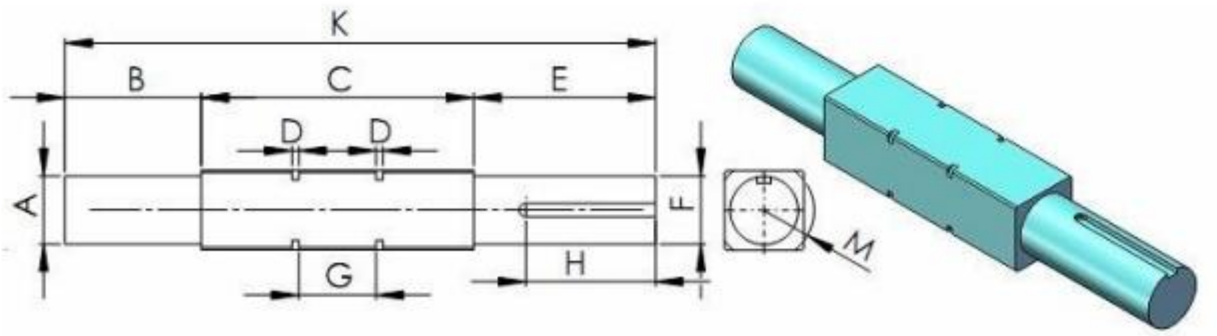
ALHAN CONVEYOR
DESIGNING GUIDE

SQUARE SHAFTS

Square shafts are preferring frequently and it depends on the using purpose in conveyor systems. The bearing holes process, after fixing the sensitivity of square shafts. For immobilizing the sprockets, key and split collars canalize. Also make sure that, the bevel on the corner must be open.



A = Bedding Diamater
B = Lenght of bedding
C=Lenght of the square shaft
D=The channel of split collar
E= Lenght of drive shaft
F= Diameter of drive shaft
H = Kewyaw
G =Sprockets Gap
M = Grove Channel Diameter

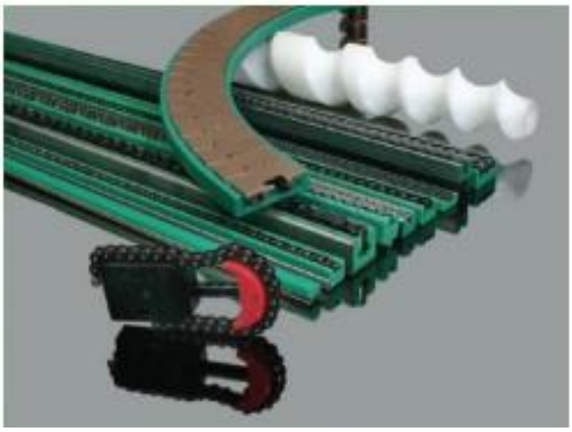
Tolerances: Total Lenght 1200 +-8mm
AKS Diameter: QH7

The width of keyway channel: : 0,05/-0,1mm
Other ops: 0,02 mm

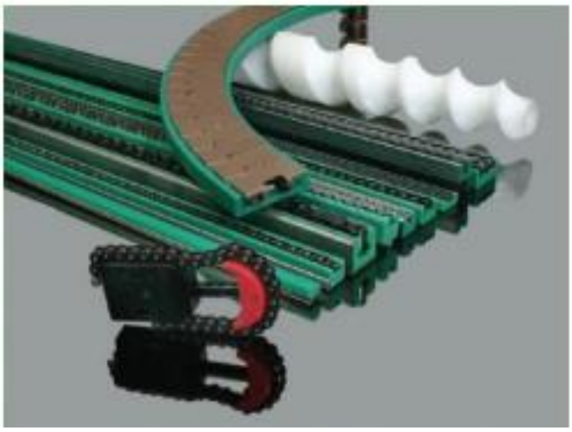
Crossing (mm)	Carbon Steel KG-37	Stainless Steel 304
25	-0,130, 0,000	0,000, -0,130
40	0,000, -0,160	0,000, -0,160
60	0,000, -0,180	0,000, -0,180
65	0,000, -0,180	0,000, -0,180
90	0,000, -0,220	0,000, -0,220

Friction and Chain Guides

This high molecular weight (UHMW) polyethylene material is highly resistant to abrasion and impact. It can also be used in a wide temperature range. With the increase in molecular weight; Its technical features are also increasing such as internal strength, tensile strength at high temperatures, cracking and wear such as tensile strength performance.Being the low coefficient of friction, it is especially preferred in the food, textile and beverage industries due to its high resistance to chemical effects. In addition, one of its mark is, that is harmless of human health.



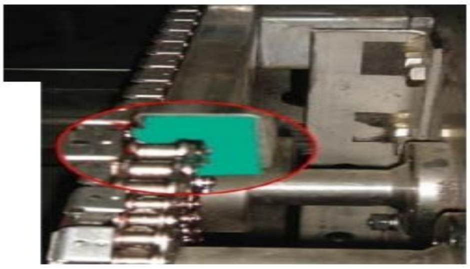
Technical Values;



Density: 0,96gr/cm3
Melting Point: 130C
Hardness: m53 Rockwell
Maximum operating temperature: 80C
Strain Failure: %800
Friction Coefficent: 0,20
Compression Strenght: 300Kgs/cm2
Materials of Plate: 5mm to 100mm

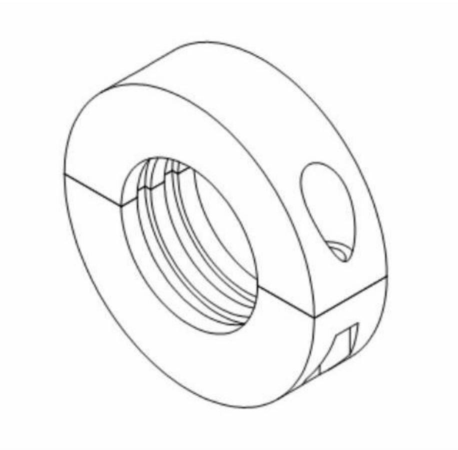
It customize according to customer requirements.

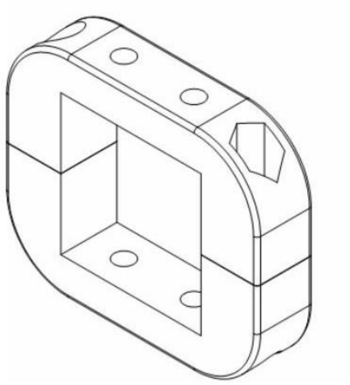
Using Areas: Friction Guides, wear plates guiding bar, bottling machines, conveyor lines, packaging machines, conveyors with buckets and cement, food industry.



SPLIT COLLARS

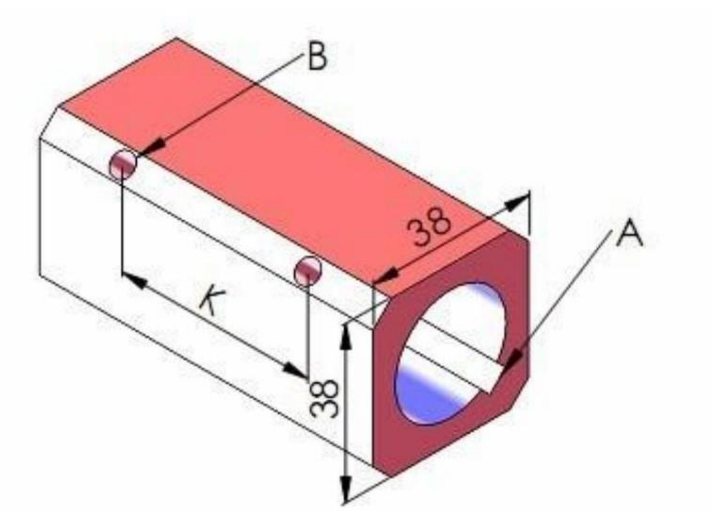
Split collars available for ϕ 20 , ϕ 25 , ϕ 30 , ϕ 35 , ϕ 40 , 40x40 ve 60x60 shafts.
It provides mountability for removing the shafts.





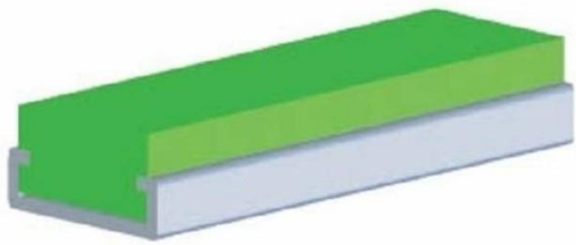
Round Hole Adapters

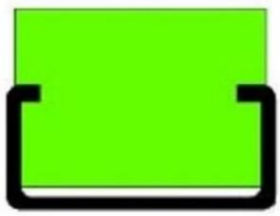
It is using for shafts and gears of different sizes to adapt each other. These are just recommended for lightly loaded belts or narrow width belts (up to 440 mm).
Adapters are manufactured from glass-reinforced polypropylene for strength and chemical resistance. However, these adapters not for to use together with split sprockets and wear-resistance sprockets. There are adapters for adapting 25 mm diameter shafts to 60 mm square threaded hole. Lock screws provide the sprockets to hold onto the adapters and lock the center sprocket to the shaft.

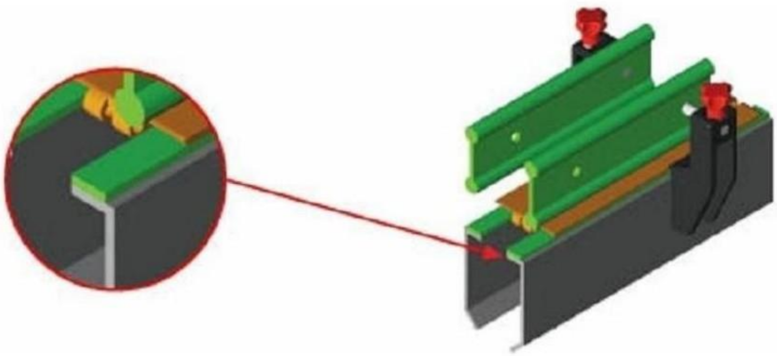


Straight Friction Guides

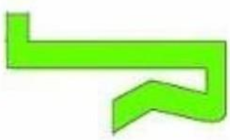
UHMW (Ultra High Moleculer Weight), HDPE (High Density Polyethylene) ve Nylatron, Standart Straight Friction Guides are available. UHMW and HDPE friction guides are available for these dimensions, 2-5mm x 15-50mm. These guides can use for food industry.

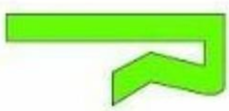


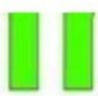




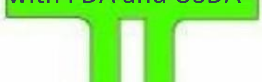
Angled and Attachable Wear Guides

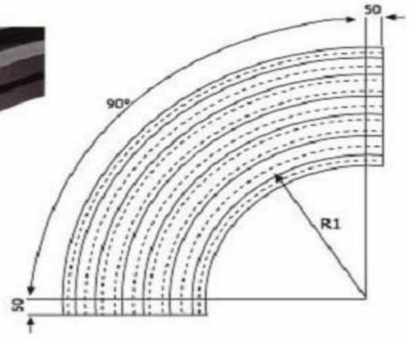




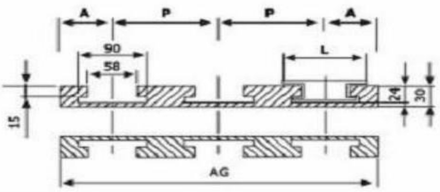


UHMW and HDPE friction guides compatible with FDA and USDA– FSIS for directly contacts with foods but Nylatron friction guide is not compatible for with FDA and USDA– FSIS.

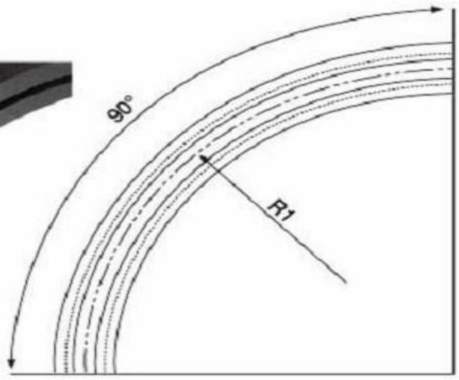




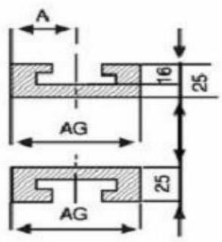
1 SET = GİDİŞ + DÖNÜŞ
1 SET = CARRY + RETURN

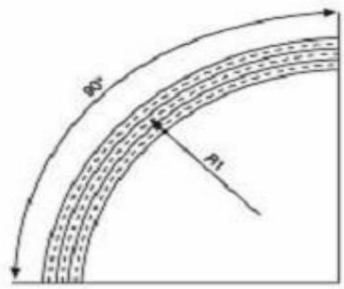


Kod
860 - 865
867 - 870
875
Soy.
D22 - D23



1 SET = GİDİŞ + DÖNÜŞ
1 SET = CARRY + RETURN





ALHAN

Spiral Belt Friction Guides

All spiral friction guides are available as UHMWand self-lubricating and gray TIVAR.Angled and railed center friction guides designed as easy to clean.

Spiral Modular Belts

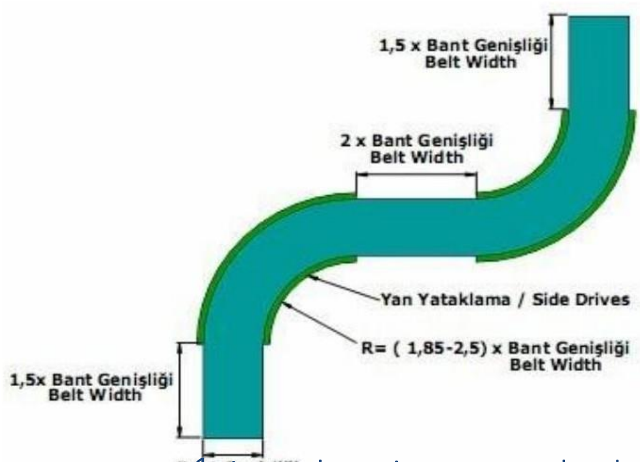
940 Model spiral modular belt has 25,4mm pitch. It is using spiral and straight conveyor systems. Collapse factor is related with internal radius and it can change between 1,8 and 2,5. 940 model belts are assembled plastic or metal pins. It does not need additional lock, there is no lock housing in the return clearence. It can replaceable with a small screwdriver in a short time. Open surface is %50 in act of straight running. Open surface ratio is %36 at turns for 500mm width. Working temperature is changing between -46C and +103C as for that which raw material using. Compared with other plastic belts; the features are high level such as product contact surface, open area, easy to clean, resistance to cold and heat. Spiral belts are available as blue,gray and white color. The pace of belt should choose as maximum 80m/min. For high speed applications, 206.DON.001 model friction guide is commendable for preventing the belt separation from the channel. This guide shaped like ‘’U’’ and it grapes the belts mutually. So, seperation of the belt from the channel disappear. If working speed increase, temperature will increase because of the friction. In this case, teflon tape is preferable as material of friction guide.

All additional specifications can be easily added onto the belt. The specifying of features is important when order the quotation. The following information is required for selection a correct belt:

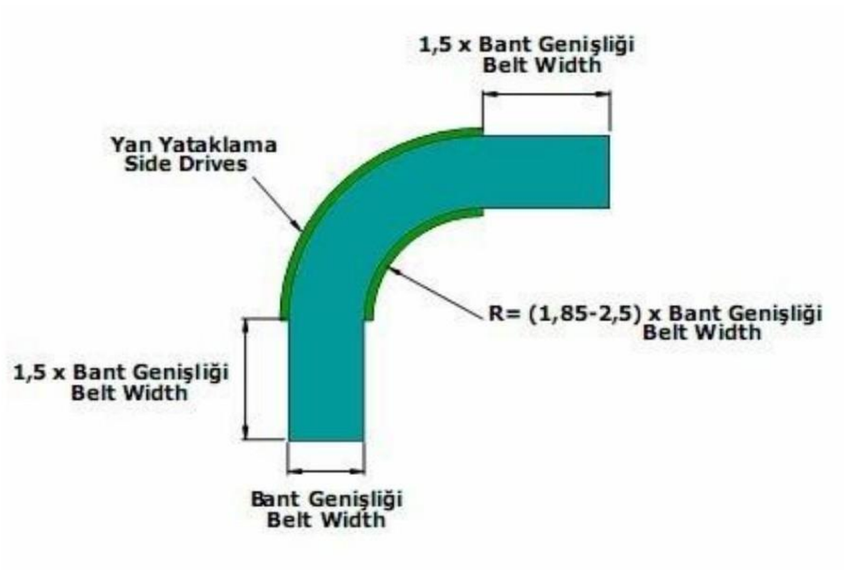
1- Band direction: must be specified as right or left.
2- Inner and outer edges must be specified.
3- Rotation of the belt clockwise or backing should be specified.

TEKNİK ÖZELLİKLER									
Bant Belt	Pim Rod	Adım Pitch mm	Doğrusal Hareket Bant mukavemeti kg/m	Taşıyacağı Yük (kg / m)			Çalışma sıcaklığı °C	Bant Ağırlığı / Belt Weight kg/m²	
				309 mm Dönüş(90°)	474 mm Dönüş(90°)	606 mm Dönüş(90°)		Metal ϕ 4,6	Plastik ϕ 4,6
PP	Pom	25,4	1700	80[a]	90[b]	100[c]	+1 +105	11,7	6,2
Pom	Naylon	25,4	2500	110[d]	125[e]	130[f]	-46 +93	13	7,5
PP	PP	25,4	1400	50[g]	60[h]	65[k]	+1 +105	11,7	6,2

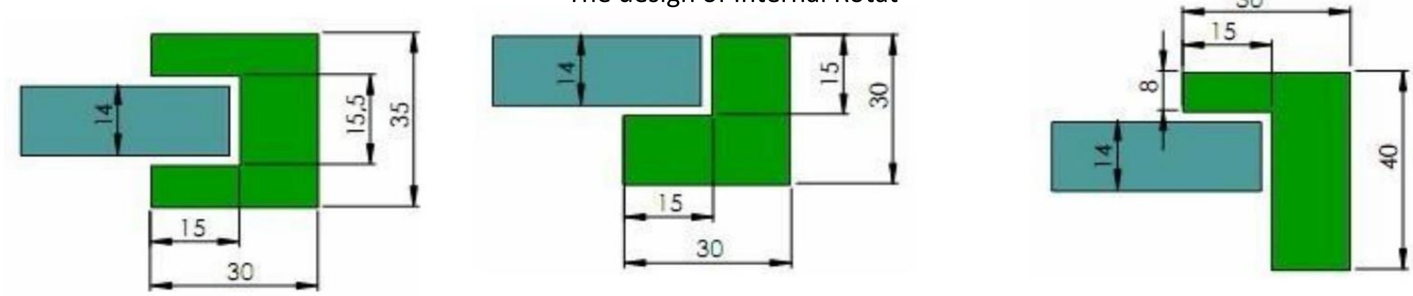
The design of Internal or External Rotation Conveyor



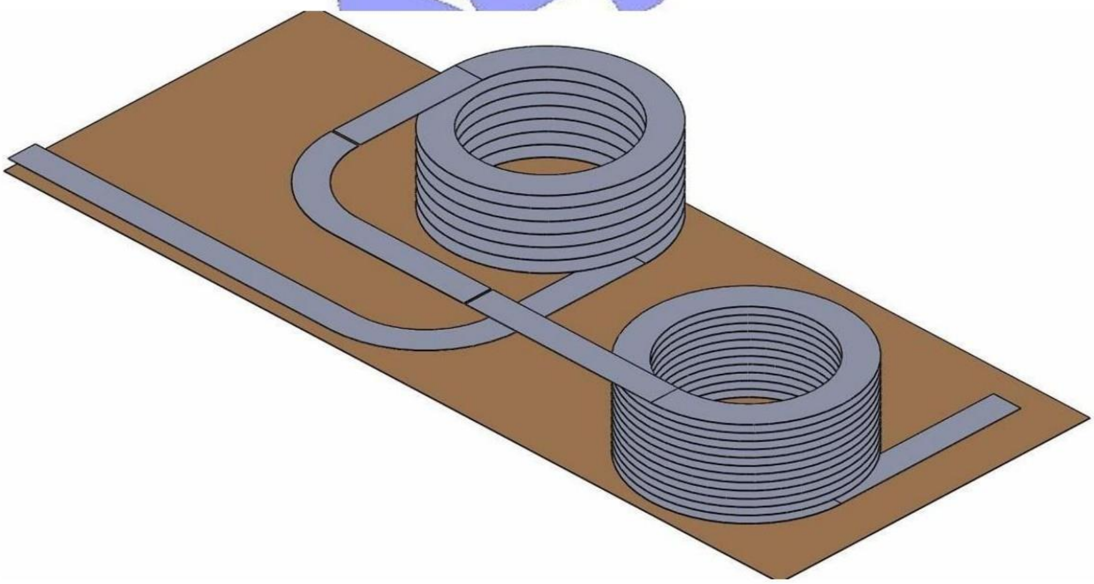
1. Internal rotation conveyor bandwidth design



The design of Internal Rotat



We are recommend Alpolen 1000 for bedding material.



Assembling of Spiral Belt

First step: The different types of moduls are laying together. There is a catch; Lengths of the modules are different from those in front and behind ones. Otherwise, if modules of the same size are placed one after the other, the tape will separate to the sides during operation.

Second Step: The modules of the belt are linking from holes of pins with plastic or metal pins and these holes are at the sides. For this connection, there is no need additional using locks. Connecting pins push toward to lockhouse with small screwdriver. These pins are locked shape of not dislocatable.

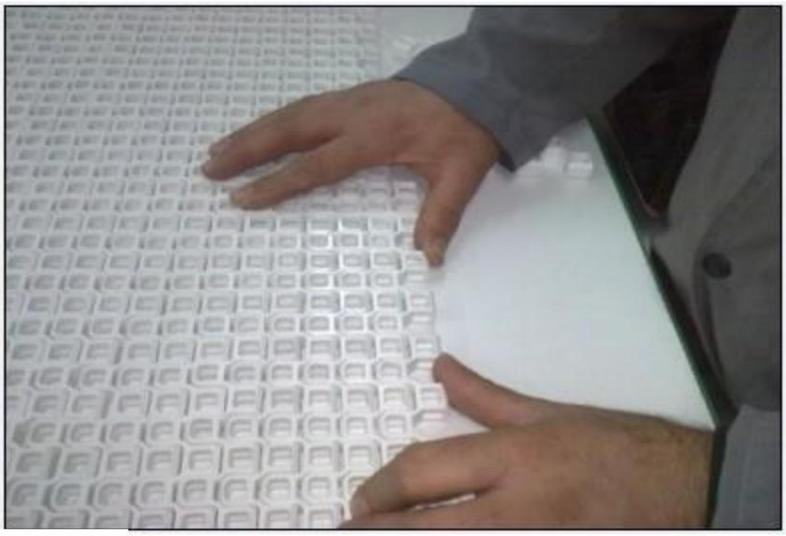


Table B2 Turning Ratio – Inner Diameter Table

Stock code	Bandwidth Hp _ mm (+/- 0.007)	Turn Rate Do	Turning Inside Diameter Rich
944 B01 K08	210	1.85	389
944 B01 K10	243	1.90	462
944 B01 K11	276	1.90	525
944 B01 K12	309	1.90	587
944 B01 K13	342	2.00	684
944 B01 K14	375	2.00	750
944 B01 K16	408	2.00	816
944 B01 K17	441	2.00	882
944 B01 K18	474	2.00	948
944 B01 K20	507	2.05	1040
944 B01 K21	540	2.05	1107
944 B01 K22	573	2.05	1175
944 B01 K23	606	2.10	1273
944 B01 K25	639	2.10	1342
944 B01 K26	672	2.10	1412
944 B01 K27	705	2.10	1480
944 B01 K29	738	2, 15	1587
944 B01 K30	771	2.15	1658
944 B01 K31	804	2.15	1729
944 B01 K33	837	2.15	1800
944 B01 K34	870	2.15	1870
944 B01 K35	903	2.20	1987
944 B01 K36	936	2.20	2060
944 B01 K38	969	2.20	2132

Do: Turn rate

Hp:Bandwidth

iç : Internal turning radius Riç=Bg xDo

R

MODULAR BELT CLEANING

Depending on the working time, the working environment and the objects carried, cleaning can be done quickly and simply withpressurized water against contamination on the gears and the belt. The system is located inside or outside the conveyor. The particles are removed by spraying pressurized water on the belt and gears.

Wear Resistance System

In environments where abrasive effects are intense, wear of pin, sprocket and modules of the belt becomes inevitable. In Over time, tape modules mismatched with the sprockets and this situation reduces the efficiency of the system considerably. Wear-resistant products should be used to minimize negative effects and increase the life of the system. Sprockets, pins and raw material of the belt must be selected in accordance with the environmental conditions (temperature, chemical effects, etc.). In these applications, Installation and maintenance by choosing split sprockets, taking into account their convenience, the operation can be carried out without dismantling the drive and idler shafts.

Wear Resistance Pins

AR pins are more solider than others because of this reason traction capacity of the belt is not decrease. AR pins are more lighter, cheaper and flexible than others. Also AR pins have chemical and wear resistance, wilder working temperature. In addition, It has FDA for directly contact the foods. On all styles of tape that employ a locking system, AR pins are attached to both corners of the belt.

They are locked in place with inserted pins. Headed pins are made from wear-resistant materials. In the headless pin holding system, locking bands use. It does not require any type of header. The locked pin holding system is a headless pin retention method. This system is for fixing pins during operation.

It uses a sliding stopper. The lock stopper can be easily moved aside when any work on the belt is required.

Basic Design Guide

In the first stage of the conveyor design, requiremnts should determine and the design should meet the requirements. The choosing of the materials should make considering of the atmospheric conditions and bench life.

Basic Design Criterias

Belt-sprocket compatibility and product transfers between belts (end-off / end-on product transfers)

It is affected by the amount of chordal action between the sprocket. Chordal action, the row of each module in the belt,it occurs when the belt rises and falls in sync with the drive sprocket or out of sync with the idler sprocket. This effect is most pronounced in the combination of large belt pitch / small pitch circle diameter. Small pitch for sprocket with circle diameter, dimension “A” is the horizontal angle of the belt at both the highest and lowest points of pitch.It is given as a range to indicate.

Chordal Action: If the belt module is fully matched with the sprocket, belt linearity is ensured the bedding assembling is installing, when the sprocket rotates by 1/2z to match the other module (z = tooth number) increases depending on the lenght of the pitch of the belt.

Driving Shafts

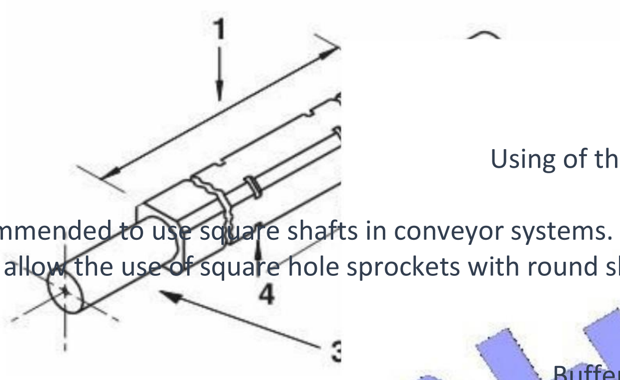
Square shafts provide maximum efficiency during the drive of the belt. Torque transmission is at the highest level because there is no need for a keyway. As for that working environment characteristics, carbon steel,aluminum or stainless steel square shafts use.

Tension in the Driver Shaft

When selecting the drive shaft in the conveyor system; features such as carrying capacity, diameter of the sprockets used, whether the conveyor has an up or down ramp, and friction loss should be taken into consideration.

Fixed Sprockets

Usually both the drive and the idler are horizontal on the shaft must be only one gear fixed in place. This sprocket uses to keep the belt traveling smoothly between the corners of the conveyor cage. It will provide the necessary tracking. Other gears should be kept horizontally.
By allowing movement, thermal expansion differences between the belt and sprocket are easily corrected. The sprocket should be fixed on both sides using snap rings or recommende to fix it in the center of the belt.



Using of the Round Shafts

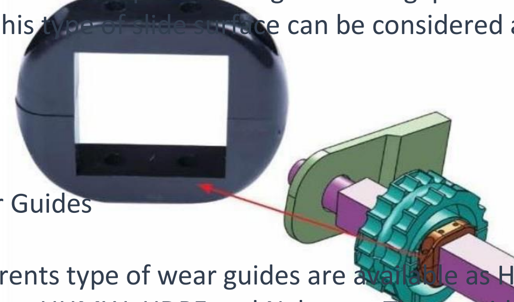
It is recommended to use square shafts in conveyor systems. However, on lightly loaded belts, (460mm). Round Hole Adapters allow the use of square hole sprockets with round shafts.

Buffer Bearings

In deep belt systems or belt systems under heavy loads, an additional bearing may be needed in the drive and idler shafts. Excessive deflection in the drive shaft, it makes it difficult for the sprocket to fit into the belt module and the pitch length increases due to wear on the sprocket. When intermediate bearings are placed on the shaft, the deflection formulas in the shaft indicate that the shaft has only two bearings. It differs from the deviation formulas where it is supported. Deflection by a third bearing placed in the center of the shaft the formula is easy to apply.

Uninterrupted Plate Guides

These plate guides are from UHMW and HDPE and it is uninterrupted. It is along to full width of the belt and extend from the drive sprocket to the idler sprocket. Rows of holes can be drilled into the plates with grooves or gaps that will allow the handling of foreign substances. In heavy loaded applications, this type of slide surface can be considered a good choice due to the continuous support which provide to the belt.

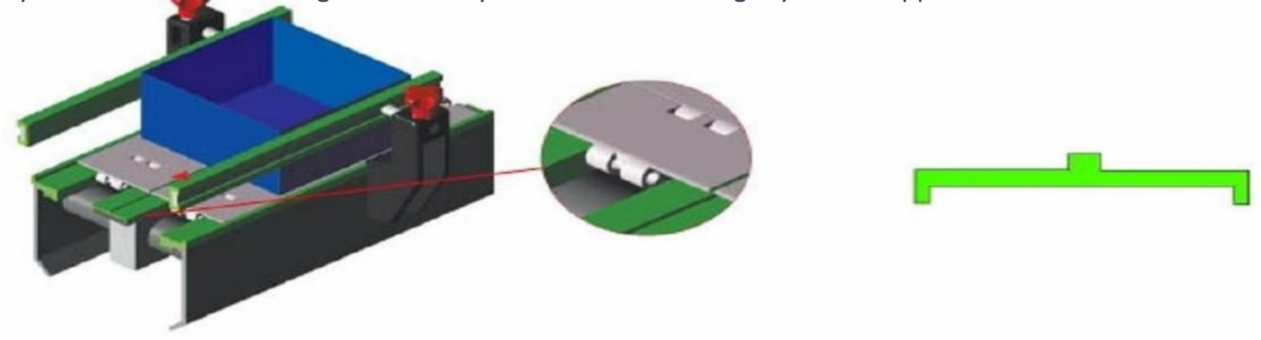


Wear Guides

Wear guides are available as UHMW Polyethylene. Some differents type of wear guides are available as HDPE and Nylatron. Standard Flat Wear Guides are thicker, narrower and flatter than UHMW, HDPE and Nylatron. These guides adapt to temperature changes. It has the ability to expand and contract freely.

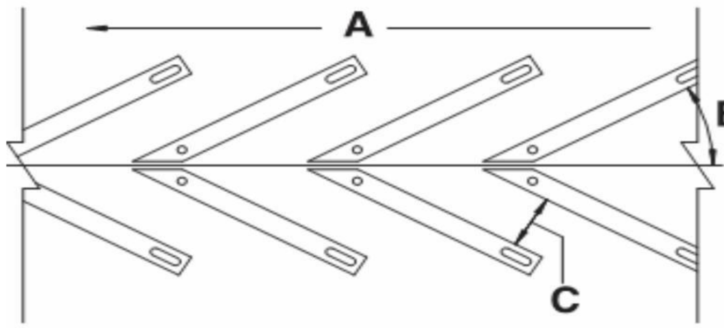
Wear Guide Arrangements

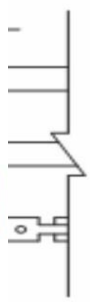
Straight, parallel runners: These supports consist of metal or plastic runners positioned parallel to the movement of the belt. While they are relatively inexpensive to install, their disadvantage is that the contact of the outside of the belt with the skids is limited to a very narrow area. This arrangement is only recommended for lightly loaded applications are done.



SEAMLESS PLATE GUIDES

These plates are continuous plates made of metal, UHMW or HDPE on which the belt slides. They extend across the fullwidth of the belt and almost from the drive sprockets to the idler sprockets. The plates can be drilled in rows with grooves orgaps that will allow the passage and discharge of foreign materials. In heavy-loading applications, this type of slide surface can be considered a good choice due to the continuous support they provide to the belt.





ERMAL GENİŞLEME KATSAYISI	
ıesi	(mm/m °C)
.cetal	0,09
	0,2
(38 °Cden küçük)	0,12
(38 °Cden büyük)	0,15
[illegible]opylen	0,06
Naylon	0,07
Aşınma Kızakları	
HDPE and UHMW PE	
-73 °C 30 °C	0,14
30 °C 99 °C	0,18
Naylon	0,06
Teflon	0,12
Metaller	
[illegible]	[illegible]

RETURNS (BAND RETURNS) AND TENSIONS

Return sections of conventional conveyors are generally subject to relatively little stress; However, they are important in the overall design.Since the return stress is high in bidirectional and push-pull conveyors, special attention should be paid to the design of this section.

CONTROL OF LENGTH

One of the primary functions of the return is to appropriately regulate the longitudinal increase (or decrease) of the belt as it runs. Control of belt length is vital in ensuring adequate belt tension after the modules are separated from the drive sprocket. If appropriate design criteria are not followed, a belt that extends longitudinally can separate from its own drive gear. If the belt is not made slightly longer, it will shorten due to low temperature, causing excessive tension and excessive shaft loads. Bands may lengthen or shorten duringoperation due to the following factors:

Temperature conversions: Assuming the belts are installed to ambient conditions, normally around 21 ÿC, any significant temperature variation during operation will result in the belt lengthening or shortening. The magnitude of thermal contraction or expansion depends onthe material of the belt, the amount of change in temperature, and the total belt length.
Take temperature effects, thermal expansion and contraction into account in your application.

Elongation under load: If tension is applied, all bands will elongate. The amount of extension in length depends on the Series and Style ofthe belt, the material of the belt, the amount of tension applied or “belt pull” applied, and the operating temperature. In general terms, on aconventional conveyor, 30% of the Applicable Belt Pull (UBC / Applicable belt strength (UBM) When the load is around, the conveyor lengthens by approximately 1% of its length. If UBC reaches UBM, this elongation should not exceed 2.5% of the conveyor length.

Elongation due to settling and wear: New tapes will generally show elongation in the first days of their operation, depending on the fit of the pins and modules. In some applications where heavy loading or abrasives are present, old tapes will elongate due to wear on the pinholes and the growth of the pin holes of the modules.

Curvilinear sag (Deflection): As the band expands or contracts, it is important to regulate the change in the length of the band.
One of the most common methods for controlling the length of the belt is to provide one or more unsupported sections on the return path where the belt can sag. This method of controlling the belt length is called the

Curvilinear Sagging Method. As these unsupported sectionsof the belt hang under their own weight, they assume an approximate "curved" shape. These curves allow for additional tape storage as the depth between the bottom and top of the curve increases. If more than one unsupported return zone is present, the additional tape length is distributed among the unsupported sections. Therefore, with more sections in the return equipped with these curvilinear zones, less space is required horizontally for additional tape storage. For applications where very large elongations will occur, other lifting arrangements may be required.

BACK TENSION

For proper belt-gear seating, a sufficient amount of return tension is required directly after the drive gear. This stress is generally referred to as Back Stress. The length and depth of the first curvilinear region behind the drive and idler gears provide back tension. Backtension increases as the length increases or depth decreases. For this reason, the depth of this curvilinear region should not be allowed to exceed the value recommended in future explanations. The sagging belt must be maintained to avoid bottom-out. This (bottom-out) reduces the back tension too much and causes the gear not to fit.

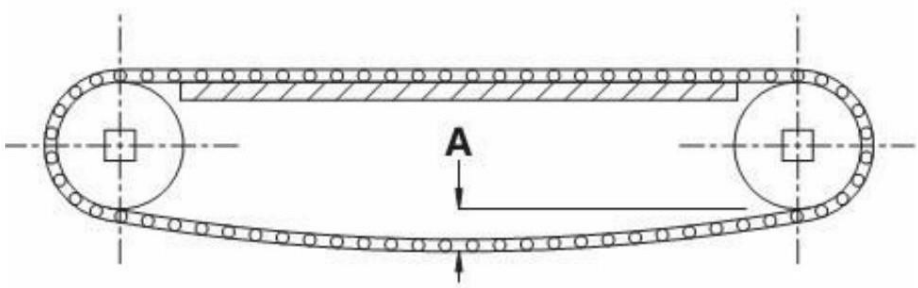
The roller directly behind the drive shaft, often referred to as the “lift” roller, must be located so that the belt wraps the sprockets between 180ÿ and 210ÿ (see dimension “C” in Dimension Designations). In traditional conveyor design, the sag and sag required forproper sprocket-belt seating are full amount of tension

It is rarely necessary to know as. In cases where curvilinear sag is used to accommodate belt length variations, it may be important to know the additional or additional length suspended between adjacent supports and the tension created by the suspended portion.

STANDARD RETURNS (BELT RETURN LOWER SLIDES)

The following descriptions provide recommended return arrangements that have proven successful in most applications. Onvery short conveyors (less than 2 m) a return support is usually unnecessary. If sag is limited to a maximum of 100 mm, only curvilinear sag between the drive and idler gears is required for proper operation. is enough

Wheeled (Roller) Returns As the length of the conveyor increases, it is important to provide intermediate support rollers on the return, but most importantly, a significant portion of the totallength of the belt is not supported.



Lower Slide Bearing Returns

If a sliding bearing is used in the return, at least 0.6 m away from the drive gears on short belts; in long bands It must start at a distance of less than 3.5 m or from 1 m to 1.2 m. A combination of return roller and sliding bearing can also beused. Consult the customer representative for detailed information.

A: 25 mm to 100 mm between each pair of rollers on long conveyors or between the drive and idler part on short conveyorsIt should be between mm.

B: The lifter cylinder should be located at a distance of 230 mm to 460 mm from the drive and idler gears. The lower roller (lifter)should be positioned so that the belt wraps around the gears between 180ÿ and 210ÿ. (Lower roll distance after drive)

A:Return rollers can be spaced 900mm - 1220mm apart on all belt series. This, in combination with A and B, should providethe appropriate amount of return tension required for proper gear seating.

D: Minimum cylinder diameter, 50 mm for belts with pitch up to 27 mm, 100 mm for belts with larger pitch.

E: Plain bearings, on short belts, at least 0.6 m away from the drive gears; For long belts, it should start at a distance of 3.5 mshort or 0.9 m - 1.2 m. A combination of return roller and sliding bearing can also be used.

SPECIAL STRETCHING ARRANGEMENTS

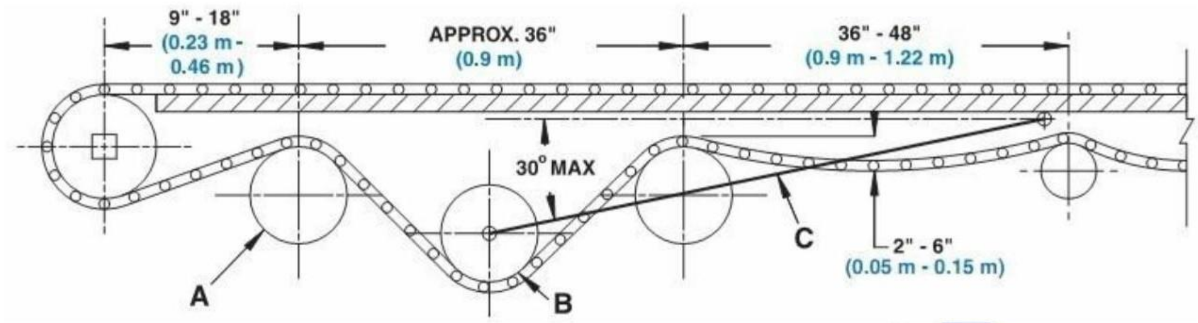
Curvilinear sagging can be described as dynamic lifting. In many applications, gears cannot be provided sufficiently to avoid slipping.

Gravity Type Tensioners

Gravity Type Tensioners usually contain a cylinder that stops in return. The weight of the roller provides the tension needed to ensure proper gear seating. The weight has its greatest effect when placed close to the drive shaft at the end of the return swing.These lifts are recommended for the following conventional conveyors:

1. Longer than 23 m or
2. Longer than 15 m, 30 m/min. faster than
3. In cases where extreme temperature changes occur or
4. 15 m/min. in startups operated above speed, and often under loading above 120 kg/m2.

For 1 inch (25.4 mm) pitch belts, a 15 kg/m weight roller with a length equal to the belt width of 100 mm diameter is recommended. The recommended features for 2 inch (50.8 mm) pitch belts are a cylinder with a weight of 30 kg/m and alength equal to the belt width of 150 mm.

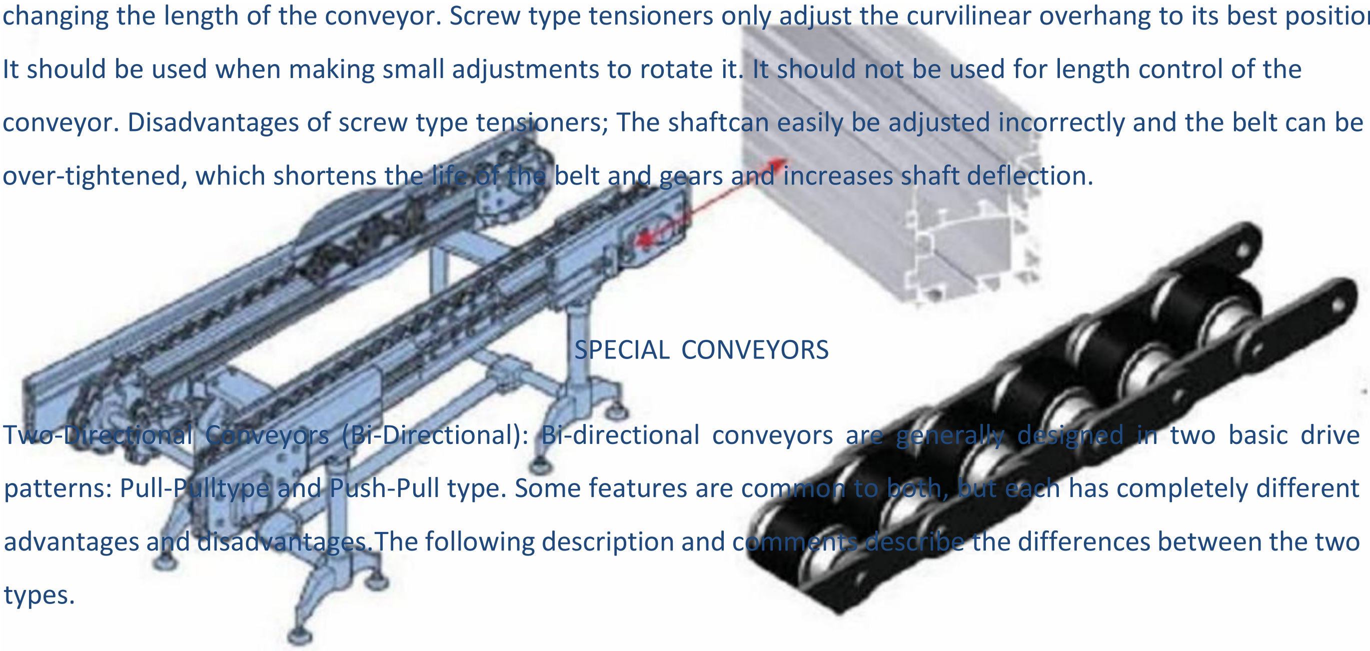


Return Stress in Short Conveyors

A : Idler load cylinder B : Tensioning weight C : Joint

Screw Type Tensioners

Screw type tensioners usually change the position of the idler shaft using adjustable stud-nuts. The shaft bearings are placed in horizontal slots in the conveyor frame. Screw type tensioners are used to move the shaft along, thus changing the length of the conveyor. Screw type tensioners only adjust the curvilinear overhang to its best position. It should be used when making small adjustments to rotate it. It should not be used for length control of the conveyor. Disadvantages of screw type tensioners; The shaftcan easily be adjusted incorrectly and the belt can be over-tightened, which shortens the life of the belt and gears and increases shaft deflection.



SPECIAL CONVEYORS

Two-Directional Conveyors (Bi-Directional): Bi-directional conveyors are generally designed in two basic drive patterns: Pull-Pulltype and Push-Pull type. Some features are common to both, but each has completely different advantages and disadvantages.The following description and comments describe the differences between the two types.

Pull-Pull Designs (Pull-Pull): There are three different types of Pull-Pull, specifically the center-drive method, the two-motor drivemethod and the single-motor and coupled-drive method.

Center-drive method: The reversible drive shaft is placed near the center of the conveyor. This drive shaft must be located to allow appropriate belt tension in the curvilinear sag areas on either side of the return. Please note that the cylinders marked "A" in the illustration are load-bearing. The shafts and bearings that support them must also be designed. Center-driven two-way conveyors, when designed correctly, provide excellent operating characteristics because gear seating is over 180ÿ. A single rotator motor is required. Belt tension in both the conveying section and the return section Since it is applied to idler shafts at two opposite ends, these shafts must be twice the belt tension determined in the UBC (Applicable Belt Pull) calculations. Therefore, shaft deflection calculations and gear backlash determination should be based on twice the UBC. This is due to higher than normal shaft tensions. ,in these designs it may sometimes be necessary to use very large shafts or rollers (wheels) instead of idler gears.

Dual-motor drive method: Dual-motor drive designs have the advantage of relatively lower stress in return, but require additional equipment (an additional motor and slip clutch) and electrical control. Despite the need for additional equipment on heavily loadedrather large units, this method is generally the most useful drive system.

Single-motor and coupled (chain or belt drive)-drive method: A single motor driving a chain rotator that drives 2 sprockets on conveyor shafts is another low-voltage option. It is also expensive due to the need for additional hardware. These drive systems aregenerally used on short conveyors because the length of the rotator chain is included.

Push-Pull Designs: Push-Pull two-way conveyors require special attention to return tension, shaft deflection and gear spacing. Whilethe drive shaft pulls the load towards itself, the conveyor moves the other conveyor.
When the direction of travel of the belt is changed, the drive shaft pushes the loaded belt. In this case, if the return tension is not greater than the transport tension, gear slipping or jumping occurs. If this situation is excessive, sagging occurs in belt transportation.interest. It is vital to design Push-Pull two-way conveyors with the required return belt tension. Experiments show that this requirement is 120% of the conveying section UBC (Applicable Belt Traction). Once the conveying section UBC is determined, the return tension is:

Required Return Stress = 1.2 x UBC

Consult customer service for more detailed information.

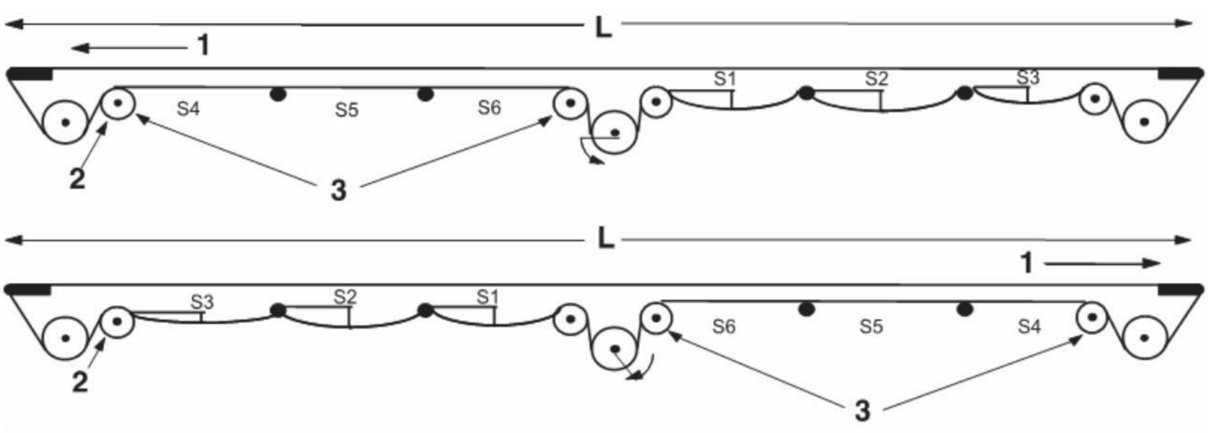
A: Load rollers: 50 mm for 12.7 mm pitch, 100 mm for 25.4 mm pitch, 150 mm for 50.8 mm pitch

B : Band direction

A: There must be at least 3 pitch lengths.

D: Drive shaft

E: Rollers can be used instead of gears to avoid the need for intermediate bearings.



1 : Band direction

3 : Load rollers

2 : Tensioning

L: Conveyor length

Effect on Shaft Deflection and Gear Spacing: Since both the drive and idler shafts will be subjected to a tension load as the beltapproaches and separates from the gears, the total shaft load is more than twice that of conventional one-way conveyors.

Therefore, when calculating shaft deflection, the added belt It is most important to increase the Total Belt Working Load forstretching. The corrected UBC value can be found from the following process:

Adjusted UBC = 2 x UBC

Use this value in the Total Shaft Load and Shaft Deflection calculations. Because the belts are stressed on both sides of the gears, a larger shaft deflection value, around 5 mm, can be tolerated for these conveyors. The corrected UBC should be used

to determine the proper spacing of the gears on the shaft. When considering the belt, Table See A6 (Maximum Gear Clearance).Note that both shafts must be considered as drive shafts for undercut and gear spacing calculations. The power and torque required to drive the Push-Pull units are not affected by the return stress, but larger shaft loads do affect the loads on the bearings .The designer should therefore pay attention to this additional load in the selection of shaft bearings.

INCLINED CONVEYORS (Z CONVEYORS)

Elevator conveyors are similar to vertical units with some design differences required for proper operation. Firstly, it is strongly recommended that the upper shaft be the drive shaft. This is a valid solution as it is quite difficult to push the product upan inclined obstacle. Secondly, as the angle of inclination increases, the curvilinear curve in length control The effect of the sagging method is reduced. It is always advisable to apply somemechanical lifting method (screw or spring) to the following shaftor idler shaft. Risers are almost always, conveyor and borders with special requirements in design

For example, shoes, sliding bearings, conveyors or borders in the return section must be designed in such a way thatthey do not interfere with the smooth operation of the conveyor.

A – If gears are used at intermediate points, the center gears are not fixed. If wheels or shoes are used, a minimum radius of 3inches (76 mm) for 1 inch (25.4 mm) pitch belts; For 2-inch (50.8 mm) pitch belts, a minimum radius of 5 inches (127 mm) is required.

B – To minimize wear, the clamping shoe radius should be as large as the application allows. Minimum radius must be 6 inches(152 mm).

C – Internal wheels or shoes must have a minimum diameter of 3 inches (76 mm).

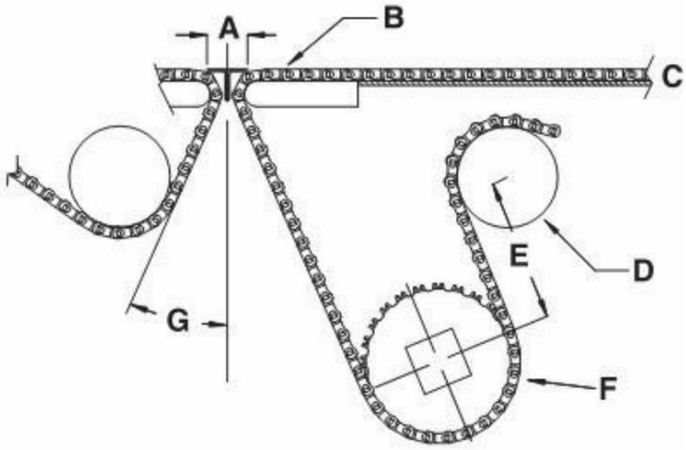
D – If product or foreign objects are expected to fall between the belt and sprockets, consider placing a drum or spiral at theidler end.

E – Keep the borders between the drive gears and the first shoe or wheel and the collection container of the conveyors clean.

F – For proper gear seating, do not allow the belt to sag between the drive sprocket and the first shoe or wheel.

Strict Transfer Methods

For very narrow end-to-end transfers, two small, steel gears are used. Gears with 40 mm and 60 mm pitch diameters provide both absolute driveand belt tracking and allow the use of very small transfer plates. When narrower transfers are desired, nosebar) or wheels can be used. The recommended smallest nose mold diameter for 12.7-25.4 mm pitch is 25 mm. Transfer pans (dead plates) can be as narrow as 25.4 mm wide. Arrangements that allow the nose molds to rotate easily are preferred. Belt tension increases obviously as it slides around the dies. Increasing belt traction is a result of the friction between the sliding band and the fixed nose-die and the winding angle function. The nose mold material should be selected to give the lowest possible sliding friction. Low friction will reduce the band tension. The amount of winding of the tape around the nose-mould also affects the band tension. It should bethe lowest possible band winding. A general nose mold arrangement is given below.



A 25.4 mm Transfer pan

B 25 mm minimum nose mold diameter

C Wear skid

D Tension shaft diameter: 75 mm

At least 100 mm between

E Axis

F Drive gear

G Wrap gap

TRANSMISSION DESIGN GUIDE

DROP /PICK UP TRANSFERS

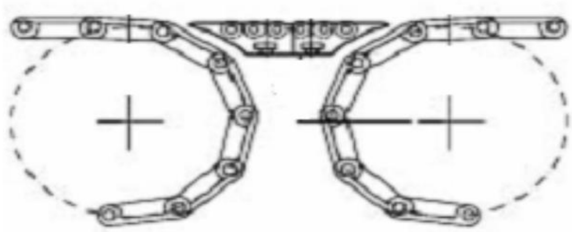
Transfer Plates: Raised Beam belts and their matching finger transfer plates are high-efficiency, low-repair transfer systems currentlyused in many container handling applications. Correct installation of finger transfer plates is mandatory for trouble-free service and long beltlife. Proper installation is especially resistant to high temperature changes. and is important in areas subject to significant thermal expansion. Even-numbered finger transfer pans should be mounted atthe center of the belt. There should be a 0.8 mm gap between the transfer pan and the belt. Finger transfer to the conveyor body

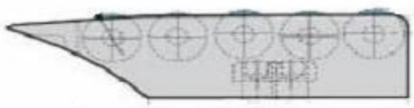
Metal plate support corner used for the security of the plates must bedrilled and threaded.

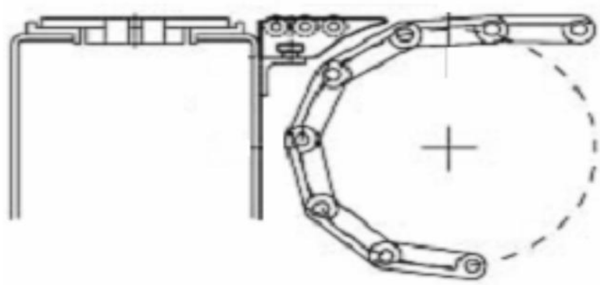
Precision is important in opening. Finger transfer plates are produced with holes suitable for various bolts. This The bolts prevent the plates from being attached too tightly. A loose fit that is not too tight allows the plate to move sideto side and work in harmony with the beam of the belt, due to expansion and contraction caused by temperature change.The length of the holes in the finger transfer plates limits the amount of expansion and contraction that can be accommodated. It is possible for very wide bands exposed to large temperature changes to exceed the expansion and contraction limits. For more detailed information about your application, please contact the Customer Representative.

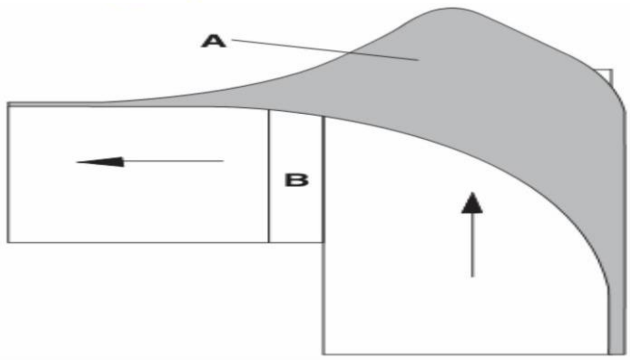
TRANSFER PLATES

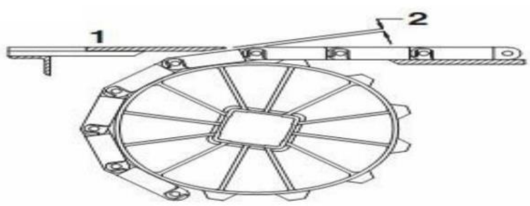
Without finger transfer plates, there must be a gap between the surfaces to transfer to allow polygonal movement ofthe belt. As the belt sits on the sprockets, the polygon effect causes the modules to pass through a fixed point (the endof the transfer pan) with varying clearances. In some installations, a gap is allowed to form Instead, it may be desirableto maintain the tip of the transfer pans in contact with the belt. This allows movement of the transfer pan, but results in small vibration movements that can create tipping problems for sensitive containers and products.

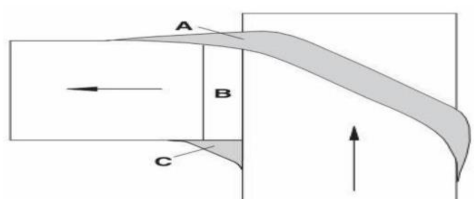












90 CONTAINER TRANSFERS

In soft drink systems, full radius guide rails with transfer pans placed tightly in the space between the delivery and deliveryconveyors can be used in the transfer of containers from one conveyor to another at an angle of 90ÿ. The containers moving along the full radius guide rails put high pressure on the rail and on each other. As containers move onto transfer pans, compressive forces reach their greatest value at the end of the outer curve.

PARABOLIC GUIDE RAILS

Parabolic guide rails were designed by a beverage industry engineer for betterdistribution of container pressure along the outer guide rail. The forces are distributed closer together. Shown in the figure below. They enable containers to be transferred more efficiently and without damage. However, if an excessively large transfer area is used, the stacked containers will overlap eachother, causing lifting.

A: Evenly distributed load in container transfer

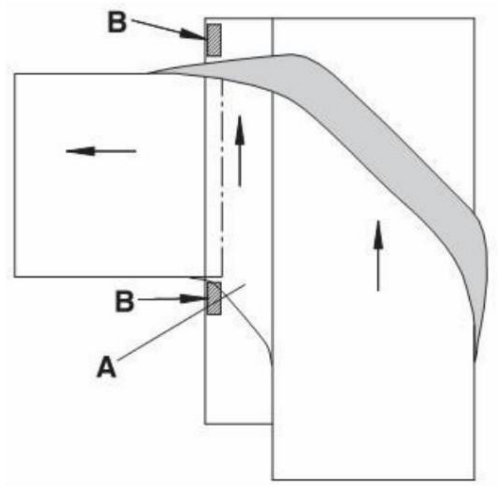
B: Transfer plate C: Dead zone

In the case of both the delivery conveyor-connected and the independent drive, the deadzone problem can be solved with the Transfer Belt. In the Figure below, in the Outline Parabolic Guide Rails Transfer Belt section, a 6-inch (152 mm) transfer belt is shown running parallel and in the same direction as the delivery conveyor. This belt is shown. It allows continuous container movement through dead space as well as transfer pans andprevents containers from getting stuck during the return.

Transfer Tapes are used to solve such problems.
For the maximum number of gears that can be used and more information, pleasecontact Customer Services. Parabolic guide rails-Transfer belts:

SPECIAL DESIGN GUIDE

With a few exceptions, the dimensions of all substances increase as their temperature increases and decrease as their temperature decreases.Since plastics expand and contract significantly, they are used in conveyor designs in all situations where the operating temperature is different from the ambient temp.



Tablo A 9 TERMAL GENIŞLEME KATSAYISI	
Bant Malzemesi	(mm/m °C)
Acetal -EC Acetal	0,09
Polietilen	0,2
Polypropylen (38 °Cden küçük)	0,12
Polypropylen (38 °Cden büyük)	0,15
Kompozit Propylen	0,06
Naylon	0,07
Aşınma Kızakları	
HDPE and UHMW PE	
-73 °C 30 °C	0,14
30 °C 99 °C	0,18
Naylon	0,06
Teflon	0,12
Metaller	
Aluminyum	0,02
Çelik(Karbon-Paslanmaz)	0,01

SLIP-STICK EFFECT

Undulations on long belts are due to a phenomenon known as slip-sticking. In this case, the belt behaves like a large spring or rubber band. The belt will make relatively short, pulsating movements along the length of the belt. It will not move until there is sufficientbelt tension to overcome the friction force. Instead of accelerating properly, the belt will wave forward. This in turn causes a brief dropin belt tension and the belt slows down due to friction. In some examples, it may take up to a minute until the belt tension increases again. The process then repeats itself. repeats. The idler end of the conveyor fluctuates even though the gears at the drive end rotateat a constant speed. Transport friction, belt stiffness, belt weight and length play a major role in determining the severity of the fluctuation on the conveyor. Stiffness is a reflection of how much the tape will stretch under a given stress. A stiffer tape will increase the tape stretch with lower elongation. A lighter tape has less frictional force to overcome.

Other factors that may affect fluctuation; The polygon effect is the belt speed, the drive system stroke (impulse), the return wheels diameter, and the distances between the return wheels. The polygon effect and the drive system stroke can initiate the ripple. However, the return wheels diameter and the distance between the return wheels are more critical. The return wheel diameter and thedistance between the return wheels are more critical. The wheels affect the path of the oscillating belt on the return. The oscillation onthe return may be transmitted to the carrying part of the belt, causing fluctuation. For more information on the distances and diametersof the wheels, contact the customer representative.

FORMULAS AND TABLES

It provides the appropriate formulas and tables needed to calculate the values for appropriate tape selection in any application. Thissection also provides measurement conversion factors for all units used in formulas and tables.

A “Chemical Guide” is provided to determine whether the desired tape material will be chemically compatible in the application strength.

CALCULATION OF THE STRUCTURE OR TENSION LOAD OF THE TAPE

The tensile strength of a working conveyor belt is determined by the combination of loads applied by frictional resistance and transporting the product to different heights, which should be included. Frictional forces are developed in two ways. First, the weights of the belt and the product carried on the conveyor create resistance as the belt is driven. Secondly, if the product is held stationary while itmoves under the belt, there will be additional resistance between the belt and the product.

Both of these friction forces are proportional to a COEFFICIENT OF FRICTION, which depends on the material in question, the qualityof its surfaces (machining), the presence (or absence) of lubrication, the cleanliness of the surfaces and other factors . Typical values of Friction Coefficients for common conveyor applications using Alhan belts are shown in Table A 1 and Table A 2. The Friction Coefficient between the belt and the wear slides in the conveying section is shown as Ss. The Friction Coefficient between the moved product and the band is shown as Ds.

The first step in calculating the belt pull (BELT PULL, BC) is the calculation of the backed-up product load (Gp). Table A 1 shows that there are two Ss lists for propylene belts, one for clean, smooth-running applications and the other for abrasive applications. Note that it isfor (abrasive) applications. In this case, abrasives are defined as small or low levels of particles, powdered fibers or glass particles.

The designer must be aware that many factors affect friction. Small changes in situations can produce large deviations. Accordingly, whenfriction coefficients are used in design calculations, these changes should be allowed.

MAXIMUM SHAFT DEFLECTION RECOMMENDATIONS

As the drive shaft bends or deflects under heavy loads, the longitudinal distance between the drive shaft and the idler shaft is less in the center ofthe belt than at the edges. This causes an uneven distribution of belt tension, with the largest loads being pulled at the edges. As the tension distribution becomes uneven, the load pulled by the teeth of the gears also increases. It has calculated the satisfactory performance that can be achieved if shaft deflections do not exceed strict limits. These limits are:

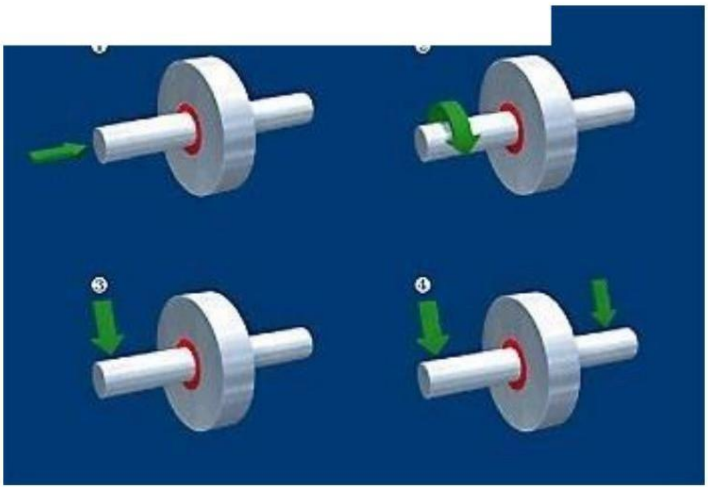
Maximum shaft deflection for conventional one-way conveyors: 2.5 mm

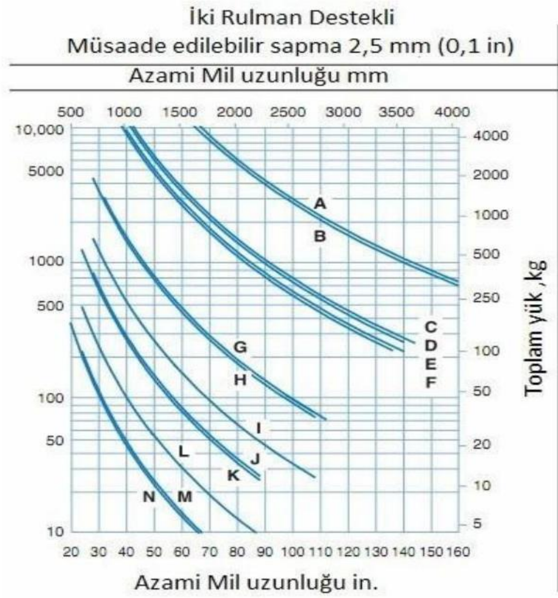
Maximum shaft deviation for bi-directional or pusher conveyors: 5.6 mm

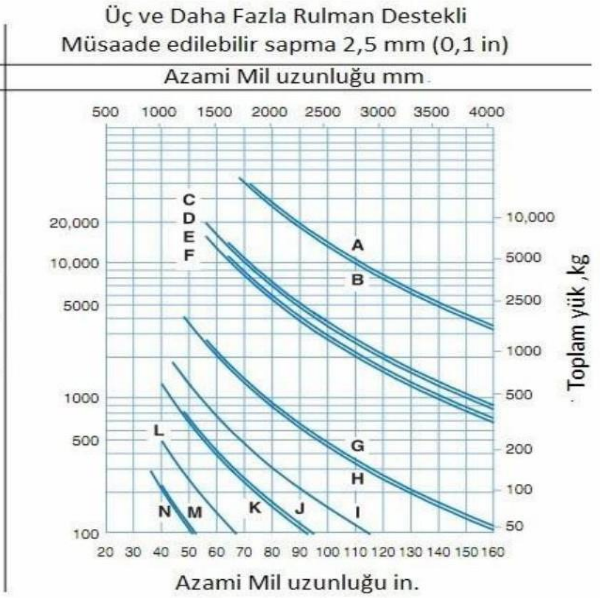
If the front shaft selection results in very large deflections, it will be necessary to choose a larger size shaft, a more durable material, oruse intermediate bearings that will reduce the shaft clearance.

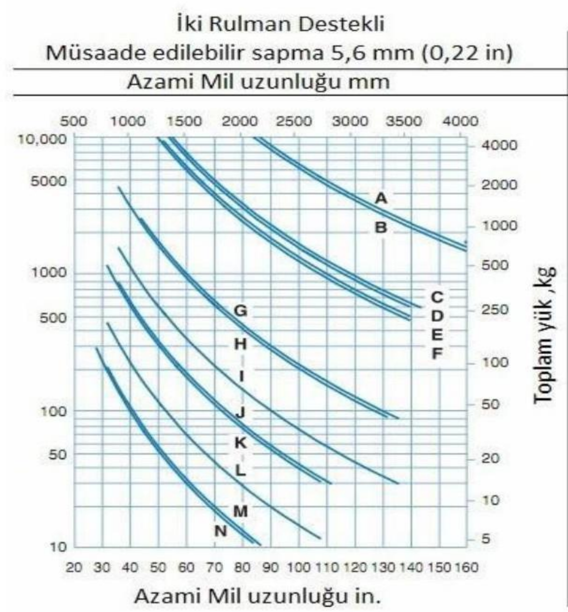
Load Conditions

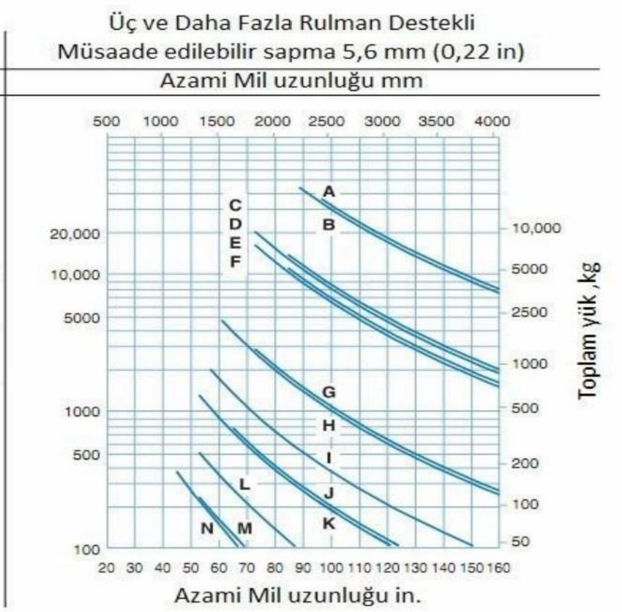
1. *Axial*
2. *Torsion*
3. *Twisting*
4. *Radial*











A: 90x90 carbon steel

B: 90x90 stainless steel

C: 65x65 carbon steel

D: 65x65 stainless steel

E: 60x60 carbon steel

F: 60x60 stainless steel

H: 40x40 carbon steel

I: 40x40 aluminum

J : 25x25 carbon steel

K: 25x25 stainless steel

G: 40 mm carbon steel

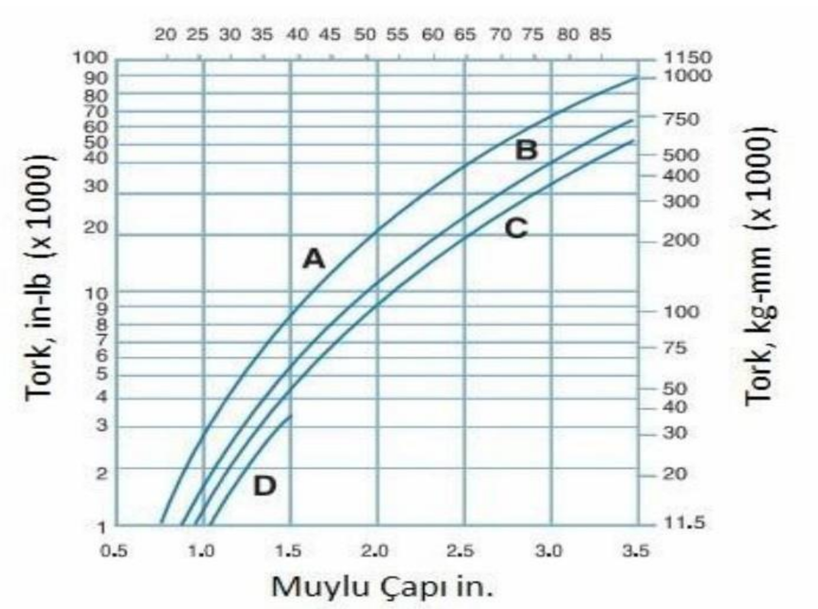
L:25x25aluminum M : 16x16 carbon steel N: 16x16 stainless steel

DRIVE SHAFT TORQUE

The drive shaft must also be strong enough to overcome resistance to the movement of the product and belt and to transmit thetorsional force from the drive motor. Torsional motion creates shear stresses on the shaft, often quite critical on very close axles. Without calculating the shear stresses, the designer can use the You can use the table below to quickly determine the maximum recommended torque on the spindle. For example, assume your starting spindle selection is 2.5 inches (63.5 mm) and made of carbon steel.

Compare the actual torque with the maximum recommended torque to decide if this axle size is sufficient.

If it's not enough, try a larger shaft size or a more durable material. If these are not possible, try smaller size gears. In many cases,the actual torque will be much smaller than the maximum recommended torque. If so, reducing the axle diameter to a smaller acceptable size will reduce the cost of the system.



THERMAL EXPANSION – CONTRACTION OF MATERIALS

As materials are exposed to high or low temperatures, their sizes likewise increase or decrease. Conveyor belts installed at a certain temperature and operating at another temperature or passing through different temperatures within the operating cycle will expand or contractaccordingly. Because plastics expand (contract) at a relatively high rate, this characteristic should be considered in the application of these tapes if significant temperature changes are expected.

DEFLECTION (SAXING CATENARY)

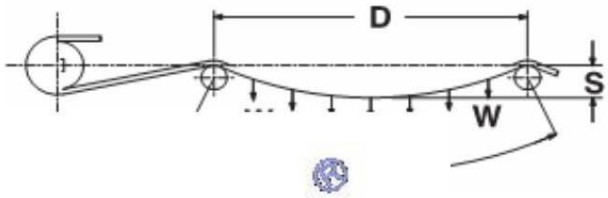
It is assumed that a band suspended between two supports under the influence of gravity takes the shape of a curve called "catenary".

The dimensions of this curve depend on the distance between the supports, the length and weight of the hanging

tape. In most cases, the actualshape of this curve does not matter, but

The conveyor designer is concerned with two things: the additional belt required and

the tension created by the sagging band. Additional



or

from here

band, X, is the difference between L and D

in the aboverepresentation:

$X = 2.66 \times S2 / D$

X=Additional band…m S=Sagging….m D=Distance between cylinders…m

The stress T created by the curvilinear sagging band is found from:

$T = d2 \times M2 / (96 xs)$

T : Tension…kg/m s : Sagging….mm d : Distance between rollers …mm M2 : belt weight kg/mm2

For calculations of rotating belts, please contact customer service.

CASE STUDIES

STEEL CAN CARRYING EXAMPLE

A beverage carrier using a 960 series Rib Channel Polypropylene belt to transport steel cans on a 18.3 m long and 1.3 m wide conveyor with a weight of 122 kg per square meter is considered. The belt will run on UHMW wear skids at a speed of 6 m per minute and wet, starts are usually areexpected to be under load and the steel cans will be transported for a total of "15.2 m". Operating temperatures are 82 °C. A 12 gear with a pitch diameter of 198 mm is preferred and Carbon Steel Shafts are accepted.

Stage 1: The friction coefficient between the belt and the UHMW wear slides, Ss, is determined as 0.11 from the section "Table A 1. Initial (static) friction coefficient between the wear slides and the band. The friction coefficient between the steel cans and the band, Ds, "Table A 2 The working(dynamic) friction coefficient between the container and the belt is found to be 0.26. Since the steel cans will be loaded at 15.2 m, the carrying area percentage is; is 15.2/18.3 or 83.1%

M1: Product load 122 kg/m2

G : Transport distance / Total conv. Length (15.2/18.3)

Gp =M1 x Ds x G / 100. kg/m2

Gp= 122x0.26x(83.1/100) = 26.4 kg/m2

Table A 4 TEMPERATURE FACTOR			
C.	POLYPROPI LEN	POLYETHYLENE	ACETAL/EC ACETAL
110	0.3		
one hundred	0.4		
90	0.45		0.55
80	0.55		0.8
70	0.65	0.8	0.95
60	0.75	0.85	0.98
50	0.85	0.9	-
40	0.95	0.92	1.01
30	-	0.95	1.01
20	-	-	1.02
10	-	1.05	1.02
0	1.02	1.09	1.02
-10	1.03	1.1	1.03
-20	1.05	1.15	1.03

Table A 5 Material Properties

P.	M.	L.	PIN	Tape Strength N/m	kg/m2	Stock Code/Stock Code Locked Model/Locked Type	Stock Code/Stock Code Sourced Model/Welded Type
25.4	PBT+FR	152.4	SS	35200	9.25	927 G04 K06	-
	PP		P.A.	21600	5.75	927 G01 K06	929 G01 K06
			PP	20400	5.5	928 G01 K06	930 G01 K06
	POM		P.A.	35200	7.85	927 G02 K06	929 G02 K06
			PP	34100	7.6	928 G02 K06	930 G02 K06
	PE		P.A.	21600	5.75	927 G03 K06	929 G03 K06
			PP	20400	5.5	928 G03 K06	930 G03 K06
25.4	PBT-FR	152.4	P.A.	35200	9.1	931 G04 K06	-
	PP		PP	21600	5.65	931 G01 K06	933 G01 K06
			P.A.	20400	5.4	932 G01 K06	934 G01 K06
	POM		PP	35200	7.75	931 G02 K06	933 G02 K06
			P.A.	34100	7.5	932 G02 K06	934 G02 K06
	PE		PP	21600	5.65	931 G03 K06	933 G03 K06
			PP	20400	5.4	932 G03 K06	934 G03 K06

P.	M.	L.	PIN	Tape Strength N/m	kg/m2	Stock Code/Stock code
38.1	POLYETHYLENE WHITE POLYETHYLENE ■ HITE	51	P.A.	7850	5.5	852 B03 K02
			PP	6750		862 B03 K02
		102	P.A.	7850		852 B03 K04
			PP	6750		862 B03 K04
		153	P.A.	7850		852 B03 K06
			PP	6750		862 B03 K06
38.1	POLACETAL BLUE POLYACETAL	204	P.A.	21500	7.8	852 M02 K02
			PP	17500		862 M02 K02
		255	P.A.	21500		852 M02 K04

P.	M.	L.	PIN	Tape Strength N/m	kg/m2	Stock Code/Stock code
12.7	PP	254.4	PP	8500	4.5	945 G01 K06
			P.A.	10000	4.5	946 G01 K06
	POM		PP	12500	6	945 G02 K06
			P.A.	15000	6	946 G02 K06
P.	M.	L.	PIN	Tape Strength N/m	kg/m2	Stock Code/Stock code
50.8	PP	51.1PP		33000	11.3	960 G01 K02
		101.2PP		33000	11.3	960 G01 K04
		301.8PP		33000	11.3	960 G01 K12
	POM	51.1PP		38000	13.1	960 M02 K02
		101.2PP		38000	13.1	960 M02 K04
		301.8PP		38000	13.1	960 M02 K12
	PE	51.1PP		30000	10.6	960 B03 K02
		101.2PP		30000	10.6	960 B03 K04
		301.8PP		30000	10.6	960 B03 K12
P.	M.	L.	PIN	Tape Strength N/m	kg/m2	Stock Code/Stock code
50.8	PP	153 PP		33000	11.2	956-957 G01 K06
		204 PP		33000	11.2	956-957 G01 K07
		255PP		33000	11.2	956-957 G01 K08
		306PP		33000	11.2	956-957 G01 K09
		357 PP		33000	11.2	956-957 G01 K10
		408 PP	.....	33000	11.2	956-957 G01 K11
		PP		33000	11.2	956-957 G01 K....

Table A 6 MAXIMUM GEAR CLEARANCE mm	
0-10%	152
10-20%	152
20-30%	152-120
30-40%	120-90
40-50%	90-75
50-60%	75-65
60-70%	65-60
70-80%	60-50
80-90%	50-45
90-100%	40

Table A 7 SQUARE SHAFT SPECIFICATIONS				
MEASUREMENT	SHAFT WEIGHT			I INERTIA MOMENT (mm4)
	ALUMINUM	CARBON STEEL	STAINLESS STEEL	
25mm	1.7	4.9	4.9	32.55
40mm	4.335	12.55	12.55	213300
60mm	10.05	29.11	29.11	1080000
65mm	11.8	34.16	34.15	1487600
E kg/mm2 ELASTICITY MODULE	7000	21100	19700	

Table A 8 LOSS OF EFFICIENCY	
Snail Gear	
Singular Reducers	5%
Double Reducers	10- 20%
Wheel Chains	3- 5%
V Tapes	3- 5%
Arm Bearings	2% to 5%
Roller Bearings	one%
Gear Reducers	
Singular Reducers	2%
Double Reducers	4%
Triple Reducers	5%

Table A 9 THERMAL EXPANSION COEFFICIENT	
Tape Material	(mm/m
Acetal -EC Acetal	0.09
polyethylene	0.2
Polypropylene (from 38 oC Small)	0.12
Polypropylene (from 38 oC big)	0.15
Composite Propylene	0.06
Nylon	0.07
Wear Guides	
HDPE and UHMW PE	
-73 oC 30 oC	0.14
30oC 99oC _	0.18
Nylon	0.06
Teflon	0.12
Metals	
Aluminum	0.02
Steel (Carbon-Stainless)	0.01

Table A 10 Recommended Torque values

Table A 10 Recommended Torque values

A: Stainless steel 303-304

B: Carbon steel C 1018

C: Stainless steel 316

D.: Aluminum 6061 -T6