materials used, see below.

Chain/ belt	In air		In hot water
	Min[°C]	max[°C]	max[°C]
Steel chains			
10,18 and 60-series	-70	+400	+120
45-series	-70	+180	N/A
Rubber top	-15	+80	N/A
Plastic chains			
XL, NC	-40	+80	+65
AS	-40	+80	N/A
CRS series	-40	+60	
LBP series	-40	+80	N/A
Plastic belts			
XLG, XLA, AS (dry)	+4	+80	+65
AS	+4	+65	N/A
XP, NP, YP(R)	+4	+104	+104
NE	-70	+35	+35
SG, PG	+4	+65	
Curves			
Combi-A	+4	+70	+65
Combi-S	+4	+100	N/A
Combi-G	+4	+80	N/A
Sprockets			
Polyamide	0	+80	N/A

When the environmental temperature differs significantly, this will influence the mechanical properties and thermal expansion of chains and belts, which is especially important on plastic products. Continuous exceeding of these temperatures can result in product failure.

Thermal expansion

Please be aware that plastic chains and belts expand or contract more than metal parts due to temperature changes. Especially for plastic belts this is important to check the thermal expansion. If a belt is to operate at a temperature above ambient, the belt expansion should be taken into account.

Thermal expansion plastic materials	
Material	Expansion coefficient
XLG/XLA-material	0.12 mm/m/°C
AS-material	0.13 mm/m/°C
XP/NP/YP-material	0.15 mm/m/°C
YPR-material	0.12 mm/m/°C
NE-material	0.18 mm/m/°C

Example

Belt type: RR 2000 XP 126 (width 3200 mm)

Assembly temperature: 20 °C

Working temperature: 65 °C

Total width expansion will be:

$$3.2 * (65-20) * 0.15 = 21.6 \text{ mm}$$

Friction coef. materials

Material	conditions	Steel	XL	XP/NP
			XLG	YP
			XLA	YPR
UHMWPE	Dry	0.30	0.18	0.23
	Water	0.22	0.13	0.15
	Lubrication	0.10	0.08	0.10
MCC 1000	Dry	0.30	0.18	0.23
	Water	0.22	0.13	0.15
	Lubrication	0.10	0.08	0.10
MCC 1200	Dry	0.30	0.18	0.23
	Water	0.22	0.13	0.15
	Lubrication	0.10	0.08	0.10
Steel	Dry	0.40	0.20	0.28
	Water	0.35	0.15	0.19
	Lubrication	0.15	0.10	0.13
Rollers	Dry	0.20	0.18	0.20
	Water	0.15	0.13	0.15
	Lubrication	0.10	0.08	0.10
Polyamide	Dry	0.30	0.19	0.25
	Water	0.23	0.13	0.15
	Lubrication	0.12	0.08	0.13

Friction coef. products

Material	conditions	Steel	XL	XP/NP
			XLG	YP
			XLA	YPR
Glass	Dry	0.35	0.18	0.25
	Water	0.30	0.15	0.19
	Lubrication	0.15	0.10	0.10
Crates	Dry	0.30	0.19	0.26
	Water	0.23	0.13	0.15
	Lubrication	0.12	0.08	0.10
Plastic	Dry	0.30	0.19	0.26
	Water	0.23	0.13	0.15
	Lubrication	0.12	0.08	0.10
Carton	Dry	0.45	0.30	0.39
	Water	-	-	-
	Lubrication	-	-	-
Metal	Dry	0.40	0.20	0.26
	Water	0.35	0.15	0.19
	Lubrication	0.15	0.10	0.13
Alu cans	Dry	0.40	0.22	0.30
	Water	0.35	0.15	0.19
	Lubrication	0.15	0.10	0.13
Pet	Dry	0.31	0.23	0.30
	Water	0.24	0.10	0.13
	Lubrication	0.17	0.08	0.10

✓ All coefficients are used as general guidelines. In practice, these values can vary because of surface quality, lubrication etc.

Conveyor length & speed

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.

Recommended Max. tracklength: 12 mtrs

✓ **For pasteurizer applications, longer tracklengths are possible.**

■ Wearlife

A higher chainload will result in higher wear of all conveyor components, as wear is related to the load, speed and running time.

■ Flow control facilities

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.

■ Slip stick 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.

■ Maximum speeds

Chain/ belt 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
Sidelflex, tab	*) ¹	60	120
Magnetflex®	*) ¹	90	180
Belts			
XLG	80	100	180
AS	60	Dry run	Dry run
XP & NP &		30	40
RBP flexbelts	40) ²	40) ²	40) ²

¹) Maximum speed values depend on the PV-value of the curve, which represents a combination of pressure and velocity resulting in the amount of heat development and melting of materials.

²) Depending on belt load, see chapter *Specific Applications* for further details on this belt

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

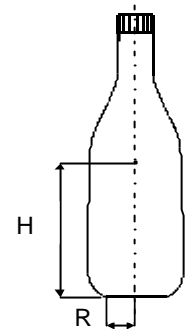
Product stability

Each product has a maximum value for acceleration, which is related to the start-stop or stop-start conditions. To determine if a 90° deadplate transfer or a Freeflow can be used, or that a Magnetflex® curve is the only solution, use the formula below.

The critical friction coefficient can be calculated as a quotient of the radius of the base and the height of the centre of gravity:

In formula: $f_{crit} = R/H$

This critical friction coefficient thus calculated must be compared with the real friction coefficient which is valid in practice (f_{real}).



The real friction coefficient strongly depends on product and actual conditions.

Now, f_{crit} and f_{real} must be compared with each other. The criteria here is that if $f_{crit} > f_{real}$, the stability of the product is sufficient. This means that the product will remain standing stable, even when it is subject to large variations in speed. It will be obvious that obstacles in the conveyor, such as a raised edge for example, still have to be avoided. Please take into account that dirt affects the friction coefficient in practice. Besides, the lubrication may not always be optimum.

If $f_{crit} < f_{real}$, this does not immediately imply that transport is not possible. In order to guarantee the stability, however, a maximum variation in speed to which the product can be subjected without tipping must be calculated. In a formula:

$$v_{lim} = \sqrt{2 \cdot g \cdot (\sqrt{H^2 + R^2} - H)}$$

v_{lim} = Maximum variation in speed	[m/s]
R = Radius of the base	[m]
H = Height of the centre of gravity	[m]
g = Gravitational acceleration	[m/s ²]

80 With a deadplate and Freeflow transfer, it may be assumed that the speed of the product will be reduced to almost nil, after which it will be transferred suddenly to the full speed of the 'outgoing' chain/belt. The speed of the outgoing chain must therefore be lower than v_{lim} to allow for a deadplate transfer.

Area	mm ²	m ²	inch ²	foot ²
1 mm ²	1	10 E-6	1.55 E-3	10.76 E-6
1 m ³	10 E+6	1	1.55 E+3	10.76
1 inch ²	645.16	0.645 E-3	1	6.94 E-3
1 foot ²	92.9 E+3	92.9 E-3	144	1

Force	N	lbf	kgf
1 N	1	0.2248	0.102
1 lbf	4.45	1	0.4536
1 kgf	9.81	2.205	1

Length	mm	m	inch	foot
1 mm	1	0.001	0.3937	0.00328
1 m	1000	1	39.37	3.28
1 inch	25.4	0.0254	1	0.8333
1 foot	304.8	0.3048	12	1

Mass	g	kg	lb
1 g	1	0.001	0.002205
1 kg	1000	1	2.205
1 lb	453.6	0.4536	1

Power	W	kW	pk	HP
1 W	1	0.001	1.36 E-3	1.34 E-3
1 kW	1000	1	1.36	1.34
1 pk	735.5	0.7355	1	0.986
1 HP	745.7	0.7457	1.014	1

Temperature	° Celsius	° Fahrenheit
° Celsius	1	(°C x 9/5) + 32
° Fahrenheit	(°F-32) x 5/9	1

Velocity	m/s	m/min	ft/s	ft/min
1 m/s	1	60	3.281	196.85
1 m/min	0.01667	1	0.0547	3.281
1 ft/s	0.3048	18.288	1	60
1 ft/min	5.08 E-3	0.3048	0.01667	1

Volume	1 cm ³ = 1 ml	1 dm ³ = 1 l	1 inch ³	1 ft ³
1 cm ³ = 1 ml	1	0.001	61.02 E-3	35.31 E-6
1 dm ³ = 1 l	1000	1	61.02	35.31 E-3
1 inch ³	16.39	16.39 E-3	1	57.87 E-5
1 ft ³	28.32 E+3	28.32	1728	1

Before building a proposed conveyor, you will have to check the chain load. MCC has developed a sophisticated computer programme, which makes conveyor calculations very easy. Please enquire MCC if you want to get a copy or download it directly from our website at www.mcc-nl.nl
 If you wish MCC to check the load for you, please contact us and use the application questionnaire below.

Chain / belt specifications

Belt / chaintype _____

- width _____ [mm]

- length _____ [m]

Product specifications

Producttype _____

Productmaterial _____

Load _____ [kg/m²]

Weight product _____ [g]

Diameter product _____ [mm]

Conveyor specification

Type of support _____

Wearstrip material _____

Product/ hour _____

Belt/chain speed _____ [m/min]

Lubrication _____

Height difference _____ [mm]

Nr. temp zones _____

Sprocket size _____ [mm]

Diameter shaft _____ [mm]

Length shaft _____ [mm]

Center drive _____ [yes/no]

Conveyor Layout from idler to drive

Section	1 Idler	2	3	4	5	6	7	8	9	10
Length [m]										
Curve angle [°]										
Radius [mm]										
Accumulation [%]										
Occupation [%]										
Temp [°C]										

✓ **On long conveyors, it is recommended to place curves as close to the idler end as possible. This way the chain load in the curve is minimum, resulting in a longer wearlife.**

Troubleshooting guide

Chain/belt jumps on sprockets or the chain/belt does not release well from the sprockets.	Chain/ belt is elongated or sprocket is worn-out. Elongation of the chain or belt can be caused by wear or due to severe overloading, caused by e.g. jams.	Replace chain/ belt and sprocket and check also other conveyor components for severe wear to find exact cause.
	Improper catenary sag.	Make sure catenary sag is in right position and has the correct dimension.
	Sprocket is worn (teeth show a hooked profile).	Replace sprockets.
	Wrong sprocket type is installed.	Install right sprocket.
	Misalignment of sprockets.	Check if sprockets have arrows pointing in the same direction.
	Improper sprocket position.	Position sprockets at the right height and distance form the wearstrips.
Jerky chain or belt operation	This problem can occur with long conveyors, operating at low speeds The so called "slip stick" effects are caused by the differences between the dynamic and static coefficient of friction.	Use lubrication if possible. Reduce chain/ belt tension by shortening the conveyor.
	Return roller diameter is too small.	Install larger diameter roller.
	Chains/belts catches the conveyor.	Remove obstructions and make sure the chain/belt moves smoothly in the returnpart.
Damaged hinges	Severe rapid elongation of the chain/ belt is usually caused by overloading, due to jams.	Replace chain/ belt and check other conveyor components like sprockets, also for severe wear.
	Blocking and obstruction in conveyor.	Check the conveyor for possible obstructions, by pulling a small piece of chain/belt through the conveyor manually.
	Exceeding the minimum backflex radius of the chain in the return section.	Install larger rollers in positions where chains/belts are bent excessively in backflex radius.
Chain or belt is elongated	Dirty hinges.	Clean chain or belt thoroughly and improve cleaning procedure.
	Chain or beltload is too high	Please consult MCC for a load calculation of the application
Rapid curve wear	In dry running lines with plastic chains, the PV limit can be exceeded.	Check application with calculation programme and replace curve upperpart by Combi-S upperpart if programme dictates so
	In lubricated lines with abrasive particles (stainless steel chain). These particles can be the cause	Replace upperpart by Combi-G upperpart.
Chain is drifting sideways on sprocket	Bad shaft/sprocket alignment.	Improve shaft/sprocket alignment and/or use guiderings.
	Conveyors are not level.	Put the conveyor level.
	Poor design of carrying track or return section, near sprocket.	Change construction according to the guidelines in this manual.
Cracked hinge eyes of plastic chain/belt	If the chain/belt shows small cracks on the outside hinge eyes, this is usually caused by so-called stress-corrosion. The combination of chain load and the influence of chemicals can cause haircracks on the hinge eyes.	Replace chain/belt and use only compatible chemicals.

Magnetflex® chains come out of curve	Uneven wear of the curve groove.	Replace curve.
	Improper chamfering of infeed or other obstructions in conveyor track where chains catch the conveyor frame.	Make sure the chain can run smoothly through the complete section and check for obstructions.
	No controlled startup.	Install a frequency controlled start and stop installation.
	Curve is not mounted level.	Check recommendations given regarding the installation of Magnetflex® curves.
Steel chain is rusted	Chain is not, or limited resistant to the liquid to which it has been exposed. Cleaning agents e.g. can sometimes be very aggressive.	Use only compatible chemicals. Consider installing a stainless steel chain with improved corrosion resistance.
Excessive chain or belt wear	Pollution.	Clean conveyor thoroughly and improve cleaning procedure.
	Failing lubrication.	Contact supplier of lubricant to improve lubrication.
	Obstruction in conveyor.	Find obstruction and remove it.
	Debris in returnpart.	Cleaning or use rollers with a larger diameter.

✓ **This table is not complete. For specific problems which cannot be solved this way, contact MCC or your nearest MCC distributor for advice.**

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