Ammeraal Beltech

EN

Technical Manual

Soliflex CB and Soliflex FB (mini)

Innovation and Service in Belting

Table of Contents

1 Introduction

Soliflex belts are homogeneous thermoplastic belts. Since these belts have no fabric inner layer, they are easy to clean and very hygienic. This makes them especially suitable for food applications; all materials comply with EC 1935/2004, EU 10/2011 (and amendments) and FDA food regulations.

Ammeraal Beltech offers a wide range of homogeneous belts with different drive systems. There are 6 drive systems available. Soliflex PRO, Soliflex PRO mini, Soliflex Center Bar (CB), Soliflex Full Bar (FB), Soliflex Full Bar mini (FB mini) and Soliflex RS friction drive. The selection matrix assists to choose the most suitable belt for your application.

This manual covers the selection of Soliflex Center Bar (CB), Soliflex Full Bar (FB), Soliflex Full Bar mini (FB mini). It helps to select the right Soliflex belt for the application and assists in the design and layout of conveyor systems. The selection of Soliflex PRO, Soliflex PRO mini and Soliflex RS friction drive is covered in 2 separate manuals.

If your question is not answered here, or if you need more detailed information about splicing, overview of accessories, technical drawings etc. please contact your local Ammeraal Beltech representative.

2 Material properties

Soliflex belts are extruded as homogeneous thermoplastic sheet. These sheets can simply be cut and welded. Soliflex sheets are produced according to strict specifications. Accessories are welded on in specialized workshops. Soliflex Center Bar (CB) and Soliflex Full Bar (FB) and Soliflex Full Bar mini (FB mini) are available in TPU material.

Soliflex CB, FB and FB mini TPU 98A belts are very resistant to hydrolysis, oils and fats. All materials comply with EC 1935/2004, EU 10/2011 (and amendments) and FDA food regulations. TPU 98A has a high abrasion resistance and will hardly show any wear. Our TPU material is very flexible and has a hardness of 98 Shore A.

Product Storage

To ensure that the material properties remain unchanged take special care of storage:

- Both Center Bar and Full Bar (mini) belts should be stored standing up
- Belts should be protected from UV light by proper packing
- Store in a dry place and not below 5°C or above 30°C

3 Basic conveyor design

To get the full benefits of Soliflex CB, FB and FB mini positive driven belts, special attention should be given to the conveyor design. This chapter gives guidelines and design considerations for the lay-out of scrapers, slider beds, tensioning devices, etc.

Soliflex CB, FB and FB mini belts are tested at conveyor speeds up to 1 m/s. Higher speeds are possible after consultation with your local Ammeraal Beltech representative.

A typical conveyor layout for a Soliflex CB, FB and FB mini belt would look like this:

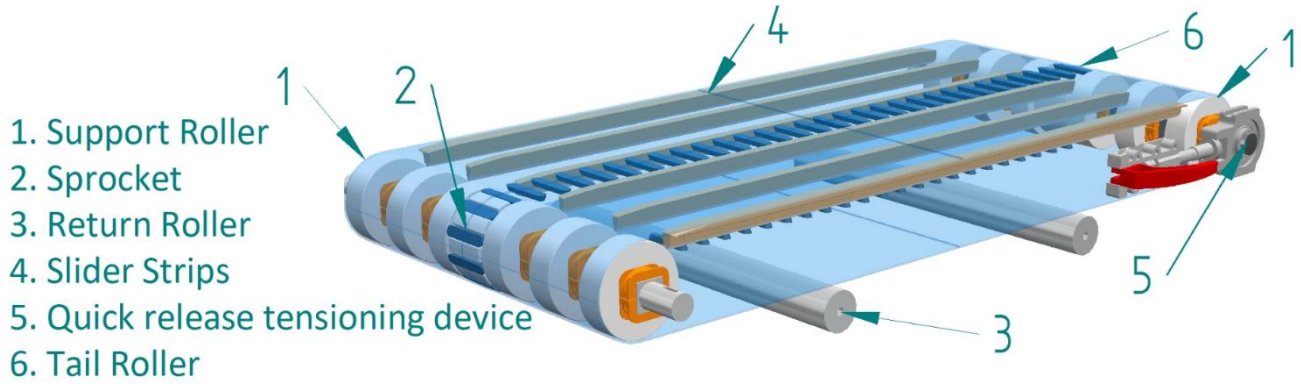
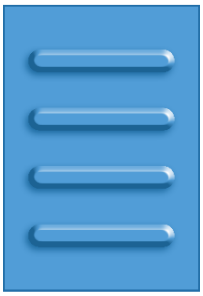


Figure 1 Soliflex Center Bar typical coveyor layout

3.1 Drive bar configuration

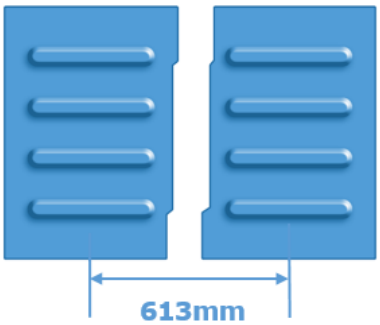
In this manual we discuss 3 different drive bar configurations; Soliflex CB, FB and FB mini

3.1.1 Soliflex Center Bar



Soliflex CB - 1 row of bars

The advice for applications from 100mm up to 800mm is **Soliflex CB - 1 row of bars**. The pitch of the Soliflex CB is 39.7 mm. The center bar is 78mm wide and 15mm long. Further details can be found in figure 2. The single row is always positioned in the center of the belt. Other configurations are possible on request.



Soliflex CB - 2 rows of bars

The advice for applications wider than 800mm is **Soliflex CB - 2 row of bars**. The center-to-center pitch of the 2 rows of bars is 613mm and is fixed.

The Soliflex Center Bars are always positioned symmetrical on the belt. Other configurations are possible on request.

The Soliflex CB – 2 rows of bars configuration is to be used for wider belts in combination with high loads. Using 2 rows spreads the transmitted force across the belt width, enabling a smooth operation.

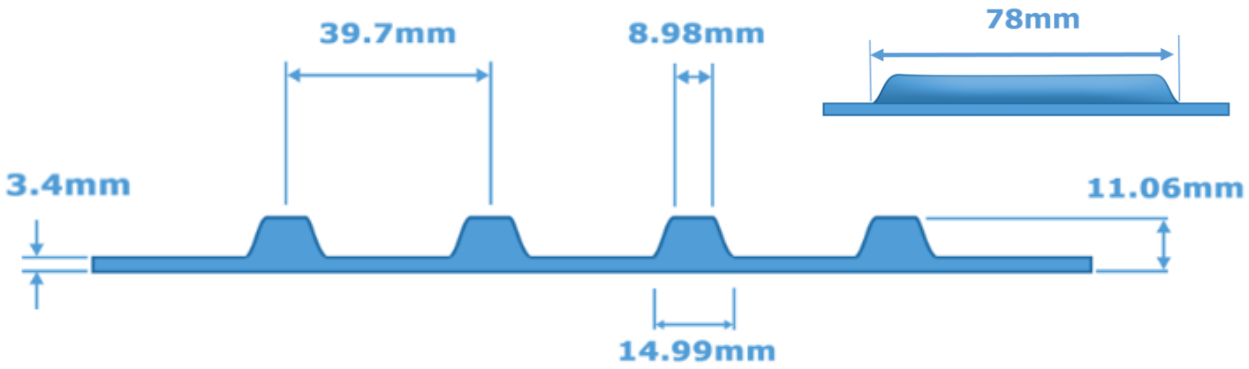


Figure 2 Soliflex Center Bar Configurations and distances

Standard widths:

Soliflex CB 1- row is available at 300mm, 450mm, 600mm and 800mm and the exact width can be customized on request.

Soliflex CB 2- row is available at 900mm, 1200mm and 1500mm and the exact width can be customized on request.

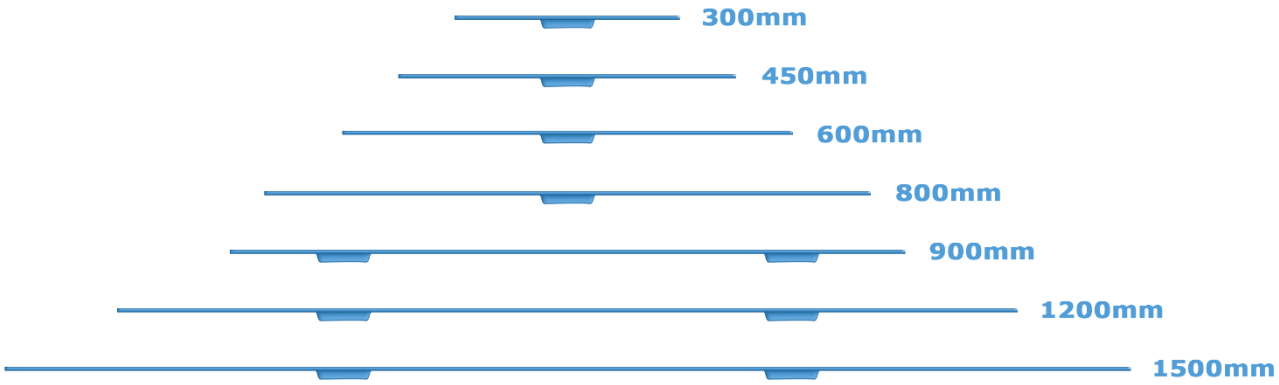
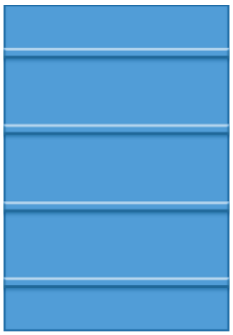


Figure 3 Soliflex Center Bar standard widths

3.1.2 Soliflex Full Bar



Soliflex FB

The Soliflex Full Bar can be used for applications from 50 mm wide up to 1500 mm wide. The pitch of the Soliflex FB is 50 mm. The Full bar is across the whole belt width which gives the possibility to use multiple sprockets to drive the belt. The full bar also gives extra lateral stability to the belt.

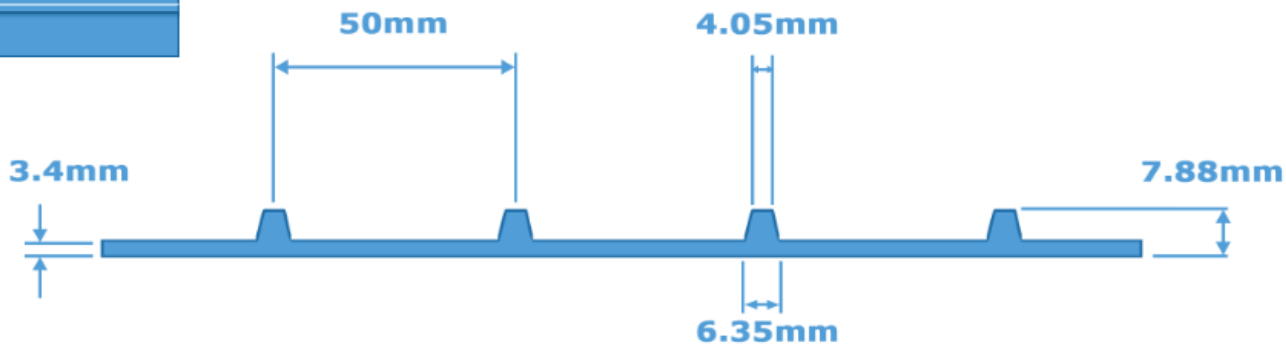
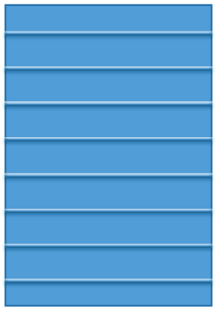


Figure 4 Soliflex Full Bar Configurations and distances

3.1.3 Soliflex Full Bar mini

Soliflex FB mini



The Soliflex FB mini is more flexible and can be used in lighter weight applications or where small pulley/sprocket diameters is required. Soliflex Full Bar mini can be used for applications from 50 mm wide up to 1500 mm wide. The pitch of the Soliflex FB mini is 25.91mm. The Full bar is across the whole belt width which gives the possibility to use multiple sprockets to drive the belt.

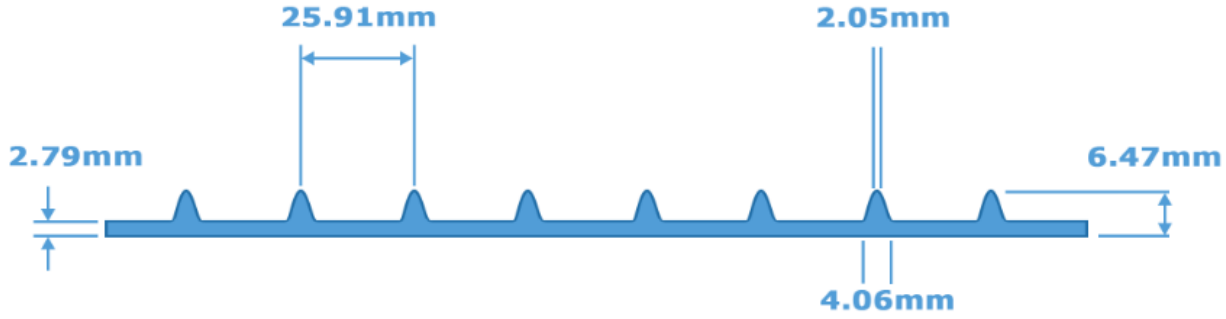
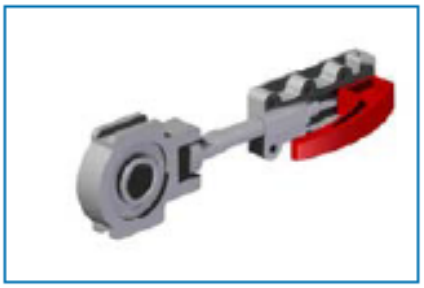


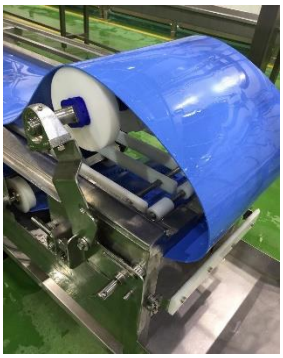
Figure 5 Soliflex Full Bar mini Configurations and distances

3.2 Belt tensioning / take-up



To operate an efficient Soliflex conveyor the optimal tension should be ≤ 0.1%. A higher level of pretension will reduce the allowable loading of the belt. Higher levels of pretension might also induce creep in the material and reduce the service life of a belt.

Specifically for the Soliflex Full Bar (mini) a tensionioning device is essential. The recommended take up is 100-150mm). Correct tensioning of the belt can assist in better tracking of the Soliflex Full Bar mini.



A retractable pulley design is the preferred solution for quick removal and installation of the belt (e.g. for cleaning purposes). Another option is to use a quick release tensioning device. This enables easy belt removal for cleaning and/or maintenance.

3.2.1 How to tension the belt?

Apply 0.1% tension by measuring a 1000 mm mark on both sides of the belt and tension until these become 1001 mm. Let the belt run for a short while and re-check the elongation.

3.2.2 Layout of drive and tail shaft

For optimal performance the Center Bar drive should have *both sprockets and support pulleys.* The tail shaft should have only pulleys. There are 2 types of pulleys. One pulley to align the bar and regular pulleys to support the belt.

The Full Bar and Full Bar mini should have **only sprockets** on both drive and tail shaft.

Depending on the actual situation (width, usage of scrapers, products to be transported etc.) it might be beneficial to fill out the complete shaft with sprockets and support pulleys. The maximum center to center distance between sprockets and/or pulleys is 150 mm.

3.3 Sprockets and support pulleys

Soliflex sprockets and support pulleys are available for both round and square shafts. All sprockets and support rollers are made from solid food grade HDPE, with FDA and EU approvals.

- Round bore 20, 25, 30, 40 and 50 mm; all with DIN keyway.
- Square bore 40 mm; other types on request.

Pulley diameters

Pulley diameters vary per drive bar. The Center Bar needs a minimum pulley of 124 mm), the Full Bar needs 95.5 mm and the Full Bar mini a minimum pulley of 50.8 mm (2 inch). All pulley diameters can be found in chapter 8: table 8.1 Soliflex specifications.

- Pilot bore for CB and FB 15 mm and FB mini 6 mm; can be machined by customer

Exact details on Soliflex sprockets and support rollers can be found in Table 6

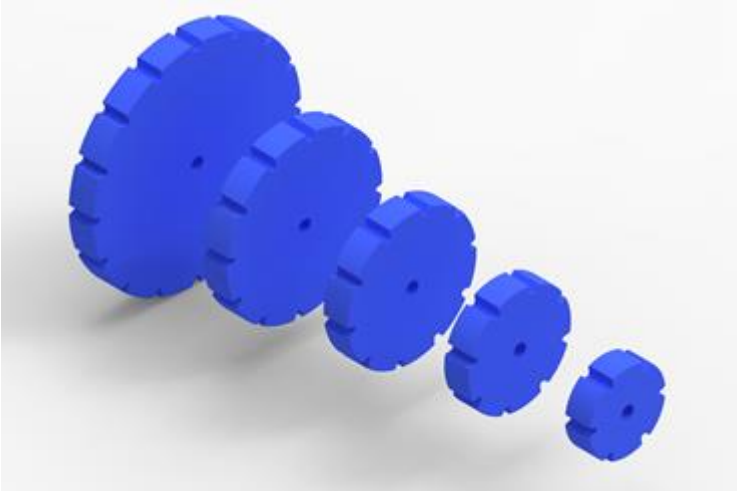
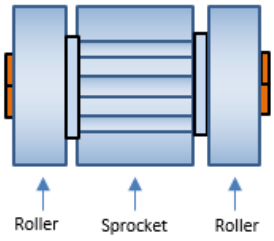
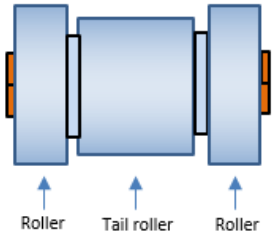


Figure 6 Soliflex Sprockets and pulleys Variations

A Center Bar drive consists of 1 sprocket and 2 support rollers



A Center Bar tail consists of 1 Tail roller and 2 support rollers

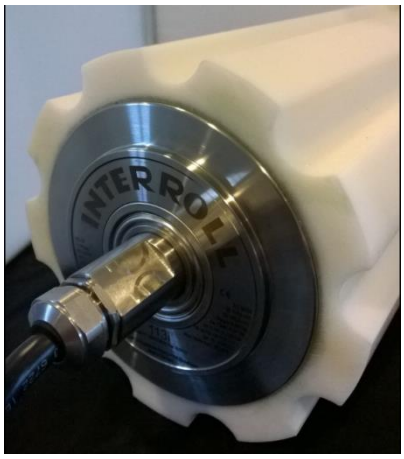


3.3.1 Mounting sprockets and support rollers to the shaft

- Both square and round bore sprockets and support rollers can be fixed in axial direction with retainer rings.
- Fixate one sprocket axial and give the other sprockets on the shaft some 2 mm play in axial direction to compensate for thermal expansion.
- Round bore sprockets and support rollers can be fitted with DIN keyways.

The minimum sprocket diameters for a belt type are valid for a flat belt. For a belt with ropes, guides or Bordoflex the minimum allowable sprocket diameter should be increased; See chapter *"Design guidelines for special conveyor types"* with design tips for special conveyors possibilities.

3.4 Drum motors



Example of Interroll Drum Motor with Soliflex PRO Lagging

Interoll has various drum laggings available for our positive drive belts.

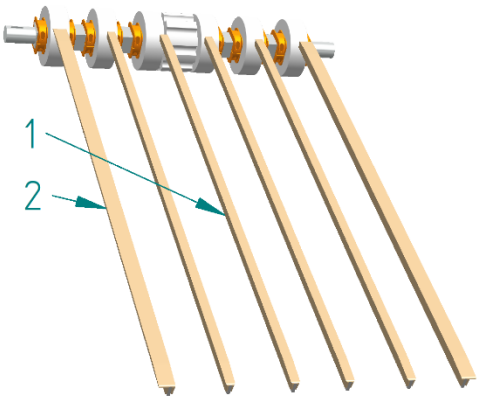
We advise to contact your local Interroll representative

Performance of the Interroll drum motor is a shared responsibility between Interroll and the OEM.

3.5 Slider strips

3.5.1 Positioning of slider strips Soliflex Center Bar

A conveyor with slider strips is the preferred solution for the Center Bar design. ***The Center Bar design in combination with slider strips ensure tracking of the conveyor belt.***

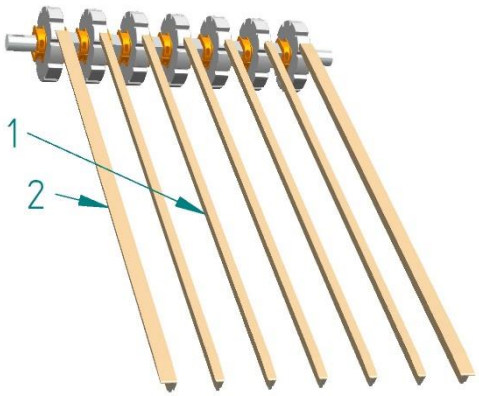


Use HDPE or UHMWPE slider strips to minimize the friction. The slider strips should be mounted close to the sprockets and pulleys. Allow some room to accommodate for possible thermal expansion (see paragraph "thermal expansion"). Make sure that the height of the slider strips is not higher than the upper face of the pulleys. Stainless steel strips or round bars are possible; use the same configuration as for HDPE strips. Recommended stainless steel type is 316(L), stainless steel type 304 gives blackening on the belt. Make sure all edges are smooth. Be aware that in moist conditions TPU belts may 'stick' to steel sliders, apply HDPE strips on the slider bed to prevent stick.

The distance between the 2 guiding strips (1) is 80mm with a tolerance of +2 -0 mm. The non-guiding strips (1) all have a distance between 50-150mm. A strip on the edge of the belt (2) is always recommended with a distance of 10-40mm.

3.5.2 Positioning of slider strips Soliflex Full Bar (mini)

A conveyor with slider strips is the preferred solution for the Full Bar (mini) design. ***The Full Bar and Full Bar mini are not self-tracking. Tracking strips at each edge of the belt are required. The height should be 1.5x the belt thickness.***

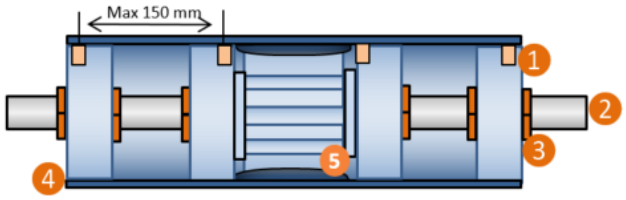


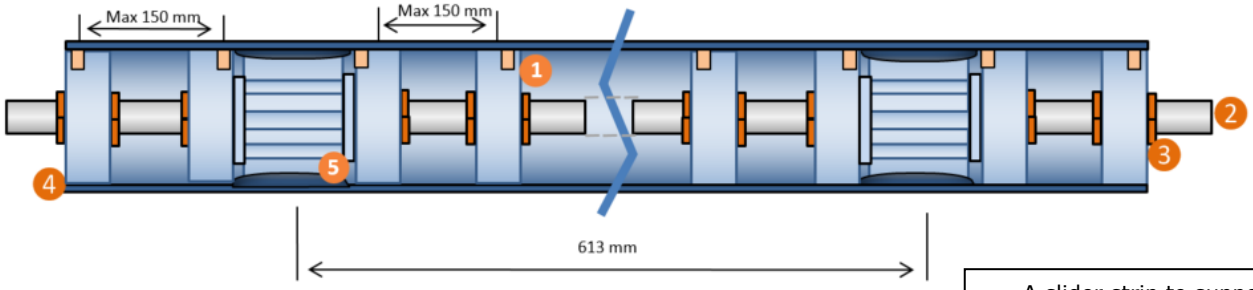
Use HDPE or UHMWPE slider strips to minimize the friction. The slider strips should be mounted close to the sprockets and pulleys. Allow some room to accommodate for possible thermal expansion. Make sure that the height of the slider strips is not higher than the upper face of the pulleys. Stainless steel strips or round bars are possible; use the same configuration as for HDPE strips. Recommended stainless steel type is 316(L), stainless steel type 304 gives blackening on the belt. Make sure all edges are smooth.

The non-guiding strips (1) all have a distance between 50-150mm. A strip on the edge of the belt (2) is always recommended with a distance of 10-40mm.

3.5.3 Positioning of slider strips Soliflex Center Bar

1. Slider strips
2. Shaft
3. Retainer ring
4. Support pulley
5. Sprocket





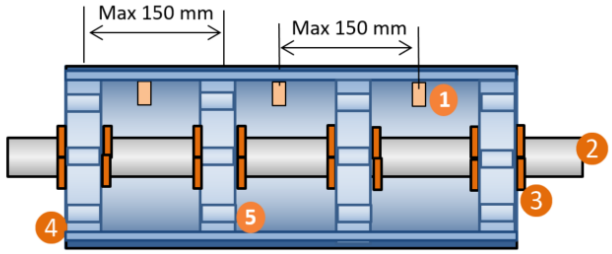
A slider strip to support the edge of the belt is always recommended within a distance of 10-40mm from belt edge.

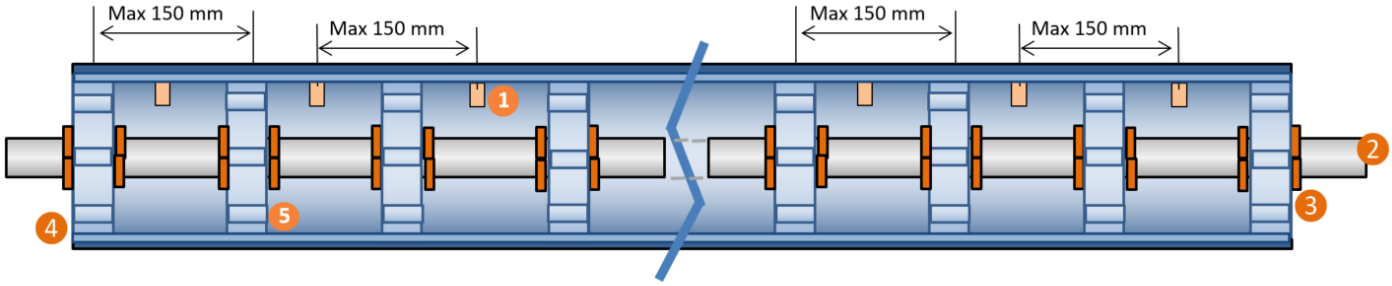
When using a CB bar the slider strips **act as guides and track** the belt in the running direction:

Strip position	Distance between 2 strips
Center Bar strips	80mm +2mm/-0mm
Others strips	Max 150mm (recommended is 100mm)

3.5.4 Positioning of slider strips Soliflex Full Bar

1. Slider strips
2. Shaft
3. Retainer ring
4. Support pulley
5. Sprocket





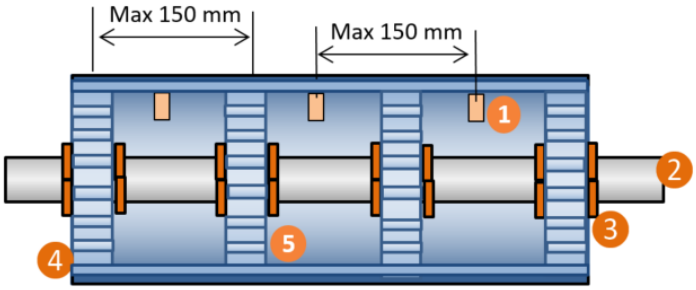
A slider strip to support the edge of the belt is always recommended within a distance of 10-40mm from belt edge.

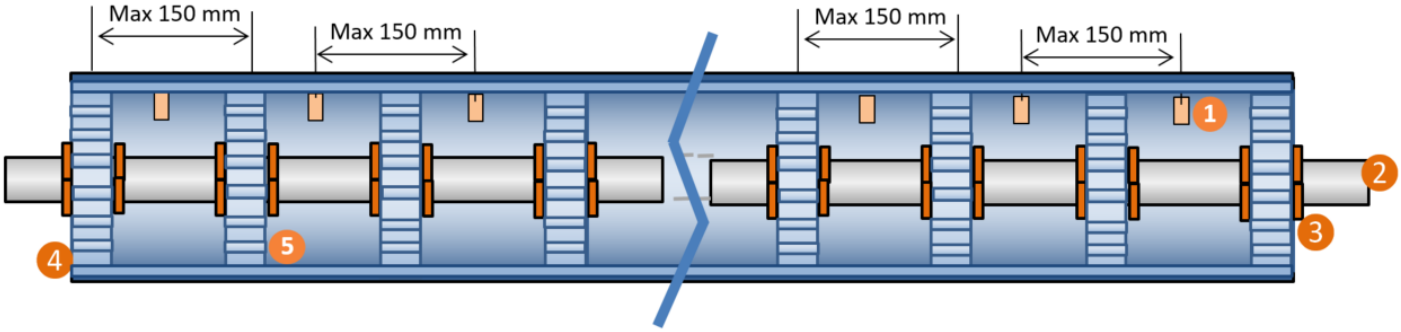
When using a FB bar the slider strips **do not** guide/track the belt in the running direction:

Strip position	Distance between 2 strips
Full Bar	Max 150mm (recommended is 100mm)

3.5.5 Positioning of slider strips Soliflex Full Bar mini

1. Slider strips
2. Shaft
3. Retainer ring
4. Support pulley
5. Sprocket



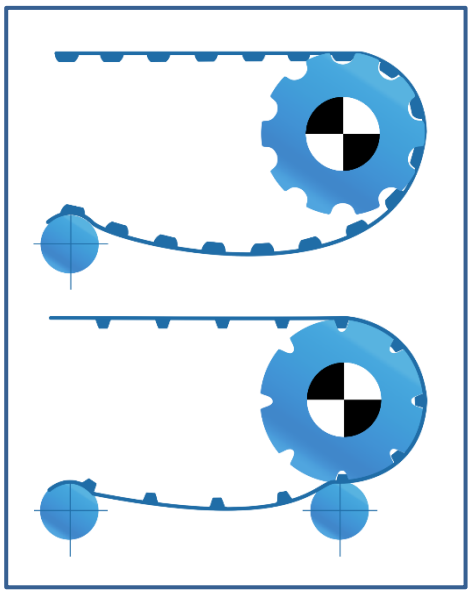


A slider strip to support the edge of the belt is always recommended within a distance of 10-40mm from belt edge.

When using a FB mini bar the slider strips **do not** guide/track the belt in the running direction:

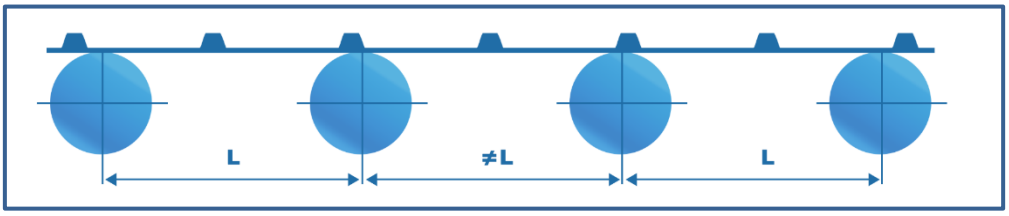
Strip position	Distance between 2 strips
Full Bar mini	Max 150mm (recommended is 100mm)

3.6 Return part of the belt



The belt in the return part will hardly have any stress. On a heavily loaded belt a large catenary sag could form. In some cases this may become so big that the belt no longer has a sufficient wrapping angle on the drive sprocket. Use of pretension of 0.1% and a snub roller (which supports the entire belt width and has a min diameter of 50mm) can be used just after the drive shaft. Position the snub roller just below or after the centerline of the drive shaft. The angle of the wrap should be between 180°-225°. Leave some room for the belt so that it is not pinched off.

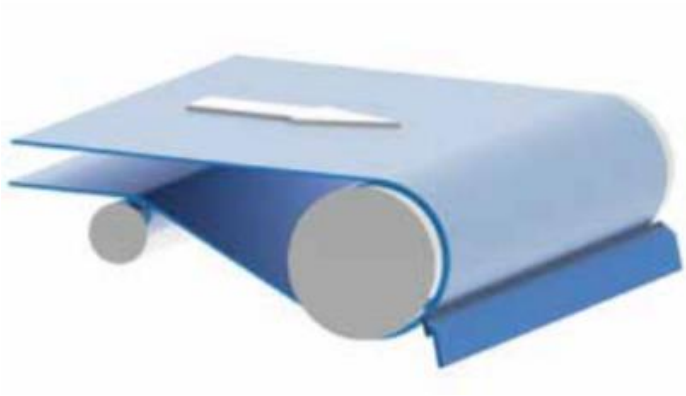
The first and last support pulley should be positioned 1 meter from the head and tail pulley. The other support pulleys or rollers in the return part should be positioned every 2 meters. To prevent resonance of the belt in the return part, this distance should be slightly varied as shown in the drawing. The diameter of these supports is minimum 50 mm.



Alternatively slider strips can be used to support the belt in the return part. This can be especially advantageous on inclined conveyors. Do not use these over the complete length of the conveyor; allow space for the catenary belt sag near the drive shaft. Slider strips will leave marks on the surface of the belt.

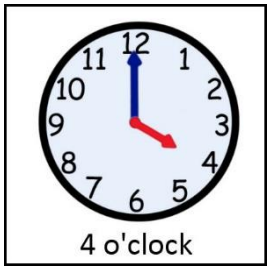
Cleated belts needs special attention in the return part of the belt. Up to 600mm support pulleys of minimum 50mm can be used at the edges. For wider belts you have to split the cleat and place a roller inbetween the cleat to support the belt. Minimum space between cleat and supportroller = 10mm.

3.7 Scrapers



Ultra-Scrapers can be used to ensure proper cleaning of the belt.

To release the product from the belt; Position the scraper on the sprocket at 2/3 of the wrap of the belt on the sprocket. (Four o'clock position). When a scraper is used 0.1% pretension has to be applied.



3.8 Thermal expansion

NOTICE *Be aware of the thermal expansion coefficient of the material.*

3.8.1 Thermal expansion / contraction

In applications where operating temperatures are different from ambient temperatures (20°C), linear expansion of the belt length and width will occur. In lateral direction the absolute expansion or contraction is relatively small and no special actions are necessary. In longitudinal direction the following will occur:

Operating temperatures higher than ambient temperatures: ***Expansion***

- Belt tension will reduce and at a certain point the pitch of the belt will no longer match the pitch of the sprockets. This will happen at about 50°C belt temperature. For belts operating at 50°C or more special precautions should be taken (e.g. using sprockets with larger pitch). Contact your local Ammeraal Beltech representative for special solutions.
- Example: belt is installed, spliced and pretensioned at 22°C and is then moved to an environment operating at 62°C. Temperature difference = 40°C, the belt will elongate 40 x 0.17 = 6.8 mm/m or 0.68%.

Each material is characterized by its own coefficient of linear thermal expansion. Changes in the belt length can be calculated as follows:

$\Delta L = L \times \alpha \times \Delta T$	α	=	linear thermal expansion coefficient
	L	=	belt length nominal in m
	ΔL	=	thermal expansion / contraction
	ΔT	=	temperature difference

3.9 Friction coefficients

Friction is a very important belt feature. In most cases a low friction between belt and slider bed/strips is preferred, this reduces the drag forces and thus the elongation in the belt and necessary power to drive it. The friction coefficients of Soliflex belts to common slider materials in common conditions can be found in table 10 of chapter 8.

Values mentioned in this manual are based on clean environmental circumstances. Application circumstances can influence the friction both negative as positive. For example flour in bakeries cause higher friction and fluids in meat factories cause lower friction.

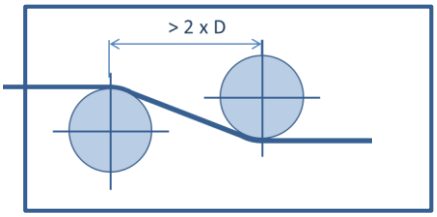
The friction between TPU and stainless steel is quite high and this is not the preferred combination. When using Soliflex belts on existing installations with steel sliders the advice is to apply HDPE slider strips on the steel slider bed. The HDPE slider strips reduces the friction on steel significantly.

The low friction smooth topside of the belt improves hygiene but limits the angle of inclination (±15°). In case a higher angle of inclination is needed cleats can be applied. In some cases (dough, meat, etc.) embossings help to increase the friction.

4 Design guidelines for special conveyor types

In most applications a straight standard conveyor does the job, sometimes special designs are needed. This chapter gives some design guidelines for a number of special conveyor types.

4.1 Flexing and back flexing diameters



The allowed minimum flexing diameters for Soliflex CB and Soliflex FB (mini) are depending on material and belt thickness. These values can be found in paragraph 8.1 and on the belt data sheet. If flex and back flex sprockets are close to each other, there should be at least 2 diameters distance in between the flexing roller centres.

Example: Scanner belt applications where flex and back flex rollers are close. The return part of the belt needs to be brought upward to accommodate for the relatively small opening through the scanner. Make sure that the centers of the rollers are at least two flex diameters apart.

For belts with accessories use minimal sprocket diameter as advised in paragraph 8.12.

4.2 Inclined conveyors

Inclined conveyors are used to overcome height differences. The angle of inclination is limited by the friction between the transported goods and the belt. For most bulk goods the angle of inclination should be less than 15°, use cleats otherwise. The friction for piece goods should be tested.

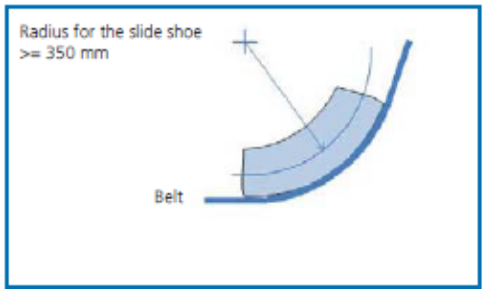
Make sure that the drive drum is always on the topside of the conveyor. This is also important for decline conveyors.

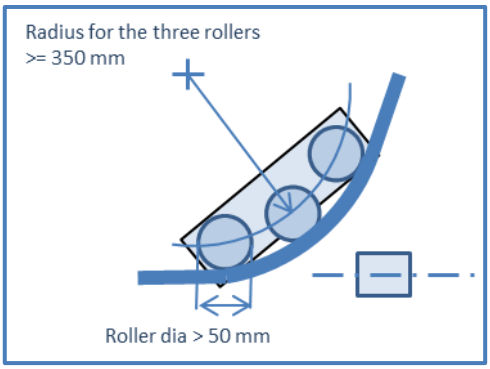
4.3 Swan neck conveyors

Swan neck conveyors are often used to transport bulk goods or small products coming from a hopper to a higher level. Swan neck conveyors only need a relatively small floor space. Inclination angles start at 30° and go up to 75°. In these conveyor types the belt width must be chosen carefully. Safe values normally recommended for homogeneous belts go up to a width of 600 mm. The special design of Soliflex CB and FB (mini) belts allows safe values up to 1000 mm. Even wider belts have been designed with the Soliflex PRO (see the Soliflex PRO manual).

Give special attention to the design of the bends:

- The recommended radius in these bends is a minimum of 350 mm. Use of roller sets in the bends for conveyors is the preferred solution.
- For slow moving conveyors (up to 0.2 m/s) slider shoes made from HDPE or UHMWPE can be used although rollers remain the preferred solution. A small outward pointing groove in the sole of the shoe can help to prevent dirt building up. *Slider shoes create high friction to the TPU cover and can create issues.*
- The effective width of shoes or rollers should be 50 mm. The space between shoe or roller and Bordoflex should be at least 10 mm.
- Swan neck conveyors up to 1500 mm width have been successfully built; *contact your local Ammeraal Beltech representative for detailed advice.*





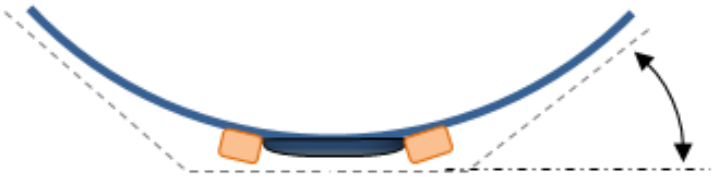
4.4 Trough conveyors

Both Soliflex Center Bar and Full Bar can be used for transport of bulk goods in troughed conveyors. Trough angles up to 40° are possible. Use UHMWPE/HDPE slider strips to support TPU belts.

4.4.1 Soliflex Center Bar

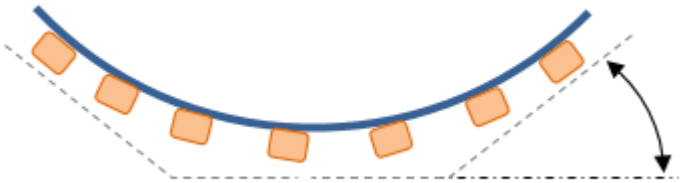
There are various trough bed constructions. A trough stainless steelbed, a trough roller bed construction or a trough UHMWPE/HDPE slider strip construction. The UHMWPE/HDPE slider strip construction gives the belt good tracking.

The transfer length from flat to trough as in-feed and out-feed should be equal to or larger than the belt width. A larger in-feed will increase the service life. Belts less than 600mm need special attention to be troughed. Consult your your local Ammeraal Beltech representative.



4.4.2 Soliflex Full Bar

The transfer length from flat to trough as in-feed and out-feed should be equal to or larger than the belt width. A larger in-feed will increase the service life. Belts less than 600mm need special attention to be troughed.



As decribed there are many different solutions for trough conveyors and application data needs to be evaluated carefully. In all cases we advice you to consult your your local Ammeraal Beltech representative.

5 Existing conveyor retrofit to Soliflex CB and FB (mini)

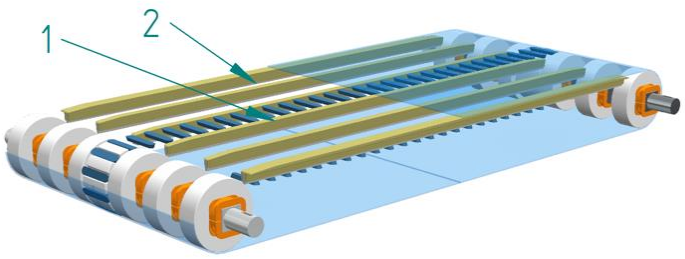
It is possible to exchange synthetic or modular belts for positive driven homogeneous belting such as Soliflex CB and FB (mini). Below are some tips for a Soliflex CB and FB (mini) retrofit on existing conveyors.

5.1 From modular belts

Sprockets and Rollers

Exchange the drive and tail pulleys for the appropriate sprockets and support rollers.

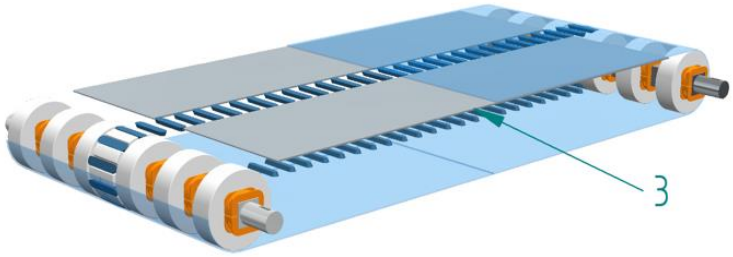
Slider strips/bed



If the slider bed construction is made out of UHMWPE, HDPE or metal strips position them in such a way that they act as guides for the Center Bar (see also the chapter on slider strips).

Ensure that the slider bed (1 and 2) height is slightly lower than or level with the upper face of the pulleys. A deviation of max. 5 mm will not negatively affect the operation of the positive drive.

5.2 From synthetic belting and flat slider bed conveyor



For a full slider bed: provide HDPE strips on top of the flat slider bed to ensure a smooth and efficient operation. Position these strips in such a way that they act as guides for the Center Bar.

Make sure that the height of the slider bed (3) is not higher than the upper face of the pulleys. A tolerance of up to 5 mm is permitted and will not negatively affect the operation of the positive drive.

It is also possible to use a profiled slider bed. It is recommended to have drainage holes in the bottom grooves to prevent dirt build up.

6 Belt calculation

For a Soliflex CB and FB (mini) belt the load on the belt needs to be compared to the allowable load for the selected belt type. The belt is subject to different loads: friction on the slider strips, the mass of the transported goods, mass of the belt (for inclined conveyors) and possible influences from scrapers etc. When accumulating products the load will also be higher and this needs to be taken into account.

This chapter covers the calculation of the allowable load for Soliflex CB and FB (mini) belts and calculation method for the determination of belt load for different types of conveyors. Your local Ammeraal Beltech representative can support you with the necessary calculations.

The starting point for the calculations is that the belt is mounted without pretension.

6.1 Belt properties – allowable load

The allowable load for a belt depends on material and width and can be calculated as follows:

F_{all} allowable load $\quad F_{all} = LF * b * FE * SF * 1000$ [1]

See the belt data sheet for the force elongation behavior of a belt (FE). The Load Factor (LF) is 0.6 with the standard sprocket and 1.0 with the Plus sprockets. The service factor (SF) depends on the operational conditions and on the conveyor type. See the table below for the service factor values.

The belt design is acceptable if the load in the belt is less than the allowable load:

$$F_B < F_{all} \quad [2]$$

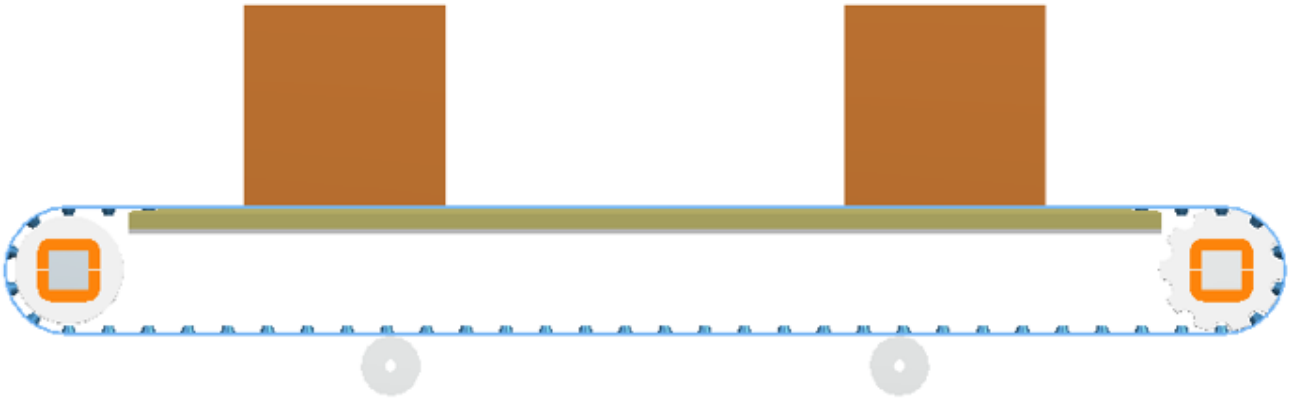
factor (SF)	**Horizontal conveyors**	**Inclined conveyors**	**Trough or swan neck [1])**
Conveyor in a *clean* environment running *less* than 8 hours/day with a speed *below* 1 m/s	1.0	0.9	0.8
Conveyor in a *clean* environment running *more* than 8 hours/day with a speed *below* 1 m/s	0.9	0.8	0.7

1) Or other conveyor types that have a combination of flat and inclined parts or back-flex rollers

6.2 Belt loads on horizontal conveyors

On a horizontal conveyor the main load comes from the friction on the slider strips. Also a scraper will create a load to the belt. Conveyors where products are accumulated encounter extra loads from the friction between products and belt. The friction coefficients between product and belt need to be determined. Notice that the weight per meter (m_A) will increase over the accumulation length.

F_1 friction load	$F_1 = \mu_1 * k * L * (m_b + m_p) * g$	[3]
F_3 scraper load	$F_3 = 85 * b$	[4]
F_4 accumulation load	$F_4 = \mu_2 * k * L_A * m_A * g$	[5]
F_B total belt load	$F_B = F_1 + F_3 + F_4$	[6]

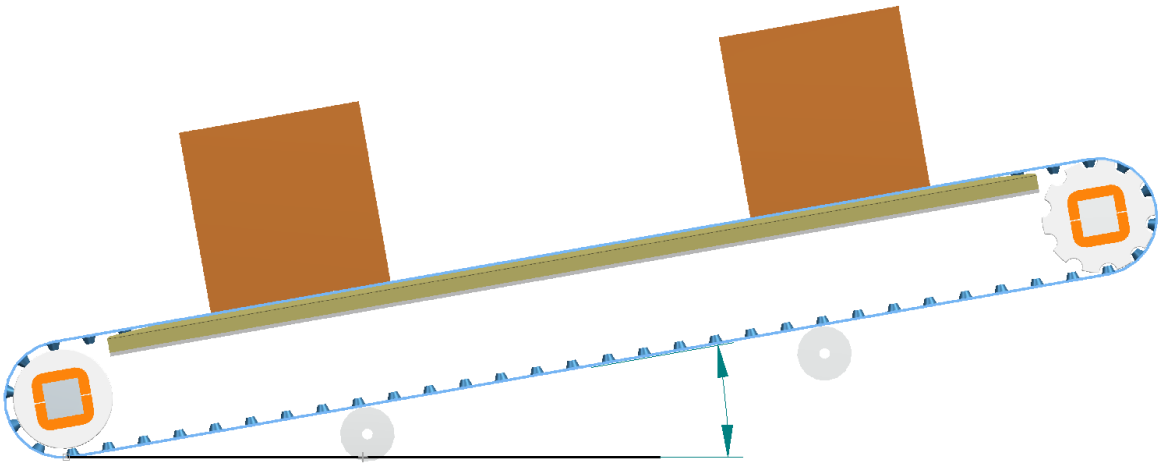


NOTICE Coefficient of friction correction factor (k). *In dirty environments the coefficient of friction will be higher than stated in the belt datasheets. Thus lowering the maximum load on the belt. In the formulas this is represented by the k. In clean environments k = 1 and dirty environments k = 1.25*

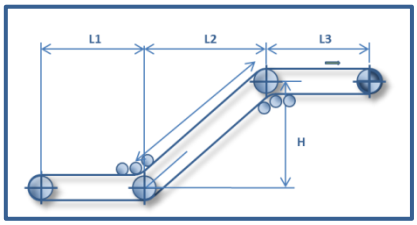
6.3 Belt loads on inclined conveyors

The product weight adds to the belt loads on an inclined conveyor, depending on the angle of inclination. Accumulation is not taken into account.

F_1 friction load	$F_1 = \mu_1 * k * L * (m_b + m_p) * g * \cos \alpha$	[7]
F_2 gravity load	$F_2 = L * (m_b + m_p) * g * \sin \alpha$	[8]
F_3 scraper load	$F_3 = 85 * b$	[9]
F_B total belt load	$F_B = F_1 + F_2 + F_3$	[10]



6.4 Belt loads on swan neck conveyors



The loads on swan neck conveyors and similar conveyors can be calculated by splitting the design up in separate horizontal and inclined conveyors. The total belt load is the sum of the belt loads for each part. Compare this total load to the allowable load for the given belt type, see formula [2]. The Soliflex CB and FB (mini) Calculation tool allows for an easy evaluation of swan neck conveyors.

6.5 Dimensioning of the motor and shaft

Calculate the required power for the motor from the speed and the total load in the belt. Also take the efficiency of the gear into account.

$$\text{P required motor power } P = F_B \times v / 1000 \times \eta \qquad [11]$$

For the calculations of the shaft we advise to use the CEMA guidelines.

6.6 Definitions

α	*inclination angle of the conveyor ..... [rad]*
b	*belt width..... [m]*
F_1	*load in the belt caused by friction to the slider bed ..... [N]*
F_2	*load in the belt caused by weight of the conveyed product ..... [N]*
F_3	*load in the belt caused by a scraper ..... [N]*
F_4	*load in the belt caused by friction to the slider bed ..... [N]*
F_{all}	*allowable load for a belt type ..... [N]*
F_B	*total load in the belt ..... [N]*
FE	*force needed for 1% elongation (see belt data sheet) .....[N/mm]*
g	*gravitational acceleration; g = 9.81 ..... [m/s²]*
k	*correction factor friction coefficient ..... [-]*
L	*conveyor length c-c ..... [m]*
L_A	*length where accumulation occurs ..... [m]*
m_A	*weight of accumulated product per m length ..... [kg/m]*
m_b	*weight of belt per m length ..... [kg/m]*
m_p	*weight of conveyed product per m belt length ..... [kg/m]*
η	*gear efficiency ..... [-]*
P	*required motor power ..... [kW]*
μ_1	*friction coefficient between belt and slider strips ..... [-]*
μ_2	*friction coefficient between product and belt ..... [-]*
1v	*belt speed ..... [m/s]*

7 Ordering belts, fabrication possibilities

Endlessed spliced Soliflex CB, FB and FB mini belts can be supplied in widths up to 1000 mm. Wider belts up to 1500mm are possible by means of plastic or stainless steel fasteners. For spliced belts wider than 1000mm you can consult your local Ammeraal Beltech representative.

The length of a belt must always be a whole number (n) times the pitch of the drive bars:

Center Bar has a pitch of 39.7mm so n=39.7
Full Bar has a pitch of 50mm so n=50
Full Bar mini has a pitch of 25.9mm so n=25.9

Calculate the ordering length by measuring the belt length and round it to match a total length of *n* x 25.9, 39. or 50 mm (where *n* = 1, 2, 3, etc.).

Tolerances

The pitch of the bars have a tolerance which is measured over multiple bars as below:

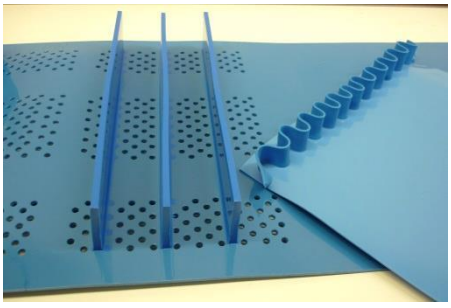
	Target			Minimum			Maximum			Measured Over
Pitch	Mm	inch		mm	inch		mm	inch		
CB	476	18.750		474	18.656		479	18.844		12 teeth
FB mini	466	18.360		464	18.270		469	18.450		18 teeth
FB	500	19.690		495	19.600		502	19.780		10 teeth

The tolerance on belt thickness is +/- .25mm. Tollerances on widths and lengths and accessories according to ISO 15147:2012

The Soliflex CB, FB and FB mini belts can be supplied spliced or open ended, with cleats, Bordoflex, punched holes, mechanical fasteners, guides and/or ropes. Notice that the distance between cleats should also match *n* times the pitch of 25.91, 39.7 or 50 mm. The accessories program is continuously updated: contact your local Ammeraal Beltech representative for an overview of fabrication possibilities.

NOTICE

Be aware that accessories may have a different colour than the belt.



8 Tables

8.1 Soliflex Specifications

Table 1 Soliflex Specifications

	TPU/30 FB mini	TPU/30 FB	TPU/30 CB
Thickness (mm)	3.0	3.3	3.0
Hardness (Sh)	98A	98A	98A
Colour	Light blue		
Temperature min (°C)	-10		
Temperature max (°C)	70		
Min Pulley Dia (mm)	47.8 (Z06)	93.8 (Z06)	124.0 (Z10)
Min Pulley Dia Backflexing (mm)	90.0mm	150.0mm	250.0mm
Chemical resistance	+		
Cold resistance	+		
Scratch resistance	++		

Table 2 Pretension

Belt type	**Advised pretension**	**Max. allowable elongation**
Soliflex CB, FB (mini)	0 - 0.1%	0.5%

8.2 Properties Sprocket

Table 3 Recommended minimum configurations Soliflex CB, FB (mini)

Number of sprockets and support pulleys Center Bar – 1 row

Belt width in mm	No. of sprockets	No. of support pulleys
< 200	1	2
201-300	1	4
301-400	1	4
401-500	1	6
501-600	1	6
601-700	1	6
701-762	1	8

Number of sprockets and support pulleys Center Bar – 2 row

Belt width in mm	No. of sprockets	No. of support pulleys
762-800	2	6
801-900	2	8
901-1000	2	8
1001-1100	2	10
1101-1200	2	10
1201-1300	2	12
1301-1400	2	12
1401-1500	2	14

Number of sprockets
Full Bar (Mini)

Belt width in mm	No. of sprockets	No. of support pulleys
< 200	2	0
201-300	3	0
301-400	4	0
401-500	5	0
501-600	6	0
601-700	7	0
701-800	8	0
801-900	9	0
901-1000	10	0
1001-1100	11	0
1101-1200	12	0
1201-1300	13	0
1301-1400	14	0
1401-1500	15	0

All sprockets and rollers need to be evenly spaced

Table 4 Sprocket Dimensions

No. of teeth (Z)	diameter (mm)		
	Center Bar	**Full Bar**	**Full Bar mini**
6	Na	93.8	47.8
8	Na	125.7	64.3
10	124.5	157.5	80.7
12	150.0	189.4	97.2
13	163.0	Na	Na
16	Na	253.1	Na
20	Na	Na	162.2
	Other dimensions available on request		

Table 5 Sprocket Bore dimensions

Pilot Bore (PB)	**Square (SQ)**	**Round (RR)**
6	40	20
15		25
		30
		40
Not all options are applicable on all sprocket type/sizes		

Table 6 Sprocket Executions

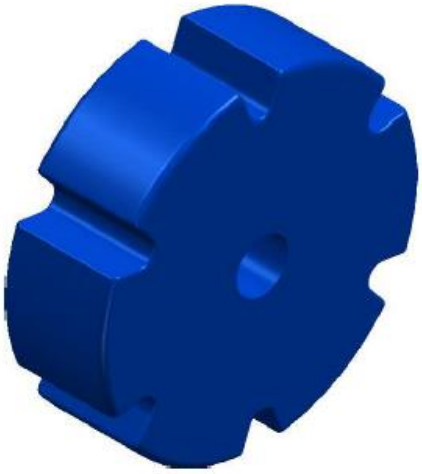
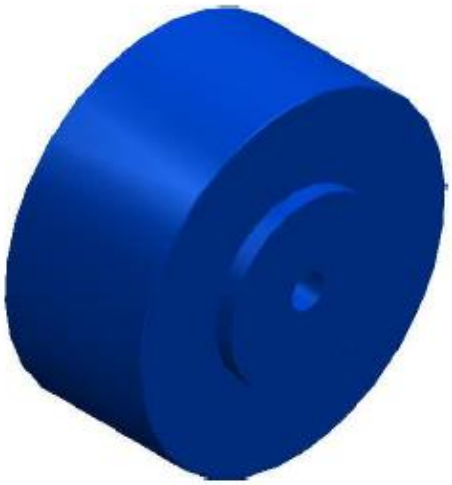
 Full Bar Sprocket	 Full Bar mini Sprocket
 Center Bar Sprocket	 Center Bar Tail Roller

Table 7 Maximum Cleat type per sprocket type

Center Bar	Full Bar	Full Bar mini	Belt cleat thickness (mm)
		Z06 47.8	Na
		Z08 64.3	Na
		Z10 80.7	Na
		Z12 97.2	Na
		Z20 162.2	Na
	Z06 93.8		3.0
	Z08 125.7		3.0 or 6.0
	Z10 157.5		3.0 or 6.0
	Z12 189.4		3.0 or 6.0
	Z16 253.1		3.0 or 6.0
Z10 124.5			3.0 or 6.0
Z12 150.0			3.0 or 6.0
Z13 163.0			3.0 or 6.0
Cleat height does not influence minimum sprocket diameter.			

Table 8 Maximum Bordoflex Height per sprocket type

Center Bar	Full Bar	Full Bar mini	Maximum height (mm)
		Z06 47.8	Na
		Z08 64.3	Na
		Z10 80.7	Na
	Z06 93.8	Z12 97.2	30 mm
		Z20 162.2	Na
Z10 124.5	Z08 125.7		50 mm
Z12 150.0	Z10 157.5		70 mm
Z13 163.0			80 mm
	Z12 189.4		90 mm
	Z16 253.1		100 mm
For belts with Bordoflex the sprocket size must be chosen larger than the standard sizes. Depending on the application the minimum sprocket diameter must be higher than 2-3 times the Bordoflex height and also be bigger than the minimum sprocket diameter than the belt.			

8.3 Thermal Expansion

Table 9 Coefficient of Friction

$\Delta L = L \times \alpha \times \Delta T$	α	=	linear thermal expansion coefficient
	L	=	belt length nominal in m
	ΔL	=	thermal expansion / contraction
	ΔT	=	temperature difference

	Material	α [mm/m/°C]
Soliflex	TPU	0.17
Slider strip materials	HDPE	0.14
	UHMWPE	0.14
	(Stainless) steel	0.01

8.4 Coefficient of Friction

Table 10 Coefficient of Friction

	Slider material	**TPU (98A) Dry**	**TPU (98A) Wet**
Center Bar	HDPE	0.35	0.38
	Stainless steel	0.55	0.40
Full Bar (mini)	HDPE	0.35	0.38
	Stainless steel	0.55	0.40

8.5 Notes: