Product overview

Contents

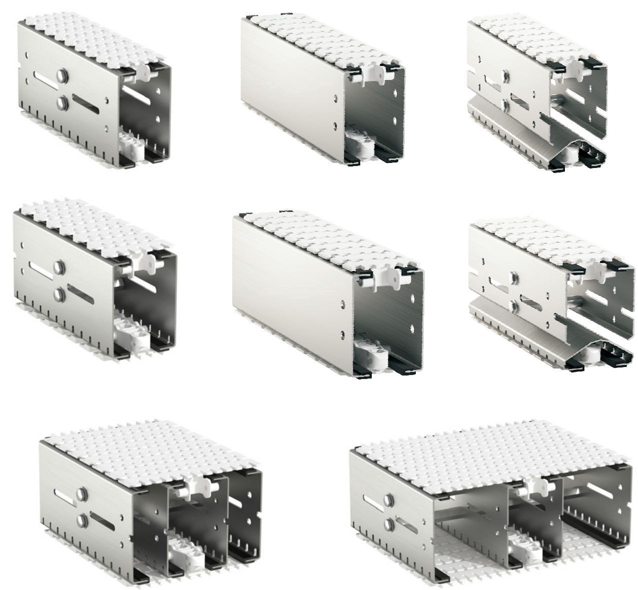
Stainless steel conveyor systems

Stainless steel conveyor system X70X, X85X, X180X, X300X (68, 83, 175, 295 mm chain)

Features

Split beams in stainless steel for easy cleaning. High resistance to aggressive chemicals. Matching drive units, idlers and guide rail and support components. Standard X180/X300 chains.

Series X are stainless steel designs adapted to the requirements of the food processing, pharmaceutical and hygiene industries. The Series X system is designed for easy integration with aluminium systems.



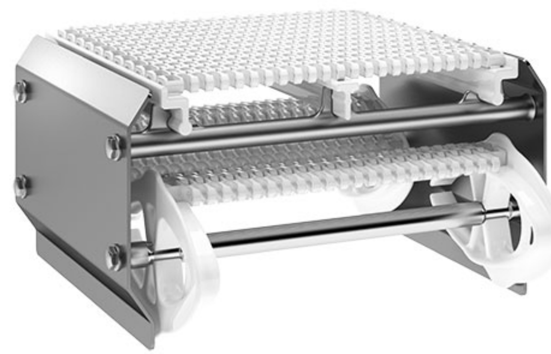
Examples of application areas

Aerosol cans, liquid soap in plastic bags, soft cheese, detergent powder, tissue paper rolls, food products, personal care products.

Stainless steel conveyor system WL222X, WL273X, WL374X, WL526X, WL678X (152/203/304/456/608 mm belt)

Features

FlexLink's newly developed stainless steel conveyor is designed to fit into demanding primary and secondary packaging applications. It addresses important aspects of today's packing processes, such as being easy to clean, smooth handling of products, safe for operators, robust design, long life, and easy to maintain with a low cost of ownership.The modularized and standardized design ensures fast set up, and facilitates rapid future extensions and changes.



Examples of application areas

Dry product handling such as bread or frozen products in primary packaging where there is a chance that the package could rupture should also be considered - the conveyor would be an easy to clean alternative to traditional conveyors.

Conveyor accessories

Guide rail components (GRX)

Catalogue section *Guide rail components* deals with various types of guide rails and guide rail support components. Those products are used with several of the conveyor systems. A number of pre-designed guide rail structures are shown as examples. New components are available for building automatically adjustable guide rail systems, accommodating products with different widths.

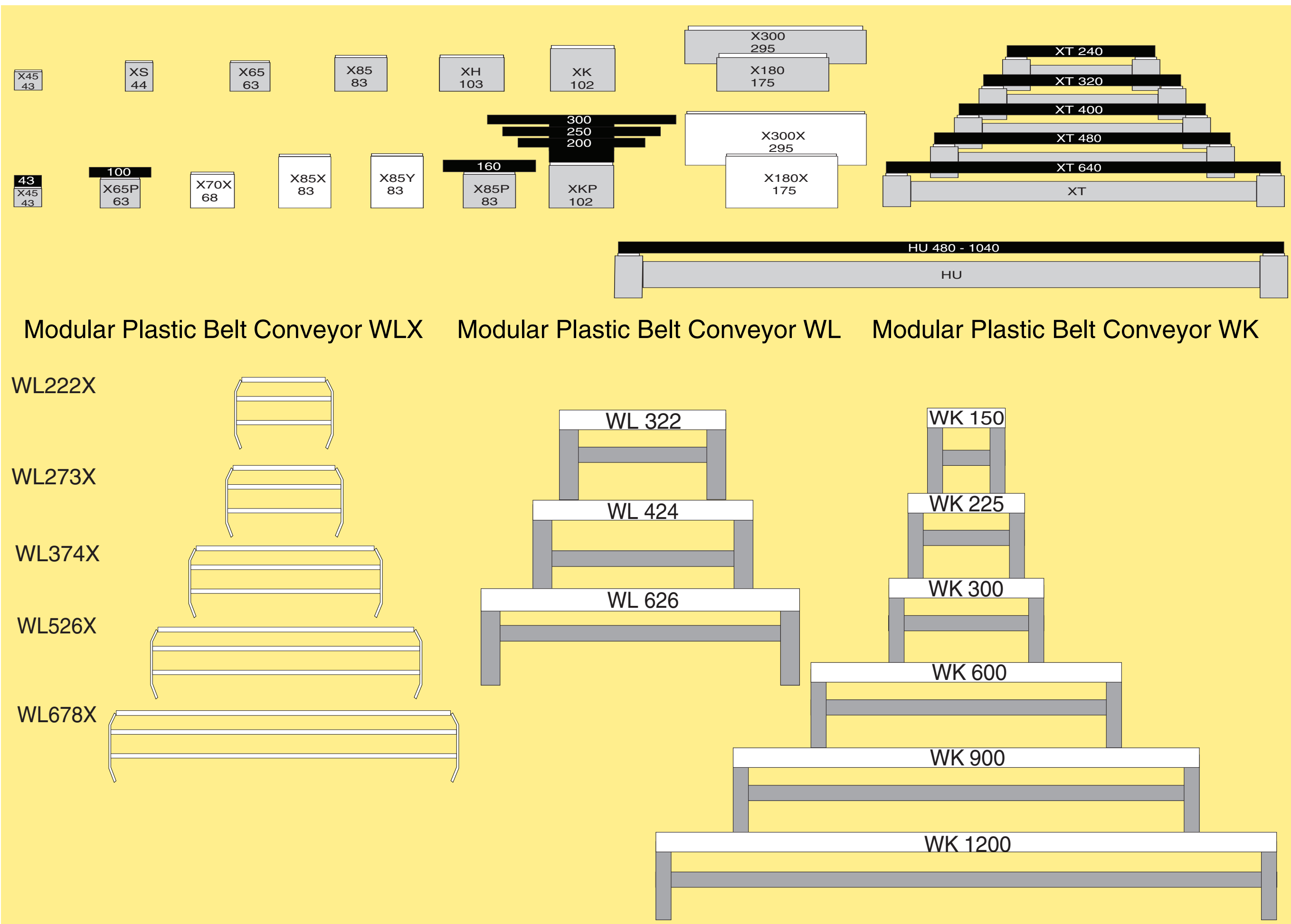
Conveyor support components (CSX)

The conveyors are held in place by a well balanced range of support components, with beam support brackets, support beams, feet, etc.

A number of pre-designed support structures are shown as examples.

Conveyor structures built from aluminium beams with standardized T-slots simplify attachment of components and accessories.

Conveyor comparison chart

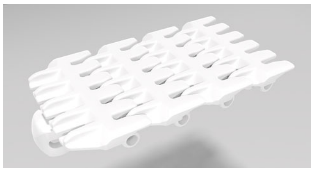


Simplified end views of conveyor beams, drawn to the same relative scale. Numeric values are widths in mm.

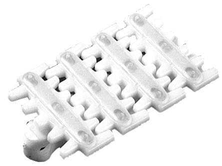
Legend	
Light grey:	Conveyor beams
Dark grey:	Pallets or puck
White:	Chain/Belt
X70X, X85X, X180X, X300X: WL222X, WL273X, WL374X, WL526X, WL678X	Stainless steel conveyor

Stainless steel conveyor system X70X, X85X, X180X, X300X – Chains

Plain chain



Friction top chain



Stainless steel conveyor system X70X, X85X, X180X, X300X – beams and beam support brackets

Conveyor beam

Beam support bracket

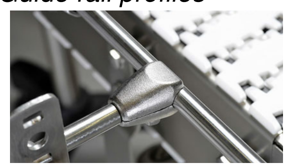
Stainless steel conveyor system X70X, X85X, X180X, X300X – drive units and idlers

End drive units

Idler end unit

Stainless steel conveyor system X70X, X85X, X180X, X300X – guide rail system

Guide rail profiles

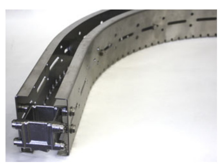


Guide rail brackets

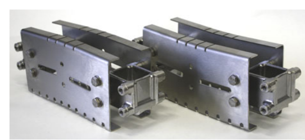
Stainless steel conveyor system X70X, X85X, X180X, X300X – bends

Wheel bends

Plain bends



Vertical bends



Stainless steel conveyor system X70X, X85X, X180X, X300X – support

Support components

Stainless steel conveyor system WL222X, WL273X, WL374X, WL526X, WL678X – Belts

Radius flush grid belt, Dry

Flat top belt

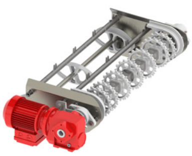
Stainless steel conveyor system WL222X, WL273X, WL374X, WL526X, WL678X – beams and beam support brackets

Conveyor beam

Beam support bracket

Stainless steel conveyor system WL222X, WL273X, WL374X, WL526X, WL678X – drive units and idlers

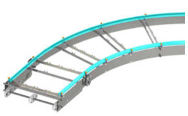
End drive units



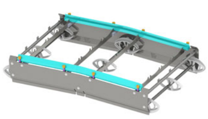
Idler end unit

Stainless steel conveyor system WL222X, WL273X, WL374X, WL526X, WL678X – bends

Plain bends



Vertical bends



Stainless steel conveyor system WL222X, WL273X, WL374X, WL526X, WL678X– support

Support components

Drive unit capacity

The required motor output power P depends on

- Traction force F
- Chain speed v

The following equation applies:

P [W] = 1/60 × F [N] × v [m/min]

The maximum permissible traction force of the various drive units, and other useful parameters, are shown in the following tables. Also see diagrams on page 12.

More information

Detailed information about the drive units can be found in “Drive unit guide” and “Spare parts”. See “Technical library” on FlexLink´s website. For information about drive units with variable speed motors, see *Drive Unit Guide*.

Drive unit specifications

End drive unit

	X70X	X85X	X180X/ X300X	WLX
Number of teeth on sprocket wheel	H: 16	H: 12	12	2x16
Chain pitch (mm)	25,4	33,5	33,5	25,4
Maximum traction force (N)				See chapter WLX
Type H_P, HN_P Standard	800	1250	1250	

Temperatures

What temperatures can a FlexLink´s conveyor operate in?

A flex link conveyor can operate in temperatures between –20 °C and +60 °C.

Temperatures up to +100 °C can be taken for short periods. This is mainly for cleaning and rinsing.

What happens if these limits exceed?

In cases where the recommended specifications have not been followed, such as in very warm and cold conditions, this will change the properties of the materials used.

FlexLink cannot guarantee components and their functionality in case these recommendations are not followed.

PO
X70X
X85X
X180X
X300X
WL 222X
WL 273X
WL 374X
WL 526X
WL 678X
CSX
GRX
FSTX
TR
APX
IDX

Chain tension limits

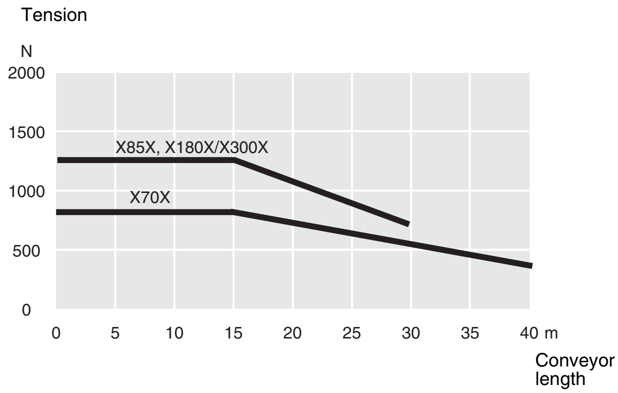
To determine the maximum chain tension allowed, it is necessary to take conveyor speed and conveyor length into consideration. Check diagram 1A and 2B-2E and use the lowest tension value obtained.

Note

The drive unit configurator on the web always proposes a motor strong enough to utilize the maximum permissible chain tension as specified in the diagrams below. Variable speed motors at very low frequencies can sometimes drop below the specified tension. Always check motor data if high pulling force is critical.

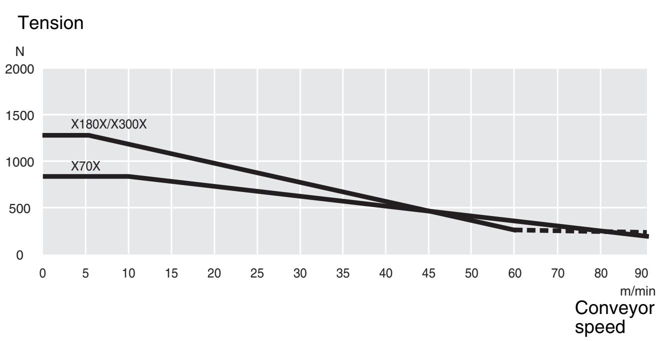
Maximum permissible chain tension

Diagram 1A



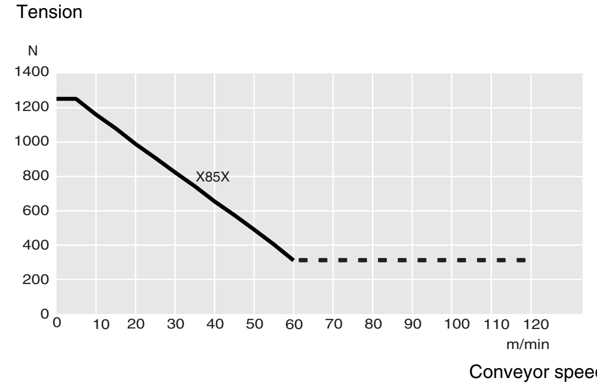
Tension/length diagram, X70X, X85X, X180X, X300X

Diagram 2A



Tension/speed diagram, X70X, X180X/X300X conveyors

Diagram 2B



Tension/speed diagram, X85X

Selecting the right chain material

Links

The base link parts of the chain links have the same basic shape, and the same technical properties. Five different materials are used. The standard material is acetal resin (POM). Different materials are used.

POM A: Copolymer Acetal with silicon

POM B: Homopolymer Acetal, silicon free

POM C: Copolymer Acetal, silicon free

POM D: Homopolymer with ultra low wear additive

Properties	Copolymer POM A / C	Homopolymer POM B / D
Heat ageing	(+) Superior	0
Hot water resistance	(+) Superior	(-)
Chemical resistance	(+) Superior ph 4-14	(-) ph 4-10
Tensile strength	0	(+) Superior
Stifness	0	(+) Superior
Impact Strength	0	(+) Superior

Strength values at 20 °C:

Product (POM)	X45	XS	X70X	X65	X85, XH, X180/ X300	XK	XT, X45H	XT Compact
Maximum working tension [N]	200	500	800	1000	1250	2500	900	180

The other materials are not as strong as POM:

- Polyester (PBT): 50% of POM value
- Polyvinylidene fluoride (PVDF): 40% of POM value.
- Conductive POM: 40% of POM value
- High temperature resistant material, 50% of POM value
- Intrinsically static dissipative (ISD) POM: see the following table..

Product (POM ISD)	X65	X85	XH	XT X45H	XT Compact
Maximum working tension	400 N	400 N	550 N	450 N	180 N

Pivots

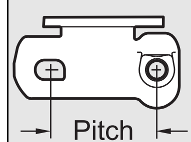
Most pivots are made in materials as specified in the table below. Otherwise the material is specified next to the link designation.

Link	POM	POM (ISD)	PBT	PVDF
Pivot	PA66	PA66 (ISD)	PA66	PVDF

Chain pitch and weight

The *Chain guide* lists the weight of most links. To calculate chain weight, you need to know the chain pitch (see picture below), the weight of the plastic pivot, the weight of the steel pin, and the cleat separation. See the following table.

Parameter	Conveyor type		
	X70X	X85X	X180X/X300X
Chain pitch, mm	25,4	33,5	33,5
Plastic pivot weight, g	1	2	2
Steel pin weight, g	4	10	10



Note

Some of the chains require modification of the drive units. There may also be limitations on minimum bend radius.

Material abbreviations

Material abbreviation	Material
POM*	Acetal resin
POM* polished	Acetal resin, polished surface
POM*, pivot PVDF	Acetal resin, pivot: PVDF
POM* GY	Acetal resin, grey
POM* BK	Acetal resin, black
POM* COND	Acetal resin, conductive
POM* ISD NAT	Acetal resin ISD, natural colour
POM* ISD GY	Acetal resin ISD, grey
PBT	Polyester
PVDF	Polyvinylidene fluoride
PVDF, pivot PA66	Polyvinylidene fluoride, pivot: PA66
POM* + steel	Actetal resin, steel top
POM* + SS	Actetal resin, stainless steel top
PA	Polyamide

Chain strength and expansion vs. temperature

Temperature °C	–20	0	20	40	60	80	100	120
Tensile strength factor	1,2	1,1	1,0	0,9	0,8	0,6	0,5	0,3
Linear expansion%	–0,4	–0,2	0	0,2	0,5	0,8	1,0	1,3

PO
X70X
X85X
X180X
X300X
WL 222X
WL 273X
WL 374X
WL 526X
WL 678X
CSX
GRX
FSTX
TR
APX
IDX

Service factor

The maximum permissible chain tension (see diagrams 1A and 2A-2E on Page 12) depends on the number of conveyor starts and stops per hour. Many conveyors run continuously, whereas others start and stop frequently. It is obvious that frequent starts and stops increase the stress on the chain.

The service factor (see table below) is used to derate for high frequency of starts and stops and for high chain speeds. Divide the tension limit obtained from the graphs by the service factor to get the derated tension limit. A high service factor can be reduced by providing a soft start/stop function.

Operating conditions	Service factor
Low to moderate speed or max. 1 start/stop per hour	1,0
Max. 10 starts/stops per hour	1,2
Max. 30 starts/stops per hour	1,4
High speed, heavy load, or more than 30 starts/stops per hour	1,6

Important

The chain tension calculations are made to ensure that the capacity of the drive unit is sufficient, but not excessive, in relation to the strength and friction of the chain. The calculations do not take into account the increased wear resulting from the higher friction in plain bends.

Chain tension calculations

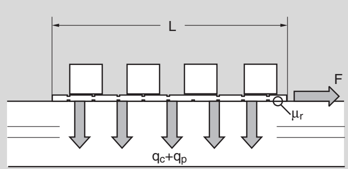
Chain tension

The tension building up in the chain can be divided into several components:

1 Friction between unloaded chain and slide rails, for example on the underside of the conveyor beam.

2 Friction between loaded chain and slide rails (Figure A).

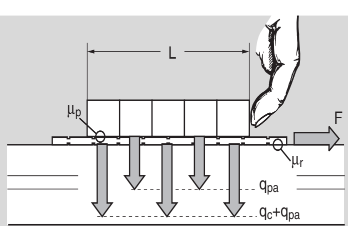
Figure A



$F=L\cdot(q_c+q_p)\cdot\mu_r$

3 Friction between accumulating products and top surface of chain (Figure B).

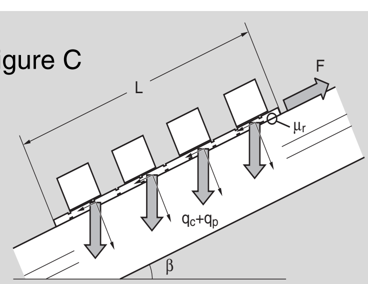
Figure B



$F=L\cdot[(q_c+q_{pa})\cdot\mu_r+q_{pa}\cdot\mu_p]$

4 Gravity force acting on products and chain in inclines and verticals (Figure C).

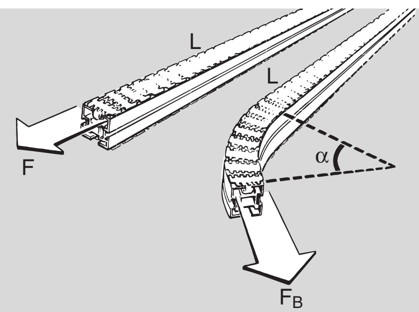
Figure C



$F=L\cdot(q_c+q_p)\cdot(\mu_r\cdot\cos\beta+\sin\beta)$

5 Added friction in plain bends. This friction is proportional to the chain tension on the low-tension side of the bend. This means that the actual friction depends on the position of the bend in the conveyor (Figure D).

Figure D



Traction force

The traction force F required to move the chain depends on the following factors:

Conveyor length.. L
Product gravity load per m
Transport... q_p
Accumulation .... q_{pa}
Chain gravity load per m .... q_c
Friction coefficient
Between chain and slide rail .... μ_r
Between chain and products....................... μ_p
Bend factor, α° plain bend (hor./vert.).......... $k\alpha$
Inclination angle .... β

Chains – configuration strings

Below, example of text strings obtained from the configurator with explanations.

Input

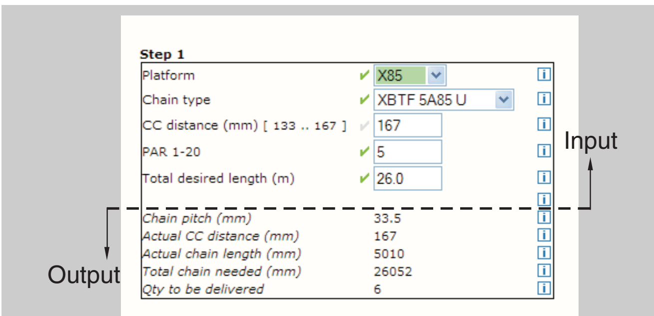
Platform: *"X85"*

Chain type: *"XBTF 5A85 U"*

CC distance (mm) [133..167]: *"167"* (depending on the PAR value, the CC distance will change.)

PAR 1-20: *"5"* (depending on the CC distance, the PAR value will change.)

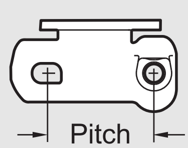
Total desired length (m): "*26"*



Output

Chain pitch: *"33,5"* (see table below)

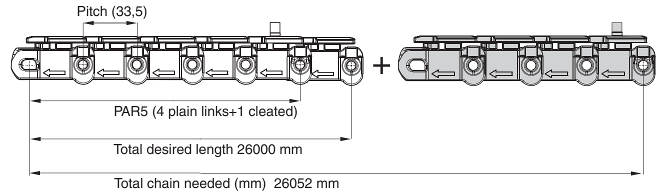
Parameter	Conveyor type				
	X70X, XS, X45H, X65, XT	X85	XH	XK	X180/X300
Chain pitch, mm	25,4	33,5	35,5	38,1	33,5



Actual CC distance (mm): The selected CC distance will be round off to the closest value which matches the chain pitch.
E.g. for value 400, PlatformX85 (pitch 33,5 mm), CC distance= 400 mm, the Actual CC will be 402 mm.

Actual chain length (mm): The actual length depending on the CC/PAR value and that the chain always ends with a cleated link. This causes the length to vary from 3000-3250 mm or 5000 to 5500 mm depending on selected platform.

Total chain needed (mm): *"26 052"* (All configurable chains starts with a number of plain links in this case 4 links before the cleat link (PAR5). The desired length is 26 000 mm and the chain pitch for X85 is 33,5 mm. This creates an incorrect number of plain links before the last cleat link. The length is corrected by adding plain links (according to the desired PAR value) and a cleated link after the "last" cleat link. See picture.



Qty to be delivered: *"6" (The desired length is 26 m and items will be delivered in multiples of 5 -meter lengths; to cover demand of necessary length, 6 packages of chains are needed.*

Configuration result:

Item no	Qty	Description
XBTF 5A85 U	**6**	**XBTF 5A85 U PAR5**

PO
X70X
X85X
X180X
X300X
WL 222X
WL 273X
WL 374X
WL 526X
WL 678X
CSX
GRX
FSTX
TR
APX
IDX

Bend factors

Each plain bend introduces a bend factor $k\alpha$. This factor is defined as the ratio between chain tension measured just after the bend and that measured before the bend. The bend factor depends on

- the amount of direction change of the bend (angle α)
- the coefficient of friction, μ_r, for the friction between chain and slide rails.

When the conveyor is dry and clean, the friction coefficient, μ_r, will be close to 0,1.

The bend factor must be used since the frictional force of a plain bend depends not only on the chain and product weight and the coefficient of friction, but also on the actual tension of the chain through the bend. This tension causes additional pressure to the conveyor beam and slide rail from the chain. The additional force is directed towards the centre of the bend.

Calculation of this additional force is more complicated, since the chain tension varies through the conveyor, being maximum at the "pull" side of the drive unit, and virtually zero at the inlet of the return chain. The bend factor provides a means of including the added friction in bends into the calculations.

The same bend factors apply to horizontal and vertical plain bends. See the table.

Note

Plain bends should only be used in exceptional cases. For normal applications, use wheel bends.

Bend type (Vertical or Plain bend)	30°	45°	60°	90°
Bend factor $k\alpha$	1,2	1,3	1,4	

