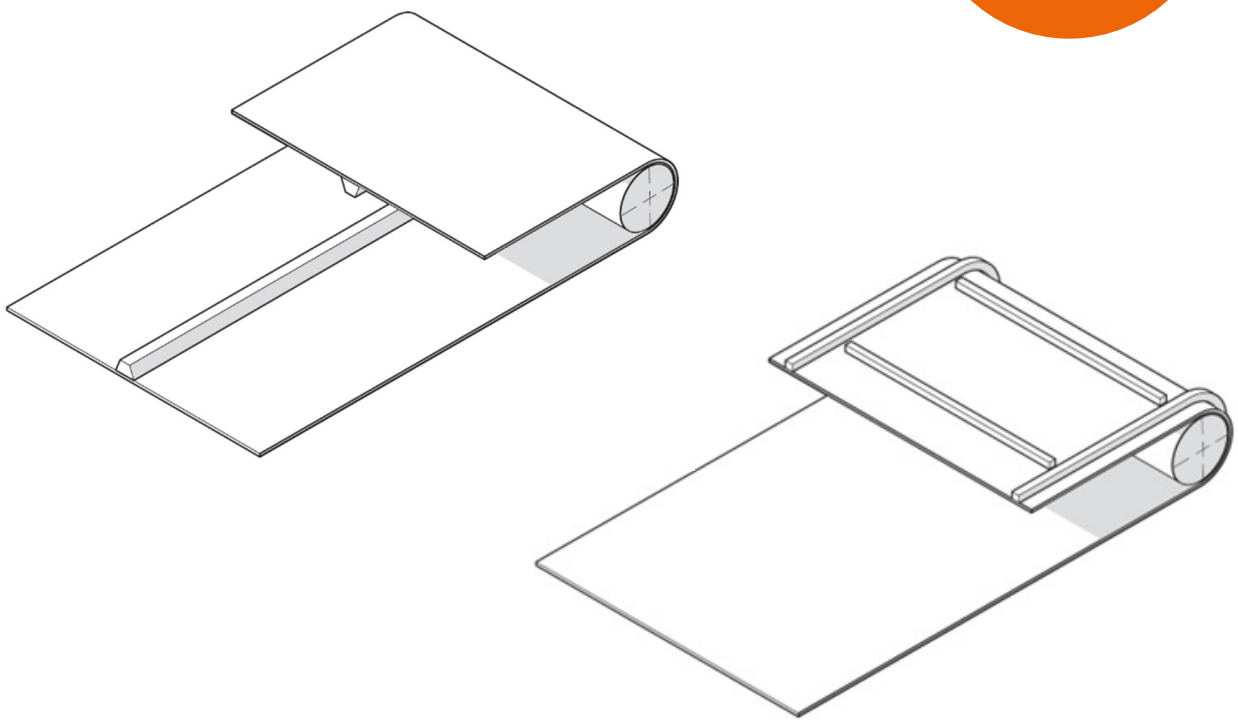
Ammeraal Beltech

EN

Technical Manual



Conveyor Belt Accessories

Innovation and Service in Belting

Table of content

1. Introduction

Ammeraal Beltech is a global leader in middle and light weight belting. Ammeraal Beltech provides services and solutions to help process and convey a wide variety of products. Our solid base is a close cooperation with customers and control over the full value chain: development, manufacturing, fabrication, sales, and service. The Ammeraal Beltech group and affiliated companies operate globally. We offer belting products and services to save our customers time and money. Whether our customers are conveying or processing products, Ammeraal Beltech has the right solution.

Image 1: full value chain and extensive product range

Ammeraal Beltech offers a comprehensive belting range.

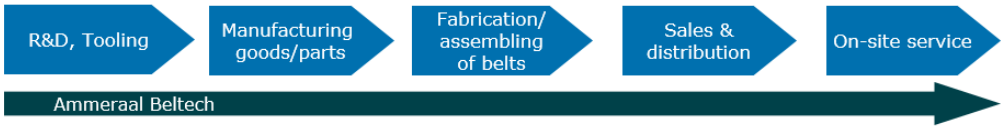
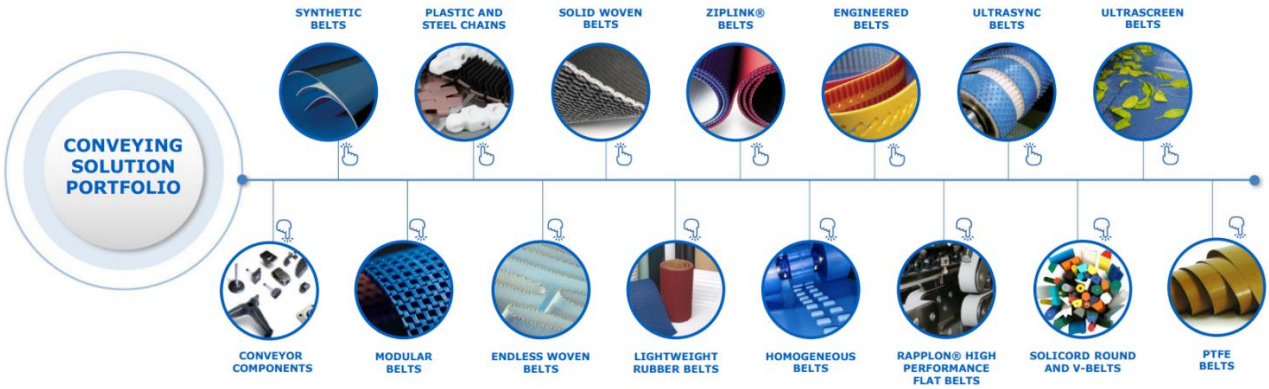


Image 2: comprehensive belting range



2. About this manual

In this manual we address accessories on plied synthetic conveyor belts. Accessories are used to add certain characteristics to a conveyor belt. There are guide ropes to keep a conveyor belt running in the center of the conveyor. Cleats to support products when being conveyed at an incline. Corrugated side walls or Bordoflex to keep bulk goods from spilling over the edge of a conveyor belt and sealed belt edges to prevent moisture, oil, and fat from entering the fabric reinforcement plies from the sides of the belt. We will discuss topics like the purpose, the material, the flexibility, and the minimum pulley diameter of the different accessories. In this manual we do not address the best practice of applying belting accessories. The central fabrication team from Ammeraal Beltech has instructions available on how to apply accessories to synthetic belts.

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3. Ropes

There are several reasons to use ropes (profiles), on a conveyor belt. First, we have the guide rope. One or more ropes fitted in the longitudinal direction on usually, the bottom side of a belt, help to keep the belt running in the center. In the engineering guide for plied synthetic conveyor belts we discuss the aspects of a conveyor design concerning the tracking of a conveyor belt. If these measures are not effective or cannot be applied in a specific application, guide ropes can be an effective tool to keep the belt centered. See image 3.

Another reason to apply a profile on a conveyor belt is to prevent bulk goods from spilling over the edges of the belt. So called spill edges are fitted to the top side of the belt in longitudinal direction. See image 4.

Ropes fitted across the belt on the top side of a belt can function as a relatively low cleat, carrying product upward on an inclined conveyor. Rope carriers can be used in combination with spill edges to create a so-called pocket belt. See image 5.

Applying guide ropes adds cost to manufacturing a conveyor belt. Guide ropes and strips should be considered wear parts, since, as soon as a guide rope is performing its function, it runs against the conveyor frame. While doing so it creates extra friction and wear.

Therefore, the use of guide ropes or guide strips should be seen as a last resort. To keep a belt running centered on a conveyor, crowned pulleys or a tracking roller are more elegant solutions. Ammeraal Beltech has training and documents available specifically on conveyor belt tracking.

The relationship between belt width, conveyor length and the level of mistracking forces determine the number and position of guide ropes on a conveyor belt. For example, for a long narrow belt one guide rope in the middle would suffice, whereas for a short and wide (square) belt it is advised to apply one guide rope at either side of the conveyor belt, see chapter 3.6 Number of guide ropes.

Image 3: guide rope

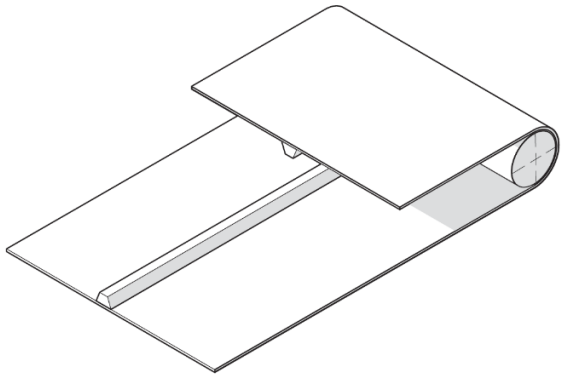


Image 4: rope as a spill edge

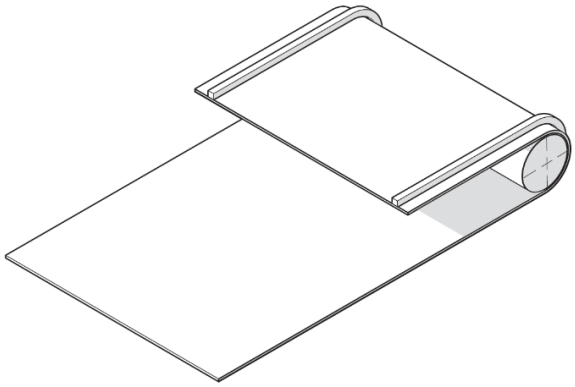
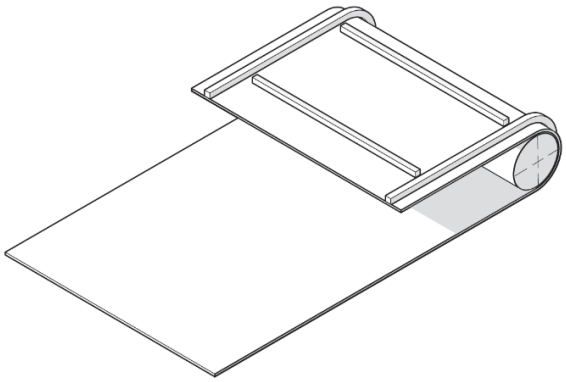


Image 5: rope as cleat, pocket belt



3.1 Types of ropes

Diverse types of ropes are available on the market, diverse types of material, hardness and color, different shapes, and solid as well as notched ropes. Usually, the type of material and color of the rope matches the type of material of the belt surface to witch the rope is attached, since only matching materials can be welded. There are exceptions like PVC and Amtel (TPE-E), these two materials welded together will have a good adhesion. Ropes fitted to a fabric belt surface are glued to the fabric.

Ropes can be grouped into two diverse groups of shape of the cross section: rectangular- and Vee-ropes. Both are available in a smooth/solid and in a notched version, see image 6, 7, 8 and 9. Notched or embossed ropes offer an increase the flexibility compared to solid ropes. Basically, there are two ways of making a notched rope. One is forming the notch when the rope is still in a soft state. The other is to mechanically remove material to form a notch shape when the rope is already in a fully solid state. The later method offers a lower quality of rope, since the surface of the notch is often rough and damaged, this makes the rope prone to breakage.

Notched ropes are more flexible than solid ropes but at the same time a notched rope is more sensitive to wear and tear. In the food industry notched ropes are considered less hygienic than smooth ropes, for this reason the use of notched ropes should be avoided in that industry.

Image 6: rectangular rope, solid

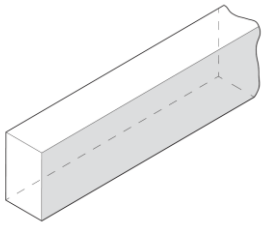


Image 7: rectangular rope, notched

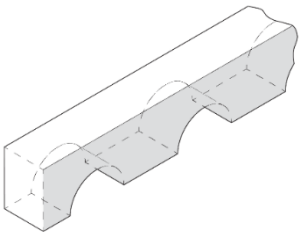


Image 8: vee-rope, solid

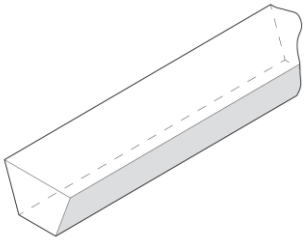
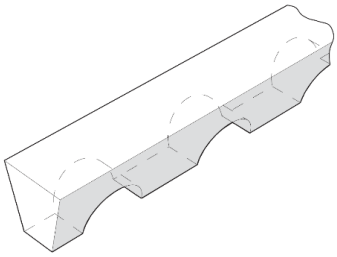


Image 9: vee-rope, notched



A typical product from Ammeraal Beltech is the Amtel (polyester) guide rope with the deep and smooth notch shape the A52, see image 10. Amtel is tough and wear resistant polyester that is compatible with several PVC compounds from Ammeraal Beltech like Flexam, Nonex and Arcon. The deep notch shape makes this type of rope highly flexible. A52 ropes have a square cross section of 9x9 mm. The A70 guide ropes have that same deep notch but have the cross section of a Vee-guide. The deep notch of the A52 profile makes this type of rope highly flexible, this is reflected in the relative low pulley factors in the table of image 24.

Image 10: A52 profile (Modulus)

3.1.1 Rope material and hardness

The material and hardness of a guide rope determine the strength, wear resistance and the flexibility of the rope. A harder rope will be stronger, more wear resistant but also less flexible, thus requiring a larger minimum pulley diameter. Polyurethane ropes resist alternating elongation and compression, due to flexing and back flexing, better than ropes made from polyvinyl chloride (PVC). Flexing, back flexing, neutral line, compression, and elongation are addressed in chapter 3.3 Flexing and back flexing and the related images.

3.1.2 Hollow ropes and reinforced ropes

Apart from solid ropes there are also hollow and reinforced ropes available in the market. Ammeraal Beltech does not recommend the use of hollow or reinforced ropes as tracking rope on a conveyor belt. Hollow ropes are more sensitive to wear and tear. The reinforcement member in reinforced ropes serve no purpose in tracking ropes, it makes

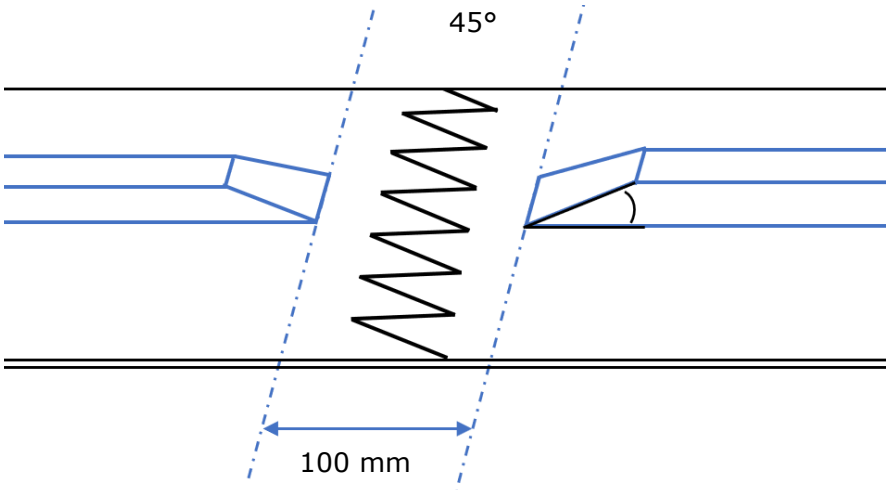
the rope less flexible and increases the minimum pulley diameter of the rope significantly.

When using guide ropes on conveyor belts one should consider that using a rope can increase the minimum pulley diameter of the configured belt. The vee shape ropes offer better flexibility than the rectangular alternative.

3.1.3 Guide ropes in the splice area

In industries like the agriculture and horticulture industry dirt and soil can accumulate in the grove on the pulley that accommodates the guide rope. This will push the rope upward when the belt is flexing over that pulley. This could lead to splice failure therefore, it is advised to leave the slice area of a finger splice free of guide rope in heavily polluted applications, see image 11.

Image 11, splice area free of guide rope, back side of the belt



3.2 Nomenclature

Ammeraal Beltech includes the most important characteristics of a rope into the nomenclature. Image 12 shows two examples of the nomenclature Ammeraal Beltech uses for ropes.

Image 12: Ammeraal Beltech nomenclature for ropes

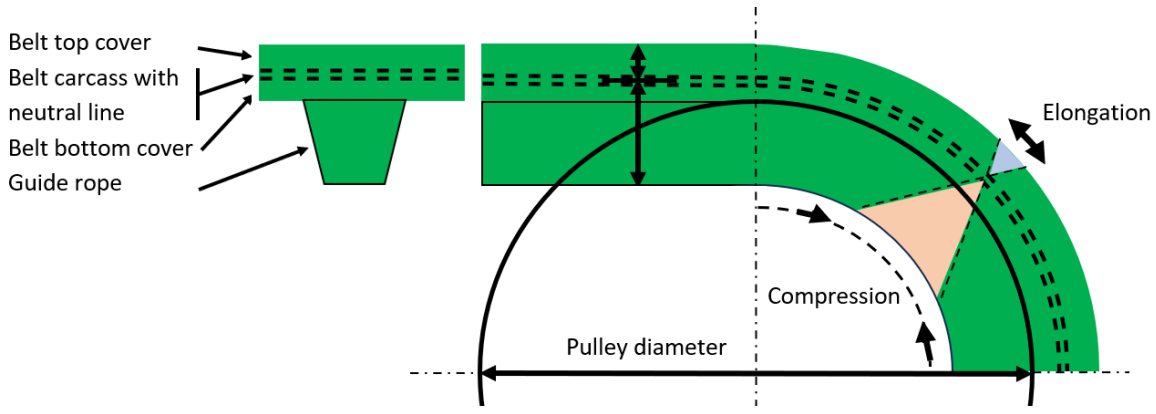
		Rope Rope	TPU PVC	Notched Solid	Vee Vee	06 06	x x	04 04	85A 60A	L. Blue Black	FG
1	Accessory type										
2	material										
3	execution										
4	shape										
5	width										
6	height										
7	hardness										
8	color										
9	Additional										

3.3 Flexing and back-flexing

3.3.1 Flexing a belt with a guide rope

Whenever a belt with a guide rope at the bottom side flexes around a pulley, the top cover of the belt is elongated, while the rope is being compressed. The dotted lines in image 13 indicate the position of the neutral line in the belt carcass. When flexing, material at the neutral line is neither elongated nor compressed. The further that material is from the neutral line, the more a material must elongate, or compress. In Image 13, the top of the guide rope is at a relatively large distance from the neutral line compared to the top layer of the belt and for that reason it needs to compress more than the top layer of the belt needs to elongate.

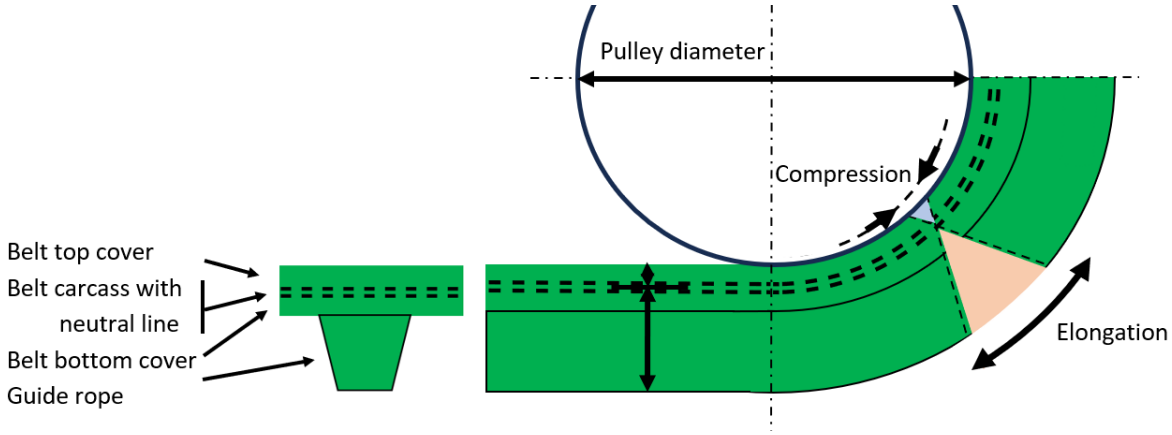
Image 13: flexing, the bottom side of the belt is bending over a pulley.



3.3.2 Back flexing a belt with a guide rope

Whenever a belt with a guide rope on the bottom side back flexes around a pulley, the top cover of the belt is compressed, and the surface of the guide rope is elongated. The dotted lines in image 14 indicate the position of the neutral line in the belt carcass. When back flexing, material at the neutral line is neither elongated nor compressed. The further that material is from the neutral line, the more a material must elongate, or compress. In image 14, the top of the guide rope is at a relatively large distance from the neutral line compared to the top layer of the belt and for that reason it needs to elongate more than the top layer of the belt needs to compress.

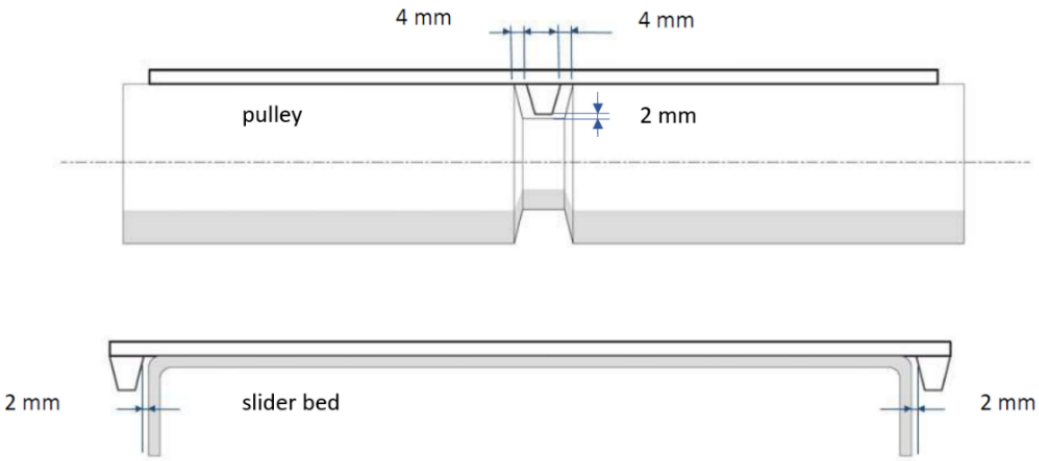
Image 14: back-flexing, the top side of the belt is bending over a pulley.



3.4 Conveyor design

When designing a conveyor for a conveyor belt with a guide rope one should keep in mind to accommodate the guide rope in the slider belt support and pulleys. The lateral space between rope and grove in the slider bed is smaller than the lateral space between a rope and the groove in a pulley, so that the rope is tracking on the slider bed and not on the pulley. The advised clearance between the accommodation and the guide rope is described in the engineering guide of synthetic belting, see image 15.

Image 15: advised clearance.



3.6 Number of guide ropes on a conveyor belt

The decision to equip a conveyor belt with one or two guide ropes must be based on the belt with and the relation between belt width and centre-to-centre length of the conveyor. Long and narrow belts that need tracking assistance from a guide rope need to have only one guide rope, fitted at the bottom side of the belt in the center of the belt. Short and wide belts that need tracking assistance from a guide rope need to have two guide rope fitted at the bottom, one at either side of the belt.

__One__ guide rope for long and narrow belts:
*centre-to-centre length of the conveyor > 1.5 * belt width*
or belt width < 500 mm

__Two__ guide ropes for Short and wide belts:
*centre-to-centre length of the conveyor < 1.5 * belt width*
or belt width > 500 mm

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4. Cleats

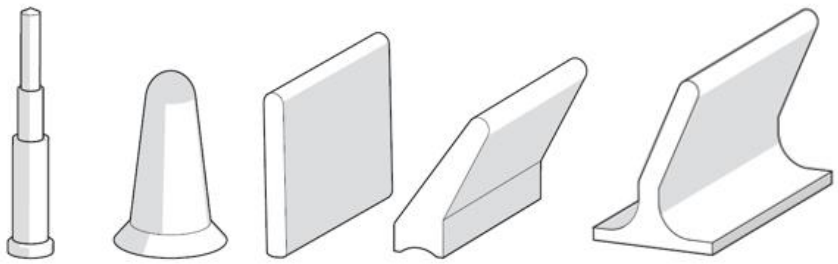
4.1 Standard cleats

If the grip between belt surface and product is no longer sufficient to have a secure transportation of a product when conveying at an incline, cleats can be a helpful solution. Cleats or carriers are fitted on the top surface of the belt and square to the belts travel direction are a physical barrier preventing the product from sliding down. In some cases, cleats are used to separate products on a belt running horizontally, for example in packaging lines.

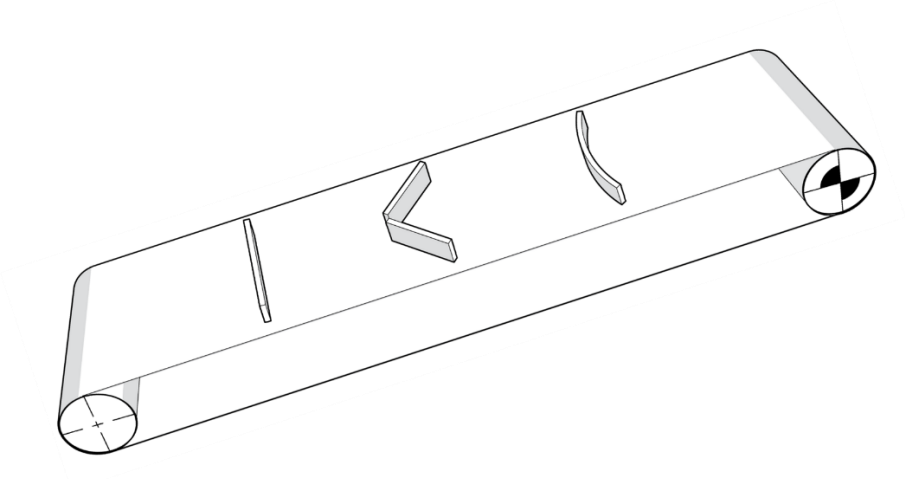
As shown in image 16 cleats come in many different shapes and sizes. simple ropes, straight cleats, cleats at an angle, bend cleats and finger cleats. Cleats can also be placed at a different angle than square to the direction of belt travel, like chevron cleats or cup-shaped cleats. Chevron and cut cleats should be designed such that the profile allows drainage of excess fluids from wet product. Image 17 shows some of the different possibilities.

Like all accessories fitted to a belt, cleats can influence the minimum pulley diameter of a conveyor belt. In chapter 7 we explain how to calculate the minimum pulley diameter of a conveyor belt with accessories.

Image 16: some examples of different shapes of cleats
Finger cleats, nipple cleats, straight cleats, cleats at an angle, bend cleats



Images 17: different cleat patterns



4.2 Cleats on Ultrasync belts

Ultrasync belts are positive drive synthetic, fabric reinforced belts that have a tooth profile on the back side to drive the belt. At the place of a tooth the belt is less flexible than between the teeth. Footless TPU cleats are the recommended cleat type for Ultrasync belts. The best place to fit a cleat is over one of the teeth and not in between, see image 18 and 19. Placing a cleat between two cleats would make the otherwise flexible part of the Ultrasync belt, between the teeth, less flexible. It is advised to design your cleated Ultrasync with all cleats positioned over teeth. This automatically means the pitch of the cleats must be a multiple of the tooth pitch. If just one of the cleats is positioned not over a tooth this influences the minimum pulley diameter of the complete belt. The influence of the cleats on the minimum pulley diameter is determined by the position of all cleats and the thickness of the foot of the cleats as shown in the tables in image 20 and 21.

Image 18, cleat over a tooth

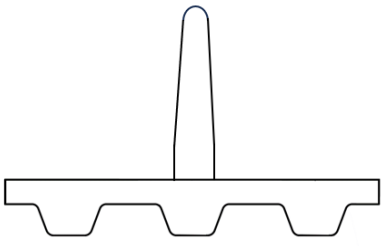


Image 19, cleat not over a tooth

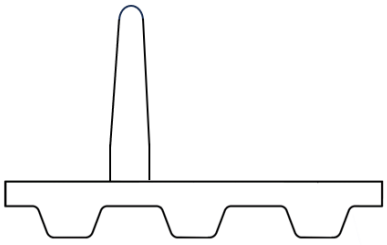


Image 20: table, minimum pulley when all cleats are positioned over T10 teeth

All cleats over T10 teeth							
Standard cleat TPU footless		NP50	NP75				
Thickness of the foot of the cleat	mm	5	6	8	10	11	12
Minimum number of teeth	#	16	18	25	35	45	60
Outer diameter at minimum number of teeth	mm	49.08	55.45	77.73	109.56	141.39	189.14
Effective diameter at minimum number of teeth	mm	50.93	57.3	79.58	111.41	143.24	190.99

Image 21: table, minimum pulley when not all cleats are positioned over T10 teeth

Not all cleats over T10 teeth							
Standard cleat TPU footless		NP50	NP75				
Thickness of the foot of the cleat	mm	5	6	8	10	11	12
Minimum number of teeth	#	30	40	45	50	55	60
Outer diameter at minimum number of teeth	mm	93.64	125.47	141.39	157.31	173.22	189.14
Effective diameter at minimum number of teeth	mm	95.49	127.32	143.24	159.16	175.07	190.99

4.2.1 An example

We give an example of the determination of the minimum pulley diameter of a cleated Ultrasync belt; The UCRY005200 Ultrasync F5 T10 Ropanyl light blue FG belt material has a minimum flexing diameter of Z = 14 or Ø 43 mm. If we place NP50 footless TPU cleats, with a base thickness of 5 mm, on this belt and all cleats are placed over the teeth the minimum pulley diameter of that configured belt increases to Z = 16 or Ø 50.93 mm. If just one cleat is placed not over a tooth, the minimum pulley diameter of that configured belt increases to Z = 30 or Ø 95.49 mm.

For cleated Ultrasync belts it is recommended to place all footless TPU cleats over a tooth.

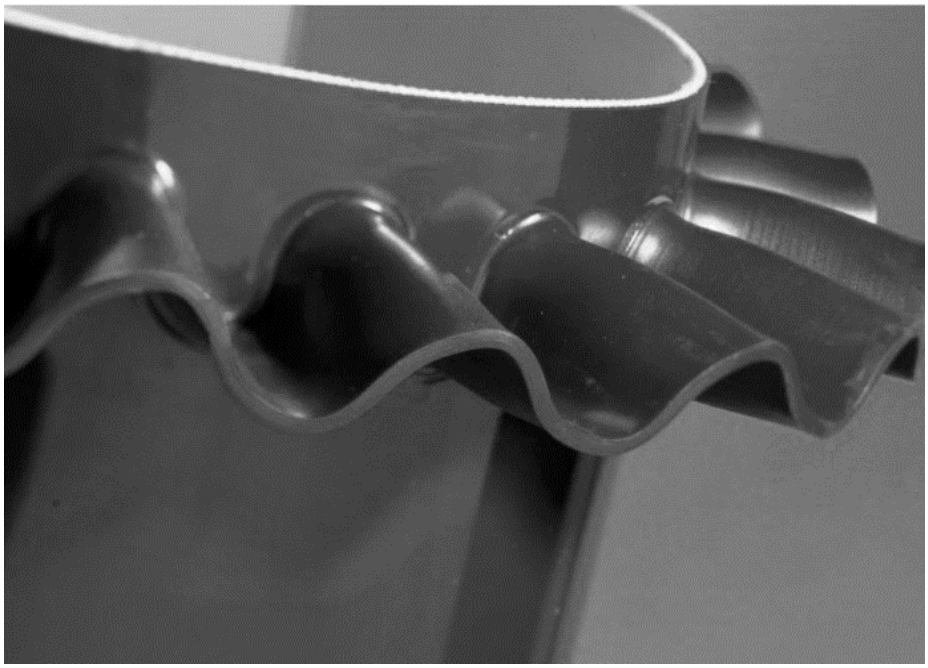
5. Bordoflex

Whenever bulk goods are being conveyed, spillage is an issue. One way of preventing bulk goods from spilling over the edge of a conveyor belt is to apply corrugated side walls or Bordoflex to the edge of the belt, see image 22. Together with cleats, Bordoflex can be used to increase the capacity of a bulk conveyor.

Just like ropes and cleats, Bordofex material should match the top layer material of the belt, to be able to weld them together. Bordoflex is available in two executions. Solid Bordoflex and fabric reinforced Bordoflex. The latter is more tear resistant than solid Bordoflex. Both executions have the same pulley factor to calculate the minimum pulley diameter. Reinforced Bordoflex may be used to support the belt in the return part, this is not recommended for solid Bordoflex material.

See chapter 7 for the calculation of the advised minimum pulley diameter of a belt with Bordoflex.

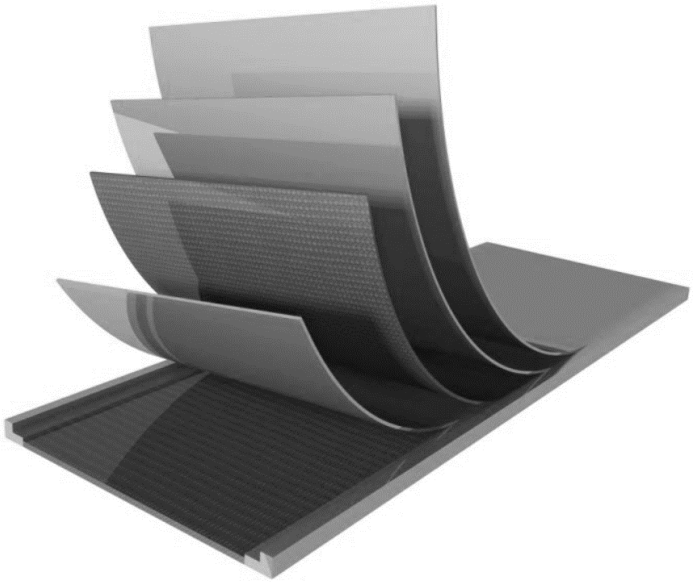
Image 22: belt with Bordoflex



6. Amseal

To prevent moisture, fat, and dirt from entering the fabric reinforcement layer(s) from the sides of a belt it can sealed with Amseal, see image 23. Amseal is a belt hygiene enhancement, especially valuable in the food industry. Amsealed belt edges are solid plastic material. Applying Amseal does not influence the minimum pulley diameter of a belt, the pulley factor is 1 (see chapter 7). It is not advised to run a belt with Amseal over a nose bar (fixed knife edge)

Image 23, Amseal



7. Calculation of the minimum pulley diameter

7.1 Pulley factors

When adding accessories like ropes, cleats, Bordoflex, and Amseal to the configuration of a conveyor belt we need to keep in mind that this might increase the minimum pulley diameter of that belt configuration. Different accessories have a different impact on the minimum pulley diameter of a belt, the material, shape, hardness, thickness, and height of that accessory all play a role in the pulley factor of an accessory. In the table of image 24 the pulley factors of the different accessories for flexing and back flexing are stated. The minimum pulley factor of a specific accessory is determined with this simple formula:

*Minimum pulley diameter of accessory (mm)= pulley factor * height of the accessory (mm)*

Image 24: table, pulley factors for belting accessories

Pulley factor of standard accessories flexing/back flexing	material		
	PVC	TPU and Dectyl	TPE-E
Vee ropes as a guide rope, solid	8/10	10/12	10/12
Vee ropes as a guide rope, notched	6/8	6/8	-
Rope as a guide rope, notched with A52 and A70	-	-	5/5
Ropes as a spill edge, Vee or rectangular, solid	10/8	12/10	12/10
Guide strips, solid	10/12	10/12	10/12
Guide strips, notched with A11	6/8	6/8	6/8
Cleats solid footless	1.1/2.5	1.1/2.5	1.1/2.5
Cleats solid with foot	2.5/5	2.5/5	2.5/5
Cleats fabric reinforced	100/200 mm	-	-
Cleats in chevron, rope or cleats (angle between ropes in the V-shape)	(55°) 9/9 (64°) 8/8 (75°) 7/7 (90°) 6/6 (110°) 4/4	-	-
Bordoflex	3/4	3/4	3/4
Amseal	Equal to the minimum pulley of the belt material. Never use Amseal in conbination with a nose bar/ fixed knife.		

Minimum pulley diameter = pulley factor * height of the accessory.

- means not available in standard range of belt accessories or pulley factor un known.

Above pulley factors apply to ..

* an operational temperature +20°C.
* an angle of wrap of 180° degrees.
* standard accessory range with the standard qualtity and hardness of plastic compound used

7.2 Angle of wrap

The angle of wrap and the operational temperature play a role when determining the minimum pulley diameter of a conveyor belt. The minimum pulley diameters of flexing and back flexing given in a technical data sheet of a specific belt refers to an angle of wrap of 90□or more. If the arc of contact of a belt to the pulley is less than 90□ the minimum pulley can be reduced. In the table of image 25 the relation is given between the arc of contact and the minimum diameter of a pulley. This table also applies to belts with accessories.

Image 25: table, angle of wrap factor

Minimum pulley and angle of wrap

Angle of wrap in degrees	Min. pulley factor in % of minimum pulley on belt data sheet
≥ 90°	100%
≥ 30° and < 90°	75%
≥ 5° and < 30°	50%
< 5°	no minimum pulley diameter

7.3 Operational temperature

Plastic materials like PVC and polyurethane (TPU) are more flexible at a higher temperature than at a lower temperature. This phenomenon has an impact on the minimum pulley diameter of a conveyor belt. Provided the operational temperature of a conveyor belt is within the range as stated on its data sheet, the minimum pulley diameter of a conveyor belt must be multiplied with the percentage factor stated in the table of image 26. This table also applies to belts with accessories.

Image 26: table, temperature factor

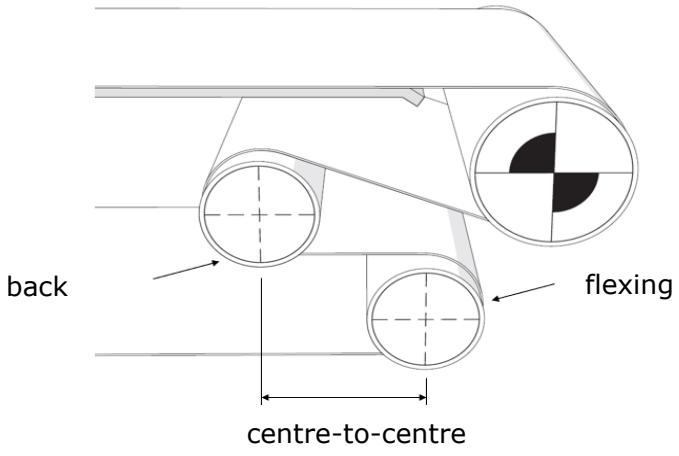
Minimum pulley and operational temperature

Operational temperature	Temperature factor
minimum operational temperature - 0° C	200%
0°C < 8°C	150%
8°C < 20°C	125%
20°C - maximum operational temperature	100%

7.4 Centre-to-centre distance of flexing and back flexing

If a plastic material first elongated and then compressed, or vice versa, it can easily be damaged when elongation or compression exceeds the limits of that that material. Also, the speed at which elongation and compression are alternated has an impact on the integrity of a plastic material. It is for that reason that a flexing pulley and a back flexing pulley should be positioned with a certain centre-to-centre distance, see image 27. For 1 or 2 ply synthetic belts the centre-to-centre distance between a flexing and back-flexing pulley with an angle of wrap of 90 degrees or more should be at least 250 mm. For belts with 2 or more plies this distance should be at least equal to the belt width with a minimum of 350 mm.

Image 27: centre-to-centre distance



8. Calculation of the minimum pulley diameter

One of the most important characteristics of a conveyor belt is the minimum allowed pulley diameter for flexing and back flexing. This characteristic is determined by the belt construction and the materials used. Strong, thick, and heavy belts require larger pulley diameters than light and thin belt types. The lifetime of a conveyor belt will be reduced when used on a conveyor with drums or pulleys with a diameter smaller than indicated on the technical data sheet of that specific belt or its accessories like ropes, cleats, Bordoflex or Amseal. The method used for endlessing the belt, splicing, or using a belt fastener, can influence the minimum pulley of the complete conveyor belt. The minimum pulley diameter given in a technical data sheet of a specific belt refers to an endless belt, endlessed with the recommended splice at an angle of wrap of 180□, at room temperature. The minimum pulley diameter of a configured belt with accessories is equal to the larges minimum pulley diameters of the belt and all of the separate accessories used. In this regard belt fasteners must also be seen as a belt accessory. The minimum pulley diameter of a belt fastener is given by the manufacturer of that belt fastener. In image 28 an example is given of the determination of the minimum pulley diameter for flexing and back flexing of a belt with accessories.

Image 28: example of the determination of minimum pulley diameter

	Belt, accessories	Data sheets, pulley factor	Minimum pulley diameter flexing / back flexing in mm
Belt	577950 Ropanyl EM 6/2 00+02 white AS FG	Flexing Ø 6 mm / Back flexing Ø 40 mm	Ø 6 / Ø 40
Guide rope	Vee rope TPU solid 10x6 mm fitted at the bottom of the belt	Flexing 10 x H / Back flexing 12 x H	Ø 60 / Ø 72
Cleat	Ropanyl TPU footless 50 mm	Flexing 1.1 x H / Back flexing 2.5 x H	Ø 55 / Ø 125
Bordoflex	TPU solid 50 mm	Flexing 3 x H / Back flexing 4 x H	Ø 150 / Ø 200
Cofigured belt	577950 + cleats + Bordoflex + guide rope		Ø 150 / Ø 200

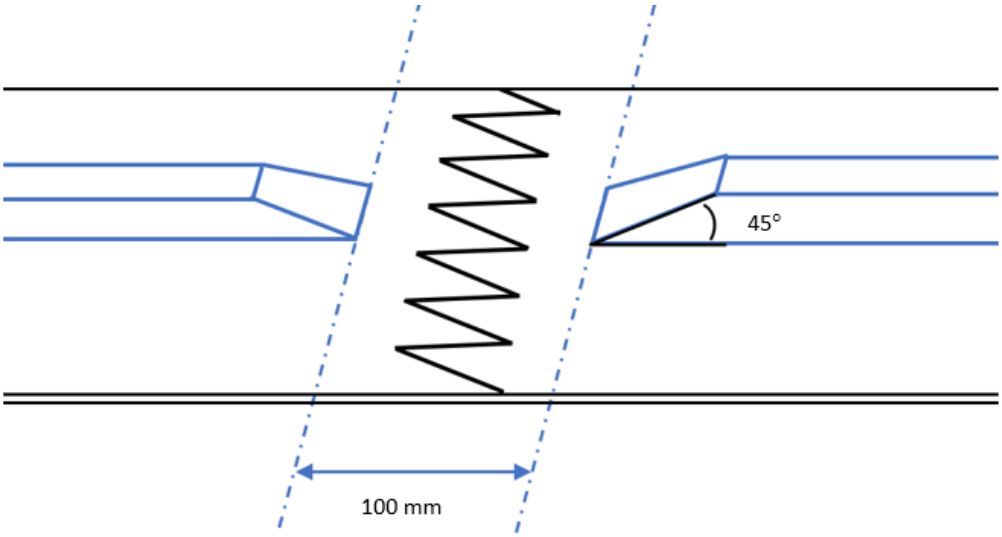
9. Trouble shooting

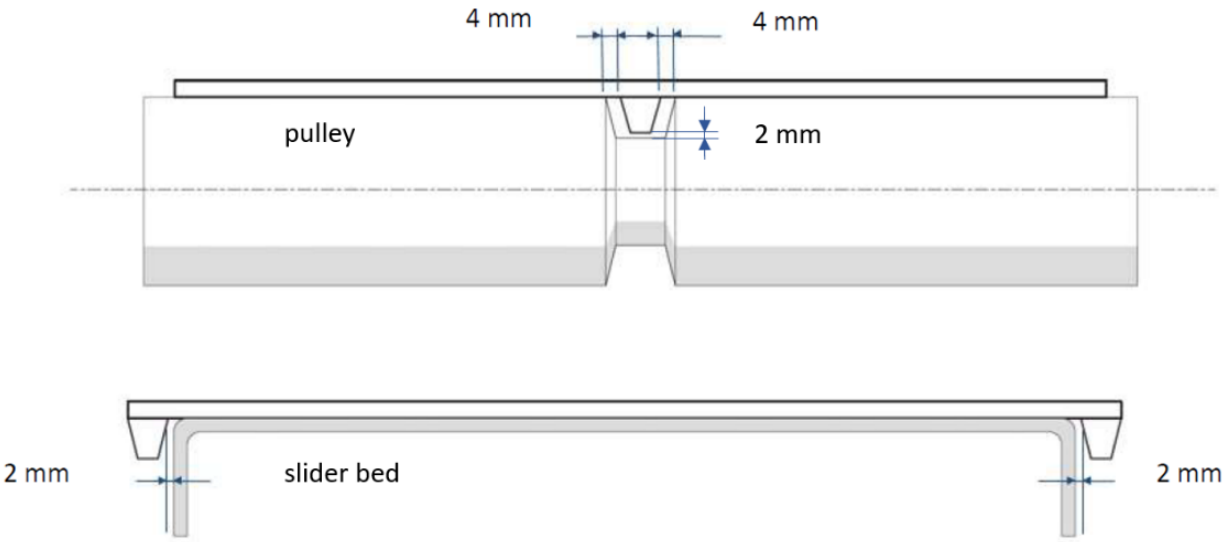
Problem	Cause	Solution
The rope or strip is cracking/breaking. Pieces of the guide rope are missing.	1. The pulleys are too small or the flexing and back flexing pulleys are placed too close to each other. 2. Chemical attack to the rope polymer. 3. Application temperature is too low in combination with the pulley diameters that are used.	1. Apply larger pulleys. Or increase the center to center distance between the flexing and back flexing pulleys. 2, 3. Consult Ammeraal Beltech about chemical resistance and/or application temperatures.
The rope or strip is delaminating from the belt surface.	1. The adhesion of the rope to the belt surface was insufficient. 2. Chemical attack to glue used to apply the rope or strip.	Consult Ammeraal Beltech with photo's of the application, drawings of the conveyor and or samples of the damaged belt.
The rope or strip is running on top of the pulley, not in designated groove.	1. The grooves in the pulleys and in the slider bed do not align. 2. The lateral clearance between rope and groove are smaller on the pulley than in the slider bed, instead of vice versa.	1. Align the pulleys and slider bed correctly. 2. Change the clearance on slider bed and/or pulleys according to the instructions in the engineering guide.
Excessive wear of the rope or strip. The rope or strip is getting more narrow.	Mind that a guide rope is a wear part, but excessive wear is undesirable. The forces driving the belt off track are too great for a rope-tracking solution. This can be due too pollution, wear of conveyor parts, too high belt tension, wrong pulley adjustment, product being on- or off loaded not in line with the belt travel.	Consult the conveyor belt tracking manual or contact Ammeraal Beltech.
Cleats are breaking, chunks of cleat material are ripped out.	1. The cleat is running against a part(s) of the conveyor. 2. Product is falling on top of the cleats and damaging them.	1. Check the complete track that the cleats are traveling for obstacles. 2. Reduce the falling height (energy) of the product. Choose a stronger type of cleat (harder, thicker or reinforced).

Problem	Cause	Solution
Cleats are delamination from the belt.	1. The adhesion of the cleats to the belt surface was insufficient. 2. The application forces on the cleat are simply too great and the cleat is ripped of the belt surface.	1. Consult Ammeraal Beltech with photo's and or belt samples. 2. Reduce the application forces on the cleats.
Cleats are bending backwards.	The application forces on the cleat are simply too great and the cleat is ripped of the belt surface.	Reduce the load on the cleat or choose a stronger type of cleat (harder, thicker or reinforced). Or apply gussets to support the back of the cleats.
Bordoflex is torn open from the top.	1. The pulleys are too small. 2. Chemical attack to the polymer. 3. Application temperature is too low in combination with the pulley diameters that are used.	1. Apply larger pulleys. Or use a lower Bordoflex. 2, 3. Consult Ammeraal Beltech about chemical resistance and/or application temperatures.
Bordoflex is delaminating from the belt.	The adhesion of the Bordoflex to the belt surface was insufficient.	Consult Ammeraal Beltech with photo's and or belt samples.
Wear of the Bordoflex.	The Bordoflex is running against a conveyor part(s).	Check the complete track that the Bordoflex is traveling for obstacles.
Amseal is delaminating from the belt.	The adhesion of the Amseal to the belt was insufficient.	Consult Ammeraal Beltech with photo's and or belt samples.
Amseal is damaged.	Amseal is running against conveyor part(s), possibly be course the belt is mistracking.	Amseal is not made to protect the belt from damage when running against a conveyor frame. Check the belt travel and track train the belt to run in the centre. Consult the belt tracking manual.

10. Summary

Belts for heavy polluted applications should have no guide rope at the finger splice.



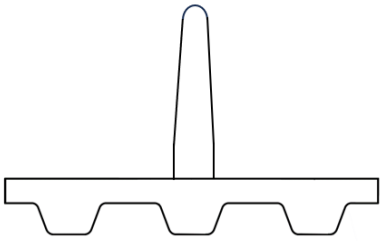


One guide rope for long and narrow belts:
centre-to-centre length of the conveyor > 1.5 * belt width, or belt width < 500 mm.

Two guide ropes for Short and wide belts:
centre-to-centre length of the conveyor < 1.5 * belt width, or belt width > 500 mm.

It is advised to place all cleats on an Ultrasync belt over a tooth. If one or more of the cleats is not positioned over a tooth the minimum pulley diameter of that belt is larger.

Cleat over a tooth



Cleat not over a tooth

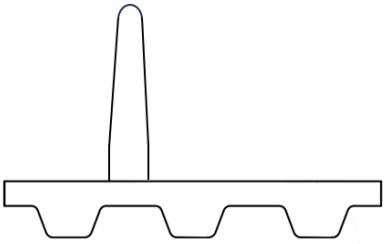


Table of minimum pulley diameters for Ultrasync belts with all cleats over a tooth.

All cleats over T10 teeth							
Standard cleat TPU footless		NP50	NP75				
Thickness of the foot of the cleat	mm	5	6	8	10	11	12
Minimum number of teeth	#	16	18	25	35	45	60
Outer diameter at minimum number of teeth	mm	49.08	55.45	77.73	109.56	141.39	189.14
Effective diameter at minimum number of teeth	mm	50.93	57.3	79.58	111.41	143.24	190.99

Table of minimum pulley diameters for Ultrasync belts with one or more cleats not over a tooth.

Not all cleats over T10 teeth							
Standard cleat TPU footless		NP50	NP75				
Thickness of the foot of the cleat	mm	5	6	8	10	11	12
Minimum number of teeth	#	30	40	45	50	55	60
Outer diameter at minimum number of teeth	mm	93.64	125.47	141.39	157.31	173.22	189.14
Effective diameter at minimum number of teeth	mm	95.49	127.32	143.24	159.16	175.07	190.99

Pulley factor of standard accessories flexing/back flexing	material		
	PVC	TPU and Dectyl	TPE-E
Vee ropes as a guide rope, solid	8/10	10/12	10/12
Vee ropes as a guide rope, notched	6/8	6/8	-
Rope as a guide rope, notched with A52 and A70	-	-	5/5
Ropes as a spill edge, Vee or rectangular, solid	10/8	12/10	12/10
Guide strips, solid	10/12	10/12	10/12
Guide strips, notched with A11	6/8	6/8	6/8
Cleats solid footless	1.1/2.5	1.1/2.5	1.1/2.5
Cleats solid with foot	2.5/5	2.5/5	2.5/5
Cleats fabric reinforced	100/200 mm	-	-
Cleats in chevron, rope or cleats (angle between ropes in the V-shape)	(55°) 9/9 (64°) 8/8 (75°) 7/7 (90°) 6/6 (110°) 4/4	-	-
Bordoflex	3/4	3/4	3/4
Amseal	Equal to the minimum pulley of the belt material. Never use Amseal in conbination with a nose bar/ fixed knife.		

Minimum pulley diameter = pulley factor * height of the accessory.

- means not available in standard range of belt accessories or pulley factor un known.

Above pulley factors apply to ..

* an operational temperature +20°C.
* an angle of wrap of 180° degrees.
* standard accessory range with the standard qualtity and hardness of plastic compound used

Minimum pulley and angle of wrap

Angle of wrap in degrees	Min. pulley factor in % of minimum pulley on belt data sheet
≥ 90°	100%
≥ 30° and < 90°	75%
≥ 5° and < 30°	50%
< 5°	no minimum pulley diameter

Minimum pulley and operational temperature

Operational temperature	Temperature factor
minimum operational temperature - 0° C	200%
0°C < 8°C	150%
8°C < 20°C	125%
20°C - maximum operational temperature	100%

An example of the determination of the minimum pulley diameter of a synthetic belt with accessories.

	Belt, accessories	Data sheets, pulley factor	Minimum pulley diameter flexing / back flexing in mm
Belt	577950 Ropanyl EM 6/2 00+02 white AS FG	Flexing Ø 6 mm / Back flexing Ø 40 mm	Ø 6 / Ø 40
Guide rope	Vee rope TPU solid 10x6 mm fitted at the bottom of the belt	Flexing 10 x H / Back flexing 12 x H	Ø 60 / Ø 72
Cleat	Ropanyl TPU footless 50 mm	Flexing 1.1 x H / Back flexing 2.5 x H	Ø 55 / Ø 125
Bordoflex	TPU solid 50 mm	Flexing 3 x H / Back flexing 4 x H	Ø 150 / Ø 200
Cofigured belt	577950 + cleats + Bordoflex + guide rope		Ø 150 / Ø 200