ETS SYSTEM

TABLE TOP CONVEYORS

easy ...CONVEYORS

www.easy-conveyors.com

THE EASY WAY...

OF SOLVING YOUR MATERIAL HANDLING NEEDS

easy ...CONVEYORS

Easy conveyors bv

Easy conveyors bv is a company with 25 years of experience in the field of intralogistic conveyor components, we have specialised ourselves in developing modular components for the production of Belt conveyors, Table top conveyors, Mat top conveyors and Roller conveyors. All our products are being developed with the "modular thought "

Quality with innovative solutions

At Easy conveyors, we believe in delivering precision in our products and services, there's simply no compromising in the quality of our products and services. We make it our business to understand your needs and requirements. This is to ensure that our continuous R&D effort for technological breakthrough enables your business to maintain its competitive advantage while delivering more value to your customers Flexibility in fulfilling infinite potential. Today's dynamic business environment requires businesses to constantly evolve with technology and new customer requirements. With this in mind, Easy conveyors components are designed to get the best out of your investment and realise the unlimited potential of your business.

Efficiency for all businesses

At end of the day, all businesses depend on their bottom lines. Results, that's all that matters and Easy conveyors has continuously raised and set the benchmark to cater to the needs and budgets of various industries.

We work towards ensuring optimal results for businesses with our cost-efficient systems that afford you with…

01 Fast layout capability
02 Minimal component variation
03 Design simplicity
04 Effective space utilization
05 Enhanced productivity
06 Low maintenance
07 User-friendliness

Distribution network

Easy conveyors is worldwide available and has set up a well-established network of exclusive distributors or integrators. Our partners are able to offer you the complete solution integrating our components. Deliveries of our components are being made out of our major stock facilities in Europe, North America, Australia and Asia, from these locations orders from the product configurator can be shipped out with 24 hours lead time.

Product configurator online

Easy conveyors offers an online engineering tool, where you can configure your desired conveyor online by answering a few simple questions. The configurator will generate the desired conveyor and you can download the file in the selected cad format.

TRY OUT ON WWW.EASY-CONVEYORS.COM

Online product configurator

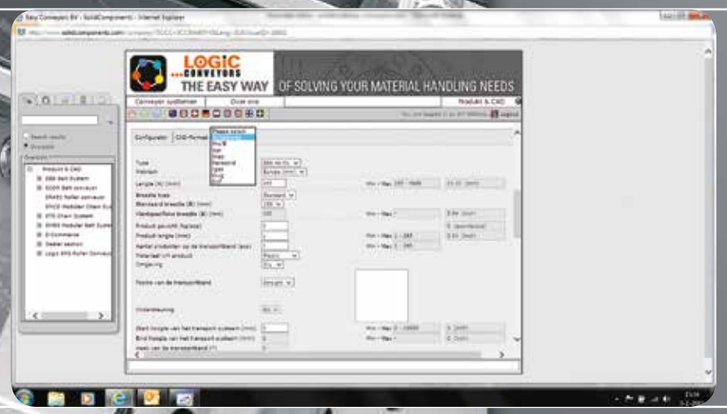
Go to **www.easy-conveyors.com** and click on product configurator and experience the simplicity of easy conveyors

1

All our products are available online, you can either configure an EBS belt conveyor, EMBS mat top conveyor, ETS table top conveyor, EMCS mat top conveyor or a ERA roller conveyor by selecting the product under product and cad button.

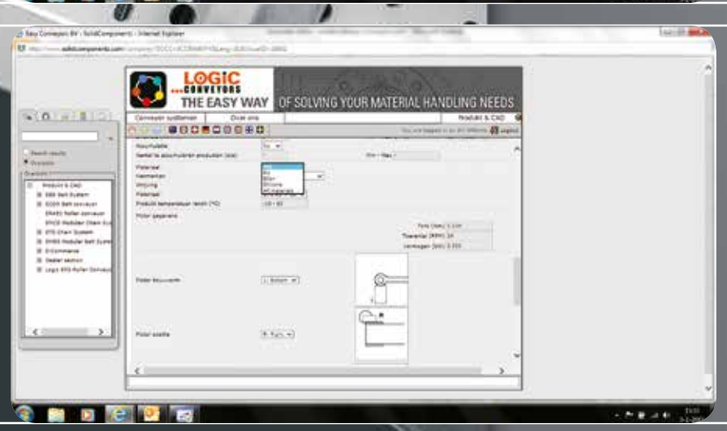
2

For example we choose an EBS belt conveyor, we need to know A & B size When we scroll down you can select the type of cad format.



3

In this part you have to fill in the desired length, width, speed, weight etc. to configure the conveyor.



4

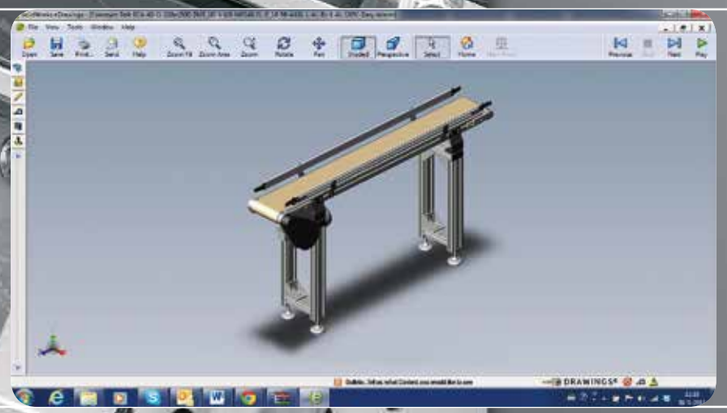
In this part the backoffice will calculate the needed power and if it fit is all possible with this conveyor.

5

When you scroll down, you have the choice to either, “request for a qoute”or download the “cad”file or a “pdf”file. If you request a qoute, your local dealer will receive an email with the request, they will take care of the qoutation and send this to you.

6

When you click on cad-file, the system will generate a cad drawing in the selected format, with your cad program or with a viewer (free download on http://www.edrawingsviewer.com/) you can open the drawing.

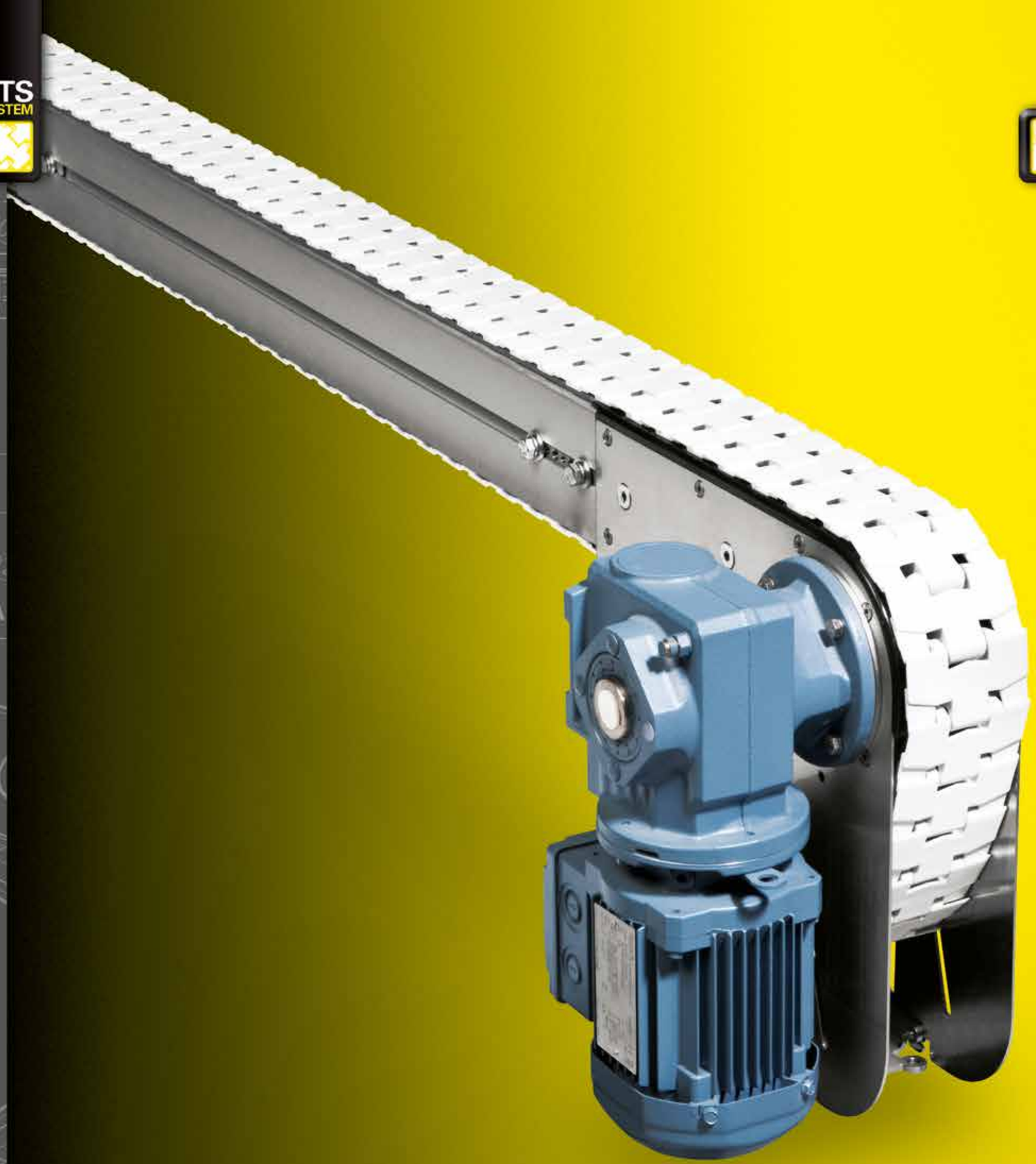


7

The drawing.

THE EASY WAY...

OF SOLVING YOUR MATERIAL HANDLING NEEDS

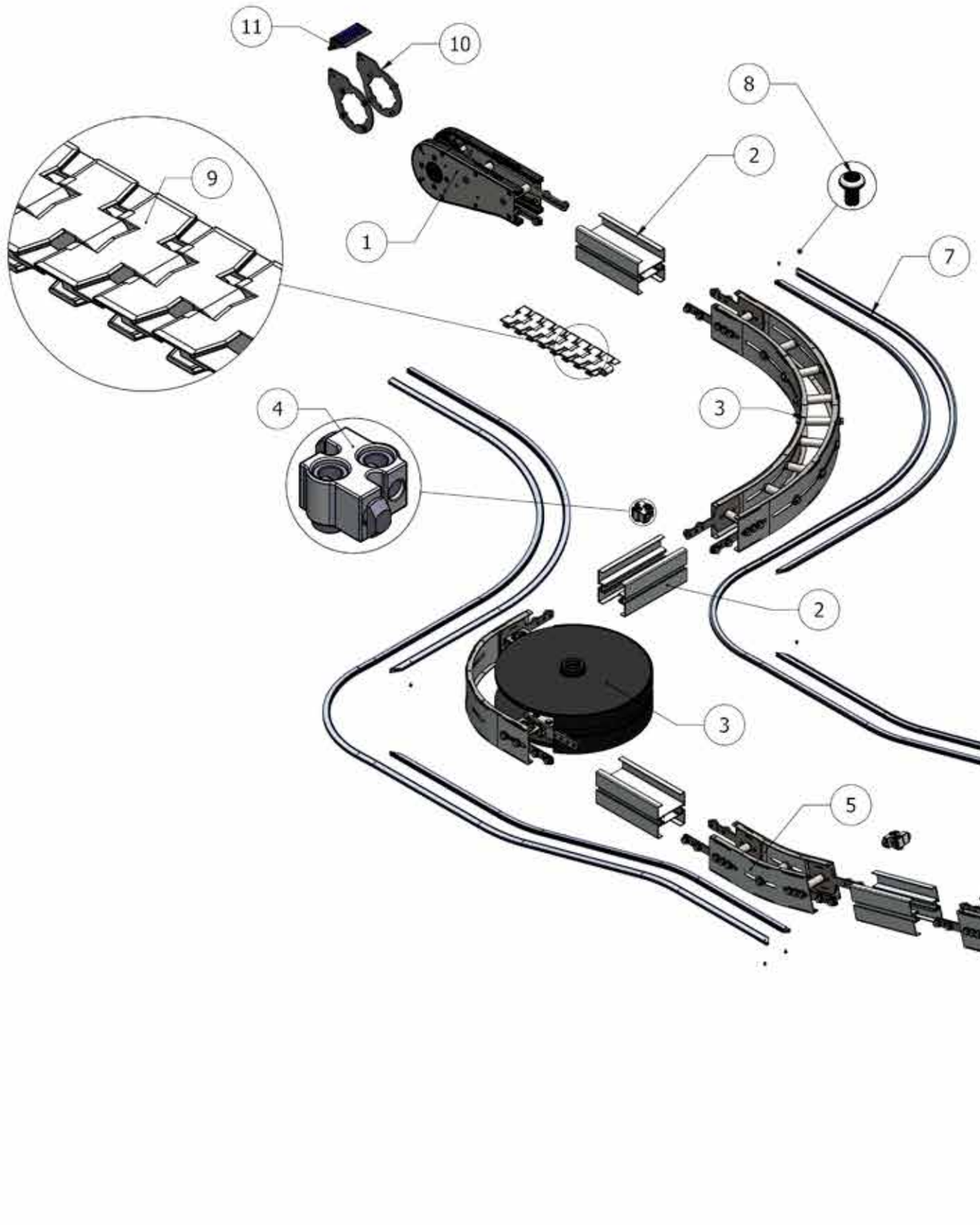


ETS SYSTEM CONTENT

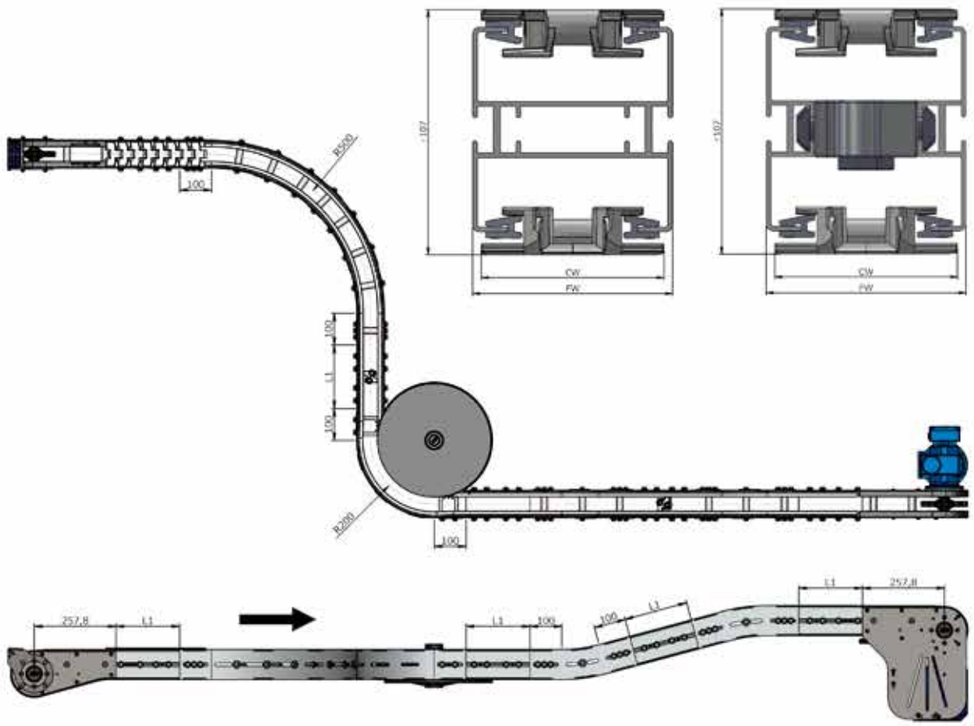
ETS HEAD DRIVE

ALUMINIUM

ETS HEAD DRIVE



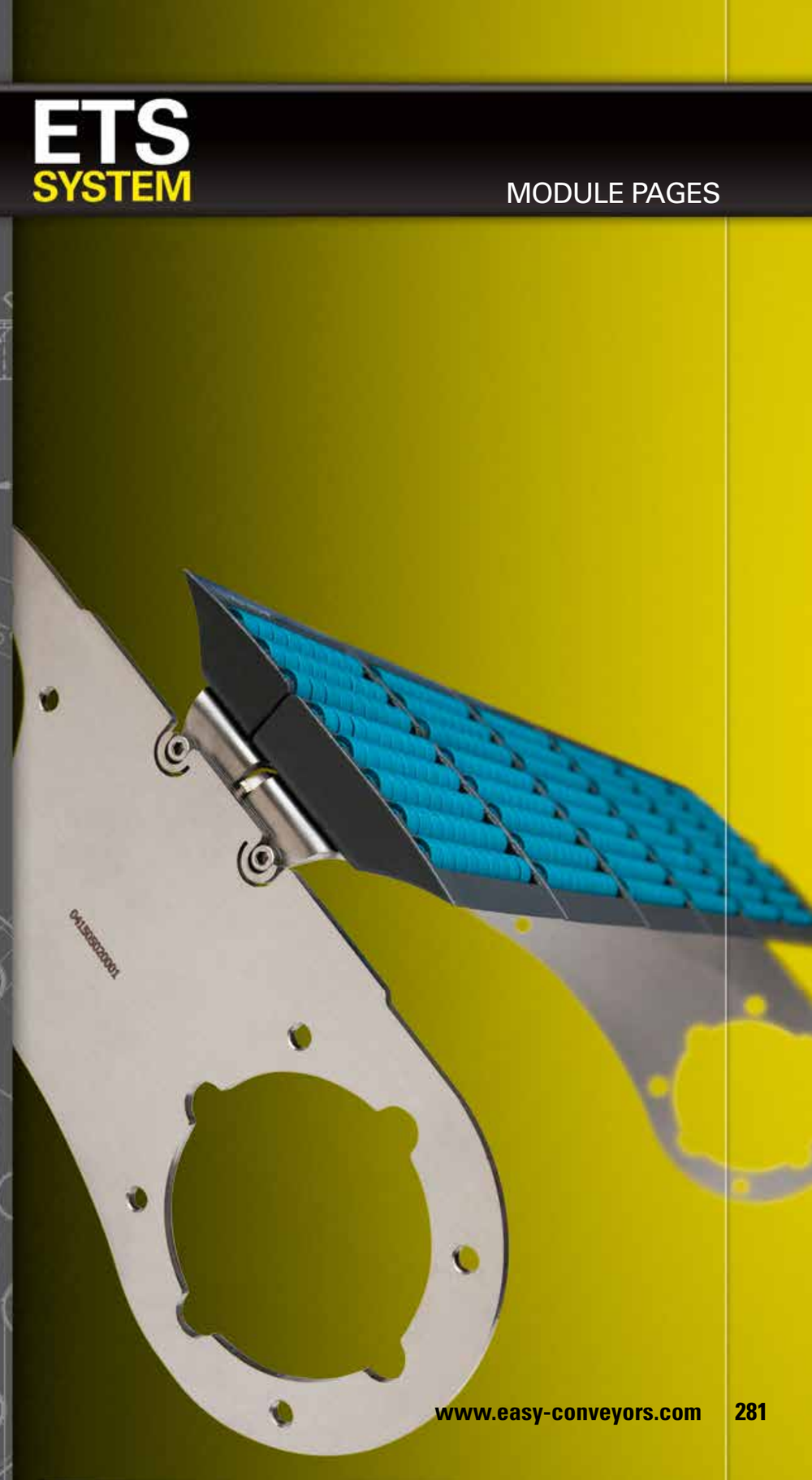
1	Return set Umlenkungsatz Kit de retour Cabeza de reenvío	Module PAGE 296
2	ETS side profile ETS Seitenprofil ETS Profil de côté Perfil lateral ETS	Module PAGE 284
3	Horizontal curve Kurve - horizontal Courbe horizontale Curva horizontal	Module PAGE 302
4	Straight connector Längsverbinder Connecteur droit Conector longitudinal	Module PAGE 284
5	Vertical curve Kurve - vertikal Courbe verticale Curva vertical	Module PAGE 306
6	Head drive set Kopfantrieb - Satz Ensemble Entraînement Direct Cabeza de tracción, juego	Module PAGE 292
7	Slide profile Gleitprofil Glissez le profil Perfil de deslizamiento	Module PAGE 284
8	Rokut rivet Kunstoff Popnail Popnail en plastique Popnail plástico	Module PAGE 284
9	ETS Chain ETS Kette ETS chaîne Cadena ETS	Module PAGE 282
10	Transfer module Transfer-Modul Module de transfer Módulo de transferencia	Module PAGE 298
11	Transfer plate Transferplatte Plaque de transfer Transferencia placa	Module PAGE 298

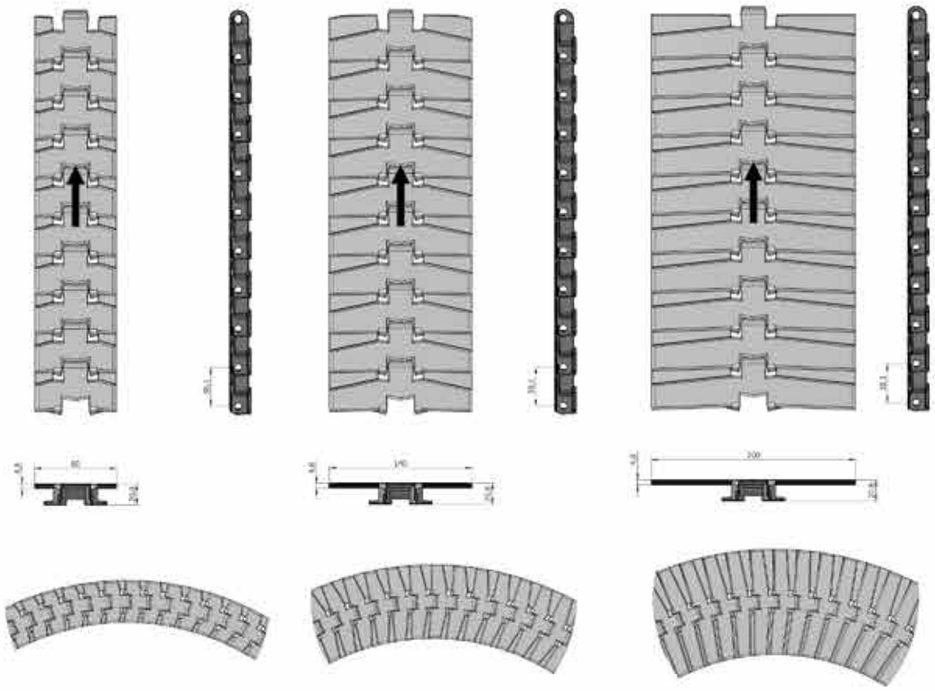


More technical information: See engineering online **www.easy-conveyors.com**

ETS HEAD DRIVE	Dimensions - Abmessungen - Dimensions - Dimensiones			
L =	Max. total +/- 30 mtr. | 98.42 Foot			Longer on request
L1 =	Min. 200 mm | 7,87" inch			
FW =	**87,5**	**147,5**	**207,5 mm**	
	3,44"	5,80"	8,17" inch	
CW =	**80**	**140**	**200 mm**	
	3,14"	5,51"	7,87" inch	
V ≈	Max. 45 mtr./min | 148 Foot/min			
Max. Torque, Couple, Esfuerzo de torsion, Drehmoment				141 Nm
Breaking load, Bruchlast, Charge de rupture, Carga de rotura				3000N (dynamic)
Support legs, Stützen, Supports, Patas de apoyo				Module PAGE 308
Side guiding, Seitenführungen, Guidage latéral, Guiado lateral				Module PAGE 320

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta



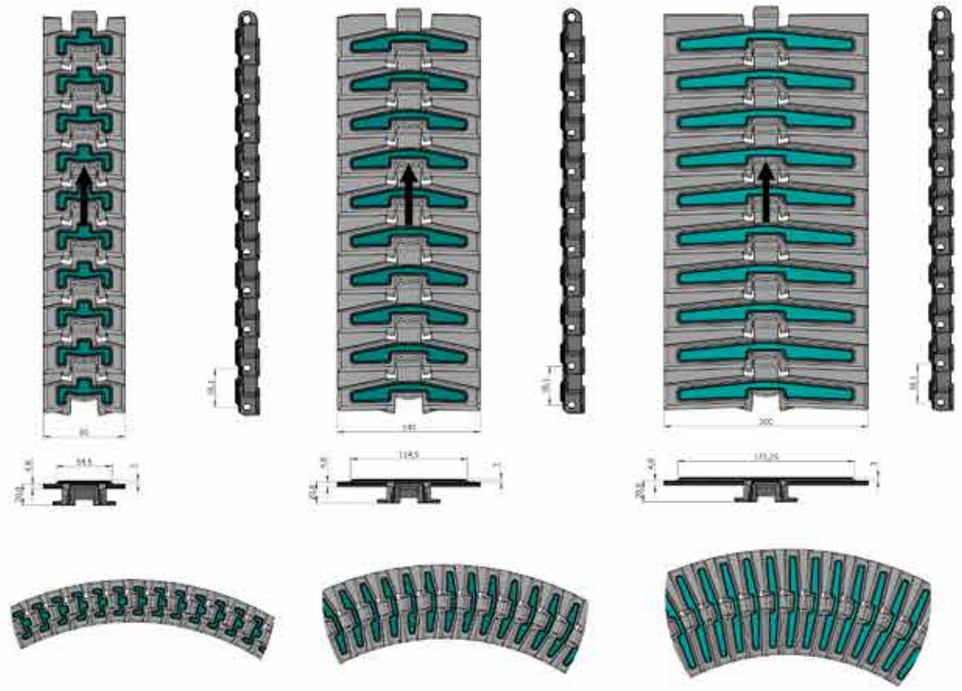


More technical information: See engineering online **www.easy-conveyors.com**

	Dimensions - Abmessungen - Dimensions - Dimensiones
Material	LFW (low friction acetal resin), Reibungsarmer Acetal Faible coefficient de frottement acétal, Acetal de baja fricción
Color	White, Weiß, Blanc, Blanco
Pin **Material**	Austentic steel, Edelstahl, Acier inoxydable, Acero inoxidable
Package	1 box; L=3 mtr

BW	Code	Breaking load (static)	Weight	Radius
80	ETP040802000085	6000 N	1.05 Kg/mtr	200
140	ETP040802000140	6000 N	1.32 Kg/mtr	500
200	ETP040802000200	6000 N	1.62 Kg/mtr	500

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta



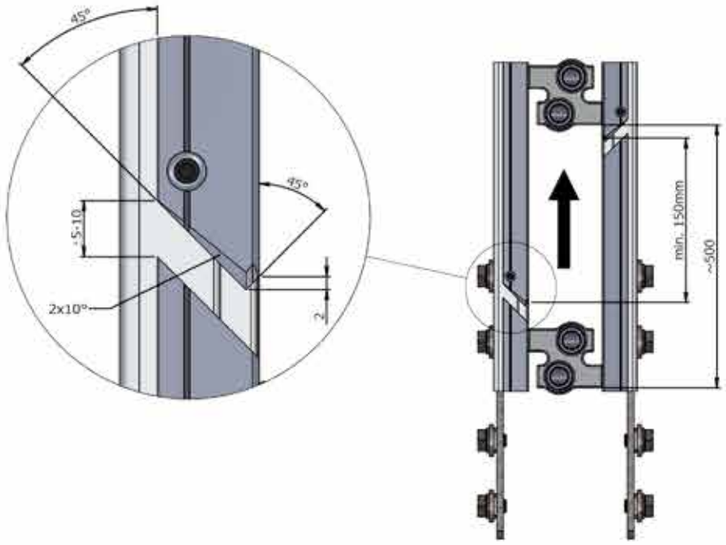
More technical information: See engineering online **www.easy-conveyors.com**

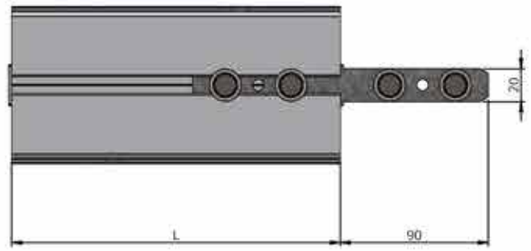
	Dimensions - Abmessungen - Dimensions - Dimensiones
Material	LFW (low friction acetal resin), Reibungsarmer Acetal Faible coefficient de frottement acétal, Acetal de baja fricción
Color	White, Weiß, Blanc, Blanco
Friction top	Thermoplastic rubber, Thermoplastischem Gummi Cautchouc thermoplastique, Caucho termoplástico
Color	Blue, Blau, Bleu, Azul
Pin **Material**	Austentic steel, Edelstahl, Acier inoxydable, Acero inoxidable
Package	1 box; L=3 mtr

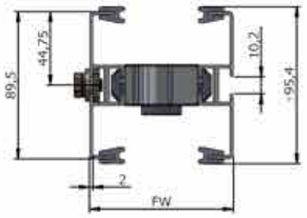
BW	Code	Breaking load (static)	Weight	Radius
80	ETP040802010085	5000 N	1.15 Kg/mtr	200
140	ETP040802010140	5000 N	1.43 Kg/mtr	500
200	ETP040802010200	5000 N	1.75 Kg/mtr	500

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta

See engineering online
www.easy-conveyors.com





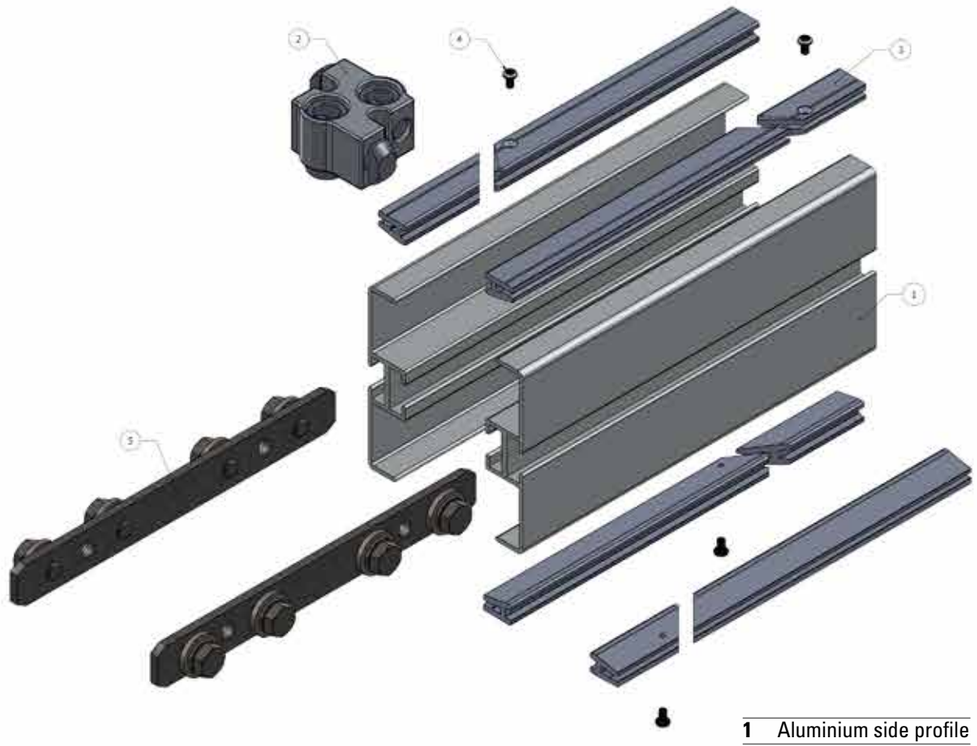


More technical information: See engineering online **www.easy-conveyors.com**

Dimensions - Abmessungen - Dimensions - Dimensiones

	FW =		L =	
ETS ALUMINIUM 80	87,5 mm	3,44" inch	5,6 mtr.	18.37 Foot

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta



1	Aluminium side profile
2	Straight connector
3	Slide profile
4	Rokut rivets
5	Profile connector set

Dimensions - Abmessungen - Dimensions - Dimensiones

Art Nr. Pos 1	Material		L =		
ETS04080500001	AL		5.6 Mtr	18.37 Foot	1 x L

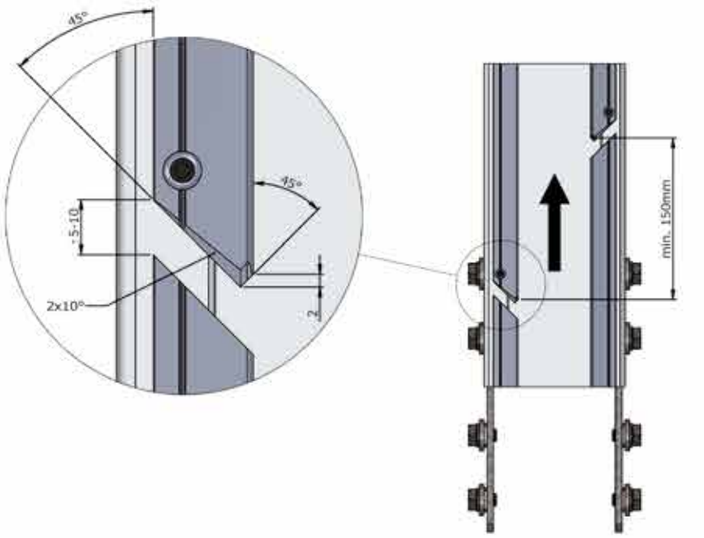
Art Nr. Pos 2	Material		L =		
ETS040805010085	AL		5.6 Mtr	18.37 Foot	10

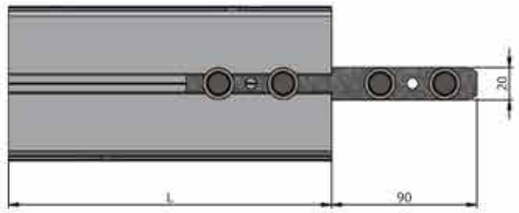
Art Nr. Pos 3	Material		L =		
ETP040801000000	TCP Black		5.6 Mtr	18.37 Foot	10 x L
ETP040801000002	TCS Grey		5.6 Mtr	18.37 Foot	10 x L

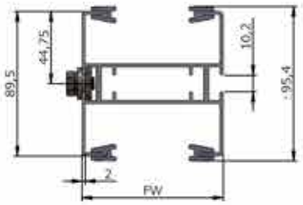
Art Nr. Pos 4	Material			
EMPT040705000005	Nylon 6.6	3,5X1,0-5,0; NYLON-66-BLACK		250

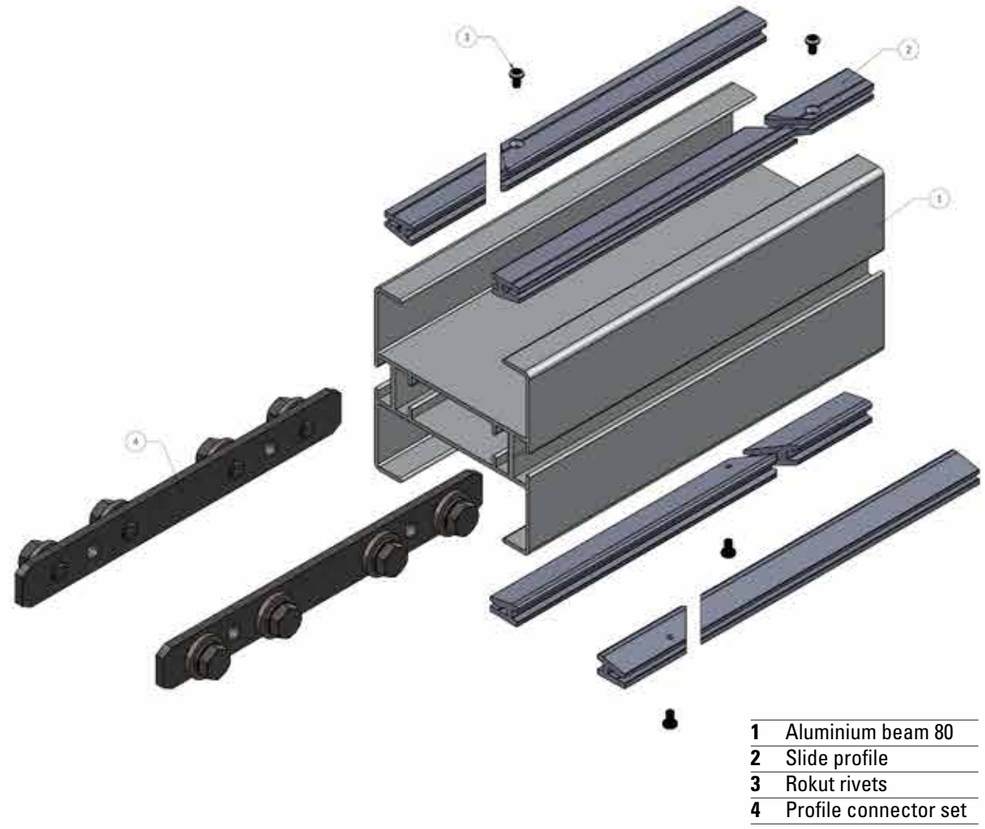
Art Nr. Pos 5	Material			
EMPT040705000006	Steel galvanized, Stahl verzinkt, Acier galvanisé, Acero galvanizado			1 set

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta









1	Aluminium beam 80
2	Slide profile
3	Rokut rivets
4	Profile connector set

More technical information: See engineering online **www.easy-conveyors.com**

Dimensions - Abmessungen - Dimensions - Dimensiones

	FW =		L =	
ETS ALUMINIUM BEAM 80	87,5 mm	3,44" inch	5,6 mtr.	18.37 Foot

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta

Dimensions - Abmessungen - Dimensions - Dimensiones

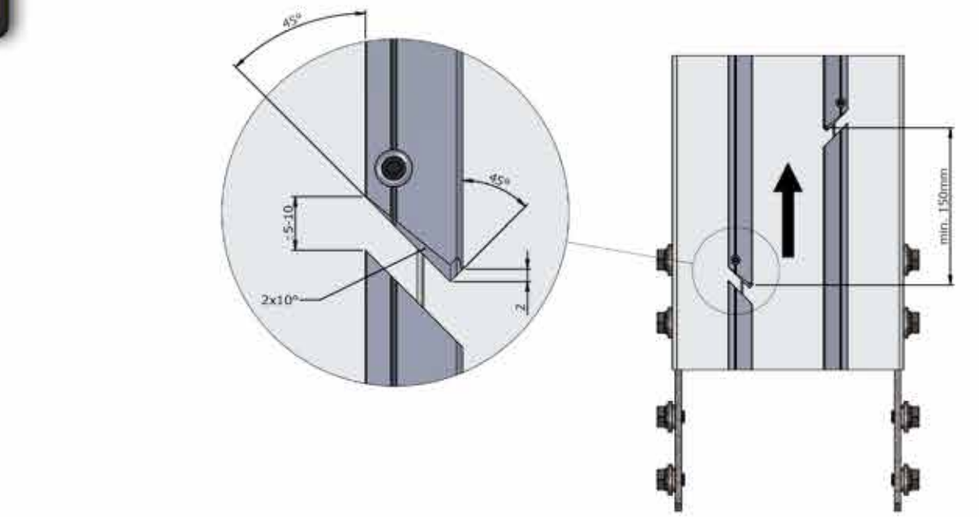
Art Nr. Pos 1	Material	L =		
ETS04080500000	AL	5.6 Mtr	18.37 Foot	1 x L

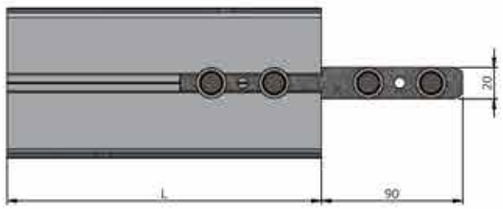
Art Nr. Pos 2	Material	L =		
ETP040801000000	TCP Black	5.6 Mtr	18.37 Foot	10 x L
ETP040801000002	TCS Grey	5.6 Mtr	18.37 Foot	10 x L

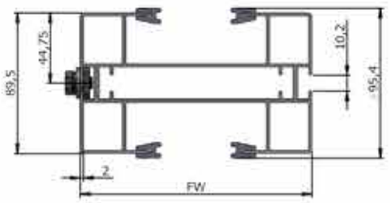
Art Nr. Pos 3	Material		
EMPT040705000005	Nylon 6.6	3,5X1,0-5,0; NYLON-66-BLACK	250

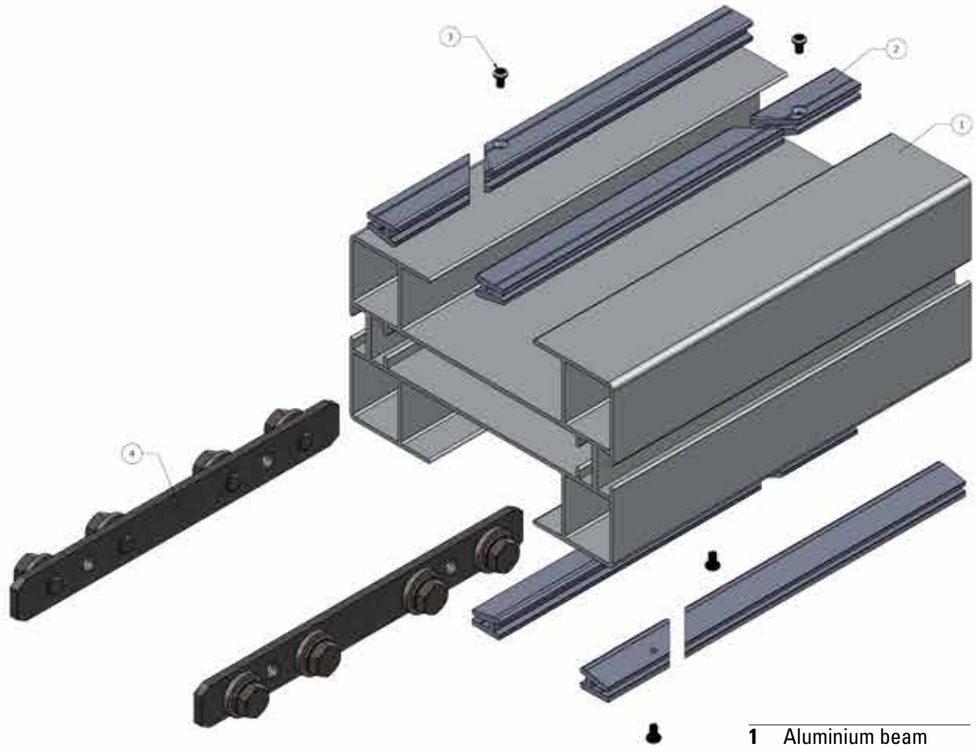
Art Nr. Pos 4	Material	
EMPT040705000006	Steel galvanized, Stahl verzinkt, Acier galvanisé, Acero galvanizado	1 set

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta









1	Aluminium beam
2	Slide profile
3	Rokut rivets
4	Profile connector set

More technical information: See engineering online **www.easy-conveyors.com**

Dimensions - Abmessungen - Dimensions - Dimensiones

	FW =		L =	
ETS ALUMINIUM BEAM 140	147,5 mm	5,80" inch	5,6 mtr.	18,37 Foot

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta

Dimensions - Abmessungen - Dimensions - Dimensiones

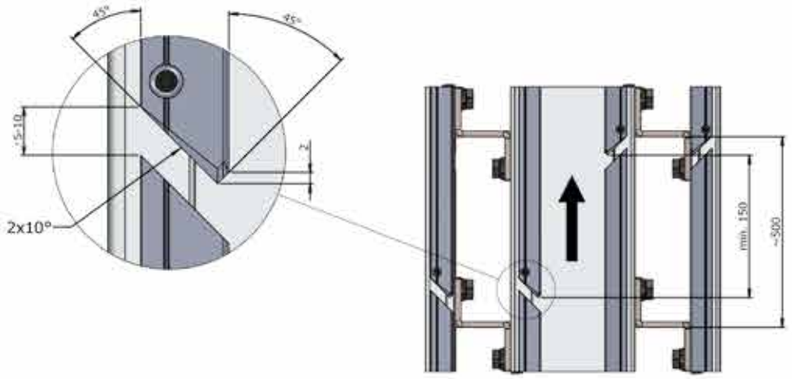
Art Nr. Pos 1	Material		
ETS040805010000	AL		1 x L = 5,6 mtr

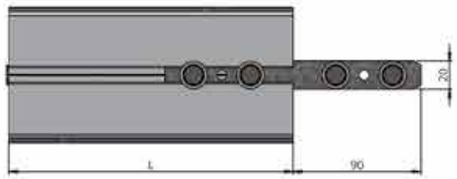
Art Nr. Pos 2	Material	L =		
ETP040801000000	TCP Black	5.6 Mtr	18.37 Foot	10 x L
ETP040801000002	TCS Grey	6 Mtr	19.68 Foot	10 x L

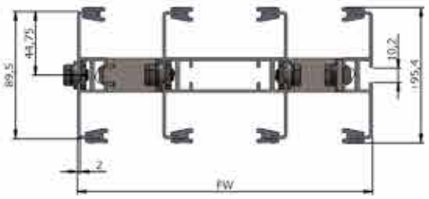
Art Nr. Pos 3	Material		
EMPT040705000005	Nylon 6.6	3,5X1,0-5,0; NYLON-66-BLACK	250

Art Nr. Pos 4	Material	
EMPT040705000004	Steel galvanized, Stahl verzinkt, Acier galvanisé, Acero galvanizado	1 set

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta





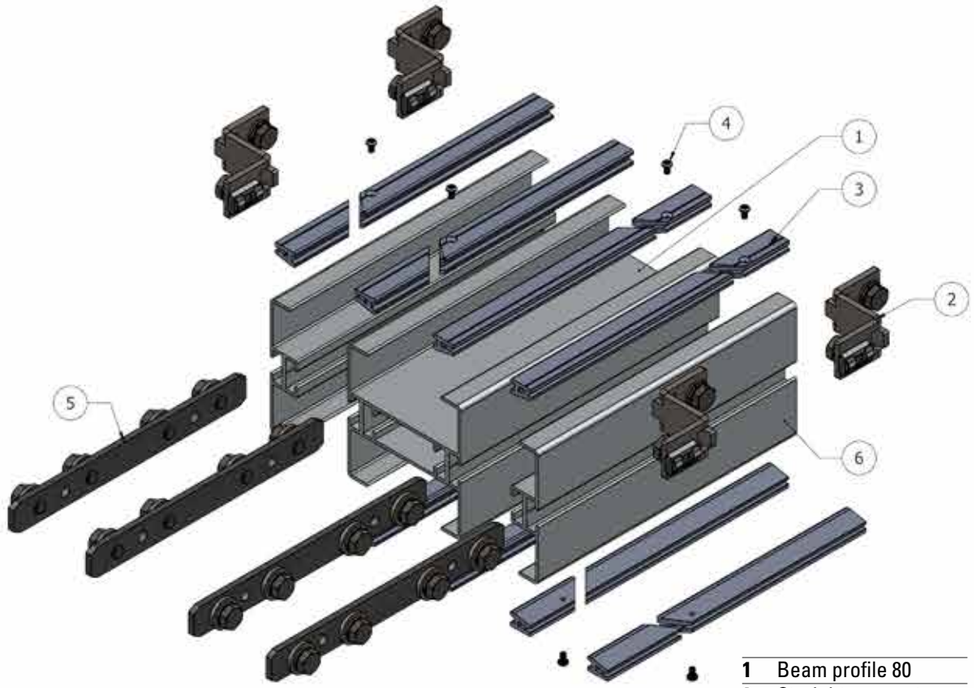


More technical information: See engineering online **www.easy-conveyors.com**

Dimensions - Abmessungen - Dimensions - Dimensiones

	FW =		L =	
ETS ALUMINIUM 200	207,5 mm	8,17" inch	5,6 mtr.	18,37 Foot

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta



1	Beam profile 80
2	Straight connector
3	Slide profile
4	Rokut rivets
5	Profile connector set
6	Side profile

Dimensions - Abmessungen - Dimensions - Dimensiones

Art Nr. Pos 1	Material	
ETS040905000000	AL	1 x L = 5,6 mtr

Art Nr. Pos 2	Material	
ETS040805010200	Stainless steel, Edelstahl, Acier inoxydable, Acero inoxidable	10

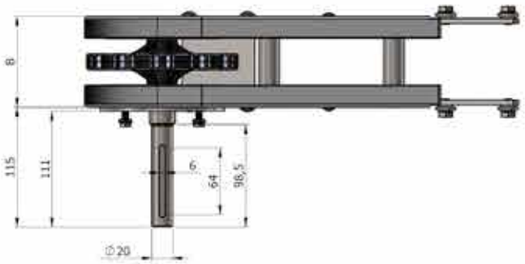
Art Nr. Pos 3	Material	L =		
ETP040801000000	TCP Black	5.6 Mtr	18.37 Foot	10 x L
ETP040801000002	TCS Grey	6 Mtr	19.68 Foot	10 x L

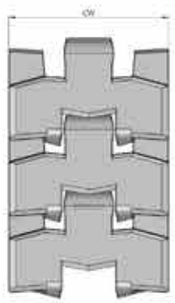
Art Nr. Pos 4	Material		
EMPT040705000005	Nylon 6.6	3,5X1,0-5,0; NYLON-66-BLACK	250

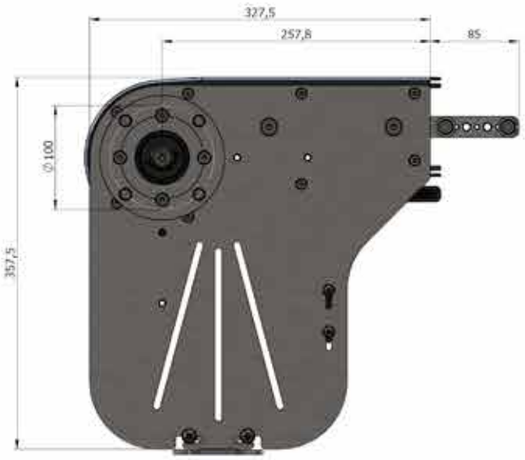
Art Nr. Pos 5	Material	
EMPT040705000006	Steel galvanized, Stahl verzinkt, Acier galvanisé, Acero galvanizado	1 set
	For 200 wide, 2 sets needed	

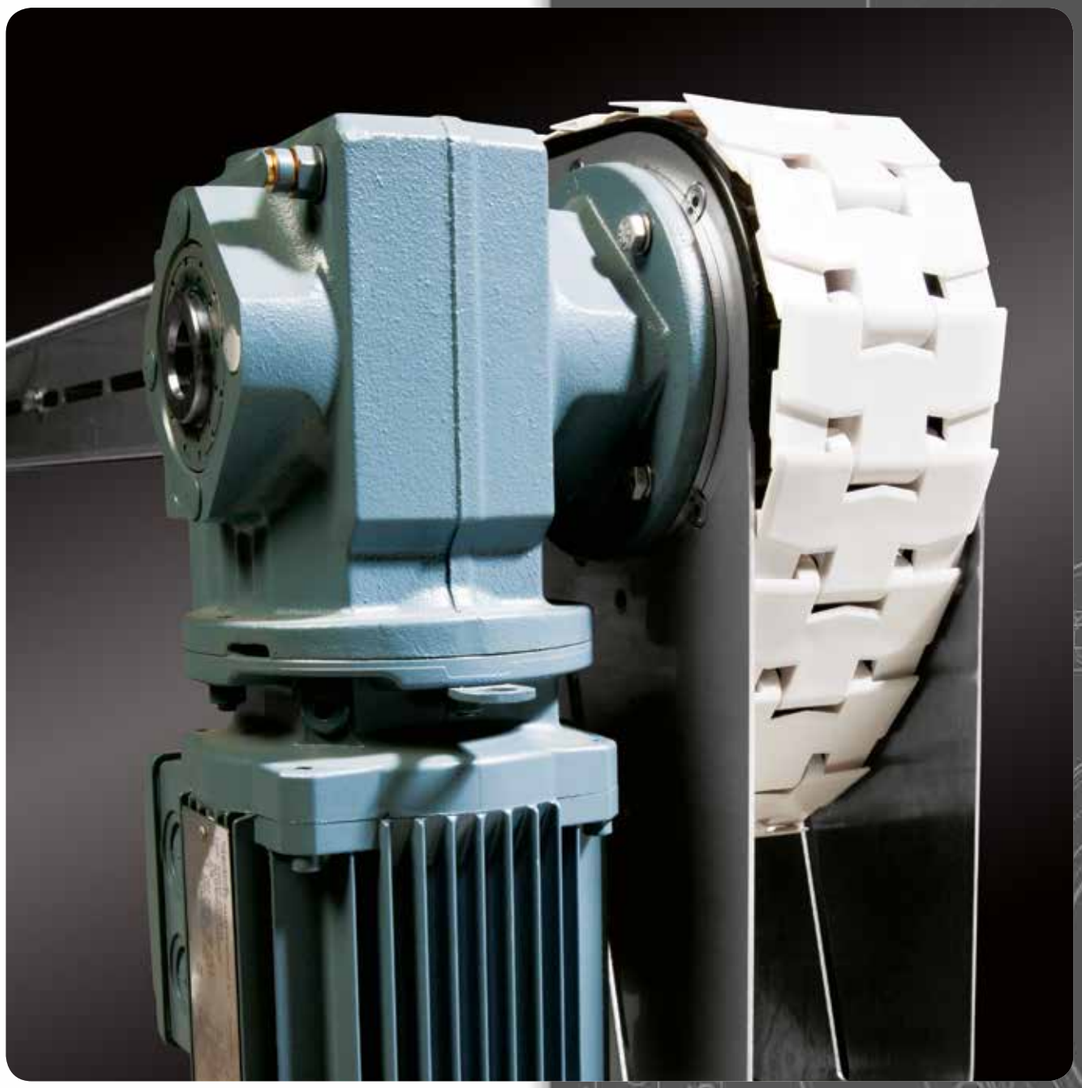
Art Nr. Pos 6	Material	
ETS040805000001	AL	1 x L = 5,6 mtr

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta







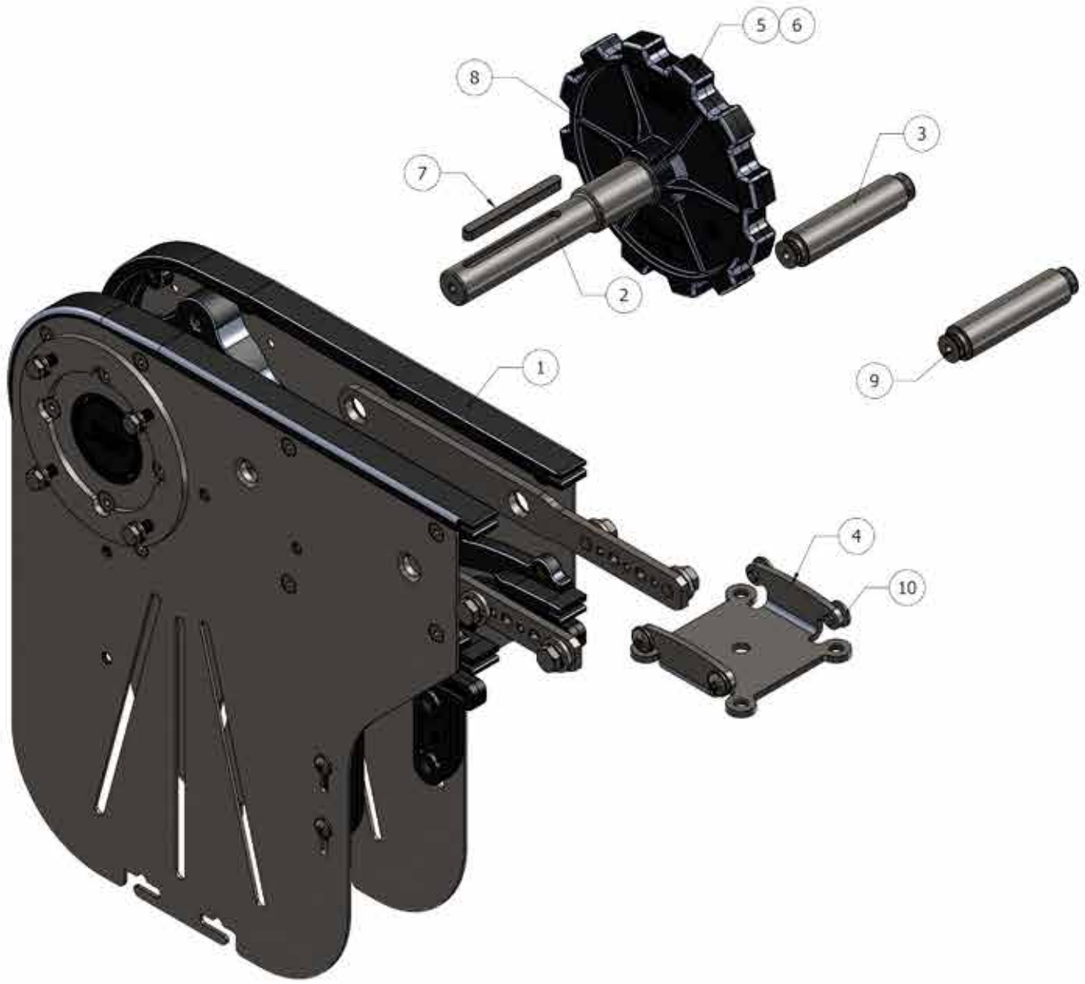


More technical information: See engineering online **www.easy-conveyors.com**

Dimensions - Abmessungen - Dimensions - Dimensiones

ALUMINIUM		CW =		FW =		
ETS040801040000R	ETS040901040000L	80 mm	3,14" inch	87,5 mm	3,44" inch	1 set
ETS040801050000R	ETS040901050000L	140 mm	5,51" inch	147,5 mm	5,80" inch	1 set
ETS040801060000R	ETS040901060000L	200 mm	7,87" inch	207,5 mm	8,17" inch	1 set
Suitable for, Geeignet für, Convient pour, Adecuado para					SEW With flange 120	

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta



1	Head drive set
2	Drive shaft
3	Drive / return unit connector
4	Drive support plate
5	Chain wheel
6	Parallel key
7	Parallel key
8	Retaining ring
9	Hexagon socket countersunk head screw
10	Hexagon socket button head screw

Dimensions - Abmessungen - Dimensions - Dimensiones

Art Nr. Pos 1			
ETS040801010000	80 mm	3,14" inch	1
ETS040801020000	140 mm	5,51" inch	1
ETS040801030000	200 mm	7,87" inch	1
Material	AL		

Art Nr. Pos 2	**Art Nr. Pos 3**			
040901000085	040904000085	80 mm	3,14" inch	1
040901000140	040904000140	140 mm	5,51" inch	1
040901000200	040904000200	200 mm	7,87" inch	1
Material	Stainless steel, Edelstahl, Acier inoxydable, Acero inoxidable + PA 6.6			

Art Nr. Pos 4			
040905030085	80 mm	3,14" inch	1
040905030140	140 mm	5,51" inch	1
040905030200	200 mm	7,87" inch	1
Material	Stainless steel, Edelstahl, Acier inoxydable, Acero inoxidable + PA 6.6		

Art Nr. Pos 5			
040906000000	Pitch diameter Ø 147.2	Bore Ø 25 DIN 6885 key seat	1
Material	PA6		

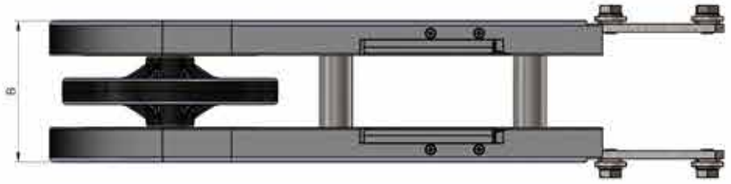
Art Nr. Pos 6		**Art Nr. Pos 7**	
BV688587040A4	1	BV688566070A4	100
Material	Stainless steel, Edelstahl, Acier inoxydable, Acero inoxidable		

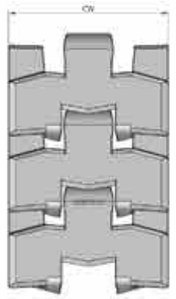
Art Nr. Pos 8	**Material**	
BV047125000A2	Stainless steel, Edelstahl, Acier inoxydable, Acero inoxidable	1

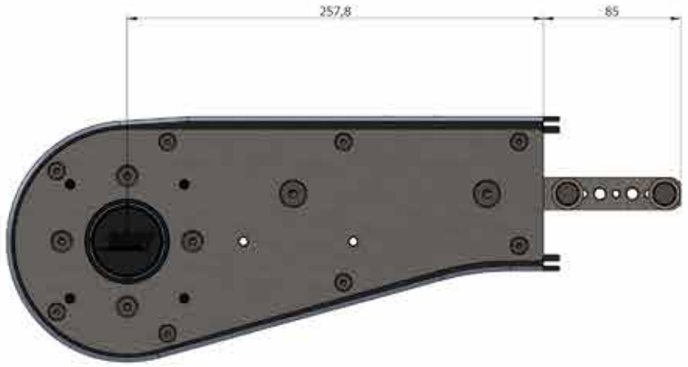
Art Nr. Pos 9	**Material**	
BV799108016A2	Stainless steel, Edelstahl, Acier inoxydable, Acero inoxidable	100

Art Nr. Pos 10	**Material**	
BV738006008A2	Stainless steel, Edelstahl, Acier inoxydable, Acero inoxidable	100

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta







More technical information: See engineering online **www.easy-conveyors.com**

Dimensions - Abmessungen - Dimensions - Dimensiones

ALUMINIUM	CW =		B =		
ETS040804040000	80 mm	3,14" inch	87,5 mm	3,44" inch	1 set
ETS040804050000	140 mm	5,51" inch	147,5 mm	5,80" inch	1 set
ETS040804060000	200 mm	7,87" inch	207,5 mm	8,17" inch	1 set
Suitable for, Geeignet für, Convient pour, Adecuado para				SEW With flange 120	

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta

1	Return set: general
2	Return shaft
3	Drive / return unit connector
4	Return wheel
5	Parallel key
6	Retaining ring
7	Hexagon socket countersunk head screw

Dimensions - Abmessungen - Dimensions - Dimensiones

Art Nr. Pos 1				
Aluminium				
ETS040804010000		80 mm	3,14" inch	1
ETS040804020000		140 mm	5,51" inch	1
ETS040804030000		200 mm	7,87" inch	1
Material	Aluminium			

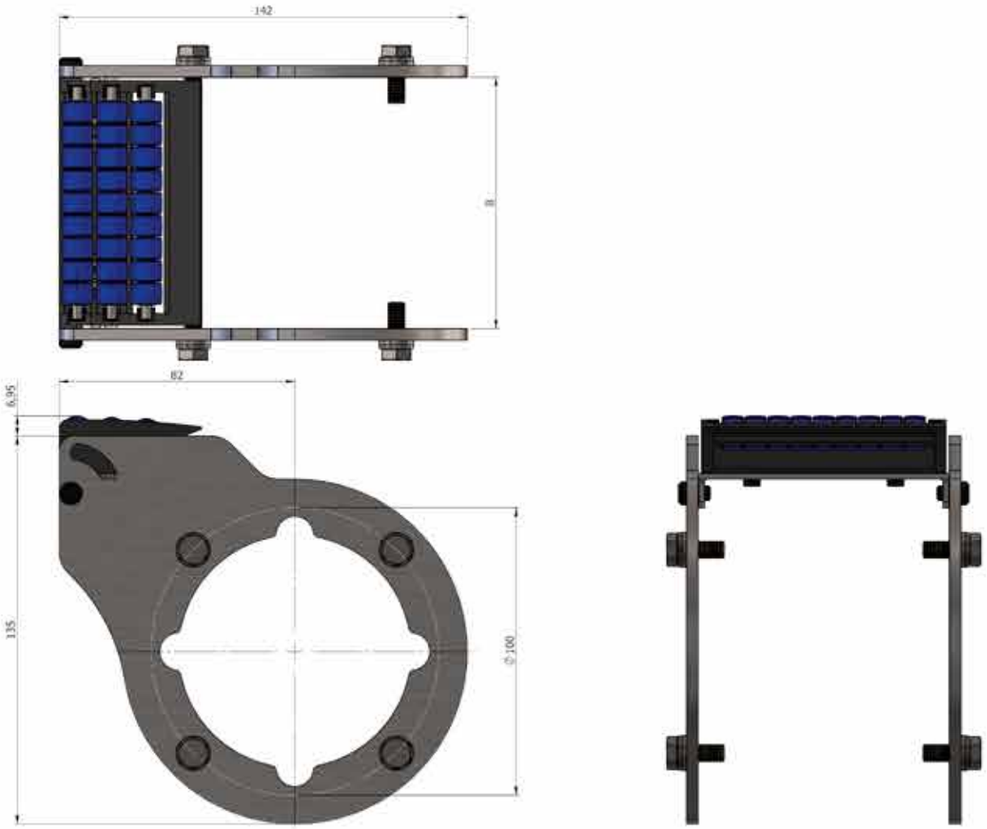
Art Nr. Pos 2	Art Nr. Pos 3			
040903000085	040904000085	80 mm	3,14" inch	1
040903000140	040904000140	140 mm	5,51" inch	1
040903000200	040904000200	200 mm	7,87" inch	1
Material	Stainless steel, Edelstahl, Acier inoxydable, Acero inoxidable + PA 6.6			

Art Nr. Pos 4				Material
040906000001	Diameter Ø 133.1	Bore Ø 25 DIN 6885 key seat	1	PA6

Art Nr. Pos 5		Art Nr. Pos 6		Material
BV688587040A4	1	BV047125000	100	Stainless steel

Art Nr. Pos 7		Material
BV799108016A2	100	Stainless steel

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta



1	Transfer module double; general
2	Transfer module double

More technical information: See engineering online **www.easy-conveyors.com**

Dimensions - Abmessungen - Dimensions - Dimensiones

	B =
ETS TRANSFER MODULE SINGLE	WIDENESS DRIVE OR RETRUN UNIT

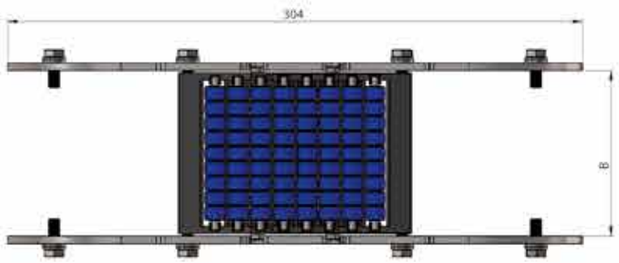
Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta

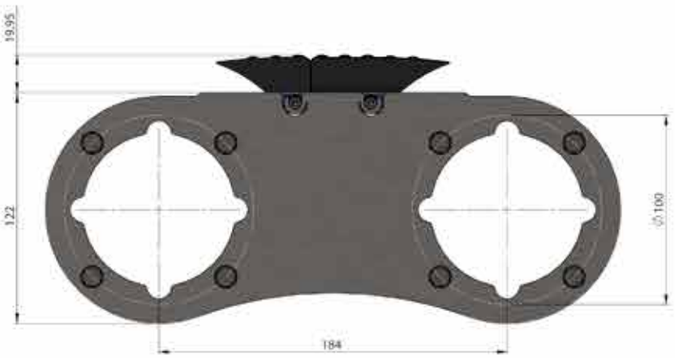
Dimensions - Abmessungen - Dimensions - Dimensiones

Art Nr. Pos 1		
ETP040801010000	ETS TRANSFER MODULE SINGLE; GENERAL	1 incl. fastners
Material	Stainless steel, Edelstahl, Acier inoxydable, Acero inoxidable	

Art Nr. Pos 2		
ETP040801010085	ETS TRANSFER MODULE DOUBLE; 85	1 incl. fastners
ETP040801010140	ETS TRANSFER MODULE DOUBLE; 140	1 incl. fastners
ETP040801010200	ETS TRANSFER MODULE DOUBLE; 200	1 incl. fastners
Material	Stainless steel, Edelstahl, Acier inoxydable, Acero inoxidable, PBT, POM	

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta





1	Transfer module double; general
2	Transfer module double

More technical information: See engineering online **www.easy-conveyors.com**

Dimensions - Abmessungen - Dimensions - Dimensiones

	B =
ETS TRANSFER MODULE DOUBLE	WIDENESS DRIVE OR RETRUN UNIT

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta

Dimensions - Abmessungen - Dimensions - Dimensiones

Art Nr. Pos 1		
ETP040801020000	ETS TRANSFER MODULE DOUBLE; GENERAL	1 incl. fastners
Material	Stainless steel, Edelstahl, Acier inoxydable, Acero inoxidable	

Art Nr. Pos 2		
ETP040801020085	ETS TRANSFER MODULE DOUBLE; 85	1 incl. fastners
ETP040801020140	ETS TRANSFER MODULE DOUBLE; 140	1 incl. fastners
ETP040801020200	ETS TRANSFER MODULE DOUBLE; 200	1 incl. fastners
Material	Stainless steel, Edelstahl, Acier inoxydable, Acero inoxidable, PBT, POM	

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta

ETS HORIZONTAL CURVE 80; R=200

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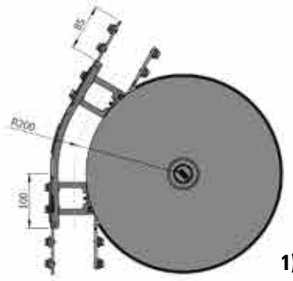
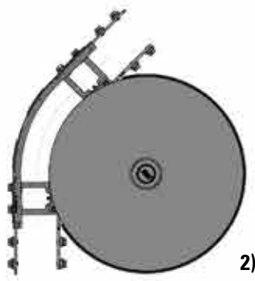
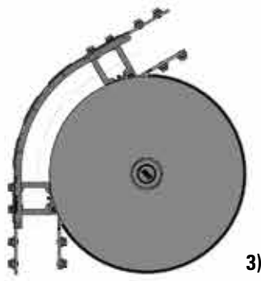


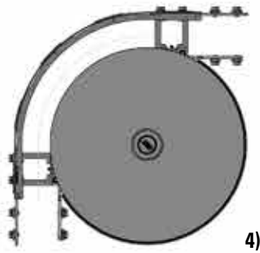
1) 30°



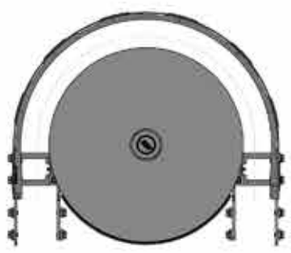
2) 45°



3) 60°



4) 90°



5) 180°

More technical information: See engineering online **www.easy-conveyors.com**

Dimensions - Abmessungen - Dimensions - Dimensiones

ALUMINIUM		FW =				
1) ETS040806010085		87,5 mm	3,44" inch	Hor. Curve 85 30°	R=200	1
2) ETS040806020085		87,5 mm	3,44" inch	Hor. Curve 85 45°	R=200	1
3) ETS040806030085		87,5 mm	3,44" inch	Hor. Curve 85 60°	R=200	1
4) ETS040806040085		87,5 mm	3,44" inch	Hor. Curve 85 90°	R=200	1
5) ETS040806050085		87,5 mm	3,44" inch	Hor. Curve 85 180°	R=200	1
Material	AL + PA 6.6					
Material	Side plates: AL, Edelstahl, Acier inoxydable, Acero inoxidable					1
	Wheelcurve: PA					1

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta

ETS HORIZONTAL CURVE 80; R=500

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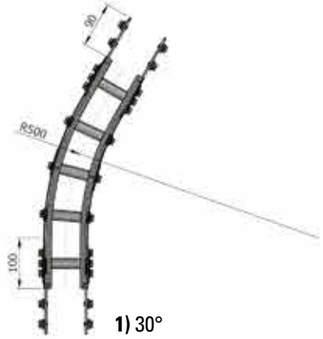
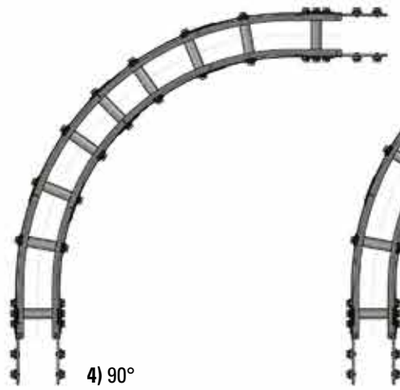


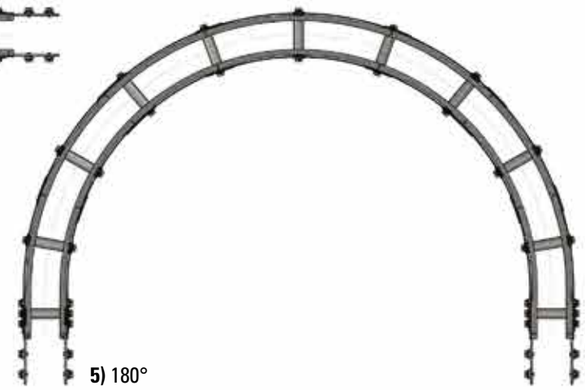
1) 30°

2) 45°

3) 60°



4) 90°



5) 180°

More technical information: See engineering online **www.easy-conveyors.com**

Dimensions - Abmessungen - Dimensions - Dimensiones

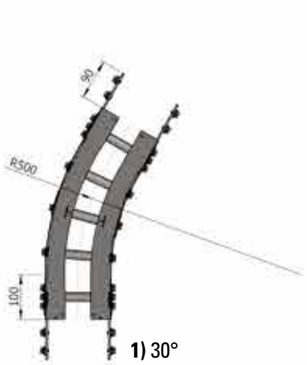
ALUMINIUM		FW =				
1) ETS040806010185		87,5 mm	3,44" inch	Hor. Curve 85 30°	R=500	1
2) ETS040806020185		87,5 mm	3,44" inch	Hor. Curve 85 45°	R=500	1
3) ETS040806030185		87,5 mm	3,44" inch	Hor. Curve 85 60°	R=500	1
4) ETS040806040185		87,5 mm	3,44" inch	Hor. Curve 85 90°	R=500	1
Material	AL					
Material	Side plates: AL, Edelstahl, Acier inoxydable, Acero inoxidable					1

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta

See engineering online
www.easy-conveyors.com

ETS HORIZONTAL CURVE 140; R=500

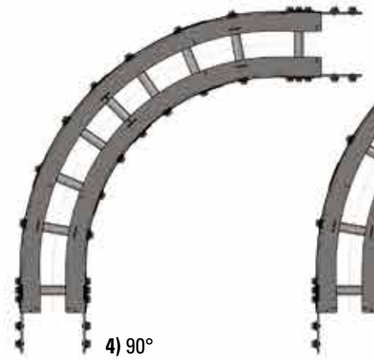
easy ...CONVEYORS



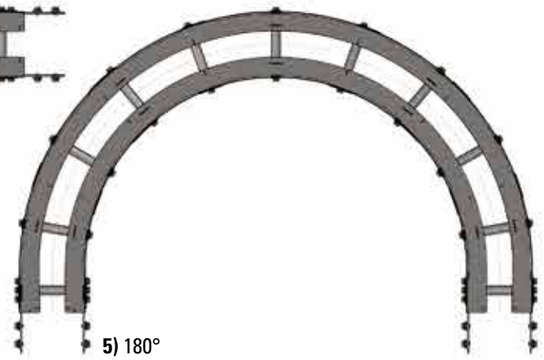
1) 30°

2) 45°

3) 60°



4) 90°



5) 180°

More technical information: See engineering online **www.easy-conveyors.com**

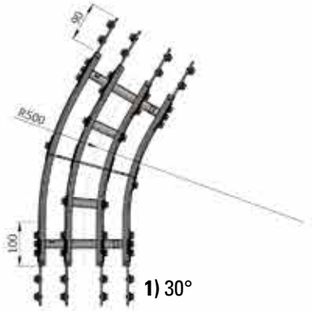
Dimensions - Abmessungen - Dimensions - Dimensiones

ALUMINIUM	FW =				
1) ETS040806011140	147,5 mm	5,81" inch	Hor. Curve 140 30°	R=500	1
2) ETS040806021140	147,5 mm	5,81" inch	Hor. Curve 140 45°	R=500	1
3) ETS040806031140	147,5 mm	5,81" inch	Hor. Curve 140 60°	R=500	1
4) ETS040806041140	147,5 mm	5,81" inch	Hor. Curve 140 90°	R=500	1
5) ETS040806051140	147,5 mm	5,81" inch	Hor. Curve 140 180°	R=500	1
Material	AL				

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta

ETS HORIZONTAL CURVE 200; R=500

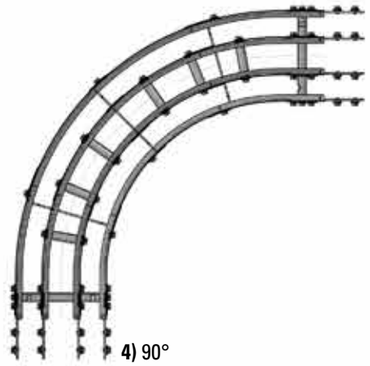
easy ...CONVEYORS



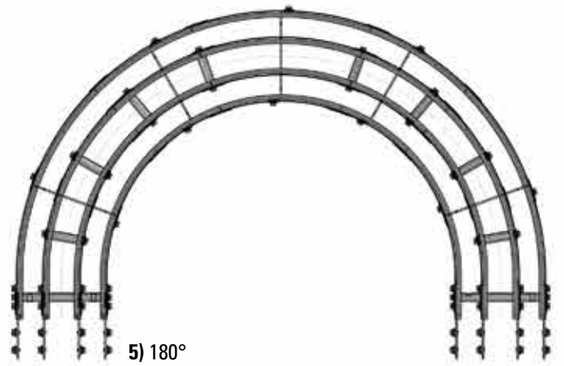
1) 30°

2) 45°

3) 60°



4) 90°



5) 180°

More technical information: See engineering online **www.easy-conveyors.com**

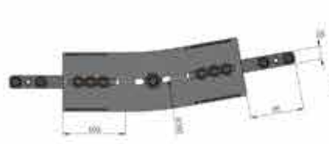
Dimensions - Abmessungen - Dimensions - Dimensiones

ALUMINIUM	FW =				
1) ETS040806011200	207,5 mm	8,17" inch	Hor. Curve 200 30°	R=500	1
2) ETS040806021200	207,5 mm	8,17" inch	Hor. Curve 200 45°	R=500	1
3) ETS040806031200	207,5 mm	8,17" inch	Hor. Curve 200 60°	R=500	1
4) ETS040806041200	207,5 mm	8,17" inch	Hor. Curve 200 90°	R=500	1
5) ETS040806051200	207,5 mm	8,17" inch	Hor. Curve 200 180°	R=500	1
Material	AL				

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta

See engineering online
www.easy-conveyors.com

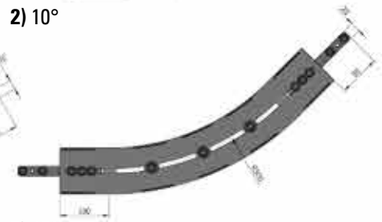
1) 5°



2) 10°

3) 15°

4) 30°



5) 45°

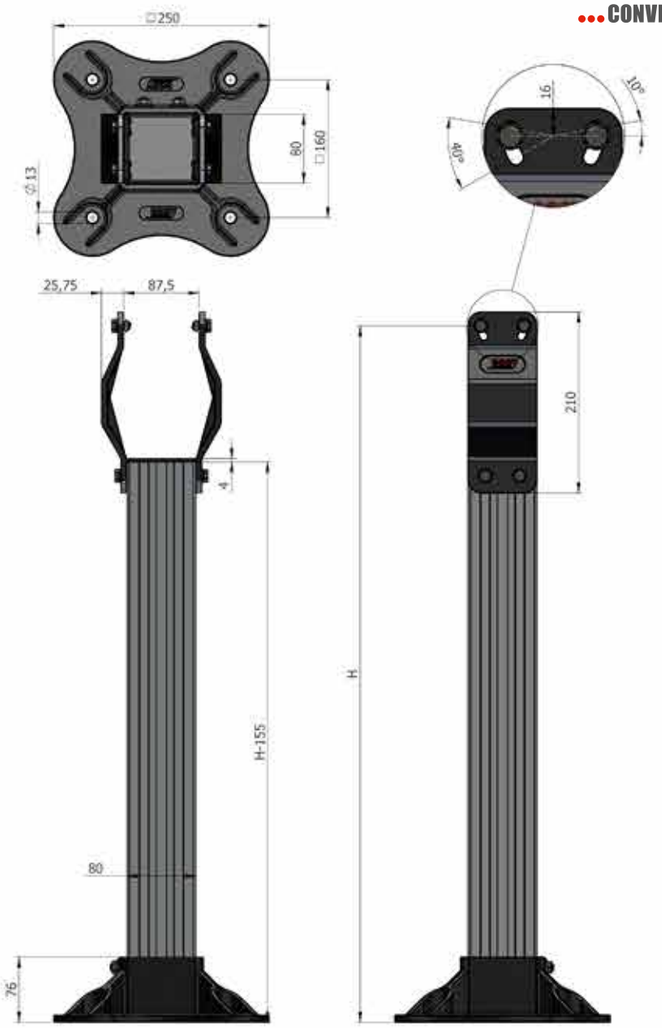
More technical information: See engineering online **www.easy-conveyors.com**

Dimensions - Abmessungen - Dimensions - Dimensiones

ALUMINIUM	**Frame Wideness**			
1) ETS040807010085	87,5mm	3,44" inch	ETS VER. SLIDE CURVE 85; 5° R=500	1
2) ETS040807020085	87,5mm	3,44" inch	ETS VER. SLIDE CURVE 85; 10° R=500	1
3) ETS040807030085	87,5mm	3,44" inch	ETS VER. SLIDE CURVE 85; 15° R=500	1
4) ETS040807040085	87,5mm	3,44" inch	ETS VER. SLIDE CURVE 85; 30° R=500	1
5) ETS040807050085	87,5mm	3,44" inch	ETS VER. SLIDE CURVE 85; 45° R=500	1
1) ETS040807010140	147,5mm	5,81" inch	ETS VER. SLIDE CURVE 140; 5° R=500	1
2) ETS040807020140	147,5mm	5,81" inch	ETS VER. SLIDE CURVE 140; 10° R=500	1
3) ETS040807030140	147,5mm	5,81" inch	ETS VER. SLIDE CURVE 140; 15° R=500	1
4) ETS040807040140	147,5mm	5,81" inch	ETS VER. SLIDE CURVE 140; 30° R=500	1
5) ETS040807050140	147,5mm	5,81" inch	ETS VER. SLIDE CURVE 140; 45° R=500	1
1) ETS040807010200	207,5mm	8,17" inch	ETS VER. SLIDE CURVE 200; 5° R=500	1
2) ETS040807020200	207,5mm	8,17" inch	ETS VER. SLIDE CURVE 200; 10° R=500	1
3) ETS040807030200	207,5mm	8,17" inch	ETS VER. SLIDE CURVE 200; 15° R=500	1
4) ETS040807040200	207,5mm	8,17" inch	ETS VER. SLIDE CURVE 200; 30° R=500	1
5) ETS040807050200	207,5mm	8,17" inch	ETS VER. SLIDE CURVE 200; 45° R=500	1

Material	AL

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta

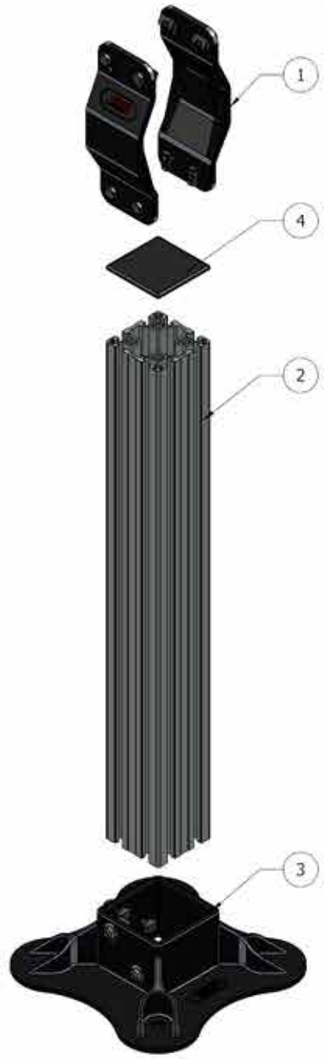


More technical information: See engineering online **www.easy-conveyors.com**

Dimensions - Abmessungen - Dimensions - Dimensiones		
FW		
SW Min =	**232 mm**	9,13" inch
H Max =	**1200 mm**	47,25" inch

Always fasten to the floor, Immer am Boden befestigen
Siempre sujete al suelo, Toujour attacher à l'étage

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta



1	I support bracket
2	Profile 80x80L
3	Support base
4	Cap 80x80

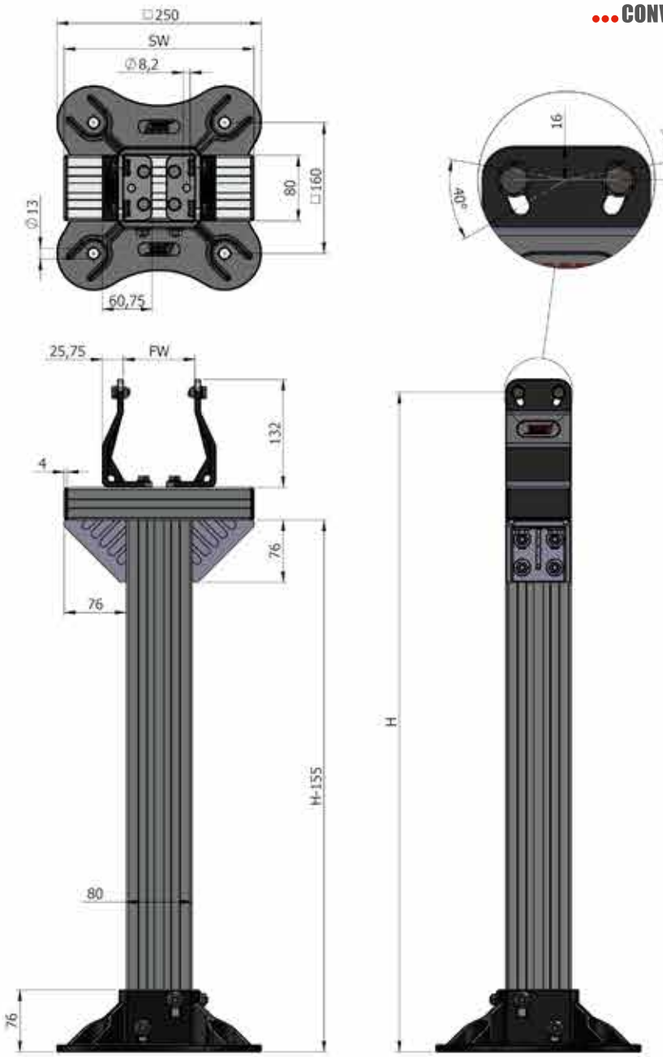
Art Nr. Pos 1	Material	
ETS040808030000 | I support bracket	PA FG	1 set of 2 pieces, incl. fasteners

Art Nr. Pos 2	Material	
020102070009 | Profile 40x80L, L= 6070 mm	AL	1

Art Nr. Pos 3	Material	
ETS040808040000 | Support base	AL RAL9005	1

Art Nr. Pos 4	Material	
020102140003 | CAP 80x80L	PA FG	10

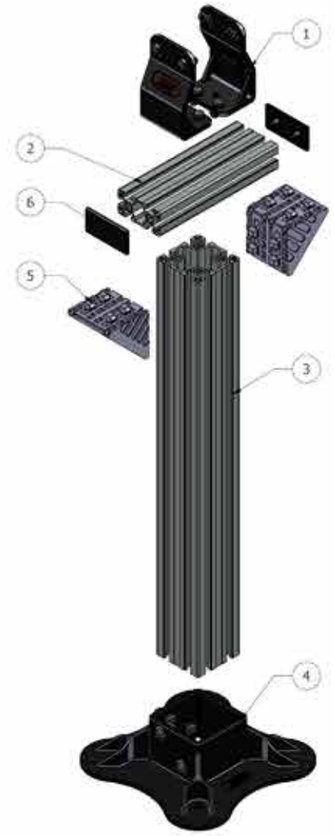
Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta



More technical information: See engineering online **www.easy-conveyors.com**

Dimensions - Abmessungen - Dimensions - Dimensiones		
FW =		
SW Min =	**232 mm**	9,13" inch
We advise a maximum (FW) than 400 mm, Wir empfehlen eine maximale Breite von 400 mm		
Se aconseja un máximo de ancho de 400 mm, Nous vous conseillons une gamme maximale de 400 mm		
H Max =	**1200 mm**	47,25" inch
Always fasten to the floor, Immer am Boden befestigen		
Siempre sujete al suelo, Toujour attacher à l'étage		

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta



1	L support bracket
2	Profile 40x80 L
3	Profile 80x80 L
4	Support base
5	Bracket 80
6	Cap 40x80

Art Nr. Pos 1	Material	
ETS040808020000 | L support bracket	PA FG	1 set of 2 pieces, incl. fasteners

Art Nr. Pos 2	Material	
020102070008 | Profile 40x80L, L= 6070 mm	AL	1

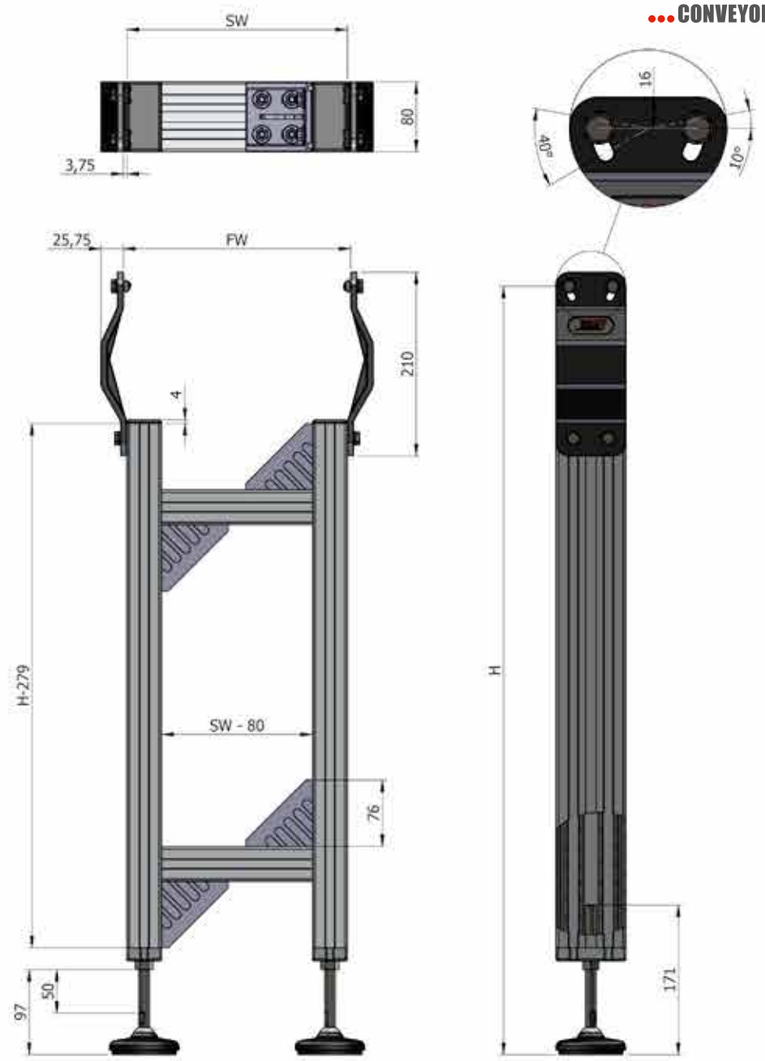
Art Nr. Pos 3	Material	
020102070009 | Profile 80x80L, L= 6070 mm	AL	1

Art Nr. Pos 4	Material	
ETS040808040000 | Support base	AL RAL9005	1

Art Nr. Pos 5	Material	
020102160001 | Bracket 80x80	AL	1 piece, incl. fasteners

Art Nr. Pos 6	Material	
020102140000 | CAP 40x80	PA FG	10

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta



More technical information: See engineering online **www.easy-conveyors.com**

Dimensions - Abmessungen - Dimensions - Dimensiones		
FW =		
SW Min =	**156 mm**	6,14" inch
H Max =	**1200 mm**	47,25" inch

Always fasten to the floor, Immer am Boden befestigen
Siempre sujete al suelo, Toujour attacher à l'étage

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta

1	I support bracket
2	Profile 40x80L
3	Profile 40x80L
4	Foot plate 40x80L
5	Hinged feet Ø80
6	Hexagon nut
7	Bracket 80
8	Cap 40x80

Art Nr. Pos 1	Material	
ETS040808030000 | I support bracket	PA FG	1 set of 2 pieces, incl. fasteners

Art Nr. Pos 2 + 3	Material	
020102070008 | Profile 40x80L, L= 6070 mm	AL	1

Art Nr. Pos 4	Material	
020102150000 | Foot plate 40x80L	AL	1 piece, incl. fasteners

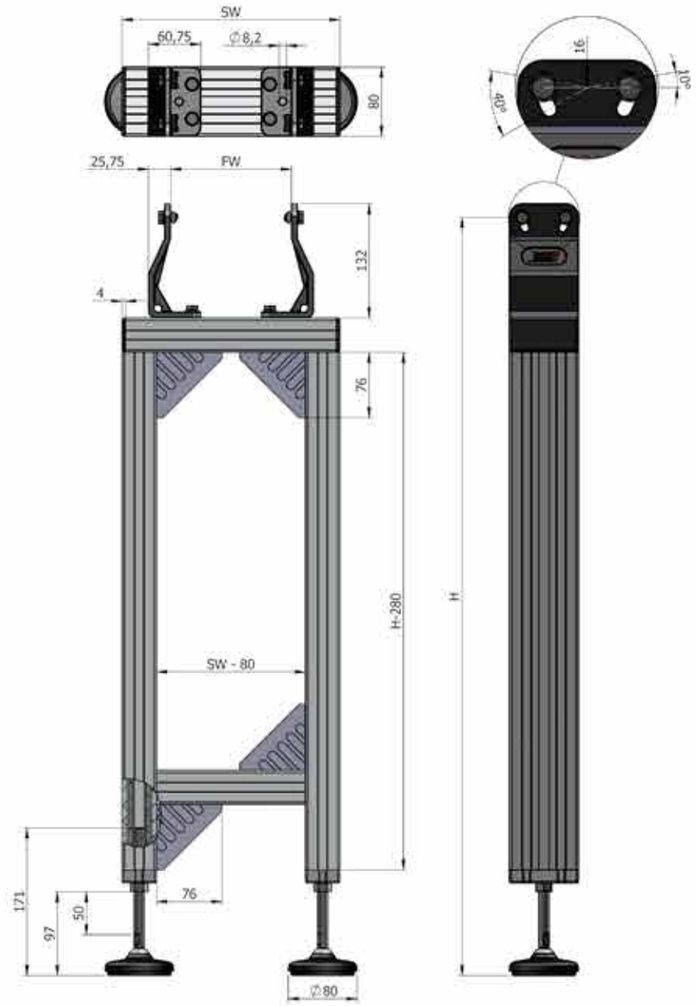
Art Nr. Pos 5	Material	
040707020003 | Hinged feet Ø80	Screw jack: Stainless steel, Foot: Synthetic plastic	1

Art Nr. Pos 6	Material	
BV093412000A2 | Hexagon nut	Stainless steel, Edelstahl, Acier inoxydable, Acero inoxidable	100

Art Nr. Pos 7	Material	
020102160001 | Bracket 80	AL	1 piece, incl. fasteners

Art Nr. Pos 8	Material	
020102140000 | Cap 40x80	PA FG	10

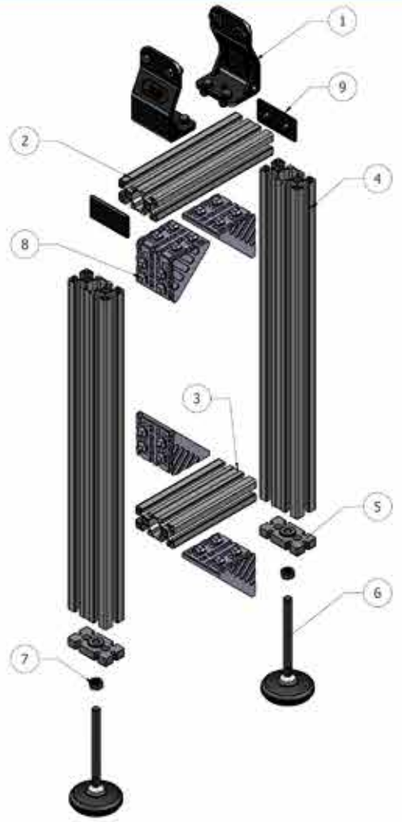
Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta



More technical information: See engineering online **www.easy-conveyors.com**

Dimensions - Abmessungen - Dimensions - Dimensiones		
FW =		
SW Min =	**232 mm**	9,13" inch
H Max =	**1200 mm**	47,25" inch
Always fasten to the floor, Immer am Boden befestigen		
Siempre sujete al suelo, Toujour attacher à l'étage		

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta



1	L support bracket
2	Profile 40x80L
3	Profile 40x80L
4	Profile 40x80L
5	Foot plate 40x80
6	Hinged feet Ø80
7	Hexagon nut
8	Bracket 80
9	Cap 40x80

Art Nr. Pos 1	Material	
ETS040808020000 | L support bracket	PA FG	1 set of 2 pieces, incl. fasteners

Art Nr. Pos 2 + 3 + 4	Material	
020102070008 | Profile 40x80L, L= 6070 mm	AL	1

Art Nr. Pos 5	Material	
020102150000 | Foot plate 40x80L	AL	1 piece, incl. fasteners

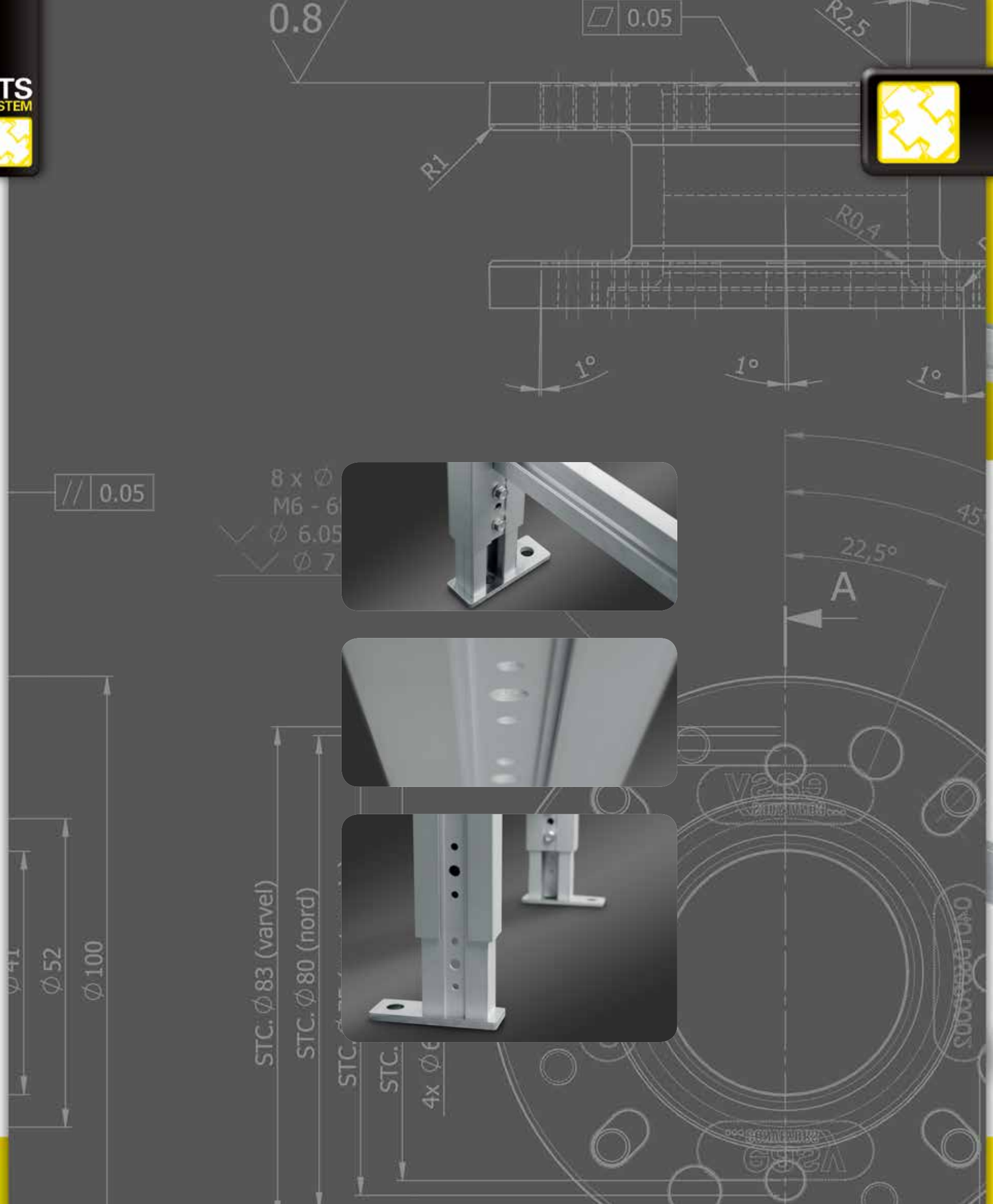
Art Nr. Pos 6	Material	
040707020003 | Hinged feet Ø80	PA FG + stainless steel, PA + edelstahl PA Acier inoxyable, PA + acevo inoxidable	1

Art Nr. Pos 7	Material	
BV093412000A2 | Hexagon nut	Stainless steel	100

Art Nr. Pos 8	Material	
020102160001 | Bracket 80	AL	1 piece, incl. fasteners

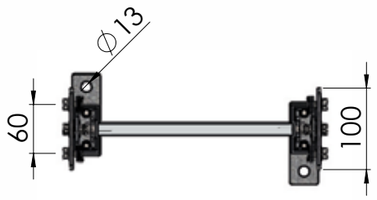
Art Nr. Pos 9	Material	
020102140000 | Cap 40x80	PA FG	10

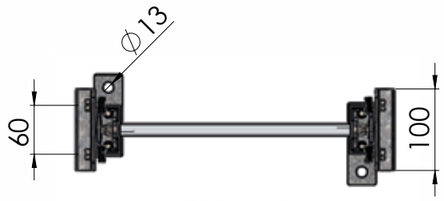
Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta

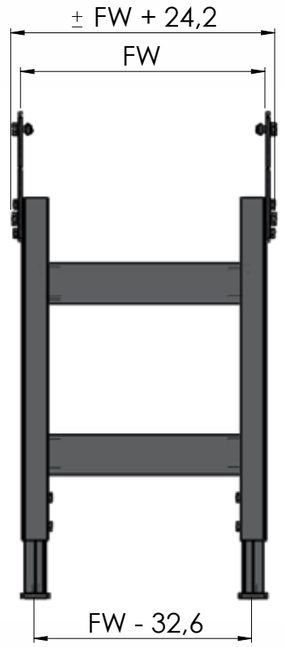


LEG SUPPORT

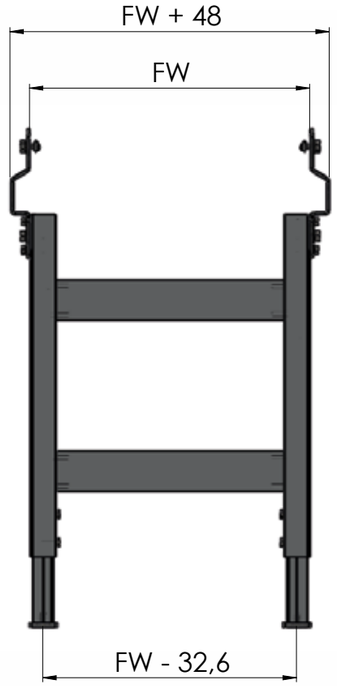
EBS, EMBS, ETS AND EMCS IN HEIGHT ADJUSTABLE







EBS, ETS & EMCS CONFIGURATION



EMBS CONFIGURATION

More technical information: See engineering online **www.easy-conveyors.com**

TECHNICAL DATA

General technical data	
Max. load capacity	200 kg
Min. Adjustable Height	±325 mm
Max. Adjustable Height	±2500 mm
Number of cross members	Type 01 & 02 – 1 piece
	Type 03 & 04 – 2 pieces
	Type 05 – 3 pieces
Side Profile	
Suitable side profile material	Aluminium

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta

More technical information: See engineering online **www.easy-conveyors.com**

Type selection

	Conveyor System				
	EBS 40	**EBS 80**	**ETS**	**EMBS**	**EMCS**
Type	Adjustable Height [mm]*				
01.	325 – 400	325 – 440	355 – 430	360 – 435	335 – 470
02.	395 – 540	435 – 580	425 – 570	430 – 575	465 – 610
03.	535 – 820	575 – 860	565 – 850	570 – 855	605 – 890
04.	815 – 1380	855 – 1420	845 – 1410	850 – 1415	885 – 1450
05.	1375 – 2500	1415 – 2540	1405 – 2530	1410 – 2535	1445 – 2570

General Support Stand CONFIGURATOR

Please create the reference number with the following configurator.

1 TYPE
GSS

2 Conveyor System
EBS 40 | EBS 80 | ETS | EMBS | EMCS

3 System Width
Enter Conveyor System Width
Standard:

EBS 40	EBS 80	ETS	EMBS	EMCS
100	200	80	255	170
200	400	140	340	255
300	600	200	425	340
400	800		510	425
500	1000			510
600	1200			680
				850

Special: On request

4 Height
01 | 02 | 03 | 04 | 05

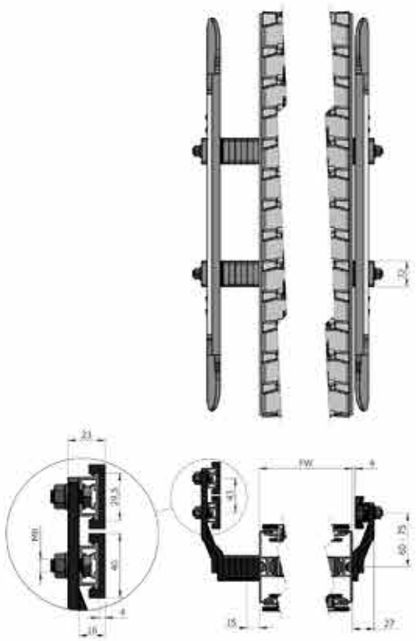
1		2		3		4
GSS	-		-		-	

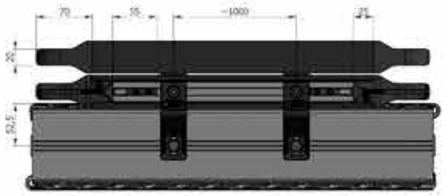
ORDER EXAMPLE

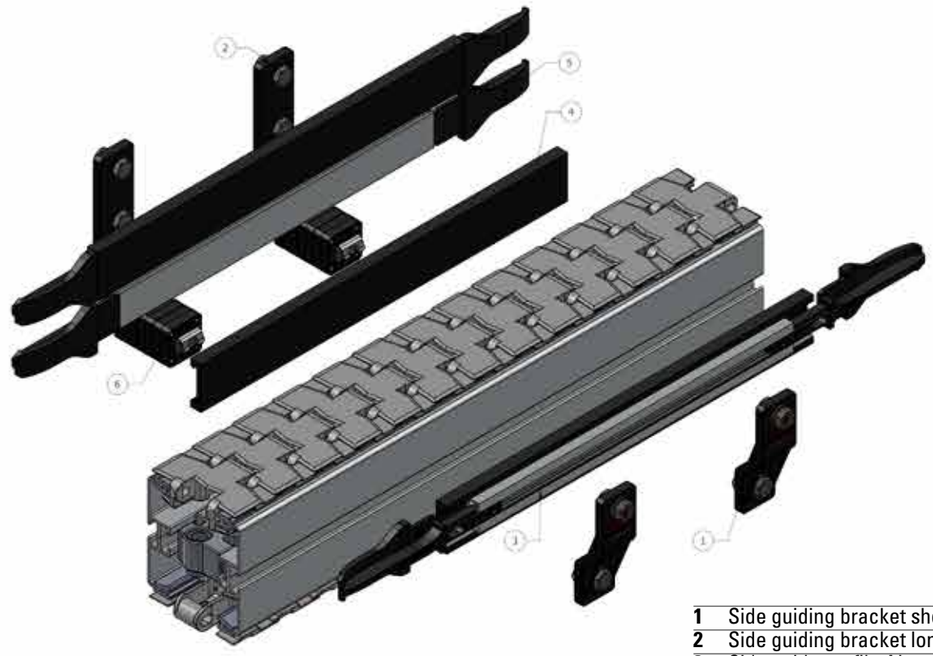
Example for a reference number:
GSS – ETS – 140 – 03

This reference number stand for a General Support Stand with the clearance for an ETS 140 conveyor type with an adjustable top of belt height between 565 mm and 850 mm.

Note:
1. Longitudinal or diagonal cross members are not included.
2. Dependable on conveyor speed, load, start/stops, etc. additional cross members noted under '1.' are not included.







1	Side guiding bracket short
2	Side guiding bracket long
3	Side guide profile AL
4	Side guide cover
5	Guide end
6	Guide spacer

Art Nr. Pos 1	Material	
ETS040809010000 | Side guiding short	PA FG	1 piece, incl. fasteners

Art Nr. Pos 2	Material	
ETS040809020000 | Side guiding long	PA FG	1 piece, incl. fasteners

Art Nr. Pos 3	Material	
ETS040809000000 | Side guide profile AL	AL	1 piece; L=5.6mtr

Art Nr. Pos 4	Material	
ECP040103000000 | Side guiding cover	PE	1 piece; l=3mtr

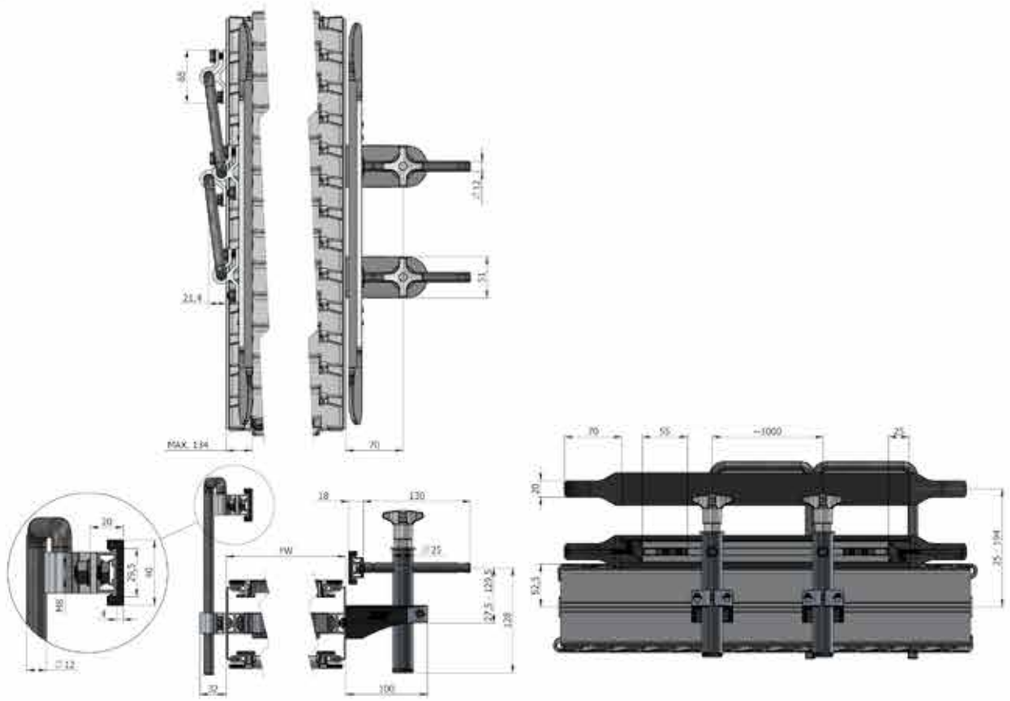
Art Nr. Pos 5	Material	
ETS040809050000 | Guide end 40	PA FG	1 set of pieces, incl. fasteners

Art Nr. Pos 6	Material	
ETS040809040000 | Guide spacer	PA FG	10

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta

More technical information: See engineering online **www.easy-conveyors.com**

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta



1	Adjustable side guide
2	Adjustable side guide
3	Side guide profile
4	Side guide cover
5	Guide end

Art Nr. Pos 1	Material	
ETS040809030000 | Side guide	PA FG + stainless steel, PA + edelstahl PA Acier inoxyable, PA + acevo inoxidable	1 piece, incl. fasteners

Art Nr. Pos 2	Material	
ERA040409010000 | Side guide	AL + steel galvanised, AL + stahl verzinkt AL + Acier galvanisé, AL + Acero galvanizado	1 piece, incl. fasteners

Art Nr. Pos 3	Material	
ETS040809000000 | Side guiding profile	AL	1 piece; L=5.6mtr

Art Nr. Pos 4	Material	
ECP040103000000 | Side guide cover	PE	1 piece; l=3mtr

Art Nr. Pos 5	Material	
ETS040809050000 | Guide end 40	PA FG	1 set of pieces, incl. fasteners

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta

More technical information: See engineering online **www.easy-conveyors.com**

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta

Quality and Service

When you are looking for a quality conveyor component, look at Easy Conveyors. We put our Leadership on the line for you. Our complete range of products combines stainless steel, carbon steel, aluminum and engineered plastics to achieve reliability, superior performance and a compact of design. We hope you will now take a moment to look through this comprehensive manual. Then, when you are ready to discuss your needs with the nearest Easy Conveyors representative, please consult the back cover of this catalog for further details about our sales network. We are able and eager to assist you setting up a smooth running line. The components you want, when and how you want them. Easy Conveyors is ready and able to satisfy your needs with quick answers and delivery of standard or custom made products. Our customers around the world know that the shortest distance between a problem and its solution is to call us: innovations, research, engineering and production are always under a strict control to improve our service and products.

Technical manual for the ETS conveyor systems

This technical manual has been developed to assist you with specific engineering information when a new conveyor is designed as well as when an existing conveyor is going to be modified. Terms like TPM (Total Productive Maintenance) and SMED (Single Minute Exchange of Dies) are getting more and more important. With the right choice of chains and components you can design your conveyors to meet these principles. A large part of our program suits these principles. With this manual we intend to create some “CONVEYOR AWARENESS”. As you will notice, most attention will be given to the construction details for the modular belt or chain, because this is the ‘moving part’ in a conveyor and therefore more critical when it comes to construction details. We also emphasize on guides as together with the belts, these are in direct contact with the customer’s product and therefore of utmost importance. The right choice of type, style of the side guides can make the difference between a medium and a high production efficiency of a filling line.

For additional data and information about technical details of our products please refer to:

- Conveyor Belts catalogue
- Conveyor Roller catalogue
- Conveyor Chain catalogue
- Conveyor Support catalogue
- Conveyor Side guiding catalogue

Contact us To contact your local Technical Support check our website www.easy-conveyors.com or send an email to: support@easy-conveyors.com We cannot take responsibility for imperfections, damage or injuries due to wrong conveyor design, poor installation or improper use of our products made with or without reference to the information in this manual. We appreciate your suggestions to improve this Engineering Manual.

Selecting the size

A product’s center of gravity, its inherent stability and its contours determine whether it is suited for transport on a mat top, table top, belt or roller conveyor system. The size of the conveyor system is selected according to the conveyed products, dimensions and weight. The maximum product width depends on its shape and the position of its center of gravity.

ETS designs

The EMBS & ETS version in aluminum is an economic solution for many transport tasks. Open profiles prevent large amounts of contaminants from accumulating in the system and are especially easy to clean. The stainless steel version is used in areas that require wet cleaning or the use of acidic or alkaline cleaning agents to comply with stringent hygiene rules, as for primary packaging in the food industry.

Notes for system layout

- Using a capture drive is related to short lightly loaded conveyor systems. This type of construction means the belt is tightened and tensioned by adjustment at one or both shafts. This conveyor system can be used in a reversing operation. It is important to be aware of temperature fluctuations when using this type of construction. In the event of low temperatures, the belt will contract significantly. At high temperatures the belt will expand, which could result in poor or even complete lack of engagement from the sprockets on the drive wheels.
- Using “sag” modules relates to longer and more heavily loaded conveyor systems. The first “sag” module must be placed after the drive unit. This ensures continuous positive engagement from the sprockets on the drive wheel. Another advantage is that it is possible to accommodate any belt contraction/expansion.
- Using a center drive is similar to the conveyor system with the “sag” modules. The only exception is that it can be used in a reversing operation. However, it cannot handle the same heavy loads!
- There is a limit on the maximum weight of the transported product and the maximum length of the conveyors due to the permissible belt tensile force.
- Belt width from > 340 must have an additional support profile for section loads >10kg/m
- The maximum width of a transported product depends on the position of its center of mass and the lateral guides.
- When using a conveyor with cleats for vertical transport, the maximum weight of a single product is limited by the strength of the cleats.
- Accumulation operation is not possible with static friction belt or cleated belt.
- Pay attention that the slide rails and section profiles are clean when assembling the system. Metal shavings or dust are highly abrasive and cause an extreme amount of wear!
- Avoid accumulation before and in the curves.
- Accumulation must never occur at the drive wheels.
- Depending on the system’s construction and the product being conveyed, certain places pose a risk of pinching / crushing. Appropriate safety devices must be provided in the operating area, as required. Also observe the notes in the assembly instructions which can be found in the download section at http://www.easy-conveyors.com
- Avoid conveying materials with a temperature higher than 60°C
- The maximum pulling force of the ETS chain is 3000 N / m. In practice this means that the curve is the critical part when it comes to force. It also means that after the curve a pretty long straight section can be built without having to much force on out belt. A curve can better be close to the return unit then near to the drive unit. If there is an option, you can take this to consideration.

Conveyor length

Conveyor length depends on

- Chain/belt type
- Lubrication
- Product
- Load
- Etc.

Operating temperatures

Dry : -40°C to + 80°C

wet : 0°C to + 65°C

Type	Max. advisable length [m]
Plastic chains, side flexing	22 - 30mtr

These are indicative figures. In any case it is recommended to double check the conveyor length by calculating the resulting chain pull.

A phenomenon called slip stick effect occurs unpredictably. It depends on speed, load, construction and lubrication. Pulsating dynamic forces are the result and affect the service life of all components of a conveyor. More importantly it influences product handling in a negative way. Long conveyors should be avoided in such cases.

Long conveyors result in high chain load, which affects many components of the conveyor and their wear life.

Conveyor speed

Maximum speed in m/min

Type	Max. advisable length [m]		
	Dry	Water	Water & Soap
Plastic chains, side flexing	45	80	115

Under abrasive or high load conditions the maximum speed is reduced. Higher speed causes higher wear in any case. For higher wear resistant materials contact our technical support.

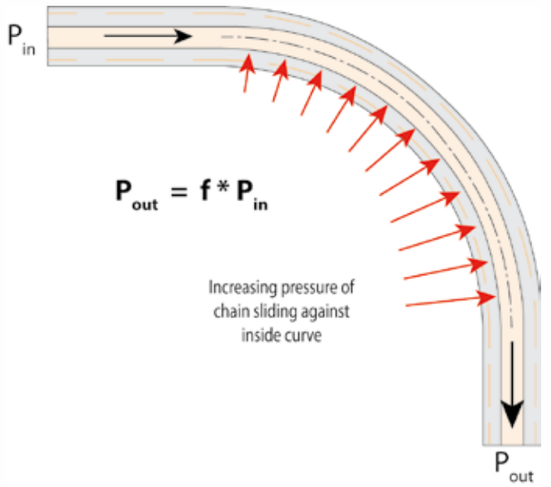
Curve systems

A chain has to be kept in a curve to avoid the chain to jump up from the curve.

Especially with instable products and a multiple strand situation The Tab has a disadvantage: the link is lifting somewhat in the curve creating a 'step' between the individual strands:

Load on curves

When designing a layout, the curves tend to be the limiting factor. The curve adds significantly to the chain pull. The chain pull at the end of the curve is the curve factor times the chain pull at the beginning of the curve. The curve factor 'f ' is depending on the angle of the curve and the friction between chain and curve (for further calculations we refer to our calculation program):



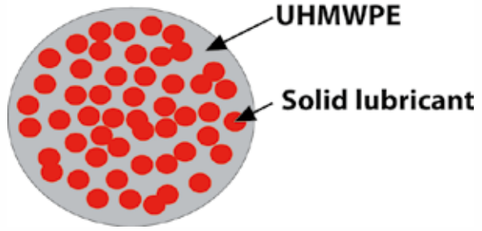
Because of this curve factor it's generally better to position a curve close to the idler end rather than close to the drive end. Then the curve adds relatively less chain pull.

In general we recommend to keep the total curve angle in a conveyor below 180°.

The pressure on the inside of the curve increases through the curve and together with the speed of the chain it generates heat. The maximum allowable Pressure and Velocity (speed) together is called PV limit. This is an important factor next to the max allowable chain pull. The generated heat will warm up the curve material and when it gets too warm, it will become softer and wears out fast.

To maximize the PV limit, Easy Conveyors uses a special material:

TCS:



- TCS is a unique compound of UHMWPE and a solid lubricant.
- TCS drastically reduces the coefficient of friction whilst maintaining the characteristics of UHMWPE.
- TCS also has a better thermal conductivity compared to UHMWPE.

WEAR STRIPS

Construction:

There are different ways of supporting a chain or belt with wear strips:

- Parallel support => this way is as default for our systems;
- Heavy duty support => in case of heavy load and/or high impact;

Make sure the wear strip is chamfered at the entry side and that there's enough space between the lengths of wear strip to absorb thermal expansion:

Thermal expansion TCP: 10-15 mm/m +10 °C (K)

Thermal expansion TCS: 0.10-0.15 mm/m / °C

Heavy duty support: In case of heavy loads or high impact, it's advisable to support the belt. Bear in mind that a heavy duty support can also easily collect dust and dirt. Make sure abrasives can leave the system.

Selection of wear strip material:

Wear strip material	Plastic chains & belts	
	Dry	Lubricated
TCS	recommended	possible
TCP	possible	possible

Temperature limits of wear strip materials must be considered.

TCS

- UHMWPE with built in dry lubricant
- Offers even lower coefficient of friction and less noise emission than standard UHMWPE
- Basic material properties are similar to UHMWPE

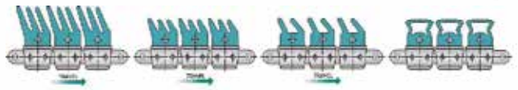
TCP

- To be used in slightly abrasive conditions
- Absorption of humidity to be considered

APPLICATIONS

Gripper chains

- Chain tracks must be adjusted parallel. The tolerance for the parallel adjustment of the tracks is < 2mm. Incorrect adjustment can lead to overloading and a high wear of gripper-flights as well as of the basic roller chain.
- Gripper ribs must be oriented backwards relative to the running direction of the chain, as shown in the picture.



T1 T2 T3 T4

- The control system of the conveyor must assure that no backline pressure is created in order to avoid damage at gripper chains.
- The clearance between the chain tracks must be adjustable. Gripping forces must be adjusted according to the product. General rule: as tight as necessary, as loose as possible. The product must be removable by hand.
- A tensioning system is necessary. Tension should just take away the play out of the chain.
- Touching products must be avoided – particularly in curving sections. The gap between the products must be big enough.
- Lubrication helps to extend the service life of the chains as well as of the chain guides.
- EXTRA style curves with the stainless steel strip will significantly elongate the service life of the curves.
- Both chain strands must run at the same speed. Any speed differential causes damage at the chain and possibly also at the product. One central drive is recommended.

Selection of gripper version:

T1: soft containers, e.g. empty PET bottles, empty cans, non pressurized containers.

T2: solid containers, e.g. glass bottles, pressurized containers.

T3: containers with non-cylindrical shape.

T4: small containers.

APPLICATIONS

Static electricity

Anti Static (AS) chain and belt material has the following properties: Surface resistivity: 10^5 Ω/sq (According to IEC60093 test method) Volume resistivity: 10^3 Ωm

In order to avoid sparks:

- It must be assured on site that the electric charge is dissipated to the ground.
- Wear strips must be conductive and grounded.
- Sprockets and idler wheels must be conductive and grounded.

For further information regarding use of our AS chains in hazardous areas please contact our Technical Support.

Noise reduction

- Use plastic chains/belts instead of steel chains.
- When designing a layout use multiple strand or wider belt running at a lower speed rather than single stand or narrow belt running at higher speed.
- Avoid chain/belt colliding with conveyor parts.
- Reduce speed differentials and thus product impact.
- Adjust sprockets/idlers according to our recommendation in the catalogue
- Use materials with optimized sliding properties (e.g. TCS wear strips, product guides and curves).
- Apply lubrication.

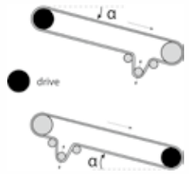
Inclined and declined conveyors

Maximum angles to avoid product sliding down on the chain

Chain type	Lubricated	Dry
Plastic chains/belt	2.5°	4.5°
Rubber top chains plastic	12 / 15°	15 / 20°

Pollution on the chain as well as on the product surface influences the maximum angles negatively.

Declines:



tan(α) > friction coefficient between chain and wearstrips Soft start/stop is recommended.

tan(α) < friction coefficient between chain and wearstrips Soft start/stop is recommended.

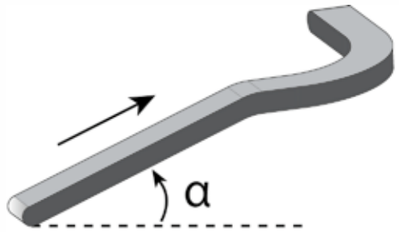
Dynamic tensioner is in both cases recommended.

Inclines:

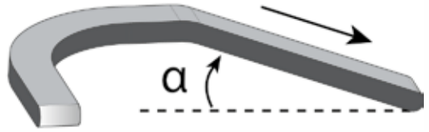
Drive is normally located at the upper end. Soft start/stop is recommended.

Curve construction in combination with inclines/declines:

ETS Side flexing chain can be used in inclined/declined conveyors only under the following restrictions:



Incline is possible before curve



Incline is possible after curve

Otherwise the chain could be lifted out.

Accumulation

Accumulation of products results in increased load on the chain as well as in increased wear on chain/belt and product.

Cleaning:

The cleaning regime needs to be re-evaluated when going away from wet lubrication because:

- Wet lubricant has also cleaning effect
- More dedicated cleaning is required f.e. where product loss occurred

Product quality:

The type and quality of the material has an influence on the behavior on the conveyors like:

- Quality of PET
- Quality of Cans
- Quality of Glass

- Raw material	- Steel/ aluminum	- Raw material; origin
- Colorants	- Painted or varnished	- New or returnable
- Blockers	- Design	- Design
- Other additives	- Material thickness	- Surface finish of bottle
- Design/ settings of machine		

Process:
When designing a layout please bear in mind that the line is going to run without wet lubrication. Think about:

- Wider conveyors -> slower speed
- Longer inliners/outliners
- Shorter buffer sections [?] Back Line Pressure
- Optimized line controls
- Larger radius curves

Mechanical:
Some small mechanical issues on conveyors that seem not to create problems need to be addressed when going away from wet lubrication. Make sure that the chains/belts are running completely free (without obstruction). Some points of attention:

- TCS wear strips and curves with built-in lubricant can replace the wet lubrication to a certain extent.
- Perfect alignment of different sections.
- Smooth transfers of wear strips.
- Stable and straight side guides at right position.
- Positioning of sprockets and idlers.
- Smooth transfer straight into curve.

Factor H:
The most important factor is the Human Factor: the people that are dealing with the line.

- How do the local people deal with the line?
- Who's responsible?
- How are the contracts made?
- 'Mind set' change when reducing lubrication!
- Never mix products! -> f.e. teflon spray in combination with dry lubricant creates high friction

---

So, is Dry Lubricant a good idea?

- Yes, in a good number of cases it brings interesting advantages.
- But be aware of the down side to get the full benefit!

Completely dry may be better?

- In certain areas of the bottling line and certain products: yes
- Depalletiser + outfeed conveyors
- Labeling, coding and packaging areas
- Cans and PET and even glass
- Beware of abrasives & chemicals

Product handling Forces due to acceleration:
The force necessary to accelerate the chain and products is calculated by:

$$F = M * a$$

F = force in [N]
M = mass of chain and product in [kg]
a = acceleration in [m/s^2]

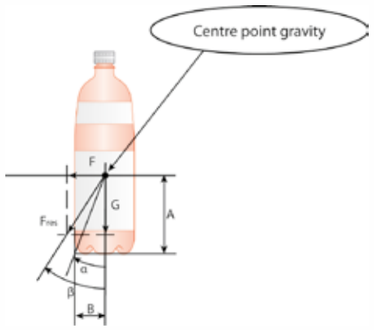
This extra force is working not only on the chain but also on the bearings, the drive unit and the structure. Frequent start-stops create an extra fatigue load on the chain and thus shorten the life time of the chain. In the calculation there's a factor included depending on number of start-stops per hour. Soft starts or frequency controllers are always advisable. Not only for the life time of the chain but also for smoother product handling and avoiding problems at start-up with products particularly unstable.

Maximum acceleration:
The max acceleration force on a product to be able to 'take along' the product with the chain is depending on the friction between product and chain. Maximum acceleration $\mathbf{a}_{max}$ can be calculated with:

$$a_{max} = \frac{F_{max}}{M} = \frac{W * \mu}{M} = \frac{M * g * \mu}{M} = g * \mu$$

W = weight of product in [N]
M = weight of product in [kg]
μ = coefficient of friction between chain and product
g = gravitational acceleration = 9.81 m/s^2

Maximum force on products to avoid tip page:
The maximum acceleration without products falling over is depending on the shape (position of centre of gravity), the weight and the material of the product. This is for instance also important when the product is being conveyed onto a dead plate. See below sketch:



G = weight product
F = horizontal force on product
F_{res} = horizontal force on product

The force F is the force due to acceleration or deceleration of the product (F=M*a), or due to a different cause like other bottles or a side guide. The bottle will tip over when the angle ß is larger than angle α. Angle α is determined by the diameter of the foot print of the product (B= ½ * diameter) and the height of the centre point of gravity (=A). Angle ß is determined by the horizontal force on the bottle (= F) relative to the weight of the bottle (= G).
The max force F is found by following formula:

$$\frac{F_{max}}{G} = \frac{B}{A} \rightarrow F_{max} = G * \frac{B}{A}$$ or

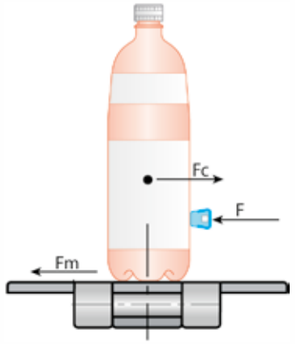
$$\mu < \frac{B}{A} \longrightarrow \text{OK}$$

$$\mu > \frac{B}{A} \longrightarrow \text{not OK}$$

MSV= maximum speed variation

$$MSV = \sqrt{2 * g\left(\sqrt{H^2 + B^2} - H\right)}$$

Centrifugal forces:
When a product is being conveyed through a curve there's a centrifugal force working on the product. This force on the product is compensated by the friction between chain and product and by a side guide.



The centrifugal force is calculated with:

$$F_c = \frac{M * v^2}{r}$$

M= weight of the product
v = speed
r = centre radius of the curve

Friction force between chain and product is calculated with:

$$F_m = M * g * \mu$$

g = gravitational acceleration
μ = coefficient of friction between chain and product.

The minimum force F that needs to be generated by the side guide is:

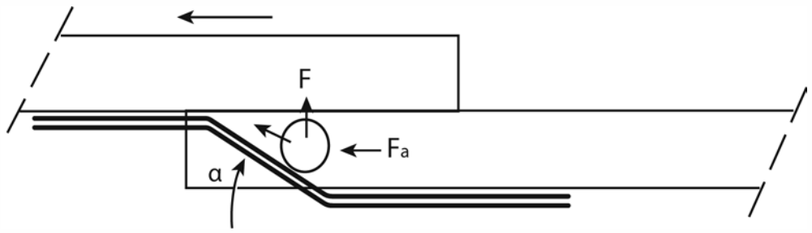
$$F = F_c - F_m = M * \left[\frac{v^2}{r} - g * \mu\right]$$

Pressure of accumulating products:
When a product is standing still (e.g. against a stopper or guide), the chain running underneath the product creates a force on the product equal to the weight of the product multiplied by the coefficient of friction between chain and product. Each following product is pushing with the same force against the next product, so the resulting force is proportional to the total weight of products upstream.

$$F_a = W_a * L_a * \mu$$

Fa = accumulation force
Wa = weight of the accumulating products in Kg/m.
La = length of accumulation in m
μ = coefficient of friction between chain and product.

Side transfer action:



Pushing the product sideward creates a force F on the product against the side guide

$$F = F_a * \sin(\alpha) = W_a * L_a * \mu * \sin(\alpha)$$

(see explanation of symbols above)

Nowadays cans and bottles are becoming thinner and thinner. At the same time more and more installations are running with less or no lubrication and are so increasing the coefficient of friction.

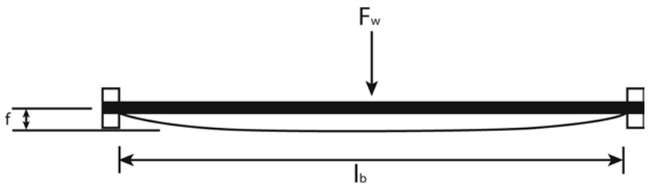
That's why it's important to take also these forces on the products into consideration. In the above mentioned formula the angle α plays an important role in a smooth transfer and reduced forces on the products. This angle should be kept a small as possible.

Shaft size:

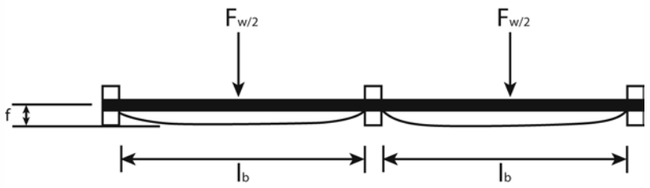
The shaft must fulfill the following conditions:

- max shaft deflection under full load (Fw). fmax is 2.5 mm. If the calculated shaft deflection exceeds this max value, select a bigger shaft size.
- Torque at max load must be below critical value

Shaft deflection can be calculated with following formula:



$$f = 0.013 * F_w * \frac{l_b^3}{E * I} \quad [mm]$$



$$f = \frac{1}{370} * F_w * \frac{l_b^3}{E * I} \quad [mm]$$

For uni-directional head drive Fw = Ts

For bi-directional centre drive Fw = 2 * Ts

For uni-directional pusher drives Fw = 2.2 * Ts

Shaft size [mm]	Inertia [mm4]
Ø20	7850
Ø25	19170

Shaft material	Modulus of elasticity E [N/mm2]	Shearing strenght [N/mm2]
Stainless steel (low strength)	195000	60

The torque on the shaft is calculated with:

$$T_{max} = F_W * \frac{d_p}{2} * 10^{-3} \quad [Nm]$$

$$T_{adm} = \eta_{adm} * \frac{d_w^3}{5000} \quad [Nm]$$

T_{max} = maximum torque
T_{adm} = admissible torque

η_{adm} = admissible shearing strength [N/mm²]

for max. admissible shearing strength see table below:

	Maximum allowable torque
Shaft diam. [mm]	Stainless steel [Nm]
Ø20	141
Ø25	276

Bearings:

Relubrication is depending on the operating conditions. Dust, load, humidity, temperature, vibrations: all affect the relubrication interval. Below table show indicative values for relubrication intervals. Please note that all our bearing are pre-greased in the factory. These is no need for immediate re-greasing. Furthermore, regreasing should be done in small amounts and with care.

Use conditions	Temperature	Re-lubrification period
Clean	up to 50°C	1-2 years
Clean	50 ÷ 70 °C	4 -8 months
Clean	70 ÷ 100 °C	1 - 3 months
Dirty	up to 70°C	2 - 8 week
Dirty	70 ÷ 100 °C	2 - 4 week
Humid + wet	-	1 - 2 week

Standard PIN Material
Special reinforced acetal resin.

Benefits:

- Suitable for metal detectors
- Easy disposal of chains after use

Plastic belt materials
Low Friction Acetal Resin
This material is commonly used in the market and offers an improved co-efficient of friction. It is also suitable for use in high speed applications.
Color: White
This material is FDA (Food and Drug Administration) approved for direct contact with food.

Rubber materials
TPR
TPR is used for ETS chains and EMBS belts and for some gripper chains. TPR is a SEBS type rubber, which assures an optimum bonding on the plastic base material.

Storage of plastic chains and belts
- Materials of our plastic chains and belts offer best stability and resistance against environmental effects at appropriate storage:
  - in the original packaging,
  - without environmental radiation / UV light,
  - dry- in a non aggressive environment - a temperature between 5°C and 35°C

- First IN, First OUT.
  We have applied that procedure in our logistic department.
  We recommend this procedure to any external warehouse.

- Do not stack pallets or other heavy goods on top of chain packs. Chains inside the packs might get damaged.
- Do not stack chain packs higher than the original stacking height – as dispatched from our shipping department.

Coefficients offriction
Below listed coefficients can be used as a guideline. Dependent on environmental and application requirements (temperatures, lubricant, material combinations, dirt/debris, product and chain/belt surfaces, etc.) the coefficients are subject to variation.

Coefficient of friction between chain and wearstrip:

Friction coefficient Chain/Slide rail (μ_T)						
	Dry/normal	Rough	Dirty	Water	Water & Soap	Oil
Straight sections **TCP**	0,2	0,4	0,5	0,16	0,10	0,10
Straight sections **TCS**	0,18	0,35	0,45	0,14	0,10	0,10
Head drive unit	0,3	0,40	0,50	0,24	0,15	0,15
Return unit	0,3	0,40	0,50	0,24	0,15	0,15
Center drive unit	1,0	1,35	1,70	0,8	0,5	0,5
Connection drive unit	0,6	0,80	1,0	0,48	0,3	0,3

Coefficient of friction between chain and product (μ_{ST}):

Lubrication	Product material					
	Paper carton	Metal (steel)	Aluminum	Plastics incl, PET	Glass (return)	New glass, ceramics
Dry	0,28	0,25	0,25	0,21	0,24	0,20
Water		0,20	0,18	0,16	0,18	0,15
Water & Soap		0,15	0,14	0,13	0,14	0,12

Chemical resistance

Data shown in the table was taken from laboratory tests performed on unstrained samples and are merely indicative, Chemical resistance under normal working conditions can depend on various factors, such as stress and temperature, concentration of the chemical agent and duration of its effects, Valid for ambient temperature (21°C)

Chemical agent	METALS								PLASTICS										RUBBERS									
	EXTRA		AISI 304		AISI 316		OT.NI		POM		PBT		PP		PA		PE		EPDM		NBR		SEBS		VITON	
	C %		C %		C %		C %		C %		C %		C %		C %		C %		C %		C %		C %		C %	
Acetic Acid	5	☆	20	☆	100	☆		O	5	●	10	☆	40	☆	10	●	10	☆	25	☆		●	25	O	20	●
Acetone		☆	25	☆		☆		☆		O		O		☆	100	☆		☆		☆		●		O		●
Acrylonitrile						☆								☆	100	☆				☆		●		O		●
Aluminium chloride				O	10	O								O	10	☆				☆		☆		☆	SA	☆
Aluminium sulphate					SA	☆								☆	10	☆		☆		☆		☆		☆	SA	☆
Amyl alcohol				☆		☆						☆		☆	10	☆		☆		☆				☆		☆
Ammonia		☆	100	☆		☆		●		☆		O	30	☆	10	☆		☆		☆		O		O		O
Ammonium chloride				O		☆							10	☆	10	☆				☆		☆		☆	SA	☆
Aniline		☆		☆		☆								☆	100	O	3	☆		●		●		●		☆
Barium chloride				O	SA	☆								☆	10	☆				☆		☆		☆		☆
Beer		☆		☆		☆		☆		☆				☆		☆		☆		☆		☆		☆		☆
Benzene		☆	70	O		☆				☆		●		☆				O		●				●		
Benzoic acid			100	☆	SA	☆						☆	SA	☆	SA	O				●		☆		●		☆
Benzol				☆		☆		☆		☆		☆		O	100	☆		O		●		●		●		O
Boric acid		O	SA	☆		☆					10	☆	SA	☆	10	☆	SA	☆		☆		☆		☆	SA	☆
Brine	10	●		O		☆						☆		O		O		☆		☆				O		
Butter				☆		☆		☆		☆		☆		☆		☆		☆		☆		☆		O		☆
Butyl acetate						☆						O		O	100	☆				O				O		●
Butyl alcohol				☆										☆	100	☆				☆		O		☆		☆
Butyl glycole						☆								☆	100	☆				☆				☆		
Calcium chloride		●		O		☆		☆				☆	50	☆	10	☆	SA	☆		☆		☆		☆	SA	☆
Carbon sulphide				☆		☆				☆				☆	100	☆				●		●		●		☆
Carbon tetrachloride			10	☆				☆		☆				●		☆				●						☆
Chlorine water		●		●		O				●		●		●				●	3	O			3	O		
Chloroform		O	10	☆		☆		☆		●		●		O	100	●		●		●		●		●		☆
Chromic acid			25	☆	50	O						O			1	O			50	O		●	50	●	50	☆
Citric acid	10	☆		☆	SA	☆		●		O	10	☆	10	☆	10	O		☆		☆		☆		☆	SA	☆
Cyclohexane						☆						☆		☆	100	☆				●		☆		●		☆
Cycloexanol						☆						☆		☆	100	☆				●		☆		O		☆
Decalin						☆						O		O		☆				●		O		●		●
Dioxane						☆						☆		O		☆				O		●		●		
Distilled water		☆	10	☆		☆		☆		☆		☆		☆		☆		☆		☆				☆		●
Ethyl acetate				O		☆						O		☆	100	☆						●				O
Ethyl alcohol				☆						☆			96	☆	96	☆						O				☆
Ethyl chloride				☆				O						●	100	☆		O				O				●
Ethyl ether						☆						☆		☆	100	☆										☆
Ferric chloride				O		☆					10	☆		☆	10	☆				☆		☆		☆	SA	☆
Food fats		☆	100	☆		☆				☆		☆				☆		☆		O		☆		O		☆
Food oils		☆		☆		☆				☆				☆		☆		☆				☆				☆
Formaldehyde		☆		☆		☆		☆		☆		☆	40	☆	30	☆		O		O		O		O	40	●
Formic acid	2	O		●	100	☆		☆	10	●		O			10	●	10	●		☆		●		☆		O
Freon 12				☆								☆				☆						☆				☆
Fresh water		☆		☆		☆				☆		☆		☆		☆		☆		☆		☆		☆		☆
Fruit juice		☆		O		☆				☆		☆		☆		☆		☆		☆		☆		☆		☆
Gasoline		☆		☆		☆		O				O		O		☆		O		●		O		●		☆
Glycerine		☆		☆		☆		☆		☆		☆		☆		☆		☆		☆		☆		☆		☆
Hydrocloric acid		●		●		●		O	35	●	20	O	30	☆		●	35	☆	15	☆		O	15	☆	37	☆
Hydrofluoric acid				●		●							40	☆		●	70	☆				●			48	☆
Hydrogen peroxide	3	☆		☆	100	☆										●			30	O		●	30	●	90	☆
Isopropyl alcohol						☆						☆		☆		☆				☆				☆		☆
Lactic acid		O				☆		●		☆	10	☆	20	☆		☆		☆		O		☆		O		☆
Linseed oil				☆		☆				☆		☆		☆		☆		☆		O		☆		●		

Chemical agent	METALS								PLASTICS										RUBBERS									
	EXTRA		AISI 304		AISI 316		OT.NI		POM		PBT		PP		PA		PE		EPDM		NBR		SEBS		VITON	
	C %		C %		C %		C %		C %		C %		C %		C %		C %		C %		C %		C %		C %	
Magnesium chloride				O		☆						☆		☆		☆				☆		☆		☆	SA	☆
Methyl acetate				O		☆						O		☆		☆				O		●		●		●
Methyl alcohol			80	☆		☆		☆		☆		☆				☆				☆		O		☆		O
Methylene chloride		O		O		☆				●		●		O		☆		O		●		●		●		O
Milk		☆		☆		☆		☆		☆		☆		☆		☆		☆		O		☆		☆		☆
Mineral oil				☆		☆				☆		☆		☆		☆		☆		●		☆		●		☆
Nitric acid	25	O	65	☆						☆				☆		●		O			10	●			70	☆
Nitrobenzene						☆						☆		☆		O				●		●		O		O
Oleic acid		O		☆		☆		☆				☆		☆		☆		O		●		O		●		O
Oxalic acid			65	☆		☆					10	☆		☆		O				O		O		O		☆
Paraffin						☆				☆		☆						☆		O				●		
Petroleum				☆		☆		☆		☆		☆		☆		☆		●		●		☆		●		☆
Petroleum ether				☆		☆		☆		☆		O		☆		☆				●		●		●		☆
Phenol				☆		☆						●		☆		●				O		●		O		☆
Phosphoric acid	25	O		●		☆		●		●		●		☆		●		☆		☆	20	O		☆	85	☆
Potassium bichromate					SA	☆						O		☆		O				☆		O		O	SA	☆
Potassium bromite						☆						☆		☆		☆				☆		☆		☆		☆
Potassium hydroxide		☆	50	☆		☆				●		●		☆		☆		☆		☆		O		☆		☆
Potassium permanganate				☆		☆								☆		●			10	☆		●	10	O		☆
Sea water		●		☆		☆		☆		O		☆		☆		☆		☆		☆		☆		O		☆
Silicone oil						☆						☆		☆		☆				☆		☆		☆		☆
Silver nitrate				O		☆								☆		☆						O				☆
Sodium carbonate		☆	100	☆	SA	☆				☆	10	☆		☆		☆		☆		☆		☆		☆		☆
Sodium chloride		O		O		☆		☆		☆				☆		☆		☆		☆		☆		☆	SA	☆
Sodium hydroxide	40	☆		☆	60	☆					10	●				☆				O		☆				
Sodium hypochlorite				●	SA	O				●	10	O		☆		☆	10	☆		●	10	O	5	☆		
Sodium silicate			100	☆		☆										☆				☆		☆		☆		☆
Sodium sulphate			100	☆		☆										☆				O		☆		☆		☆
Soft drinks				☆		☆				☆		☆		☆		☆		☆		☆		☆		☆		☆
Suds				☆		☆				☆	10	☆		☆		☆		☆		☆		☆		☆		☆
Sulphuric acid		●		●		O		☆		●	2	☆		☆		●		O	50	☆		●	50	O	95	☆
Tartaric acid		☆	50	☆		☆		●		O	50	☆		☆		☆		☆		O		☆		☆		☆
Tetrahydrofuran						☆						☆		O		☆				●		●		●		●
Tetralin				●		☆						☆		●		☆				●		●		●		☆
Tincture of iodine				O		☆		●						☆		●		☆		O		●		O		☆
Toluol		☆				☆						☆		☆		☆				●		●		●		O
Transformer oil		☆				☆						☆		O		☆				●		☆		●		☆
Tricholoethylene				●	100	☆						●		O		O				●		●		●		☆
Triethanolamin						☆						☆		☆		☆				O		●		O		●
Turpentine		☆		☆		☆				●		☆						●		●				●		
Vaseline						☆						☆				☆		O		●		☆		●		☆
Vegetable juice		☆		☆		☆				☆		☆		☆		☆		☆		☆		☆		☆		☆
Vegetable oils		☆		☆		☆				☆		☆		☆		●		☆		☆		☆		O		☆
Vinegar		☆		☆	100	☆		☆		☆	10	☆		☆		☆		☆	25	☆		O	25	O		●
Water and soap		☆		☆		☆		☆		☆		☆		☆		☆		☆		☆		☆		☆		☆
Whisky		☆		☆		☆		☆		☆		☆		☆		☆				☆		☆		☆		☆
Wine		☆		☆		☆		☆		☆		☆		☆		☆		☆		☆		☆		☆		☆
Xilol		☆		☆		☆		O		●		☆		●		☆		●		☆		●		☆		☆

ABBREVIATION

C = concentration
SA = saturated

☆ = good resistance
● = insufficient resistance (not recommended)

O = fairly good resistance depending on use conditions
blank spaces = no tests performed

Parameters affecting wear rate

Operating conditions:
- Load
- Speed
- Number of starts per hour- No soft start/frequency inverter controlled drive
- Product accumulation
- Lubrication
- Water quality
  - Concentration of chlorines
  - Water hardness
  - Contaminations
  - Discontinuous water supply
- Lubricant
  - Suitability/performance
  - Dosing
  - Efficiency of nozzles

Cleaning:
- Cleaning agent
  - Frequency
  - Intensity
  - Rinsing
  - Concentration
  - Temperature
- Chemical attack

Environment:
- Temperature
- Humidity
- Wear increasing media/abrasives
- Corrosion
- Cleanliness- Soil e,g, from construction work

Conveyor components:
- Material quality
- Construction
- Dimensional accuracy of
  - Wear strips
  - Sprockets
  - Idlers
  - Return rollers
  - Shaft alignment

Conveyor construction:
- Choice of chain/belt
- Suitability of selected chain/belt for the application
- Mounting of wear strips
  - Flatness
  - Chamfers
  - Raised portions
  - Expansion compensation gaps

Changed/modified conditions:
- Modification of conveyor or its parts/components
  - Maintenance
  - Overhaul

Cleaninginstructions

Cleaning is necessary to:
- minimize dirt and debris built up
- keep bacteriological situation under control
- elongate service life of chains/belts
- ensure smooth running of chain/belt for optimum product stability
- prevent crashes due to f,e, glass debris
- prevent malfunction due to sticky residues
- keep friction low

Frequency:

As a rule of thumb we say that cleaning the line once every week is sufficient,

Of course in practice depending on the circumstances this can be more frequent (f,e, during product changes in case of product loss or other pollution) or less frequent in a relatively clean environment,

In the direct surrounding of the filler cleaning will be more frequent anyway, Depending also on the bacteriological situation it may be necessary to clean at least once a day or once every shift,

Also chemicals coming f,e, from a pasteurizer may ask for more frequent cleaning to prevent the chemicals from affecting the chain/belt materials,

In a can line where aluminum cans are filled, there's the aluminum oxide that has to be kept under control, This can occur also far away from filler-pasteurizer, where the line is running dry, When the cans are accelerating on an inliner the remaining drops will fall down with the aluminum oxide on the chain causing a highly abrasive sludge to built up on the inliner, Therefore it may be necessary to clean more frequent also further down the line due to 'local' circumstances,

Method:

Important for an optimum service life of the chains and belts is a general inspection on the conveyors already during operation, Listen for strange –rattling or squeaking- noises, Check transfer plates, return rollers, bearings, etc, Make sure the chain/belt is still running free without extra load or obstruction, Often the service life of a chain/belt is reduced for mechanical reasons that can be sorted easily,

When cleaning we advice to go thru following steps:

1. Check for foreign parts on the conveyor, Check also the return part,
2. Rinse with warm (max 60°) or cold water thoroughly while chain/belt is running,
3. Use mild (PH-5-9) detergent according to suppliers instructions,
4. If necessary clean mechanically (brush) when pollution is hard to remove,
5. Rinse thoroughly with warm (max 60°) or cold water, Make sure all detergent is rinsed off while chain/belt is running,
6. Final mechanical check that chain/belt is running free and without obstruction, During this process it's important not to forget to clean in between carry and return section and underneath where the return support system is,

Especially with plastic chains/belts the detergent in use needs to be checked for compatibility with the plastic materials of the chain/belt,

General:

As obvious as it seems, cleaning is important! Since nowadays pressure on production rates and production costs are getting higher and higher, companies tend to look at cleaning when trying to cut costs,

Less time and resources are available while at the same time the capacity of the lines (and thus pollution and product loss) has to go up,

When companies are setting up a cleaning regime they tend to focus on the individual machines (mainly filler and surrounding) and not so much on the conveyors, Therefore we want to promote 'CONVEYOR AWARENESS' in this respect,

Dry versus wet:

When a wet lubricant is in use (water & soap) product loss is normally flushed off by the water & soap, Often the soap also has a 'cleaning function' built in, But wet circumstances also attract dust and dirt and wet circumstances will increase the growth of bacteria, When a line is standing still during a stop or during the weekend without cleaning, the lubricant will dry in which may cause pollution and changing sliding characteristics of the chains/belt after several times,

Under dry circumstances the conveyors generally remain cleaner, But product loss needs to be cleaned to avoid functional problems of the line,

Therefore functionally speaking wet lubrication is more safe but requires just as well regular cleaning and is a high cost factor,

All together with the present state of conveyor technology it is possible to run a major part of a glass, can or a PET line dry taken into consideration that a regular cleaning regime is in place,

Inspection procedure

1. Inspect chains for unusual wear patterns or damage,
2. Look for excessive gaps between chain flights,
3. Check conveying surface for Flatness, bent or broken Flights,
4. Inspect hold-down tabs or beveled sliding surfaces for excessive wear,
5. Review chain catenary sag for proper amount,
6. If take-ups are used, check that take-up tension is not excessive, Do not preload chain,

7. Check all idlers, rollers, turn discs and sprockets for freedom of rotation,
8. Examine sprockets for excessive wear,
9. Look for debris build up in sprocket tooth pockets,
10. Check for excessive guide ring wear,
11. Check all wear strips and fasteners for excessive wear,
12. Check all transfer points, dead plates, turn tables, turn discs and sprockets for proper elevation and alignment,
13. Review function of lubrication system,
14. Inspect general cleanliness of conveyor system,

Installationprocedure

1. Check all sprockets, idlers, turn discs and rollers for proper elevation and alignment with regard to the conveyor tracks,
2. Check all wear strips (carrying and return), dead plates, dividers and transfers mechanism for proper location, elevation, spacing and Flatness,
3. Check all fasteners for proper tightness (torque), Fasteners used on wear strips and dead plates must have recessed heads,
4. Check all conveyor splice points for proper elevation, alignment and fastening,
5. Inspect conveyor system for obstructions by pulling a short section of chain (1 meter) through the entire conveyor,
6. Check lubrication system (if present),
7. Install conveyor chain, assuring that the following has been done:
   - A Check for correct direction of chain travel,
   - B Assemble chain in 3 meters sections and avoid twisting or damaging the chain,
   - C Connect chain sections on the conveyor, Make sure that the connecting pins are not protruding,
   - D Adjust chain catenary (sag) to the proper elevation, Note: readjustment is usually necessary after a certain operating time,
8. Insure that lubricant is evenly dispersed through conveyor system,
9. Start up conveyor by jogging and/or using short running periods before loading the system, Be alert to unusual noises or actions, If a problem should occur, refer to the trouble shooting guide,

Replacement criteria

Chains must be replaced when:

- The chain starts to jump on the sprocket due to elongation, This may start to happen at 3% elongation or more,
- The thickness of the plate has been reduced by 50%,
- The surface becomes uneven or scratched causing stability problems,
- The hinge is worn to an extend that the pins protrude

Belts must be replaced when:

- The belt starts to jump on the sprocket due to elongation, This may start to happen at 3% elongation or more,
- The thickness of the module has been reduced by 1 mm from the top and from the bottom,
- The surface becomes uneven or scratched causing stability problems,

When replacing chains/belts, it is recommended to replace wear strips and sprockets/idlers as well, Sprockets and Idlers must be replaced when:

- teeth are worn flat
- chain/ belt does not release well
- teeth are damaged
- bore of idler is worn out and idler starts to oscillate
- hub or keyway are damaged
- new chain/ belt is installed

Wear strip must be replaced when:

- thickness is reduced by 50% and stability problems occur
- dirt or debris is embedded
- Fixing rivets protrude.

Layout procedure for a ETS conveyor system

Task definition:
Determine number and position of the work steps, calculate the available space.

▼

Plan rough system layout:
Lengths, segments, curves, slopes (sketch) ◀

▼

Product-specific data:
Determine conveyed material data:
Dimensions, mass, friction figures, antistatic environment needed?

▼

Production-specific data:
Determine conveyor parameters:Speed, conveyed material spacing and cycle, number of start-up operations/h, accumulation section

▼

Detailed system layout planning:
Accumulation sections, product interchange points
▶ **www.easy-conveyor.com**

▼

Chain tensile force calculation F
▶ **Examples 1-2, page 352 – page 359**

▼

$F<F_{permissible}$ (page 257 & 260):

YES **NO ▶**

▼

$F<<F_{permissible}$ (oversized) ▶

NO **YES ▶**

▼ ▼

Check drive torque:

$$\frac{M * 2}{\varnothing TK} \geq F$$

OK? **YES** **NO ▶**

▼

[✔]

Needed data

- The length and/or width of the belt conveyor (mm)
- The width of the belt (mm)
- Wanted speed (mtr/min)
- Product weight (Kg)
- Product length (mm) [!] (in direction of transport)
- Amount of products on the conveyor (pcs)
- Product to transport (bakery, food, plastic, cardboard, glass or metal)
- Slide profile (TCP / TCS)
- State of contact surfaces between slide rail/chain -(dry normal -dirty -rough/Water/Water & Soap/Oil)
- State of contact surfaces between goods/chain (dry/water/water & soap)
- Ambient temperature (°C)
- Start/Stop each hour (pcs/hr)
- Frequency controller (Yes or No)
- Accumulation (Yes or No)
- Amount of products to accumulate (pcs)
- Running hours per day
- Type of loading

Weight (q_K)		Actual lenght (L_K)	Straight lenght (L_S)	
(kg/m²)	Drive / return units	(mtr)	Drive / return units	(mtr)
1,05	ETS80 FLAT TOP Return unit	0,777	Return unit	0,34
3,2	ETS80 ROLLER			
1,15	ETS80 FRICTION Drive unit	0,984	Drive unit	0,347
1,62	ETS200 FLAT TOP Straight section	2 x Li		
1,75	ETS200 FRICTION			

Belt length Hor. Curves (mm)	
(two side)	
ETS HORIZONTAL CURVE; 30° R200	609,33
ETS HORIZONTAL CURVE; 45° R200	714
ETS HORIZONTAL CURVE; 60° R200	818,66
ETS HORIZONTAL CURVE; 90° R200	1028
ETS HORIZONTAL CURVE; 180° R200	1656
ETS HORIZONTAL CURVE; 30° R500	923,33
ETS HORIZONTAL CURVE; 45° R500	1185
ETS HORIZONTAL CURVE; 60° R500	1446,66
ETS HORIZONTAL CURVE; 90° R500	1970
ETS HORIZONTAL CURVE; 180° R500	3540

Belt length Vert. Curves (mm) Degrees (ß)	
(two side)	
ETS VERT. SLIDE CURVE; 5° R=500	487,22
ETS VERT. SLIDE CURVE; 10° R=500	574,14
ETS VERT. SLIDE CURVE; 15° R=500	661,67
ETS VERT. SLIDE CURVE; 30° R=500	923,34
ETS VERT. SLIDE CURVE; 45° R=500	11
ETS VERT. SLIDE CURVE; 60° R=500	1446,67
ETS VERT. SLIDE CURVE; 90° R=500	1970

Friction forces occur in curves (μ_R)	
0° (Straight sections)	1,0

Curve angle (vertical)	
5°	1,03
10°	1,05
15°	1,05
30°	1,10
45°	1,20

WHEEL Curve angle (horizontal)	
30°	1,05
45°	1,05
60°	1,075
90°	1,10
180°	1,15

SLIDE Curve angle (horizontal)	
30°	1,2
45°	1,3
60°	1,4
90°	1,6
180°	2,2

Application factor C_1	
Approach procedures /h	**Application factor**
0 – 1	1,0
2 – 10	0,83
11 – 30	0,71
> 30	0,62

Breaking force (max -40°C / +80°C) C_2	
Temperature °C	**Breaking force factor**
0	1,12
20	1,0
40	0,96
60	0,92

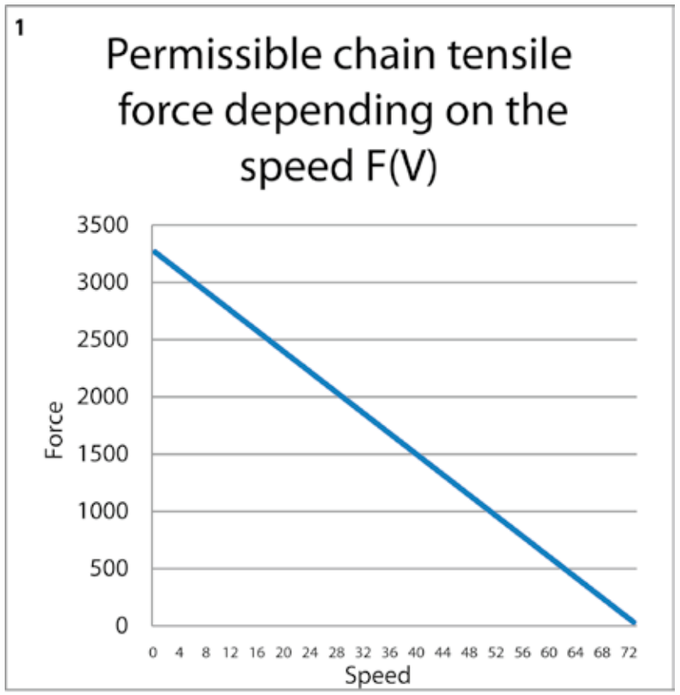
Factor C_3 Breakaway torque	
Temperature °C	**Breaking force factor**
0,09 kW	2,1
0,12 kW	2.4
0,18 kW	1,8
0,25 kW	1,8
0,37 kW	1,8
0,55 kW	2,1
0,75 kW	2,2
1,1 kW	2,0
Frequency controller	1,5

The permissible chain tensile force depends on the conveying speed as well as the ambient and operating conditions.

If the calculated chain tensile force exceeds the permissible amount, you can:

- divide the section into various chain conveyors.
- alter the system layout, e.g. by shorten the section.
- shorten the accumulation sections.
- reduce the speed.

1



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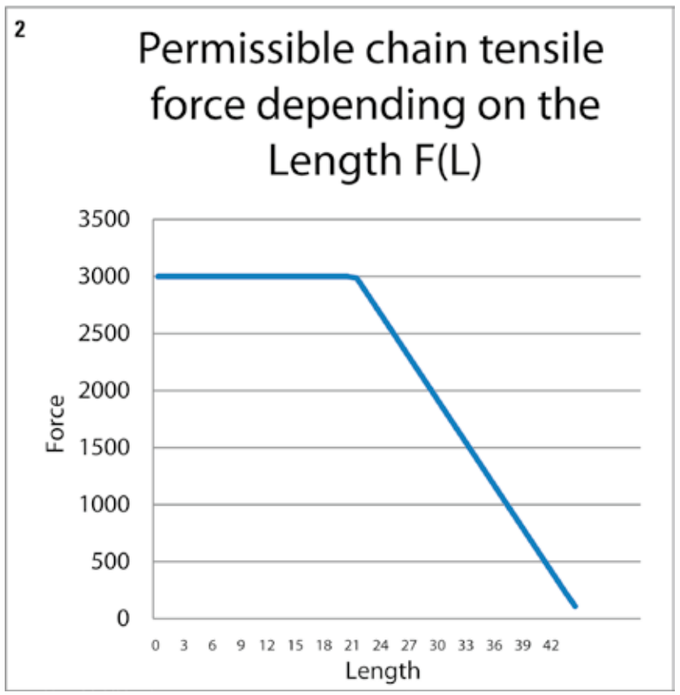


MOTOR SELECTION

The drive torque of the selected gear motor must be greater than the calculated required drive torque.
There are the following options to reduce the required drive torque:

- reduce the chain tensile force (F).
- reduce the speed (v) and use a gear motor with a higher drive torque.
- change the operating conditions (e. g. the ambient temperature)

Procedure for both calculations:

- Divide the conveyor section into segments. Segment 1 starts at the traction stand (e.g. at the return unit, at the connecting drive outlet), the last segment ends at the drive unit. The division is made according to operating mode (conveying operation / accumulation operation). When using horizontal or vertical curves the segment ends after the curve.
- Calculate the individual segments in ascending order. The chain tensile force of the current segment will enter the calculation of the following segment as a counter force. The result of the last segment is the required chain tensile force to operate the conveyor.
- The tensile force resulting from the chain return can generally be overlooked.

Exceptions:

- The conveyor contains more than 2 curves.
- The section load of the goods is lower than that of the chain (round trip): **$q_F \leq 2 \cdot q_K$**

In these cases, the first segment begins at the head drive outlet.

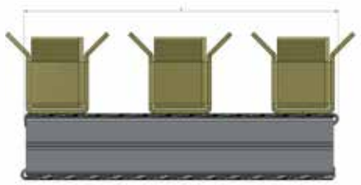
For all calculations

$$q_{Fi} = \frac{M_i * g}{L_i}$$

ETS Straight

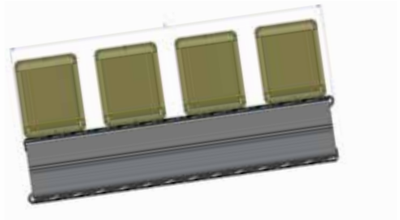
$$F_i = [\, F_{i-0} + L_i * (Q_K + Q_{Fi}) * \mu_T + (L_K - L_i) * qK * \mu_T \,] * \mu_R$$

$$F_i = [\, F_{i-0} + L_i * (Q_K + Q_{Fi}) * \mu_T \,] * \mu_R \text{ (connection drive))}$$



ETS Incline/Decline

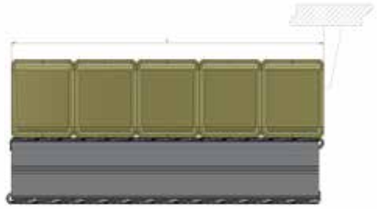
$$F_i = [\, F_{i-0} + L_i * (Q_K + Q_{Fi}) * (\mu_T * \cos ß + \sin ß) + (L_K - L_i) * qk * (\mu_T * \cos ß - \sin ß) \,] * \mu_R$$



ETS Accumulation (is not possible when using a friction or a cleated belt)

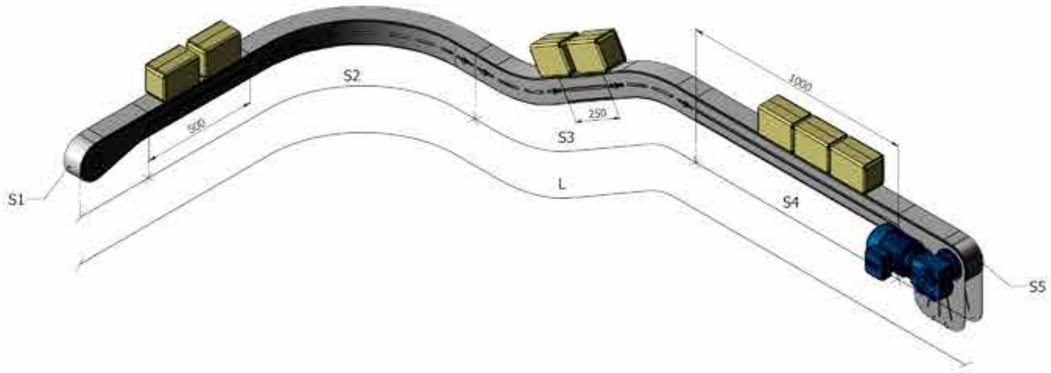
$$F_i = [\, F_{i-0} + L_i * \{ (Q_K + Q_{Fi}) * \mu_T + Q_{Fi} * \mu_{ST} \} + (L_K - L_i) * Q_K * \mu_T \,] * \mu_R$$

$$F_i = [\, F_{i-0} + L_i * \{ (Q_K + Q_{Fi}) * \mu_T + Q_{Fi} * \mu_{ST} \} \,] * \mu_R \text{ (connection drive)}$$



LIST OF APPLIED ABBREVIATIONS

F	= Chain Tensile force (at the drive pulley) (N)	M_H	= Run-up Torque (Nm)
$F_{perm.}$	= Permissible load capacity	M_i	Total product mass (Kg)
F_i	= Chain tensile force of individual segments (N)	M_N	= Nominal Torque (Nm)
g	= 9,81 (m/s²)	M_T	= Motor Torque (Nm)
μ_R	= Friction forces occur in curves	ν	= Belt speed (mtr/min)
μ_{ST}	= Friction coefficient Product/Chain	A_Z	= Amount of Accumulation
μ_T	= Friction coefficient Chain/Slide rail	f_B	= Service Factor
L	= Conveyor section length (mtr)	P_A	= Mechanical Drive Power (kW)
L_i	= Segment length (mtr)	P_M	= Motor Power (kW)
L_K	Actual chain length (mtr)	R_H	= Running hours / day
L_S	= Chain length straight (mtr)	S_L	= Shock Load
q_{Fi}	Section load of conveyed material on segment Li (N/mtr)	S_S	= Start/Stops /hr
q_K	Weight of the belt (N/mtr)	U_L	= Uniform Load
ß	= Angle for Incline or Decline (°)	V_L	= Variable Load
		η	= Efficiency (%)



Example 1: Calculation ETS Incline	
Conveyor system	ETS Aluminum
Chain width	80mm
Wanted speed	20 mtr/min
Pitch diameter	Ø147.3mm
Product weight	10 kg
Product Length	175mm
Product material	Cardboard
Conveyor length L	6,232mtr
Chain section load q_K	11,28 N/m (1,15*9.81)
Slide rail	TCP
State of contact surfaces μ_{ST}	Dry
State of contact surfaces μ_T	Dry - Normal
Ambient temperature	30°C
Start/Stop	5/h
Frequency controller	Yes
Accumulation on Section 3	Yes
Amount of products to accumulate	3 pieces
Running hours per day	16 hr
Type of loading : Uniform Load Permissible load capacity	2366N (see table 1 or 2 page 251)

ETS SECTION 1

L_i = Segment length (mtr)	: 0,34
L_K = Actual chain length (mtr)	: 0,777
μ_R = Friction forces occur in curves	: 1,0
μ_T = Friction coefficient Chain/Slide rail	: 0,3

$$q_{Fi} = \frac{M_i * g}{L_i} \qquad q_{Fi} = \frac{0 * 9,81}{0,34} \qquad q_{Fi} = 0$$

ETS Section 1

$F_1 = [F_{i-0} + \{ L_i * (q_K + q_{Fi}) * \mu_T \} + \{ (L_K - L_i) * q_K * \mu_T \}] * \mu_R$

$F_1 = [0,0 + \{ 0,34 * (11,28 + 0) * 0,3 \} + \{ (0,777 - 0,34) * 11,28 * 0,3 \}] * 1,0$

$F_1 = [0,0 + \{ 0,34 * 3,384 \} + 1,479] * 1,0$

$F_1 = [0,0 + 1,151 + 1,479] * 1,0$

$F_1 \approx$ **2,63 N**

ETS SECTION 2

L_i = Segment length (mtr)	: 0,986 ((Slide Curve 90° | 1 side) + 1 * 0.5mtr)
L_K = Actual chain length (mtr)	: 1,972 ((Slide Curve 90° | 2 side) + 2 * 0.5mtr)
μ_R = Friction forces occur in curves	: 1,60 (Slide curve 90°)
μ_T = Friction coefficient Chain/Slide rail	: 0,3
M_i = Total product mass (Kg)	: 20 Kg

$$q_{Fi} = \frac{M_i * g}{L_i} \qquad q_{Fi} = \frac{20 * 9,81}{0,986} \qquad q_{Fi} = 199 \text{ N/m}$$

ETS Section 2

$F_2 = [F_{i-0} + \{ L_i * (q_K + q_{Fi}) * \mu_T \} + \{ (L_K - L_i) * q_K * \mu_T \}] * \mu_R$

$F_2 = [2,63 + \{ 0,986 * (11,28 + 199) * 0,2 \} + \{ (1,97 - 0,986) * 11,28 * 0,2 \}] * 1,60$

$F_2 = [2,63 + \{ 0,986 * 42,056 \} + 2,22] * 1,60$

$F_2 = [2,63 + 52,04 + 2,22] * 1,60$

$F_2 \approx$ **74,12 N**

ETS SECTION 3

L_i = Segment length (mtr)	: 1,17 ((Vert. Curve 30° | 1 side) + 1 * 0.25mtr)
L_K = Actual chain length (mtr)	: 2,35 ((Vert. Curve 30° | 2 side) + 2 * 0.25mtr)
μ_R = Friction forces occur in curves	: 1,10 (Vert. slide curve 30°)
μ_T = Friction coefficient Chain/Slide rail	: 0,2
M_i = Total product mass (Kg)	: 20 Kg

$$q_{Fi} = \frac{M_i * g}{L_i} \qquad q_{Fi} = \frac{20 * 9{,}81}{1{,}17} \qquad q_{Fi} = 167{,}70 \text{ N/m}$$

ETS Section 3

$F_3 = [F_{i-2} + \{ L_i * (Q_K + Q_{Fi}) * (\mu_T * \cos\beta + \sin\beta) \} + \{ (L_K - L_i) * Q_K * (\mu_T * \cos\beta - \sin\beta) \}] * \mu_R$

$F_3 = [74{,}12 + \{ 1{,}17 * (11{,}28 + 167{,}70) * (0{,}2 * 0{,}866 + 0{,}5) \} + \{ (2{,}35 - 1{,}17) * 11{,}28 * (0{,}2 * 0{,}866 - 0{,}5) \}] * 1{,}10$

$F_3 = [74{,}12 + \{ 1{,}17 * 178{,}98 * 0{,}67 + \{ 13{,}20 * -0{,}33 \}] * 1{,}10$

$F_3 = [74{,}12 + 140{,}30 - 4{,}36] * 1{,}10$

$F_3 \approx$ **231,07 N**

ETS SECTION 4

L_i = Segment length (mtr)	: 1,0 (Straight section)
L_K = Actual chain length (mtr)	: 2,0 (Straight section * 2)
μ_R = Friction forces occur in curves	: 1,0
μ_T = Friction coefficient Chain/Slide rail	: 0,2
M_i = Total product mass (Kg)	: 60 Kg

$$q_{Fi} = \frac{M_i * g}{L_i} \qquad q_{Fi} = \frac{60 * 9{,}81}{1} \qquad q_{Fi} = 588{,}6 \text{ N/m}$$

Accumulation

$$q_{Fi} = \frac{M_i * g}{L_i} \qquad q_{Fi} = \frac{60 * 9{,}81}{0{,}525} \qquad q_{Fi} = 1121{,}14 \text{ N/m}$$

ETS Section 4

$F_4 = [F_{i-3} + \{ L_i * (Q_K + Q_{Fi}) * \mu_T + Q_{Fi} * \mu_{ST} \} + \{ (L_K - L_i) * Q_K * \mu_T \}] * \mu_R$

$F_4 = [231{,}07 + \{ 1{,}0 * (11{,}28 + 588{,}6) * 0{,}2 + 1121{,}14 * 0{,}28 \} + \{ (2{,}0 - 1{,}0) * 11{,}28 * 0{,}2 \}] * 1{,}0$

$F_4 = [231{,}07 + \{ 1{,}0 * 120 + 313{,}92 \} + 2{,}26] * 1{,}0$

$F_4 = [231{,}07 + 433{,}92 + 2{,}26] * 1{,}0$

$F_4 \approx$ **667,25 N**

ETS SECTION 5

L_i = Segment length (mtr) Li	: 0,34
L_K = Actual chain length (mtr)	: 0,777
μ_R = Friction forces occur in curves	: 1,0
μ_T = Friction coefficient Chain/Slide rail	: 0,3

$$q_{Fi} = \frac{M_i * g}{L_i} \qquad q_{Fi} = \frac{0 * 9{,}81}{0{,}34} \qquad q_{Fi} = 0$$

ETS Section 5

$F_5 = [F_{i-4} + \{ L_i * (Q_K + Q_{Fi}) * \mu_T * \} + \{ (L_K - L_i) * Q_K * \mu_T \}] * \mu_R$

$F_5 = [667{,}25 + \{ 0{,}347 * (11{,}28 + 0) * 0{,}3 \} + \{ (0{,}984 - 0{,}347) * 11{,}28 * 0{,}3 \}] * 1{,}0$

$F_5 = [667{,}25 + \{ 0{,}347 * 3{,}384 \} + 2{,}16] * 1{,}0$

$F_5 = [667{,}25 + 1{,}17 + 2{,}16] * 1{,}0$

$F_5 \approx$ **670,60 N**

$F_{max} = F_{perm.} * C_1 * C_2$

$F_{max} = 2366 * 0{,}83 * 1{,}0$

$F_{max} \approx$ **1964 N** F = 670,60 N

System is OK

$$M_N = \frac{F * (d_A / 2)}{1000}$$

$$M_N = \frac{670{,}60 * (147{,}3 / 2)}{1000}$$

$M_N \approx$ **49,39 Nm**

Run-up Torque

$M_H = M_N * C_3$

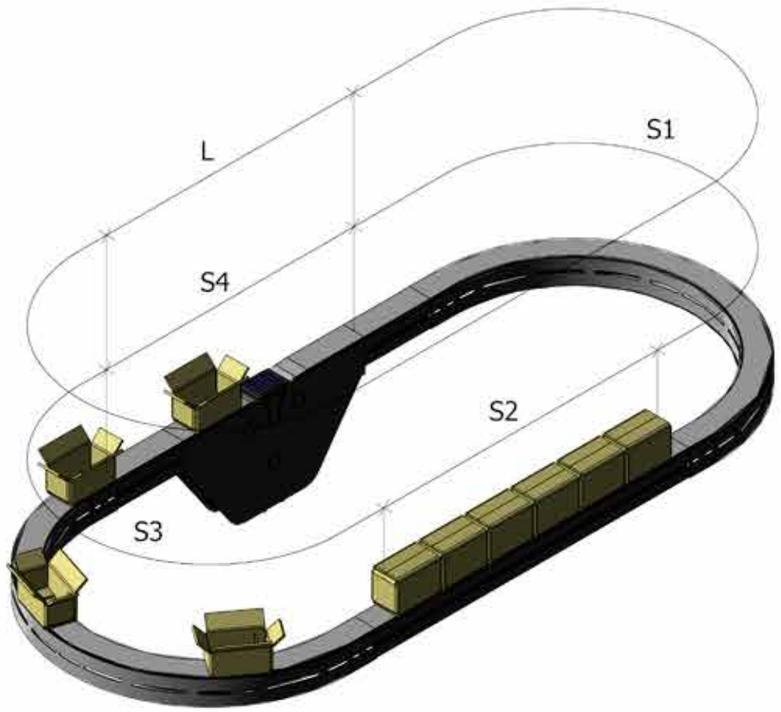
$M_H = 49{,}39 * 1{,}5$

$M_H \approx$ **74,10 Nm**

$$P_A = \frac{F_U * \nu}{1000} \qquad P_A = \frac{670{,}60 * 0{,}33}{1000}$$

$P_A =$ 0.22 kW

$P_M = \frac{P_A}{\eta}$ [kW] chose, the next larger standard motor



Example 2: Calculation ETS Connection drive	
Conveyor system	ETS Aluminum
Belt width	140mm
Wanted speed	15 mtr/min (0,25 mtr/sec)
Pitch diameter	Ø147.3mm
Product weight	5 kg
Product Length	175mm
Product material	Cardboard
Conveyor length L	6,6mtr
Chain section load q_K	12,95 N/m (1.32*9.81)
Slide rail	TCS
State of contact surfaces μ_{ST}	Dry
State of contact surfaces μ_T	Dry - Normal
Ambient temperature	45°C
Start/Stop	30/h
Frequency controller	Yes
Accumulation on Section 2	Yes
Amount of products to accumulate	6 pieces
Running hours per day	8 hr
Type of loading : Uniform Load Permissible load capacity	2591N (see table 1 or 2 page 251)

ETS SECTION 1

L_i = Segment length (mtr)	: 1,97 ((slide Curve 180° | 1 side) + 0.2mtr)
μ_R = Friction forces occur in curves	: 2,2 (Slide curve 180°)
μ_T = Friction coefficient Chain/Slide rail	: 0,18

$$q_{Fi} = \frac{M_i * g}{L_i} \qquad q_{Fi} = \frac{0 * 9{,}81}{1{,}97} \qquad q_{Fi} = 0$$

ETS Section 1

$F_1 = [\, F_{i-0} + \{\, L_i * (\, Q_K + Q_{Fi}\,) * \mu_T \,\}\,] * \mu_R$

$F_1 = [\, 0 + \{\, 1{,}97 * (\, 12{,}95 + 0\,) * 0{,}18 \,\}\,] * 2{,}2$

$F_1 = [\, 0 + 4{,}60\,] * 2{,}2$

$F_1 \approx$ **10,10 N**

ETS SECTION 2

L_i = Segment length (mtr)	: 1,1 (Straight section)
μ_R = Friction forces occur in curves	: 1,0
μ_T = Friction coefficient Chain/Slide rail	: 0,18
M_i = Total product mass (Kg)	: 25 Kg

$$q_{Fi} = \frac{M_i * g}{L_i} \qquad q_{Fi} = \frac{25 * 9{,}81}{1{,}1} \qquad q_{Fi} = 267{,}55 \text{ N/m}$$

Accumulation

$$q_{Fi} = \frac{M_i * g}{L_i} \qquad q_{Fi} = \frac{25 * 9{,}81}{1{,}05} \qquad q_{Fi} = 280{,}3 \text{ N/m}$$

ETS Section 2

$F_2 = [\, F_{i-1} + \{\, L_i * (\, Q_K + Q_{Fi}\,) * \mu_T + Q_{Fi} * \mu_{ST} \,\}\,] * \mu_R$

$F_2 = [\, 10{,}10 + \{\, 1{,}1 * (\, 12{,}95 + 267{,}55\,) * 0{,}18 + 280{,}3 * 0{,}28 \,\}\,] * 1{,}0$

$F_2 = [\, 10{,}10 + 55{,}54 + 78{,}48\,] * 1{,}0$

$F_2 \approx$ **144,12 N**

ETS SECTION 3

L_i = Segment length (mtr)	: 1,77 (Slide Curve 180° | 1 side)
μ_R = Friction forces occur in curves	: 2,2 (Slide curve 180°)
μ_T = Friction coefficient Chain/Slide rail	: 0,18
M_i = Total product mass (Kg)	: 10 Kg

$$q_{Fi} = \frac{M_i * g}{L_i} \qquad q_{Fi} = \frac{10 * 9{,}81}{1{,}77} \qquad q_{Fi} = 83{,}14 \text{ N/m}$$

ETS Section 3

$F_3 = [\, F_{i-2} + \{\, L_i * (Q_K + Q_{Fi}) * \mu_T \,\} \,] * \mu_R$

$F_3 = [\, 144{,}12 + \{\, 1{,}77 * (12{,}95 + 83{,}14) * 0{,}18 \,\} \,] * 2{,}2$

$F_3 = [\, 144{,}12 + 30{,}61 \,] * 2{,}2$

$F_3 \approx$ **384,42 N**

ETS SECTION 4

L_i = Segment length (mtr) Li	: 1,545 (Drive unit 1,345mtr + 0.2mtr)
μ_R = Friction forces occur in curves	: 1,0
μ_T = Friction coefficient Chain/Slide rail	: 0,6
M_i = Total product mass (Kg)	: 5 Kg

$$q_{Fi} = \frac{M_i * g}{L_i} \qquad q_{Fi} = \frac{5 * 9{,}81}{1{,}545} \qquad q_{Fi} = 31{,}75 \text{ N/m}$$

ETS Section 4

$F_4 = [\, F_{i-3} + \{\, L_i * (Q_K + Q_{Fi}) * \mu_T \,\} \,] * \mu_R$

$F_4 = [\, 384{,}42 + \{\, 1{,}545 * (12{,}95 + 31{,}75) * 0{,}6 \,\} \,] * 1{,}0$

$F_4 = [\, 384{,}42 + 41{,}44 \,] * 1{,}0$

$F_4 \approx$ **425,86 N**

$F_{max} = F_{perm.} * C_1 * C_2$

$F_{max} = 2591 * 0{,}71 * 0{,}96$

$F_{max} \approx$ **1766 N** F = 425,86 N

System is OK

$$M_N = \frac{F * (d_A / 2)}{1000}$$

$$M_N = \frac{425{,}86 * (147{,}3 / 2)}{1000}$$

$M_N \approx$ **31,37 Nm**

Run-up Torque

$M_H = M_N * C_3$

$M_H = 31{,}37 * 1{,}5$

$M_H \approx$ **47,05 Nm**

$$P_A = \frac{F_U * \nu}{1000} \qquad P_A = \frac{425{,}86 * 0{,}25}{1000}$$

$P_A =$ 0.11 kW

$P_M = \frac{P_A}{\eta}$ [kW] chose, the next larger standard motor

Conclusion

You can see above that the motor and also the conveyor system are selected because of the input. Also you can see that some values cause a certain overload situation for the system, motor or both.

There are a few options to prevent an overload.

- Lower the speed
- Lower the amount of product on the conveyor
- Less Start/Stops
- Less Accumulation
- Change type of loading
- Shorten the conveyor
- Choose another conveyor system
- Less running hours per day.
- Choose another transport system. (roller conveyor, mattop conveyor or tabletop conveyor)

ETS SYSTEM

easy ...CONVEYORS

Chain/belt jumps on sprocket

Possible causes	Remedy
Chain/belt is enlongated e.g. due to wear or overloaded	Replace chain/belt and sprocket. Check other components as well. Eliminate cause of overload.
Improper catenary sag	Check dimensions and adjust
Sprocket is worn	Replace sprocket
Wrong sprocket type	Install correct sprocket
Misaligned sprocket	Check and adjust
Improper sprocket position	Check and adjust position

Chain/belt does not release well

Possible causes	Remedy
Incorrect sprocket dimension or type	Check and replace sprocket
Sticky residue	Clean chain/sprocket or renew
Improper catenary sag	Check dimensions and adjust

Slip stick operation

Possible causes	Remedy
Slip stick	Use lubrication Reduce chain/belt tension by shortening the conveyor
Return roller diameter too small	Install larger rollers
Chain/belt catches the conveyor	Remove obstructions. Check return part as well
Improper catenary sag	Check dimension and adjust

Damaged chain hinges

Possible causes	Remedy
Overloading	Eliminate cause of overloading Check sprockets and other components Replace chain/belt Replace components if necessary
Blocking and obstructions	Check the complete conveyor
Exceeding the minimum backflex radius	Check conveyor construction
Too small radius for side flexing chain	Check minimum radius of chain and adjust accordingly

Elongation

Possible causes	Remedy
Overloading	Eliminate cause of overloading Check sprockets and other components Replace chain/belt Replace components if necessary
Wear from dirt in hinges	Improve cleaning or Use HB pins

Rapid curve wear

Possible causes	Remedy
Overheating	Use EXTRA curve or Nolu-S
Embedded abrasives	Replace curve

Chain drifts sideways on sprockets

Possible causes	Remedy
Bad shaft/sprocket alignment	Adjust or use collars
Conveyors is not level	Adjust

Cracked hinge eyes

Possible causes	Remedy
Stress-corrosion caused by incompatible chemicals	Check chemicals compatibility with chain/belt material Use appropriate chemicals

Chains for magnetic system releases from curve

Possible causes	Remedy
Worn curve	Replace curver
Improper chamfering of the infeed or other obstructions	Check and adjust/rework
No soft start-up	Install frequency inverter drives
Curve not mounted level	Check and adjust

Corroded steel chain

Possible causes	Remedy
Incompatible combination of chain material and chemicals	Use only compatible chemicals
May occur even with stainless steel	Consider higher graded material

Excessive chain/belt wear

Possible causes	Remedy
Pollution	Improve cleaning
Failing lubrication	Check lubrication system Contact lubricant supplier
Obstructions	Check all sections
Debris in return part	Clean conveyor Install roller with larger diameter

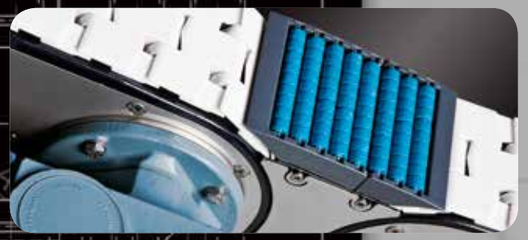
Sprockets don't slide on shaft when belt extends due to temperature increase

Possible causes	Remedy
Pollution	Improve cleaning
Axial fixing incorrect	Re-adjust axial fixing according to temperature situation
Wrong bore tolerance	Replace by sprockets with PLUS tolerance

Rapid wear on sprockets

Possible causes	Remedy
Abrasive conditions	Improve cleaning Use steel sprockets

Please contact technical support at any time in case of doubt.




easy
CONVEYORS
ERS
Roller conveyors
EBS
Belt conveyors
ETS
Mat top conveyors
EMBS
Table top conveyors
EMCS
Modular belt conveyors

METAALUNIE CONDITIONS

General Terms and Conditions issued by Koninklijke Metaalunie (the Dutch organization for small and medium-sized enterprises in the metal industry), referred to as the METAALUNIE TERMS AND CONDITIONS, filed at the Registry of the Rotterdam District Court on 1 January 2014. Issued by Koninklijke Metaalunie, P.O. Box 2600, 3430 GA Nieuwegein, the Netherlands. © Koninklijke Metaalunie

Article 1: Applicability

1.1. These Terms and Conditions apply to all offers made by members of Koninklijke Metaalunie, all agreements they conclude and all agreements that may result therefrom, all this in so far as the Metaalunie member is offeror or supplier.

1.2. A Metaalunie member using these Terms and Conditions is referred to as the Contractor. The other party is referred to as the Client.

1.3. In the event of any conflict between the substance of the agreement concluded between the Contractor and the Client and these Terms and Conditions, the provisions of the agreement will prevail.

1.4. These Terms and Conditions may only be used by Metaalunie members.

Article 2: Offers

2.1. All offers are without obligation.

2.2. If the Client provides the Contractor with data, drawings and the like, the Contractor may rely on their accuracy and completeness and will base its offer on the same.

2.3. The prices stated in the offer are based on delivery ex works, Contractor's place of establishment, in accordance with the Incoterms 2010. Prices are exclusive of VAT and packaging.

2.4. If the Client does not accept the Contractor's offer, the Contractor is entitled to charge the Client for all costs incurred by the Contractor in making the offer to the Client.

Article 3: Intellectual property rights

3.1. Unless otherwise agreed in writing, the Contractor retains the copyright and all industrial property rights in the offers made by it and in the designs, pictures, drawings, models (including trial models), software and the like provided by it.

3.2. The rights in the data referred to in paragraph 1 of this article will remain the property of the Contractor irrespective of whether the costs of their production have been charged to the Client. These data may not be copied, used or shown to third parties without the Contractor's prior express written consent. The Client will owe the Contractor an immediately payable penalty of € 25,000 for each breach of this provision. This penalty may be claimed in addition to damages pursuant to the law. 2

3.3. On the Contractor's first demand, the Client must return the data provided to it as referred to in paragraph 1 of this Article within the time limit set by the Contractor. Upon breach of this provision, the Client will owe the Contractor an immediately payable penalty of € 1,000 per day. This penalty may be claimed in addition to damages pursuant to the law.

Article 4: Advice and information provided

4.1. The Client cannot derive any rights from advice or information it obtains from the Contractor if this does not relate to the assignment.

4.2. If the Client provides the Contractor with data, drawings and the like, the Contractor may rely on their accuracy and completeness in the performance of the agreement.

4.3. The Client indemnifies the Contractor from and against all liability to third parties relating to use of the advice, drawings, calculations, designs, materials, samples, models and the like provided by or on behalf of the Client.

Article 5: Delivery period / performance period

5.1. The delivery period and/or performance period will be set by the Contractor on an approximate basis.

5.2. In setting the delivery period and/or performance period, the Contractor will assume that it will be able to perform the assignment under the conditions known to it at that time.

5.3. The delivery period and/or performance period will only commence once agreement has been reached on all commercial and technical details, all necessary data, final and approved drawings and the like are in the Contractor's possession, the agreed payment or instalment has been received and the necessary conditions for performance of the assignment have been satisfied.

5.4. a. In the event of circumstances that differ from those that were known to the Contractor when it set the delivery period and/or performance period, it may extend the delivery period and/or performance period by such period as it needs to perform the assignment under such circumstances. If the work cannot be incorporated into the Contractor's schedule, it will be performed as soon as the Contractor's schedule so permits.
b. In the event of any contract addition, the delivery period and/or performance period will be extended by such period as the Contractor needs to (cause to) supply the materials and parts for such work and to perform the contract addition. If the contract addition cannot be incorporated into the Contractor's schedule, the work will be performed as soon as the Contractor's schedule so permits.
c. If the Contractor suspends its obligations, the delivery period and/or performance period will be extended by the duration of the suspension. If the continuation of the work cannot be incorporated into the Contractor's schedule, the work will be performed as soon as the Contractor's schedule so permits.
d. In the event of inclement weather, the delivery period and/or performance period will be extended by the resulting delay.

5.5 The Client is required to pay all costs incurred by the Contractor as a result of delay affecting the delivery period and/or performance period as referred to in Article 5.4. 3

5.6 If the delivery period and/or performance period is/are exceeded, this will in no event entitle to damages or termination.

Article 6: Transfer of risk

6.1. Delivery will be made ex works, Contractor's place of establishment, in accordance with the Incoterms 2010. The risk attached to the good passes to the Client at the time the Contractor makes the good available to the Client.

6.2. Notwithstanding the provisions in paragraph 1 of this article, the Client and Contractor may agree that the Contractor will arrange for transport. In that event, the risk of storage, loading, transport and unloading will be borne by the Client. The Client may insure itself against these risks.

6.3. In the event of a purchase in which a good is exchanged (inruil) and the Client retains the good to be exchanged pending delivery of the new good, the risk attached to the good to be exchanged remains with the Client until it has placed this good in the possession of the Contractor. If the Client cannot deliver the good to be exchanged in the condition that it was in when the agreement was concluded, the Contractor may terminate the agreement.

Article 7: Price change

7.1. The Contractor may pass on to the Client any increase in costing factors occurring after conclusion of the agreement.

7.2. The Client will be obliged to pay the price increase as referred to in paragraph 1 of this article on any of the occasions below, such at the discretion of the Contractor:
a. upon the occurrence of the price increase;
b. at the same time as payment of the principal sum;
c. on the next agreed payment deadline.

Article 8: Force majeure

8.1. The Contractor is entitled to suspend performance of its obligations if it is temporarily prevented from performing its contractual obligations to the Client due to force majeure.

8.2. Force majeure is understood to mean, inter alia, the circumstance of failure by suppliers, the Contractor's subcontractors or transport companies engaged by the Contractor to perform their obligations or perform them in good time, weather conditions, earthquakes, fire, power failure, loss, theft or destruction of tools or materials, road blocks, strikes or work stoppages and import or trade restrictions.

8.3. If the Contractor's temporary inability to perform lasts for more than six months, it will no longer be entitled to suspend performance. On expiry of this deadline, the Client and the Contractor may terminate the agreement with immediate effect, but only as regards such part of the obligations that has not yet been performed.

8.4. In the event of force majeure where performance is or becomes permanently impossible, both parties are entitled to terminate the agreement with immediate effect as regards such part of the obligations that has not yet been performed.

8.5. The parties will not be entitled to compensation for damage suffered or to be suffered as a result of suspension or termination as referred to in this article.

Article 9: Scope of the work

9.1. The Client must ensure that all licences, exemptions and other administrative decisions necessary to carry out the work are obtained in good time. The Client is required upon the Contractor's first demand to send the Contractor a copy of the documents mentioned above.

9.2. The price of the work does not include:
a. the costs of earthwork, pile driving, cutting, breaking, foundation work, cementing, carpentry, plastering, painting, wallpapering, repair work or other construction work;
b. the costs of connecting gas, water, electricity or other infrastructural facilities;
c. the costs of preventing or limiting damage to any goods present on or near the work site.
d. the costs of removal of materials, building materials or waste;
e. travel and accommodation expenses.

Article 10: Changes to the work

10.1. Changes to the work will in any event result in contract variations work if:
a. the design, specifications or contract documents are changed;
b. the information provided by the Client is not factually accurate;
c. quantities diverge by more than 10% from the estimates.

10.2. Contract additions will be charged on the basis of the pricing factors applicable at the time the contract addition is performed. Contract deductions will be charged on the basis of the pricing factors applicable at the time the agreement was concluded.

10.3. The Client will be obliged to pay the price of the contract addition as referred to in paragraph 1 of this article on any of the occasions below, such at the discretion of the Contractor:
a. when the contract addition arises;
b. at the same time as payment of the principal sum;
c. on the next agreed payment deadline.

10.4. If the sum of the contract deduction exceeds that of the contract addition, in the final settlement the Contractor may charge the Client 10% of the difference. This provision does not apply to contract deductions that result from a request by the Contractor.

Article 11: Performance of the work

11.1. The Client will ensure that the Contractor can carry out its activities without interruption and at the agreed time and that the requisite facilities are made available to it when carrying out its activities, such as:
a. gas, water and electricity;
b. heating;
c. lockable and dry storage space;
d. facilities required pursuant to the Working Conditions Act and Working Conditions Regulations.

11.2. The Client bears the risk of and is liable for any damage connected with loss, theft, burning and damage to goods belonging to the Contractor, the Client and third parties, such as tools, materials intended for the work or material used in the work, that are located on the work site or at another agreed location.

11.3. The Client is obliged to adequately insure itself against the risks referred to in paragraph 2 of this article. In addition, the Client must procure insurance of work-related damage as regards the material to be used. Upon the Contractor first demand, the Client must send it a copy of the relevant insurance policy/policies and proof of payment of the premium. In the event of any damage, the Client is required to report this to its insurer without delay for further processing and settlement.

11.4. If the Client fails to perform its obligations as described in the previous paragraphs and this results in delayed performance of the activities, the activities will be carried out as soon as the Client performs its obligations as yet and the Contractor's schedule so permits. The Client is liable for all damage suffered by the Contractor as a result of the delay.

Article 12: Completion of the work

12.1. The work is deemed to be completed in the following events:
a. when the Client has approved the work;
b. when the work is been taken into commission by the Client. If the Client takes part of the work into commission, that part will be deemed to be completed;
c. if the Contractor notifies the Client in writing that the work has been completed and the Client does not inform it in writing as to whether or not the work is approvedwithin 14 days of such notification having been made;
d. if the Client does not approve the work due to minor defects or missing parts that can be rectified or subsequently delivered within 30 days and that do not prevent the work from being taken into commission.

12.2. If the Client does not approve the work, it is required to inform the Contractor of this in writing, stating reasons. The Client must provide the Contractor with the opportunity to complete the work as yet.

12.3. The Client indemnifies the Contractor from and against any claims by third parties for damage to non-completed parts of the work caused by use of parts of the work that have already been completed.

Article 13: Liability

13.1. In the event of an attributable failure, the Contractor is obliged to perform its contractual obligations as yet.

13.2. The Contractor's obligation to pay damages, irrespective of the legal basis, is limited to damage for which the Contractor is insured under an insurance policy taken out by it or on its behalf, but will never exceed the amount paid out under this insurance in the relevant case.

13.3. If, for any reason whatsoever, the Contractor cannot invoke the limitation in paragraph 2 of this article, the obligation to pay damages will be limited to a maximum of 15% of the total assignment amount (excluding VAT). If the agreement comprises parts or partial deliveries, the obligation to pay damages is limited to a maximum of 15% (excluding VAT) of the assignment amount of that part or that partial delivery.

13.4. The following does not qualify for compensation:
a. consequential loss, including business interruption loss, production loss, loss of profit, transport costs and travel and accommodation expenses. The Client may insure itself against this damage if possible;
b. damage to goods in or under its care, custody or control. Such damage includes damage caused as a result of or during the performance of the work to goods on which work is being performed or to goods situated in the vicinity of the work site. The Client may insure itself against such damage if it so desires;
c. damage caused by the intent or wilful recklessness of agents or non-management employees of the Contractor.

13.5. The Contractor is not liable for damage to material provided by or on behalf of the Client where that damage is the result of improper processing.

13.6. The Client indemnifies the Contractor from and against all claims by third parties on account of product liability as a result of a defect in a product supplied by the Client to a third party and that consisted, entirely or partially, of products and/or materials supplied by the Contractor. The Client is obliged to compensate all damage suffered by the Contractor in this respect, including the full costs of defence.

Article 14: Warranty and other claims

14.1. Unless otherwise agreed in writing, the Contractor warrants the proper execution of the agreed performance for a period of six months after delivery/completion. In the event that a different warranty period is agreed, the other paragraphs of this article are also applicable.

14.2. If the agreed performance was not properly executed, the Contractor will decide whether to properly execute it as yet or to credit the Client for a proportionate part of the invoice amount. If the Contractor chooses to properly execute the performance as yet, it will determine the manner and time of execution itself. If the agreed performance consisted (entirely or partially) of the processing of material provided by the Client, the Client must provide new material at its own risk and expense.

14.3. Parts or materials that are repaired or replaced by the Contractor must be sent to the Contractor by the Client.

14.4. The Client bears the expense of:
a. all costs of transport or dispatch;
b. costs of disassembly and assembly;
c. travel and accommodation expenses.

14.5. The Client must in all cases offer the Contractor the opportunity to remedy any defect or to perform the processing again.

14.6. The Client may only invoke the warranty once it has satisfied all its obligations to the Contractor.

14.7. a. No warranty is given if the defects result from:
- normal wear and tear;
- improper use;
- lack of maintenance or improper maintenance;
- installation, fitting, modification or repair by the Client or third parties;
- defects in or unsuitability of goods originating from, or prescribed by, the Client;
- defects in or unsuitability of materials or auxiliary materials used by the Client.

b. No warranty is given in respect of:
- goods supplied that were not new at the time of delivery;
- the inspection and repair of goods of the Client;
- parts for which a manufacturer's warranty has been provided.

14.8. The provisions of paragraphs 2 to 7 of this article apply mutatis mutandis to any claims by the Client based on breach of contract, non-conformity or on any other basis whatsoever.

14.9. The Client cannot assign any rights under this article.

Article 15: Obligation to complain

15.1. The Client can no longer invoke a defect in performance if it does not make a written complaint to the Contractor in respect thereof within fourteen days of the date it discovered, or should reasonably have discovered, the defect.

15.2. On pain of forfeiture of all rights, the Client must submit complaints regarding the amount invoiced to the Contractor in writing within the payment deadline. If the payment deadline is longer than thirty days, the Client must complain no later than thirty days after the date of the invoice.

Article 16: Failure to take delivery of goods

16.1. Upon expiry of the delivery period and/or performance period, the Client is obliged to take delivery of the good or goods forming the subject of the agreement.

16.2. The Client must lend all cooperation that can be reasonably expected from it to enable the Contractor to make the delivery.

16.3. If the Client does not take delivery of goods, such goods will be stored at the risk and expense of the Client.

16.4. Upon breach of the provisions in paragraphs 1 and/or 2 of this article, the Client will owe the Contractor a penalty of € 250 per day, to a maximum of € 25,000. This penalty may be claimed in addition to damages pursuant to the law.

Article 17: Payment

17.1. Payment will be made at the Contractor's place of establishment or to an account to be designated by the Contractor.

17.2. Unless agreed otherwise, payment will be made as follows:
a. in cash where sale is at the service desk;
b. in the case of payments in instalments:
- 40% of the total price upon assignment;
- 50% of the total price after supply of the material or, if delivery of the material is not included in the assignment, after commencement of the work;
- 10% of the total price upon completion;
c. in all other cases, within thirty days of the date of the invoice.

17.3. If the Client fails to comply with its payment obligation, instead of paying the sum of money agreed it will be obliged to comply with a request by the Contractor for payment in kind (inbetalinggeving).

17.4. The right of the Client to set off or suspend amounts it is owed by the Contractor, save in the event of the Contractor's bankruptcy or if statutory debt rescheduling applies to the Contractor.

17.5. Irrespective of whether the Contractor has fully executed the agreed performance, everything that is or will be owed to it by the Client under the agreement is immediately due and payable if:
a. a deadline for payment has been exceeded;
b. an application has been made for the Client's bankruptcy or suspension of payments;
c. attachment is levied on the Client's goods or claims;
d. the Client (a company) is dissolved or wound up.
e. the Client (a natural person) requests to be admitted to statutory debt rescheduling, is placed under guardianship or dies.

17.6 If payment is not made within the agreed payment deadline, the Client will immediately owe interest to the Contractor. The interest rate is 12% per annum, but is equal to the statutory interest rate if the latter rate is higher. When calculating interest, part of a month is regarded as a whole month.

17.7 The Contractor is authorised to set off its debts to the Client with amounts owed by the Client to companies affiliated with the Contractor. In addition, the Contractor is authorised to set off amounts owed to it by the Client with debts to the Client of companies affiliated with the Contractor. Further, the Contractor is authorised to set off its debts to the Client with amounts owed to the Contractor by companies affiliated with the Client. Affiliated companies are understood to mean the companies belonging to the same group, within the meaning of Article 2:24b Dutch Civil Code, and participating interests within the meaning of Article 2:24c Dutch Civil Code.

17.8 If payment is not made within the agreed payment deadline, the Client will owe the Contractor all extrajudicial costs, with a minimum of € 75. These costs will be calculated on the basis of the following table (principal sum plus interest):
on the first € 3,000 15%
on any additional amount up to € 6,000 10%
on any additional amount up to € 15,000 8%
on any additional amount up to € 60,000 5%
on any additional amount from € 60,000 3%
The extrajudicial costs actually incurred will be owed if these are higher than they would be according to the above calculation.

17.9 If judgment is rendered in favour of the Contractor in legal proceedings, all costs that it has incurred in relation to these proceedings will be borne by the Client.

Article 18: Security

18.1. Irrespective of the agreed payment conditions, upon the first demand of the Contractor the Client is obliged to provide such security for payment as the Contractor deems sufficient. If the Client does not comply with such demand within the period set, it will immediately be in default. In that event, the Contractor is entitled to terminate the agreement and to recover its damage from the Client.

18.2. The Contractor will retain ownership of any goods delivered as long as the Client:
a. fails or will fail in the performance of its obligations under this agreement or other agreements;
b. has not paid debts that have arisen due to non-performance of the aforementioned agreements, such as damage, penalties, interest and costs.

18.3. As long the goods delivered are subject to retention of title, the Client may not encumber or alienate the same other than in the ordinary course of its business.

18.4. Once the Contractor has invoked its retention of title, it may take possession of the goods delivered. The Client will lend its full cooperation to this end.

18.5. The Contractor has a right of pledge and a right of retention in respect of all goods that are or will be held by it for any reason whatsoever and for all claims it has or might acquire against the Client in respect of anyone seeking their surrender.

18.6. If, after the goods have been delivered to the Client by the Contractor in accordance with the agreement, the Client has met its obligations, the retention of title will be revived with regard to such goods if the Client does not meet its obligations under any agreement subsequently concluded.

Article 19: Termination of the Agreement

If the Client wishes to terminate the agreement without the Contractor being in default, and the Contractor agrees to this, the agreement will be terminated by mutual consent. In that case, the Contractor is entitled to compensation for all financial loss, such as loss suffered, loss of profit and costs incurred.

Article 20: Applicable law and competent court

20.1. Dutch law applies.

20.2. The Vienna Sales Convention (C.I.S.G.) does not apply, nor do any other international regulations the exclusion of which is permitted.

20.3. Disputes will be heard exclusively by the Dutch civil court with jurisdiction over the Contractor's place of establishment, unless this is contrary to mandatory law. The Contractor may deviate from this rule of jurisdiction and apply the statutory rules of jurisdiction.

EASY CONVEYORS

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