engineering handbook

SIDEWALL®

Introduction

“Sidewall is born of the experience of three Italian companies, which put in a network their history, their skills, their men believing that produce a good belt is a mission.
All the belts’ components are produced in Italy with first class raw materials regularly tested in our internal laboratories.
Three production lines, with a manufacturing capacity of about 150m per day, are able to grant flexibility and promptness in deliveries to satisfy the demand of today’s international markets.
Our team of specialists can also support you with a complete after-sale service, which includes assembly, start-up and belt’s vulcanization on plant, if required.
Our commercial and technical staff is at your full disposal for any explanation and/or information you may need.”

Sidewall® conveyor belts

Sidewall® corrugated steep angle conveyor belts consist of a cross stabilized base belt, corrugated sidewalls and cleats.
Sidewall® conveyor belts are the most efficient and reliable system for bulk material steep angle or vertical conveying and they are used in several industries:

- **Steel plants**
- **Mines**
- **Cement plant**
- **Foundries**
- **Batching plants**
- **Power plants**
- **Tunneling**
- **Recycling and waste industries**
- **Sand, gravel and stone quarries**

Main Advantges of the system

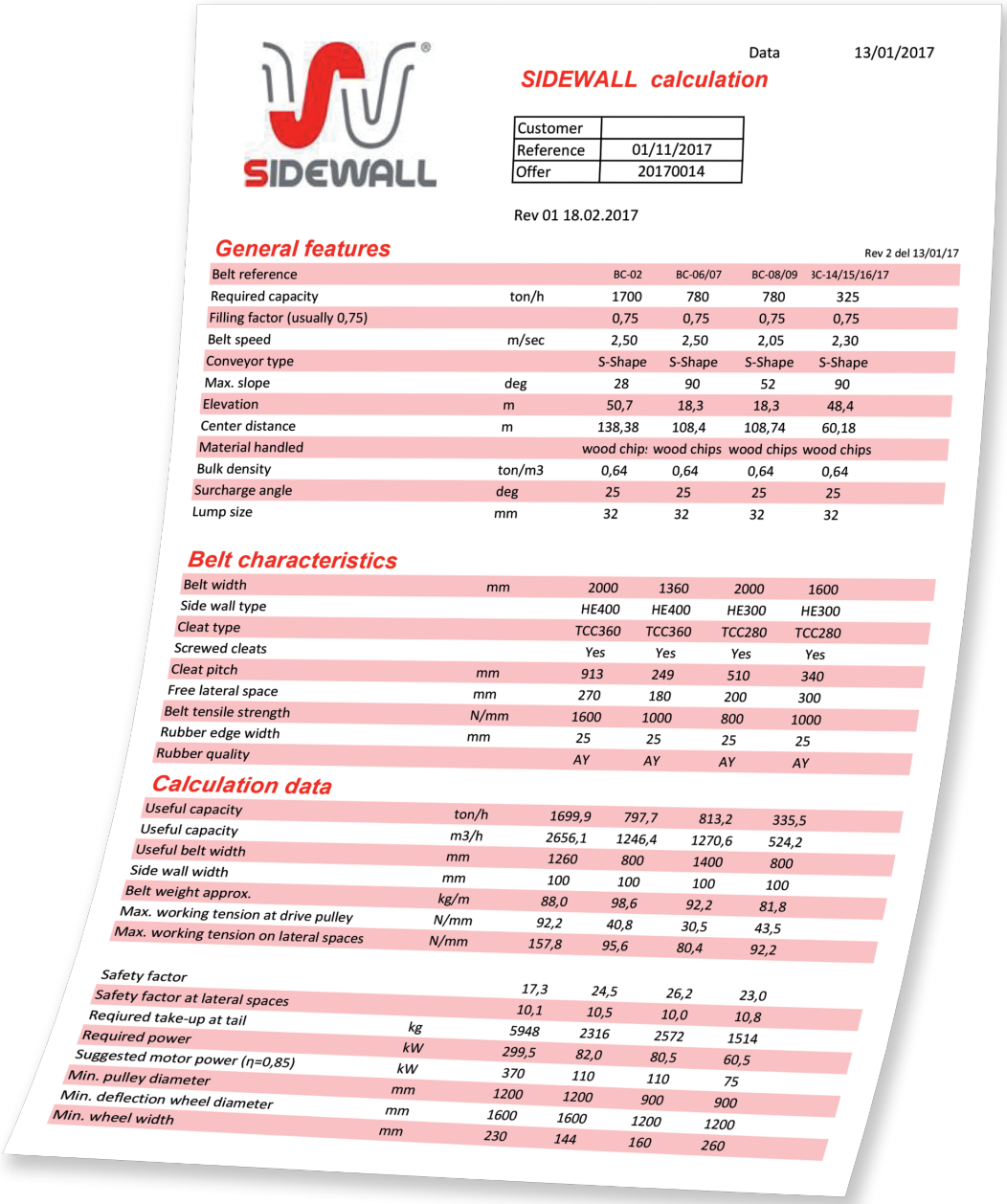
Sidewall conveyor belt system has many advantages if compared with conventional belt conveyors, bucket elevators or mechanical elevators:

- **No Transfer Points from the feed hopper to the discharge point**
- **Higher handling capacity**
- **No material spillage**
- **Minimum maintenance**
- **Minimum horizontal occupation**
- **Low Power Requirement**

Lifespan of a corrugated sidewall conveyor belt mainly depends on the connection between the profiles (sidewalls and cleats) and the base belt.
Sidewall hot vulcanization system and exclusive profiles design ensure the highest, strongest and most reliable adhesion in the market.

Sidewall® belt design

Our Technical team can support you in designing the right belt to fit your needs.
In order to set correct Sidewall® belt dimensions, specific geometrical formulas have to be used based on speed, elevation, slope, center distance and coveyed material.
In particular pay attention to free lateral spaces working tension and relative safety factor; take also care of possible cleats interference during the belt loading.



Data 13/01/2017

SIDEWALL calculation

Customer	
Reference	01/11/2017
Offer	20170014

Rev 01 18.02.2017

General features

Rev 2 del 13/01/17

Belt reference		BC-02	BC-06/07	BC-08/09	BC-14/15/16/17
Required capacity	ton/h	1700	780	780	325
Filling factor (usually 0,75)		0,75	0,75	0,75	0,75
Belt speed	m/sec	2,50	2,50	2,05	2,30
Conveyor type		S-Shape	S-Shape	S-Shape	S-Shape
Max. slope	deg	28	90	52	90
Elevation	m	50,7	18,3	18,3	48,4
Center distance	m	138,38	108,4	108,74	60,18
Material handled		wood chip:	wood chips	wood chips	wood chips
Bulk density	ton/m3	0,64	0,64	0,64	0,64
Surcharge angle	deg	25	25	25	25
Lump size	mm	32	32	32	32

Belt characteristics

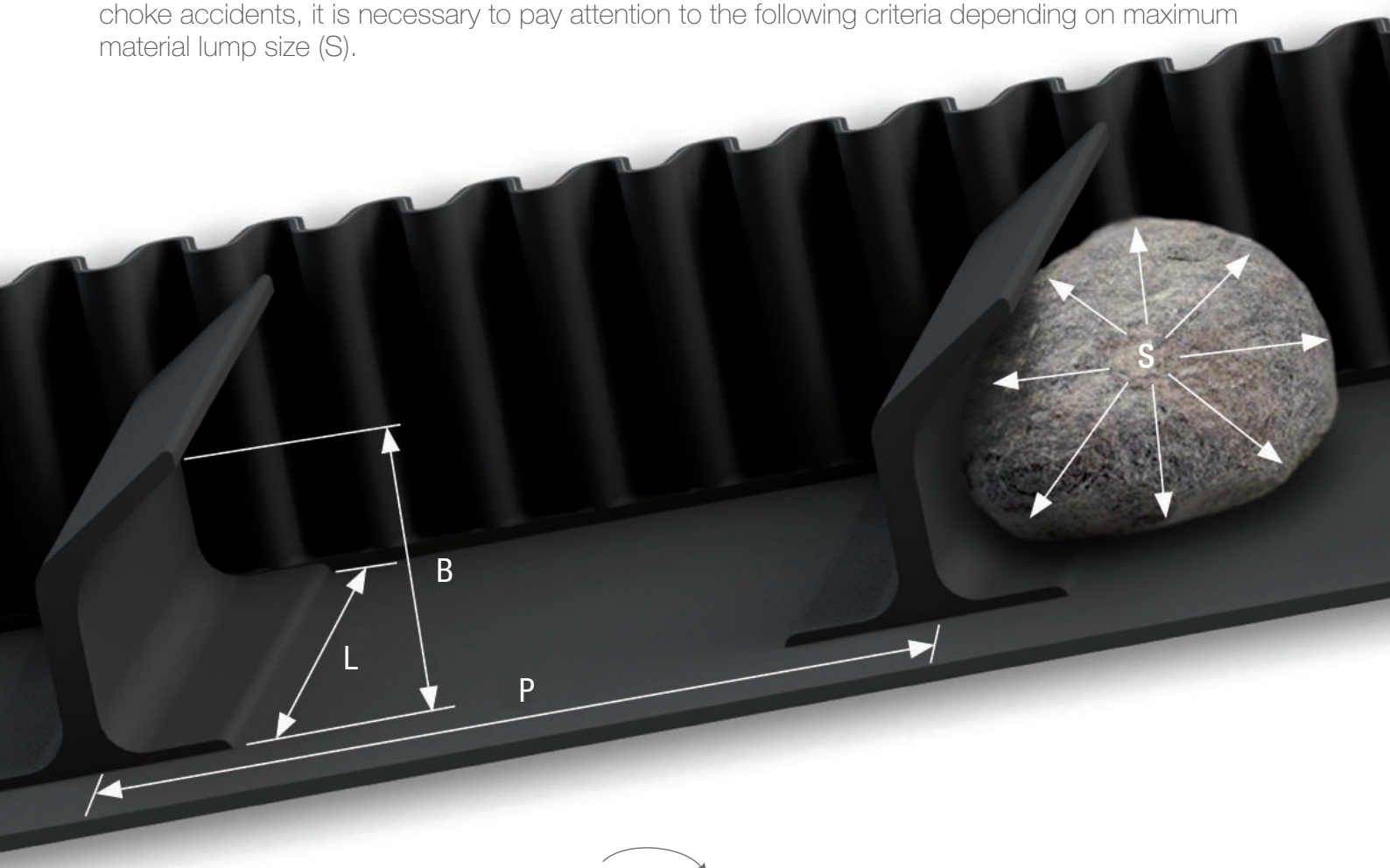
Belt width	mm	2000	1360	2000	1600
Side wall type		HE400	HE400	HE300	HE300
Cleat type		TCC360	TCC360	TCC280	TCC280
Screwed cleats		Yes	Yes	Yes	Yes
Cleat pitch	mm	913	249	510	340
Free lateral space	mm	270	180	200	300
Belt tensile strength	N/mm	1600	1000	800	1000
Rubber edge width	mm	25	25	25	25
Rubber quality		AY	AY	AY	AY

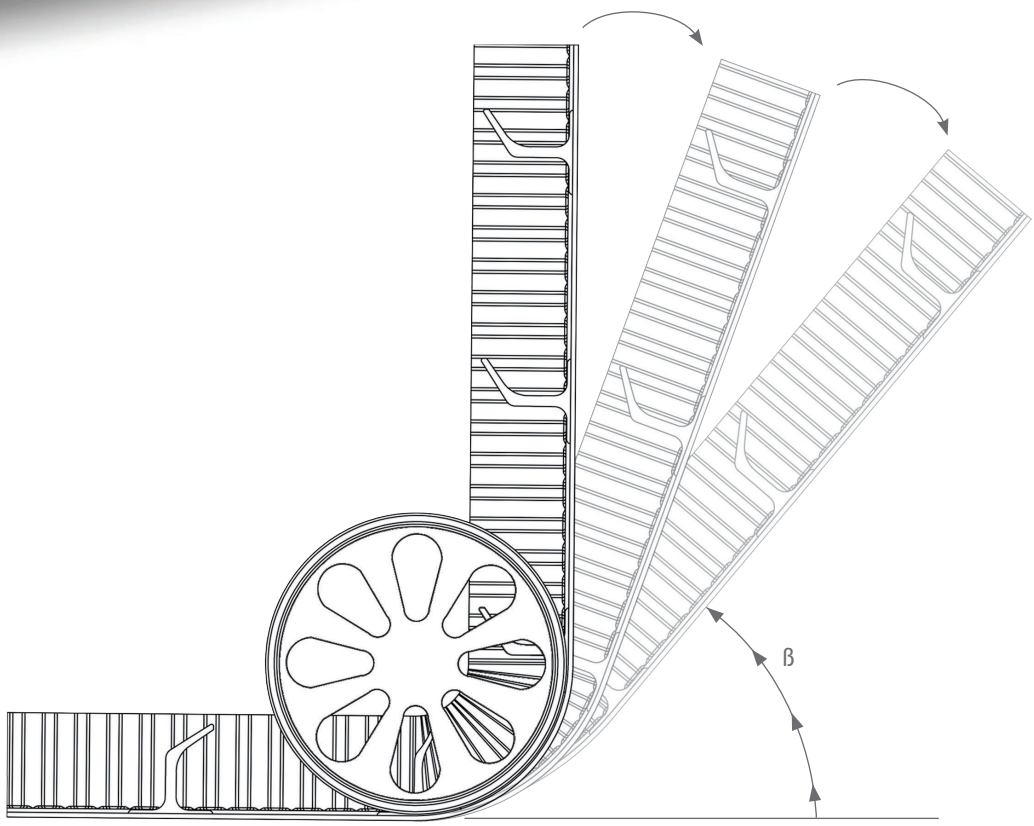
Calculation data

Useful capacity	ton/h	1699,9	797,7	813,2	335,5
Useful capacity	m3/h	2656,1	1246,4	1270,6	524,2
Useful belt width	mm	1260	800	1400	800
Side wall width	mm	100	100	100	100
Belt weight approx.	kg/m	88,0	98,6	92,2	81,8
Max. working tension at drive pulley	N/mm	92,2	40,8	30,5	43,5
Max. working tension on lateral spaces	N/mm	157,8	95,6	80,4	92,2
Safety factor		17,3	24,5	26,2	23,0
Safety factor at lateral spaces		10,1	10,5	10,0	10,8
Reqiured take-up at tail	kg	5948	2316	2572	1514
Required power	kW	299,5	82,0	80,5	60,5
Suggested motor power (η=0,85)	kW	370	110	110	75
Min. pulley diameter	mm	1200	1200	900	900
Min. deflection wheel diameter	mm	1600	1600	1200	1200
Min. wheel width	mm	230	144	160	260

Sidewall® belt design

The material lump size is also important in belt designing.
With the aim to avoid the spillage or projection of material during the transportation or possible choke accidents, it is necessary to pay attention to the following criteria depending on maximum material lump size (S).

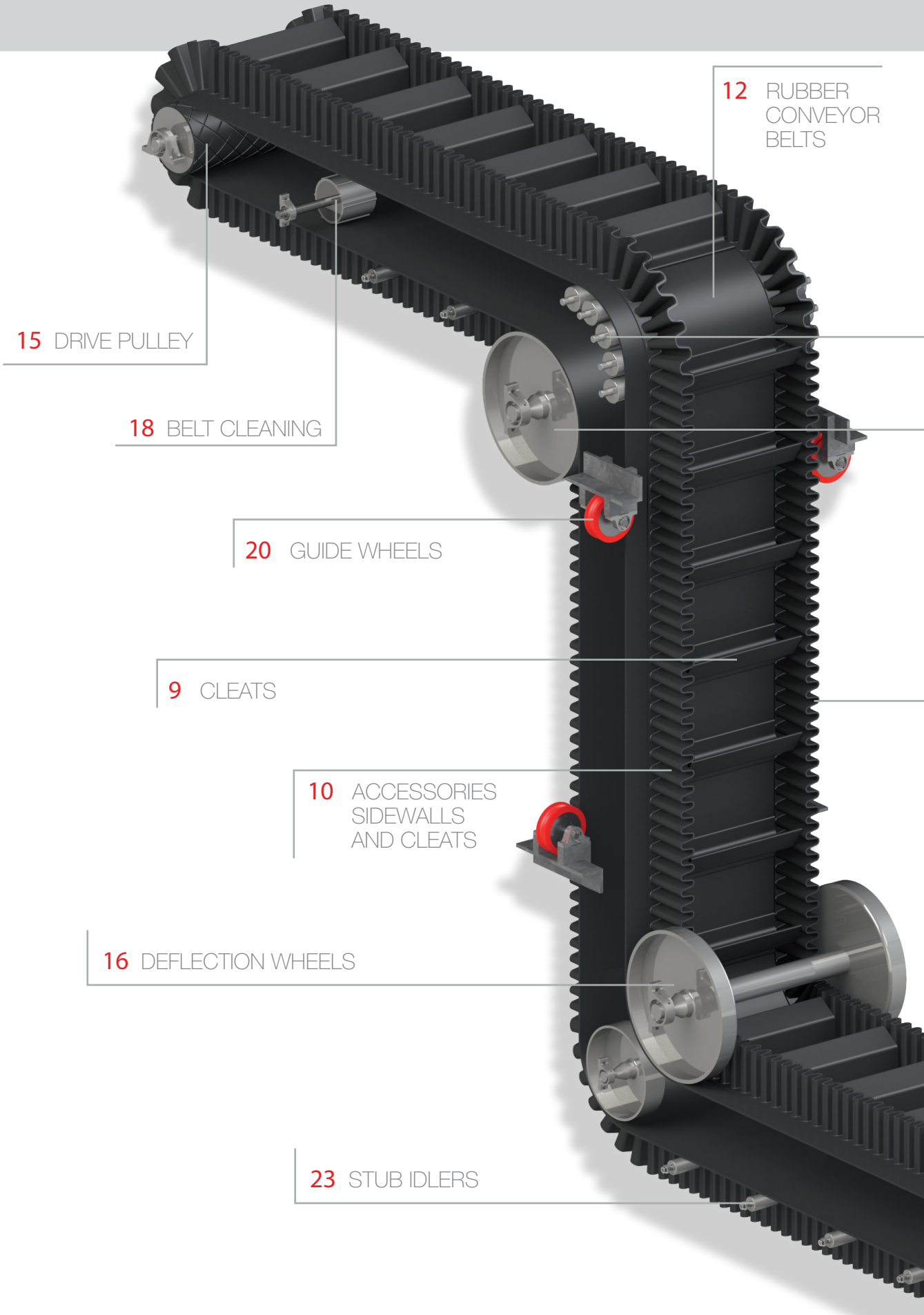




$$L = 2{,}3 \times S$$

$$P = 1{,}8 \times S$$

$$B = S \times \left(\frac{ß}{100} + 0{,}6 \right)$$


12 RUBBER CONVEYOR BELTS
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9 CLEATS
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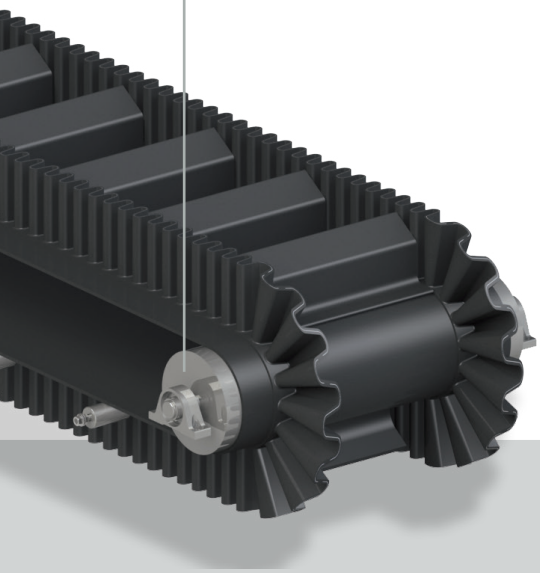
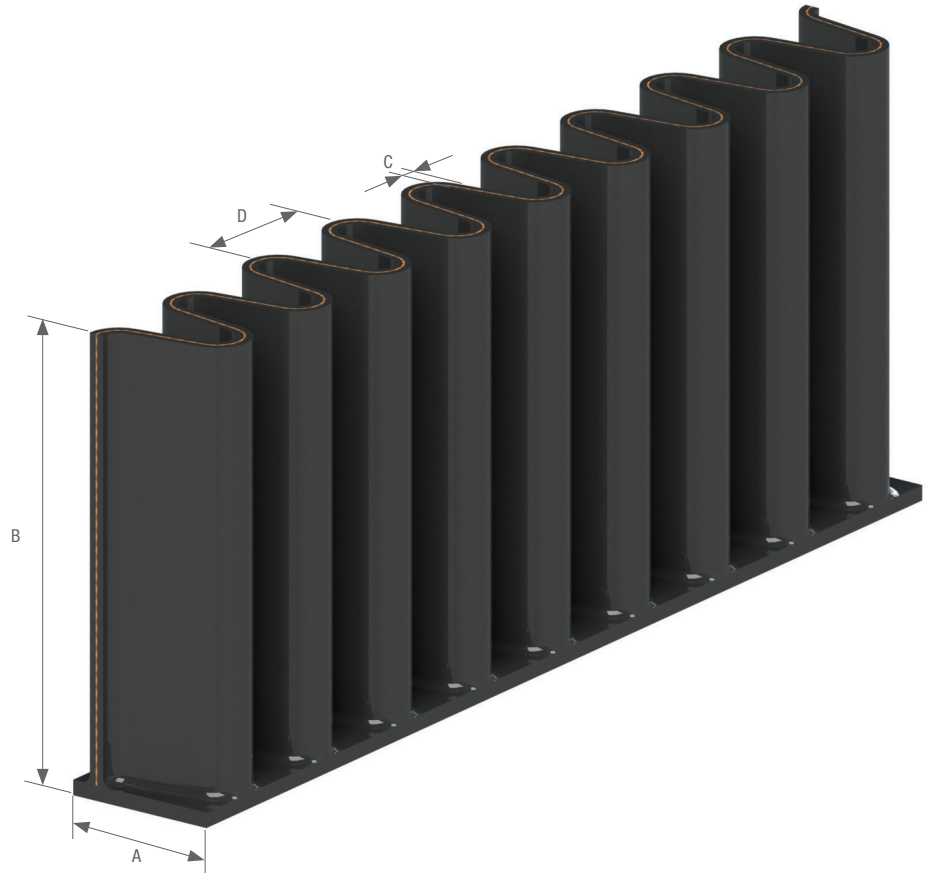


Sidewalls



article code	HEF fabric	HEL no fabric	A	B	C	D	weight	Ø pulley	Ø deflection
			mm	mm	mm	mm	Kg/m	mm	mm
40/30	-	√	30	40	5	25	0,5	-	-
40/50	√	√	50	40	6	50	0,8	250	280
60	√	√	50	60	6	50	1,2	250	280
80	√	√	50	80	6	50	1,4	280	315
100	√	-	50	100	6	50	1,6	360	480
120	√	-	50	120	6	50	2,2	360	480
160	√	-	70	160	6	55	3,7	480	640
200	√	-	80	200	8	65	5	600	800
240	√	-	80	240	8	65	6	720	960
300	√	-	100	300	9	90	8,2	900	1200
160/75	√	-	75	160	9	60	4,6	480	640
200/75	√	-	75	200	9	60	5,6	600	800
240/75	√	-	75	240	9	60	6,6	720	960
250/75	√	-	75	250	9	60	7	750	1000
280/75	√	-	75	280	9	60	7,8	900	1200
300/75	√	-	75	300	9	60	8,3	900	1200
400	√	-	100	400	12	83	18,7	1200	1600
500	√	-	100	500	12	83	23,7	1500	2000

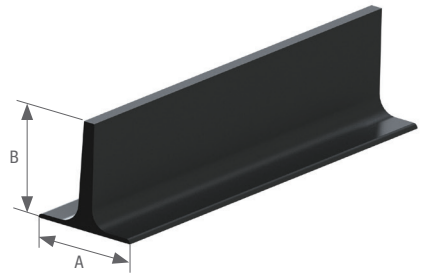
How to compose the article code

HBF	TC	140	FRK

- HBF → With or with out fabric reinforcement
- TC → Cleats shape
- FRK → Rubber quality (p.11)
- 140 → Profile height

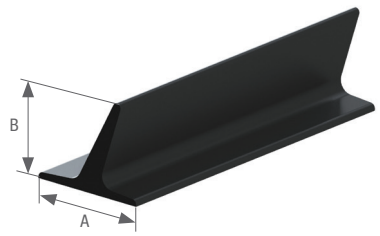
Cleats

T



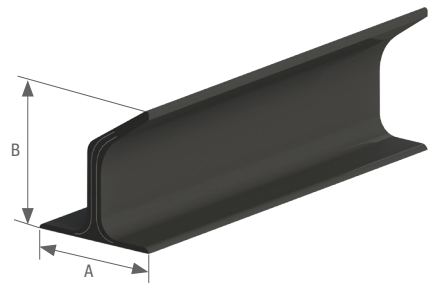
article code	HBL no fabric	HBF fabric	A mm	B mm	weight Kg/m
T20	√	-	40	20	0,2
TB30	√	-	80	30	1,1
TB40	√	-	80	40	1,2
TB50	√	-	100	50	2,3
T55	√	-	80	55	0,9
T75	√	√	100	75	1,6
T90	√	√	110	90	2,4
T110	√	√	110	110	3,0
T140	√	√	110	140	3,6
T180	√	√	150	180	4,7

C



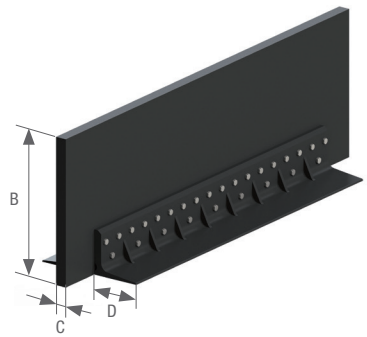
article code	HBL no fabric	HBF fabric	A mm	B mm	weight Kg/m
C55	√	-	90	55	1,2
C75	√	-	90	75	2,0
C110	√	√	110	110	2,7

TC



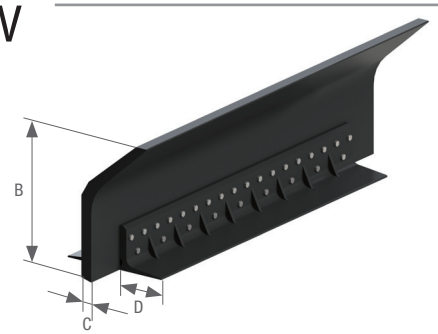
article code	HBL no fabric	HBF fabric	A mm	B mm	weight Kg/m
HBL-TC70	√	√	70	70	1,24
HBL-TC90	√	√	110	90	2,7
HBL-TC110	√	√	110	110	3,0
HBL-TC140	√	√	140	140	4,3
HBL-TC180	√	√	170	180	6,3
HBL-TC220	√	√	175	220	7,4
HBL-TC230	-	√	175	230	7,8
HBL-TC240	-	√	175	240	8,2
HBL-TC250	-	√	175	250	8,5
HBL-TC260	-	√	175	260	8,7
HBL-TC280	-	√	190	280	11,9

TW



article code	HBL no fabric	HBF fabric	B mm	C mm	D mm
TW280	-	√	280	30	99
TW360	-	√	360	30	99
TW380	-	√	380	30	99
TW480	-	√	480	30	99

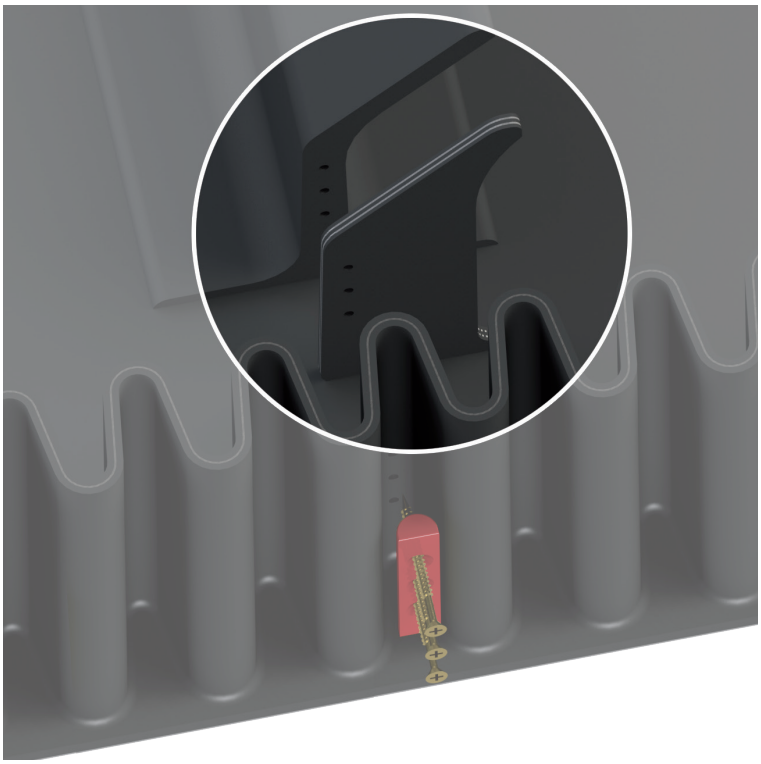
TCW



article code	HBL no fabric	HBF fabric	A mm	B mm	C mm	D mm
TCW280	-	√	228	280	30	99
TCW360	-	√	228	360	30	99
TCW380	-	√	228	380	30	99
TCW480	-	√	228	480	30	99

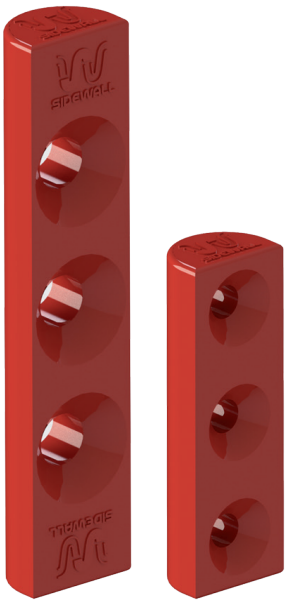
Sidewalls and cleats accessories

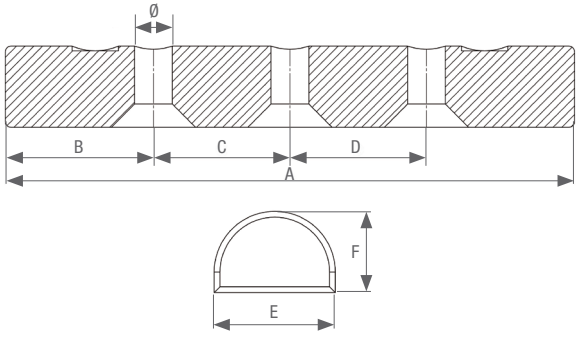
BLINKERS



article code	cleat reference
BLK-70	HBF-TC70
BLK-110	HBF-TC110
BLK-140	HBF-TC140
BLK-180	HBF-TC180
BLK-220	HBF-TC220
BLK-280	HBF-TC280
BLK-360	HBF-TCW360
BLK-380	HBF-TCW380
BLK-480	HBF-TCW480
BLK-580	HBF-TCW580
BLK-600	HBF-TCW600

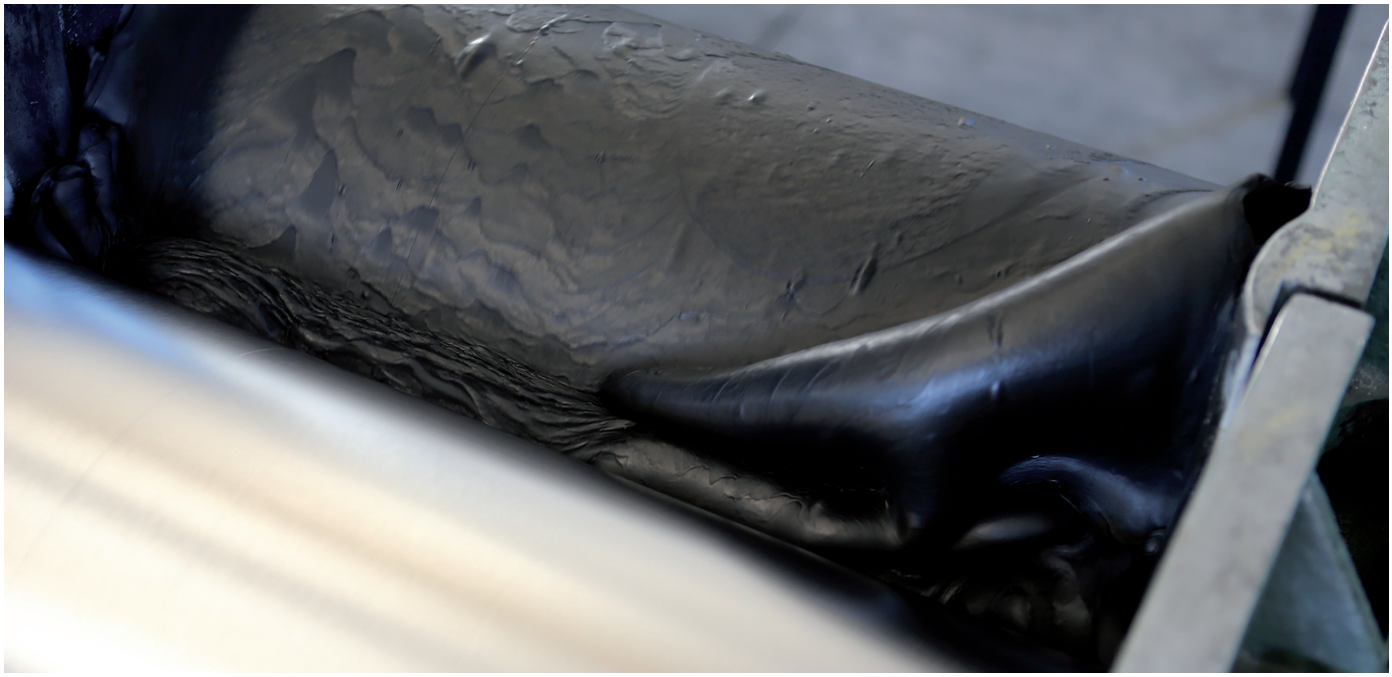
FIX





article code	A	B	C	D	E	F	Ø
	mm	mm	mm	mm	mm	mm	mm
FIX-S	55	8,5	19	19	18	12,5	5,5
FIX-B	98	25,5	23,5	23,5	20,8	13,9	6,5

Rubber quality



Abrasion Resistant:

AY Standard abrasion-resistant rubber (Y Grade - DIN 22102 / RMA II).
Working Temperature range -20 +60°C.
AW Extra abrasion-resistant and Cold resistant rubber (W grade - DIN 22102 / RMA I).
Working Temperature range -50 +60°C.

Heat Resistant:

HR130 Heat resistant rubber for continuous service up to 130°C with peaks of 150°C
HR150 Heat resistant rubber for continuous service up to 150°C with peaks of 180°C

Oil Resistant:

OR Oil and grease resistant rubber.
This rubber guarantees a good belt resistance against the chemically aggressive effects due to the transport of materials with moderate oil presence, like corn, fertilizers and solid urban waste materials.
Working Temperature range -20 +60°C.

Self Extinguish:

FRK Self-extinguish rubber according ISO 340, equivalent Grade K DIN 22102.
Working Temperature range -20 +60°.

Self Extinguish and Oil Resistant:

ORK Mild Oil resistant, Self-extinguish rubber according ISO 340, equivalent Grade K DIN 22102.
This rubber guarantees a good belt resistance against the chemically aggressive effects due to the transport of materials with moderate oil presence, like corn, fertilizers and solid urban waste materials.
Working Temperature range -20 +60°.

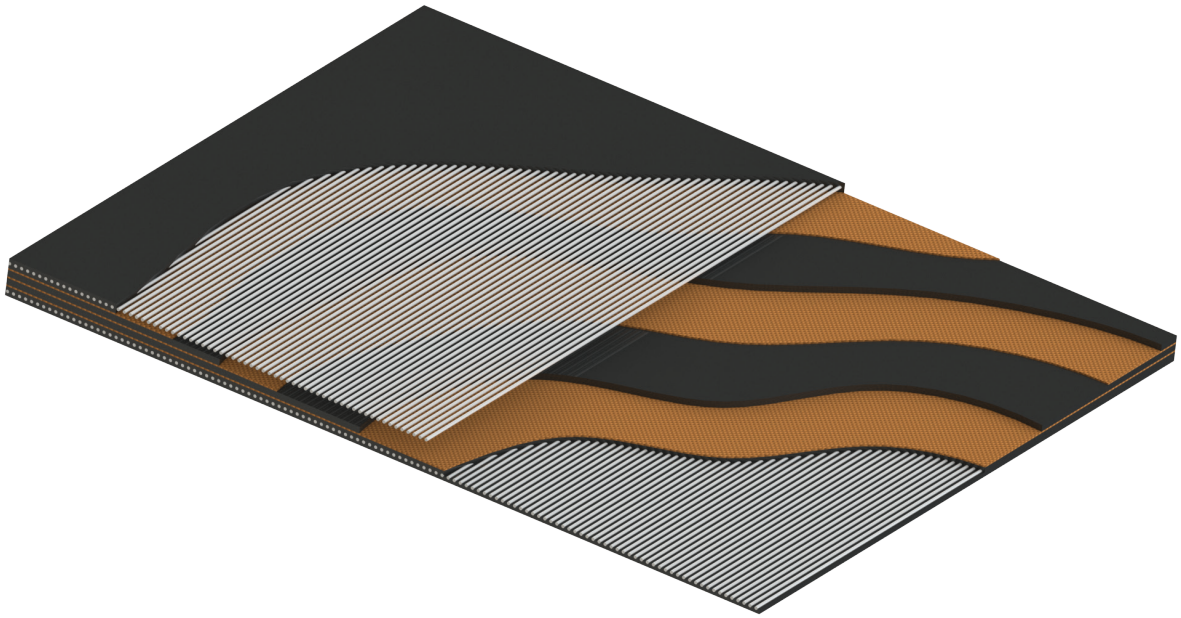
All compounds are antistatic according to ISO284 and ozone resistant.

Rubber conveyor belts

One of the most important characteristics of sidewall belts for high inclined and vertical systems is the use of base conveyor belts with cross stabilized insertions.
Sidewall conveyor belts are characterized by elevation changes from horizontal to inclined and/or vertical, and in the return strand, they are held up only on the free lateral spaces.
These deflection and support zones require a very rigid and stiff belt.
These cross stabilized base belts are then a fundamental component of sidewall belts;
since they are manufactured with a huge range of rubber compounds, they can meet any conveying exigency.

TEXRIGID

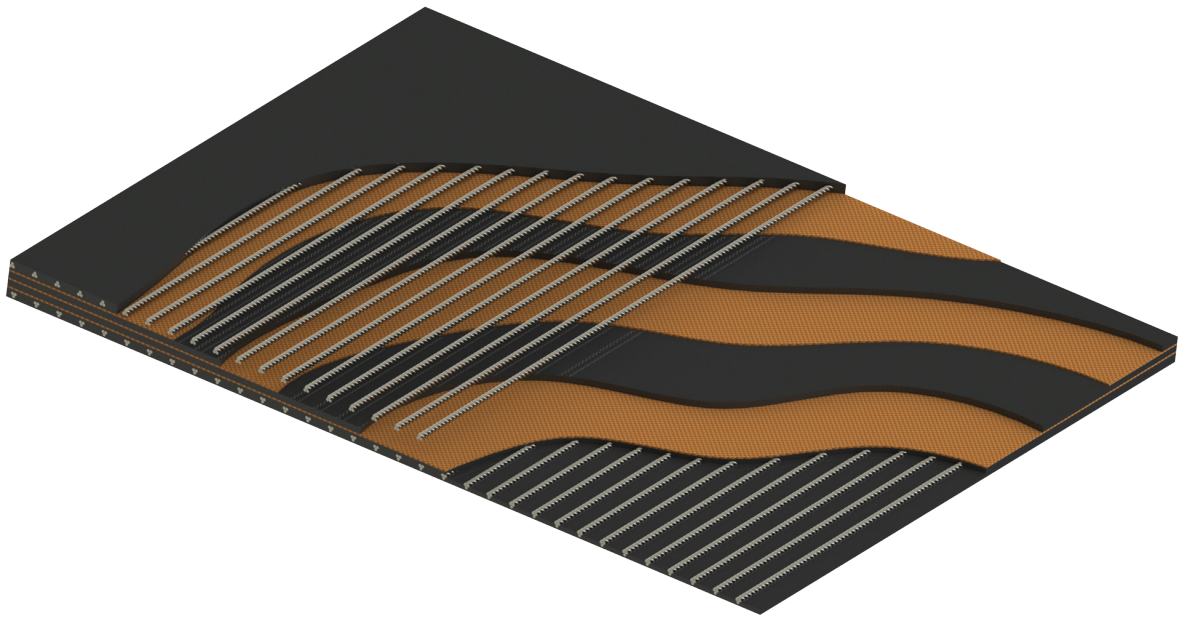
Texrigid is a cross stabilized belt based on textile carcass EP type (Polyester - Polyamid) with two layers of rigid fabrics made of Polyester. Texrigid Belts are suitable for medium - heavy applications.
Different tensile strengths and/or cover thickness are available on demand.
In the table below you can find some standard types.



article code	tensile strength	fabrics	cover	Ø min. pulley
	N/mm	n.	mm	mm
TEXRIGID 315	315	2 + 1	3 + 1,5	250
TEXRIGID 500	500	3 + 2	5 + 3	400
TEXRIGID 630	630	4 + 2	5 + 3	500
TEXRIGID 800	800	5 + 2	5 + 3	630
TEXRIGID 1000	1000	5 + 2 / 6 + 2	5 + 3	800
TEXRIGID 1250	1250	5 + 2	5 + 3	800
TEXRIGID 1600	1600	5 + 2	5 + 3	1000

CROSSRIGID

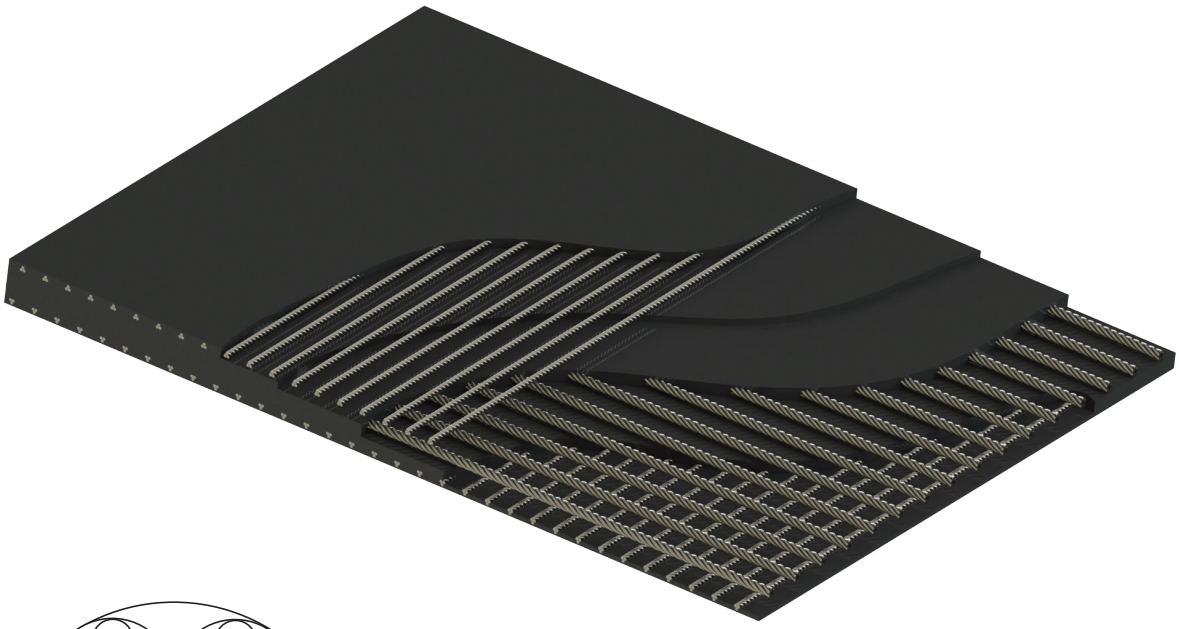
Crossrigid Belts are based on textile carcass EP (Polyester - Polyamide) with stiff steel cord inserts assuring stability and rigidity of the belt also for long center distances and high elevations.
Different tensile strengths and/or cover thickness are available on demand. In the table below you can find some standard types.

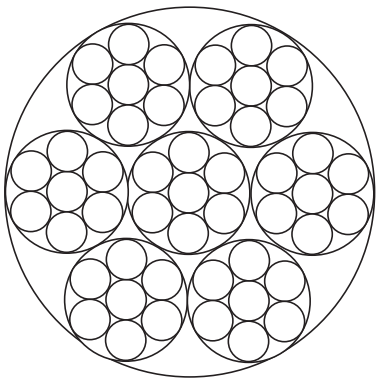


article code	tensile strength	fabrics	cover	Ø min. pulley
	N/mm	n.	mm	mm
CROSSRIGID 500	500	3 + 2	5 + 3	400
CROSSRIGID 630	630	4 + 2	5 + 3	500
CROSSRIGID 800	800	5 + 2	5 + 3	630
CROSSRIGID 1000	1000	5 + 2 / 6 + 2	5 + 3	800
CROSSRIGID 1250	1250	5 + 2	5 + 3	800
CROSSRIGID 1600	1600	5 + 2	5 + 3	1000

CROSSRIGID HR

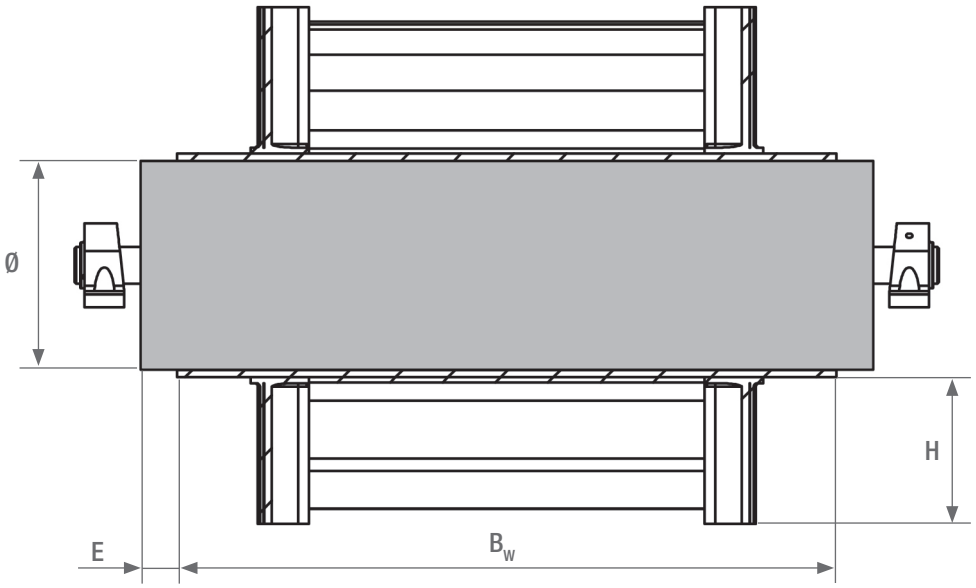
Steel cord belts with high transversal rigidity and minimum longitudinal elongation. The rigid reinforcement can be tailor made to obtain the required transversal rigidity, especially with very heavy application and with high elevations.
Crossrigid HR is also available with free zone under the sidewall base.
Belts made on demand and under specific design.





article code	tensile strength	min. cover thickness	Ø min. pulley
	N/mm	mm	mm
CROSSRIGID HR 1000	1000	6 + 4	630
CROSSRIGID HR 1250	1250	6 + 4	800
CROSSRIGID HR 1600	1600	6 + 4	800
CROSSRIGID HR 2000	2000	6 + 4	800
CROSSRIGID HR 2500	2500	6 + 4	1000
CROSSRIGID HR 3150	3150	6 + 4	1250
CROSSRIGID HR 3500	3500	6 + 4	1250

Drive and tail pulley



B_w	E
	mm
400 <-> 700	50
700 <-> 1400	75
1400 <-> 2000	100
2000 <-> 2400	125

Drive Pulley

In most cases the discharge pulley is also the drive drum.
The pulley is normally fixed after installation and requires no adjustment.
For most applications the pulley face is rubber coated.
However, it is not advisable to crown the pulley when you use Crossrigid or Crossrigid HR belts, damage may result to the base belt, please contact the Sidewall technical department in case of doubt.

SIDEWALL height	Ø pulley
mm	mm
40/30	-
40/50	250
60	250
80	280
100	360
120	360
160	480
200	600
240	720
300	900
250/75	750
280/75	900
300/75	900
400	1200
500	1500
600	1800
630	1900

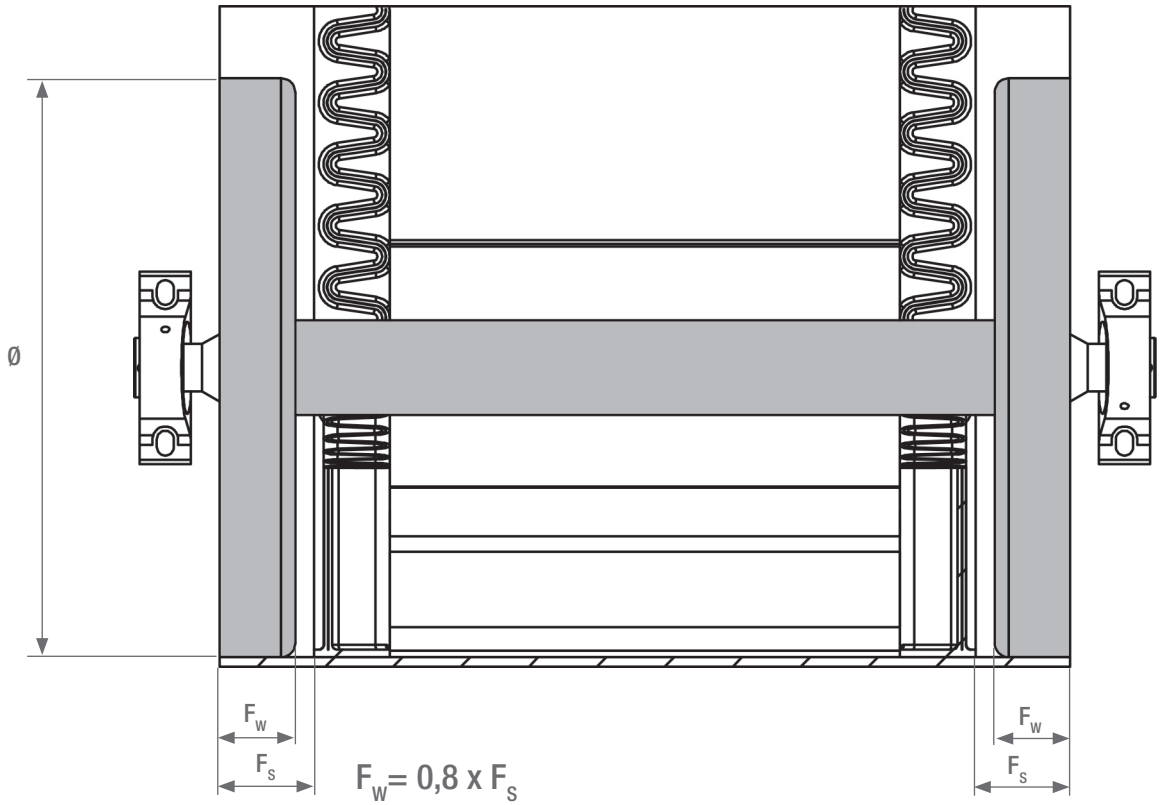
Tail Pulley

The tail pulley is also the tensioning drum, tension normally being applied via screw take-up or counterweight depending on the plant dimensions and service heaviness.
When calculating the amount of take-up please take into account that the maximum stretch of a belt will be 1.5%, plus an amount for safety.

Notes

The above pulley diameters are based on sidewall height.
Larger pulley diameters may be required depending on the tensile strength of the base belt.

Deflection wheels



The general formula to calculate the deflection wheel diameter is 4 x H where H = sidewall height.

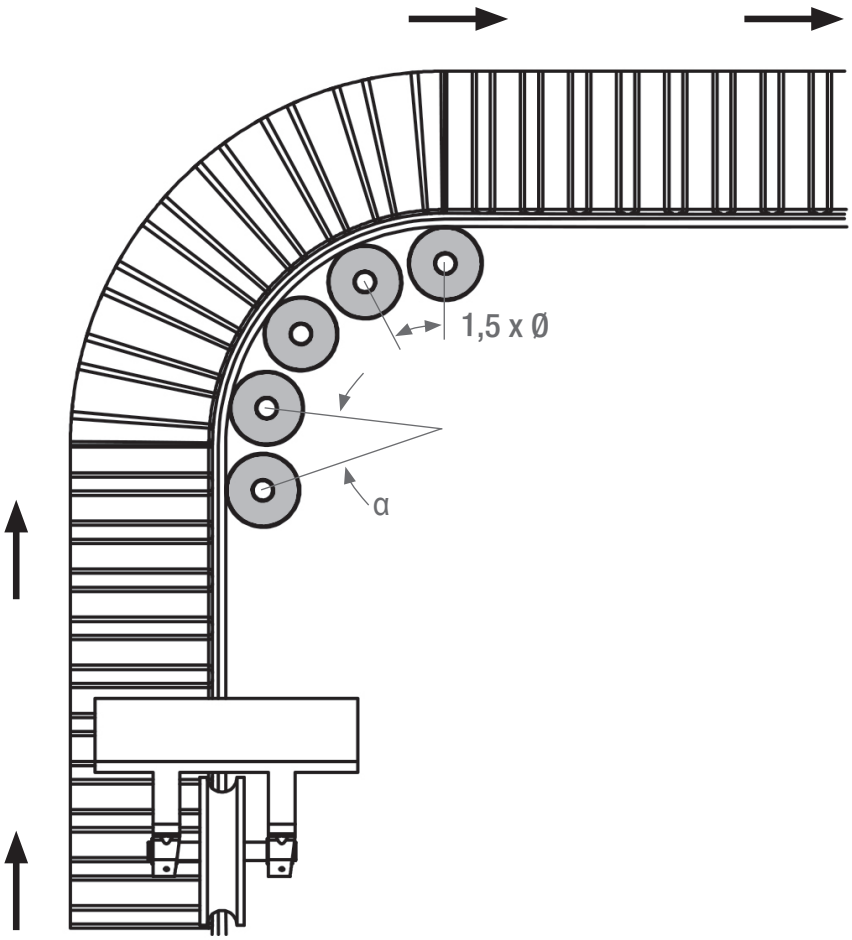
Consideration should be given to material lump size and cleat pitch to ensure a big enough radius to prevent pinching the material in the curve.

Dimension Fw shown above is normally the minimum value and it can vary according to the required belt support.

Allowances must be made for clearance between the deflection system and the sidewalls.

SIDEWALL height	Ø deflection
mm	mm
40/30	-
40/50	280
60	280
80	315
100	480
120	480
160	640
200	800
240	960
300	1200
250/75	1000
280/75	1200
300/75	1200
400	1600
500	2000
600	2400
630	2500

Top deflection curve



The change in angle can be achieved either by a series of idlers positioned as per the sketch or by a single pulley. The minimum recommended idlers diameters for the corresponding sidewall heights are as follows.

The amount of deflection "α" for each idler depends on the Sidewall type as follows:

Type HEL: Max 15°

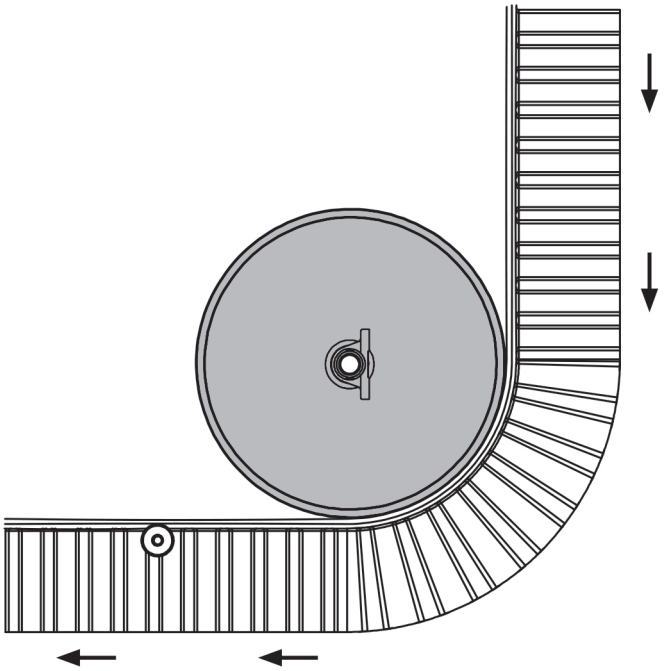
Type HEF: Max 10°

In addition the maximum pitch of the idlers is set at 1.5 x D where D = Idler Diameter.

The radius is determined by the belt speed and by the method of deflection, angle of inclination, friction value of the material and the profile type/height. The idler shaft diameter must also take into account radial loadings and may therefore need to be increased accordingly. On installations with high lifts it may be necessary to install small pulleys with external bearings.

SIDEWALL height	Ø
mm	mm
40/30	60
40/50	60
60	60
80	89
100	89
120	89
160	108
200	108
240	108
300	133
250/75	133
280/75	133
300/75	133
400	please ask
500	please ask
600	please ask
630	please ask

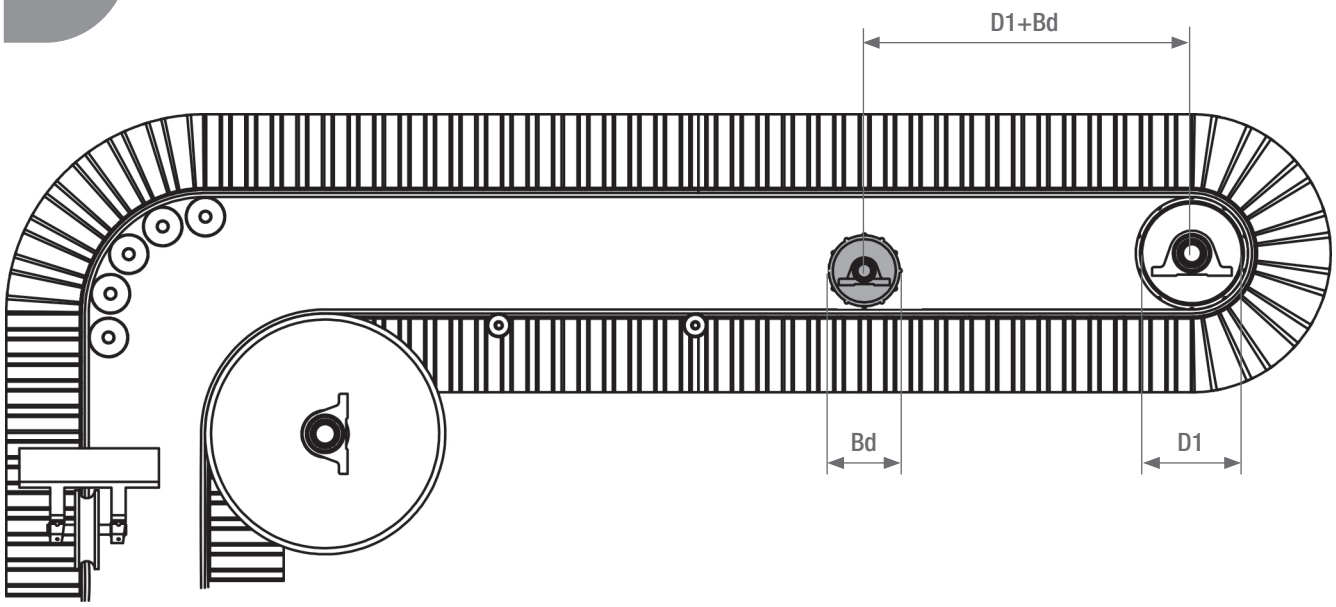
Bottom deflection curve



At bottom deflection curve a single drum system is the advisable.
The drum may be rubber lagged for better frictional contact with the base belt aiding belt alignment at this point.
For Crossrigid and Crossrigid HR belts the drum must be flat without any crown.
The diameter of the drum is the same as the recommended minimum pulley diameters for the drive and tail pulleys.

Note
The system needs to be adjustable to allow for belt tracking, please see the section on belt tracking (page 22).

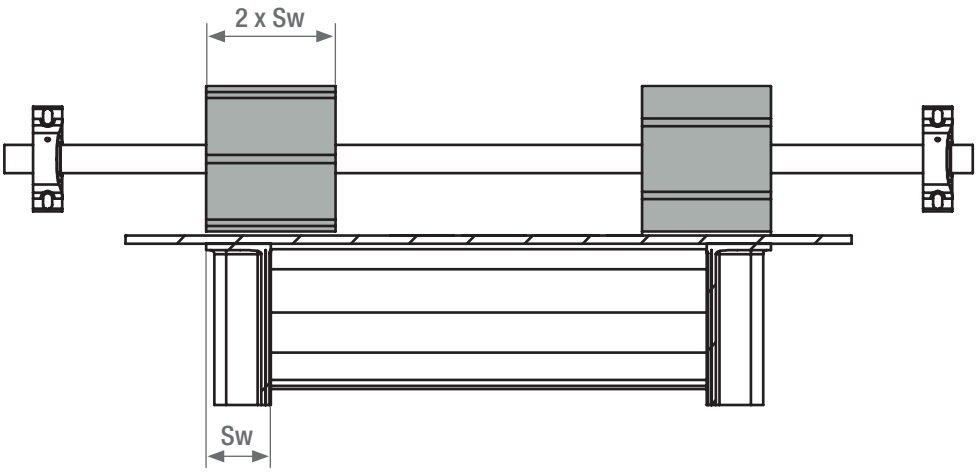
Belt cleaning

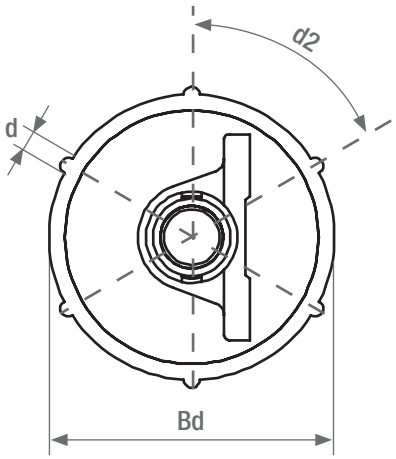


Sidewall® Conveyor Belts have self cleaning properties, but in case of sticky materials, the assistance of a cleaning device will be required.
Sidewall® Shake Rolls must be positioned at discharge point as per above drawing.

Note
The actual position of the discharge hopper will depend on the length of the horizontal section, it may also be necessary to install additional support. Please consult our technical department for advice on the hopper design.

Shake roll





Bd	d2	d
	°	mm
315	6 x 60°	20
500	6 x 60°	25

Note

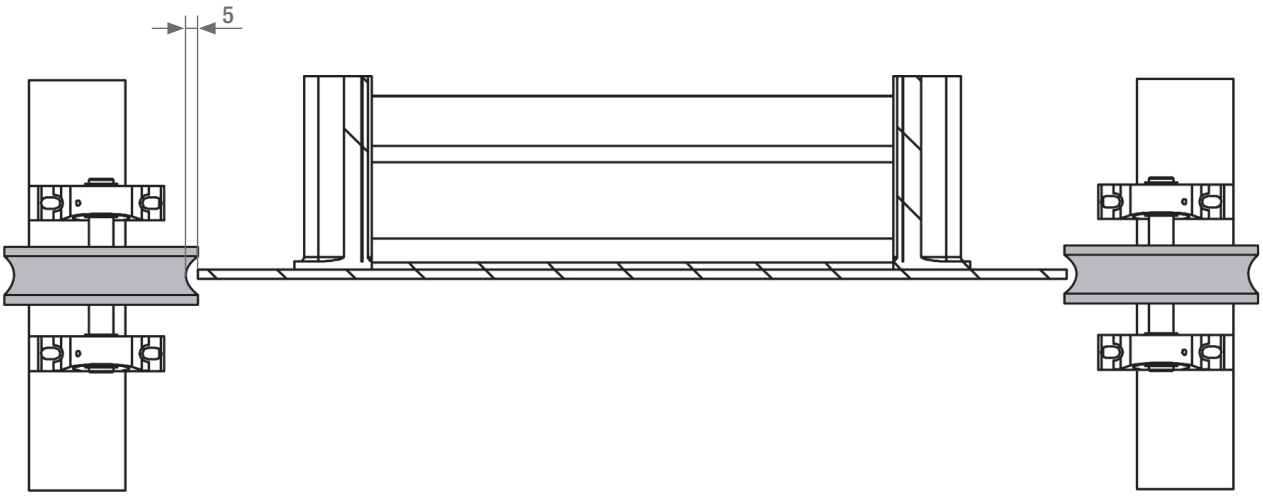
Drums are positioned so that the outer face is directly above the Sidewall outer edge.

The dimension Bd is one size below the installed drum diameter.

The steel rods (d2) must be made of hardened steel, when installing it is very important that the rods (d) are off-set. The system works at the best with belt speed over 1 m/sec.

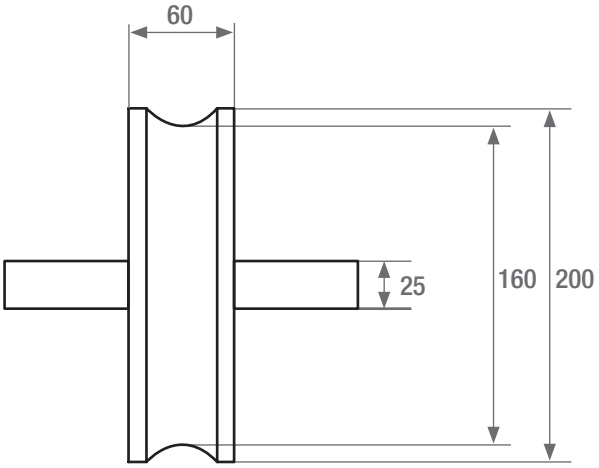
For particularly sticky material we recommend to adopt a par (Tandem) unit.

Guide Wheels



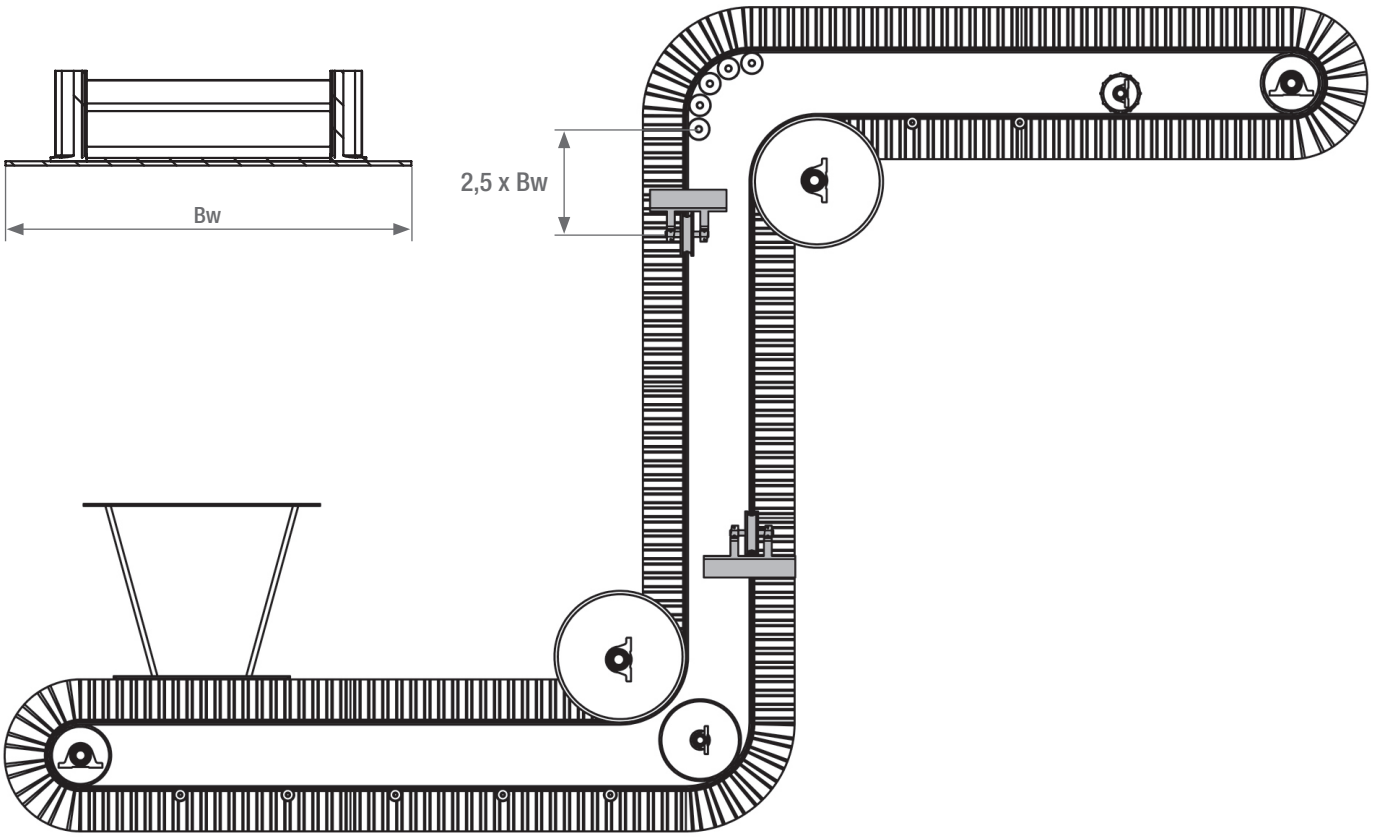
Sidewall® Guide Wheels can be used with all cross-rigid belt constructions.
The hollow sections inside the wheels allow for compression of the guiding wheel thus protecting the edges of the belt.
The wheels are made of polyurethane ensuring self cleaning properties.
The wheels are also available in heat resistant and self extinguish rubber.

These wheels are highly recommended and ensure a high degree of security in both normal and diffcult applications.



Typical cross-section of a belt showing the correct positioning of the Guide Wheels.

Guide Wheels

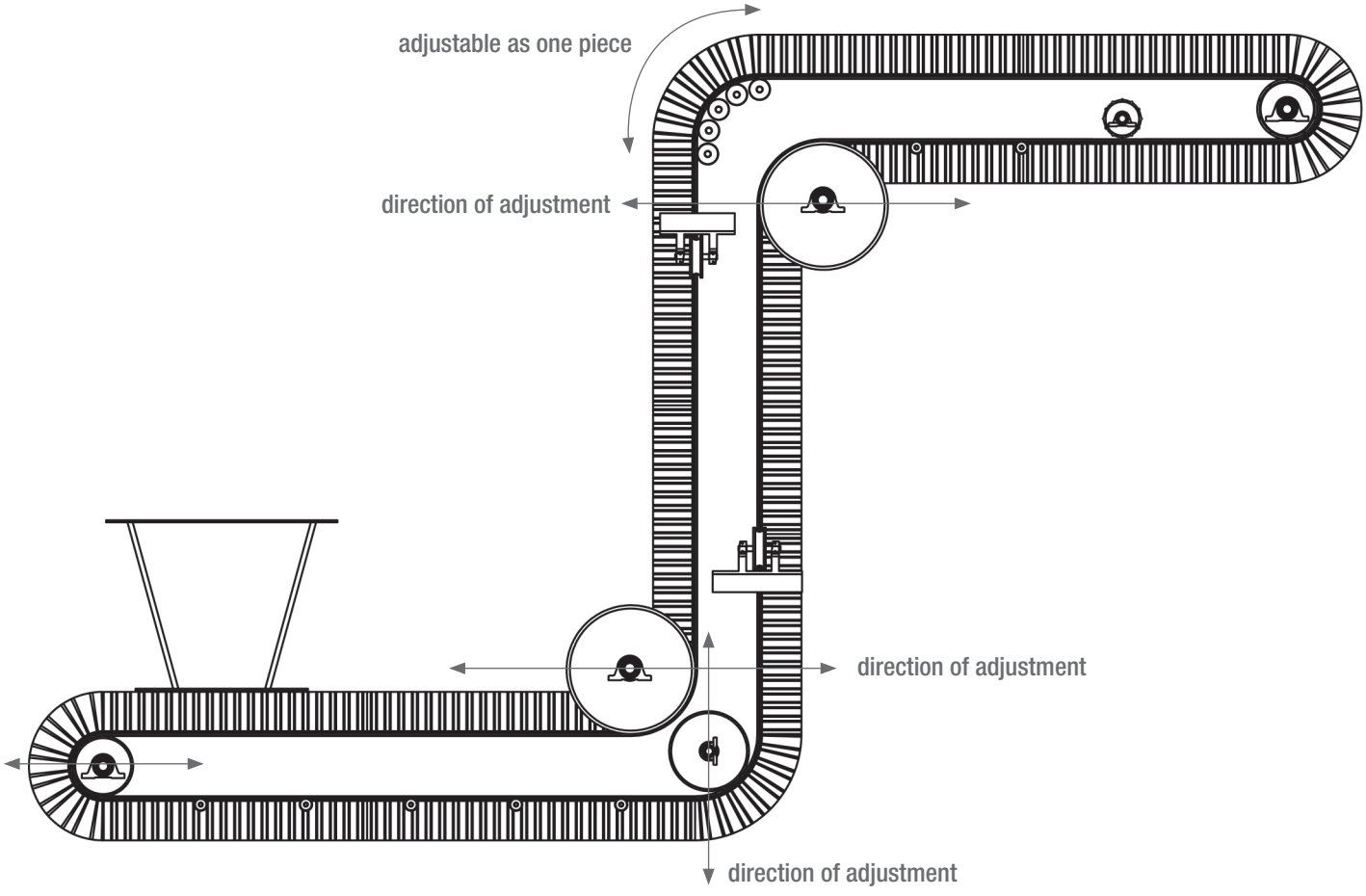


The positioning of the Guide Wheels is important. By placing the guiding system in the recommended places potential damage to the belt edges and sidewalls is eliminated. It is recommended that the fixing of the Guide Wheel shafts be adjustable of +/– 50 mm.
The dimension of 2.5 x Bw is an approximation and can be varied between 2 and 3 times belt width.
For a better belt tracking, in case of elevation higher than 20 m, placing extra wheels is advisable In case of doubt please contact our technical service.

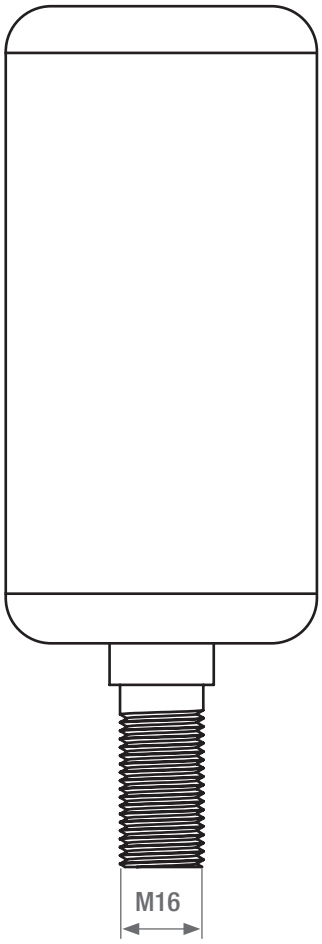
Note
The belt should always track correctly, the Guide Wheels are used to prevent damage, for maximum life the belt needs to be checked for straight running regularly.

Belt tracking

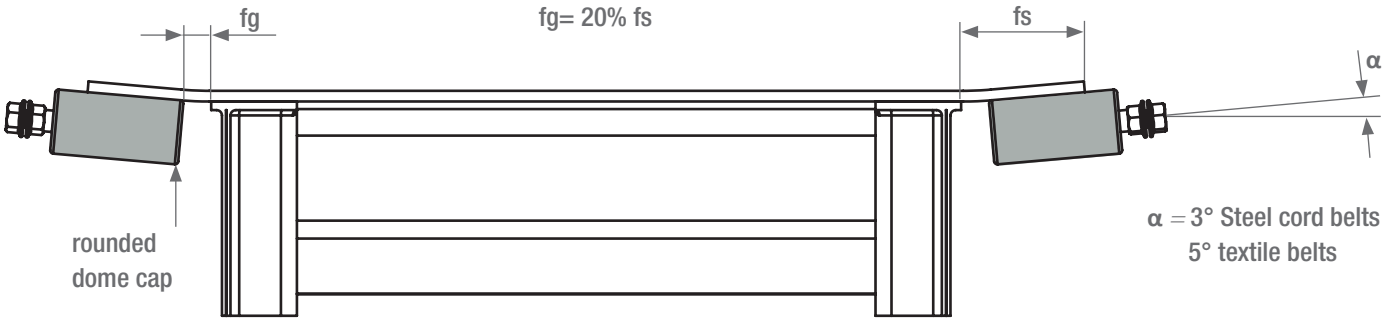
The Guide Wheels are used to prevent damage, for maximum life the belt needs to be regularly checked so that it should always track correctly and straight running.
Please check the below drawing in order to verify all possible adjustment.



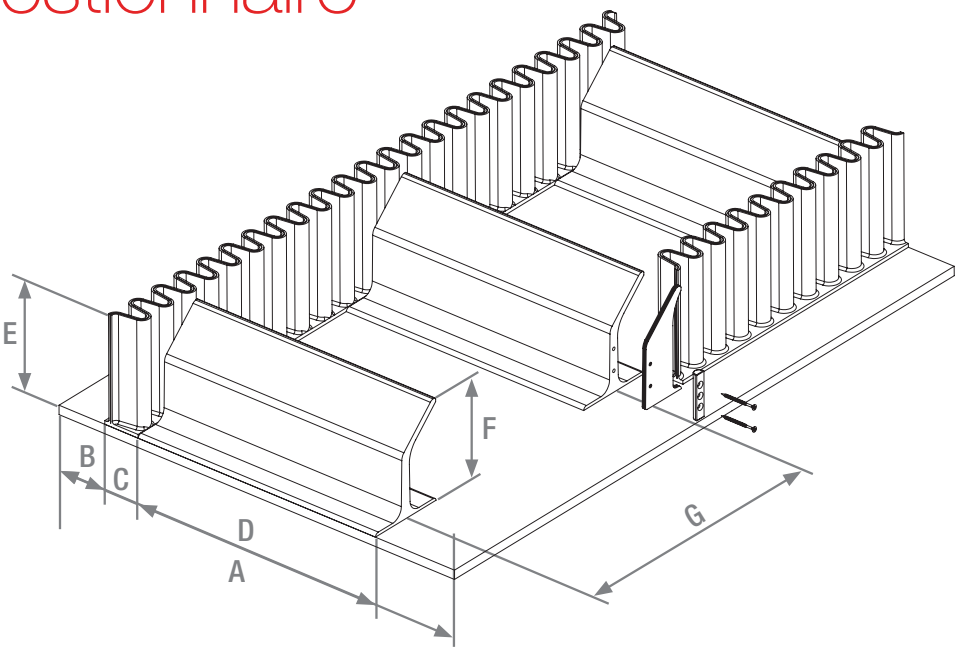
Stub idlers



Stub idlers are mainly used on return side.
By setting the idlers at 3° or 5° (depending on belt construction) belt tracking is assisted.
It is important that only stub idlers with rounded dome end caps are used and are slot mounted for adjustment.
The pitch of the stub idlers on the return side is max 1000mm.



Questionnaire



Customer

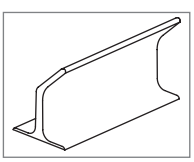
Reference	
Mail	
Quantity	

Belt dimensions

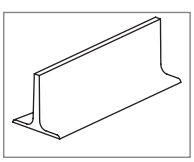
	u.m.	value
A	mm	
B	mm	
C	mm	
D	mm	
E	mm	
F	mm	
G	mm	

	u.m.	value
Belt length	mm	
Fix		☐ yes ☐ no
Blinkers		☐ yes ☐ no
Endless closed		☐ yes ☐ no
Endless prepared		☐ one side ☐ no

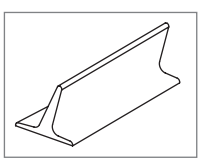
☐ Cleat "TC"



☐ Cleat "T"



☐ Cleat "C"



Notes

Technical remarks

Belts

	u.m.	value
Base belt		
Rubber quality		

Material

	u.m.	value
Materials to be conveyed		
Bulk density		
Lump size	mm	
Temperature	C°	

Capacity

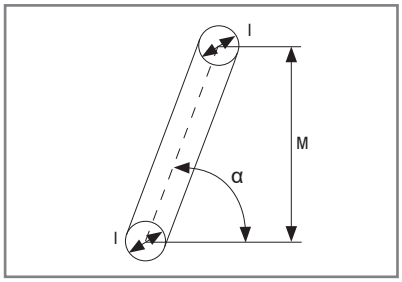
	u.m.	value
Mass flow	t/h	
Volume flow	m^3/h	

	u.m.	value
Moisture	%	
Oil presence	☐ yes	☐ no
Chemicals presence	☐ yes	☐ no

System dimensions

	u.m.	value
Installation	☐ existing	☐ new
Belt speed	m/min	
H	mm	
I	mm	
L	mm	
M	mm	
N	mm	
α	°	
$ß_1$	°	
$ß_2$	°	

☐



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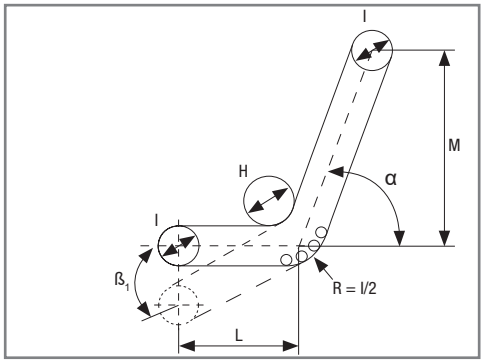

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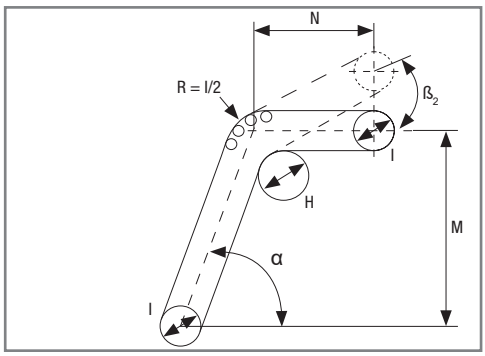

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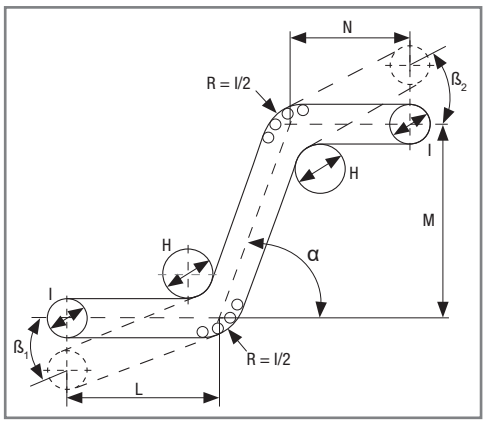

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Thanks for your interest

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