S-Wall™ Sidewall Conveyor Belting

Technical Manual

The definitive technical guide to steep angle conveying utilising the S-Wall™ corrugated Sidewall Conveyor Belt

Features

System Analysis
Full Product Details
Conveyor Design Criteria
Installation Procedures
Splicing Details
Tracking Guide + Maintenance Guide

PHOENIX
Extreme Conveyor Belt Solutions

Introduction

Since 1984 Specialised Belting Supplies, SBS, has been committed to the development of the Sidewall Conveyor Belt System. The launch of S-Wall™ represents the latest developments in steep angle conveying using the Sidewall Conveyor Belt System.

This new brochure contains our current technical data on both components and conveyor design. The brochure is produced in loose-leaf format so that we may keep you up to date with the latest developments, if you need more detailed information than that shown here please contact our technical sales department.

S-Wall™ is the latest generation of Sidewall Conveyor Belts, following a considerable investment programme we now produce the profiles at our new dedicated factory in Thetford, Norfolk, England. The design of the new profiles and the equipment used in the production is of the highest technical standards. New revised polyester fabrics used in our range of cross-stabilised base belts mean higher rigidity values with very low elongation and newly developed rubber compounds for our Sidewalls and Cleats ensure they can withstand the high stresses imposed in high capacity steep angle conveying.

The Sidewalls are produced from a high elasticity and high strength rubber compound and offer excellent flexibility and therefore maximum flexing. The use of diagonal fabric for the reinforcement within the Sidewalls ensures maximum elongation of the fabric at the flexing points as well as increasing tensile strength, again increasing the life of the Sidewall The assembly lines for complete belts has also received new investments for maximum quality standards and higher productivity. The recently installed computer controlled roughening machine can precisely roughe the base belt automatically and to an exact depth, important in ensuring maximum bond strengths.

We hope that you find this brochure of interest and can find the information you require, whether it's for loose profiles or design criteria for a new installation. If you have any doubts or would like more information please contact our sales or technical departments for assistance.

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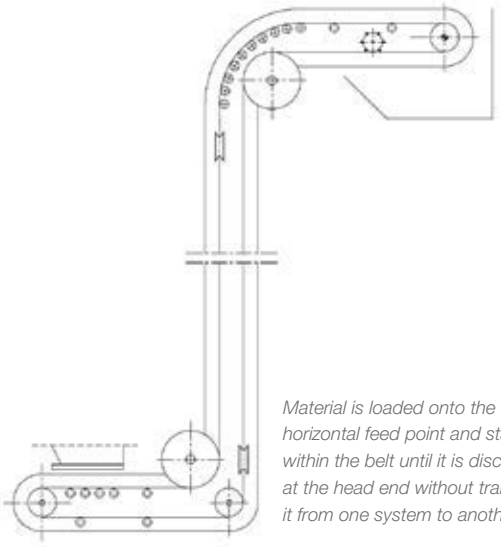
System Advantages

1. No Transfer Points

From the feed hopper to the discharge point, the belt is capable of turning through any angle up to a vertical line and back to the horizontal. This eliminates the need for multi drives and prevents product degradation and spillage at transfer points. In addition the method of feeding the belt reduces further still dust and pollution.



Material is loaded onto the horizontal feed point and stays within the belt until it is discharged at the head end without transferring it from one system to another.

2. No Spillage with Steep Angle Conveying

Once material is loaded onto the belt it is effectively contained between the Sidewalls and is prevented by the cross cleats from falling back. As the belt travels along the conveying line it retains the load within its own 'side skirts', eliminating spillage, but more importantly, as the Sidewalls actually form part of the belt there is none of the wear normally associated with side skirts. The smooth transition when changing angle also ensures the material remains within the belt's effective carrying area.

3. Maximum Utilisation of Space

In areas where land is at a premium, i.e. dockside, or within existing plant where space is a problem, the S-Wall™ Sidewall Conveyor Belt System provides the ideal solution. With the ability to convey material at angles up to 90° the required ground space is minimal.

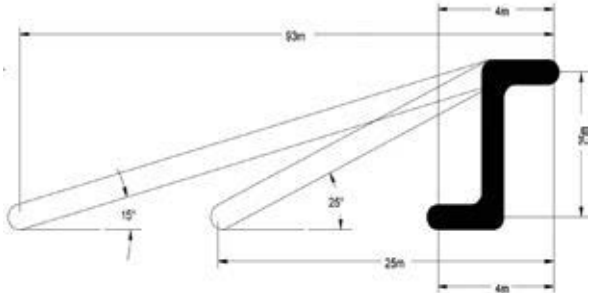


Illustration of ground saving ability of the S-Wall™ system.

System Advantages

4. Minimum Maintenance, Long Belt Life

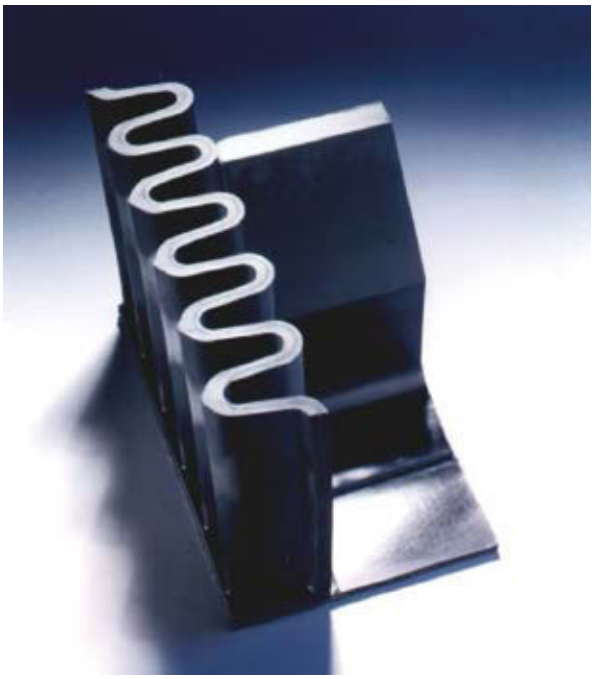
In comparison between mechanical elevators and Sidewall Belt systems it has been proven that the S-Wall™ Sidewall Belt has considerable advantages. The belt itself requires no maintenance and the reduced number of moving parts plus simple conveyor construction virtually eliminates costly downtime. The actual components used in the belt have been developed from high strength abrasion and wear resistant material to extend operational life. The design of the corrugated Sidewalls is such that they have excellent resistance to idler penetration on return side supports.

5. Wide Range of Materials can be Handled

With the extensive range of belt sizes available, the PHOENIX S-Wall™ Sidewall Conveyor Belt System is capable of handling almost all materials: large lumps, free flowing, delicate or fragile substances, highly abrasive material, light weight or heavy loads. Our application engineers have the experience and a thorough working knowledge to specify the systemto suit your needs.

6. Low Power Requirement, Quiet Smooth Running

A clear advantage of using an PHOENIX S-Wall™ Sidewall Conveyor Belt System is the low power required to move the loaded belt. Because the system can elevate at steep angles (up to 90°) centre distances tend to be small and even in high lift applications power required to elevate is considerably less than in other systems. As the belt is running on rotating idlers, the low resistance results in a quiet system, an advantage when operating in close proximity to personnel. Where environmental factors need to be considered, the system can be totally enclosed.



Profiles

The next section gives details of the S-Wall™ range of profiles.

Sidewalls

S-Wall™ Sidewalls are available in 4 basic product groups as shown below. If purchased as loose profiles the Sidewalls are packed into non-returnable containers, there is not normally any minimum order quantity, however for special qualities please check before ordering. Please refer to your price list for information on ordering and quantity discounts.

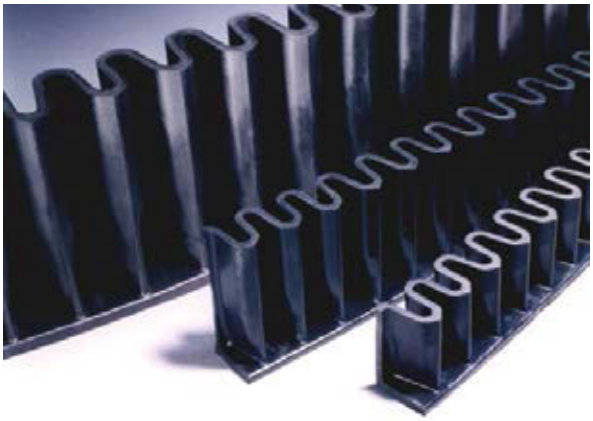
PHOENIX S-Wall™ corrugated Sidewalls represent the latest in design ideas and manufacturing techniques.

The Sidewall design ensures maximum flexing without fatigue, the profile has excellent vertical stability for load retention and return side support. The design allows for high compression to ensure smooth inner deflection around small radii. Another important design feature is that the Sidewalls can be pressed from both sides when mounting, this offers much higher bond strengths and security.

The fabric insertion is of the diagonal type which gives excellent tear resistance and also allows the Sidewall to flex more easily.

The rubber compounds used have been tested to ensure maximum flexibility along with high abrasion resistant and high tensile strength.

The 'in-house' test conveyor designed and built specifically to test the new range of S-Wall™ Sidewalls has proved the design and rubber compounds work together in harmony increasing the life of the Sidewall and ensuring maximum durability.



PHOENIX S-Wall™ Sidewalls are manufactured utilising the latest production techniques.

Type S

Standard Construction in heights from 40mm to 120mm. Future developments will include the possibility to supply with a Tacky Back.

Type SR

Standard construction but with Diagonal Fabric Reinforcement.

Type HDSR

Heavy duty construction including fabric reinforcement as standard in heights from 120mm to 300mm. The fabric reinforcement is of the diagonal type ensuring maximum flexibility with high vertical stability. If required these can be supplied without fabric reinforcement to special order, Ref: HDS.

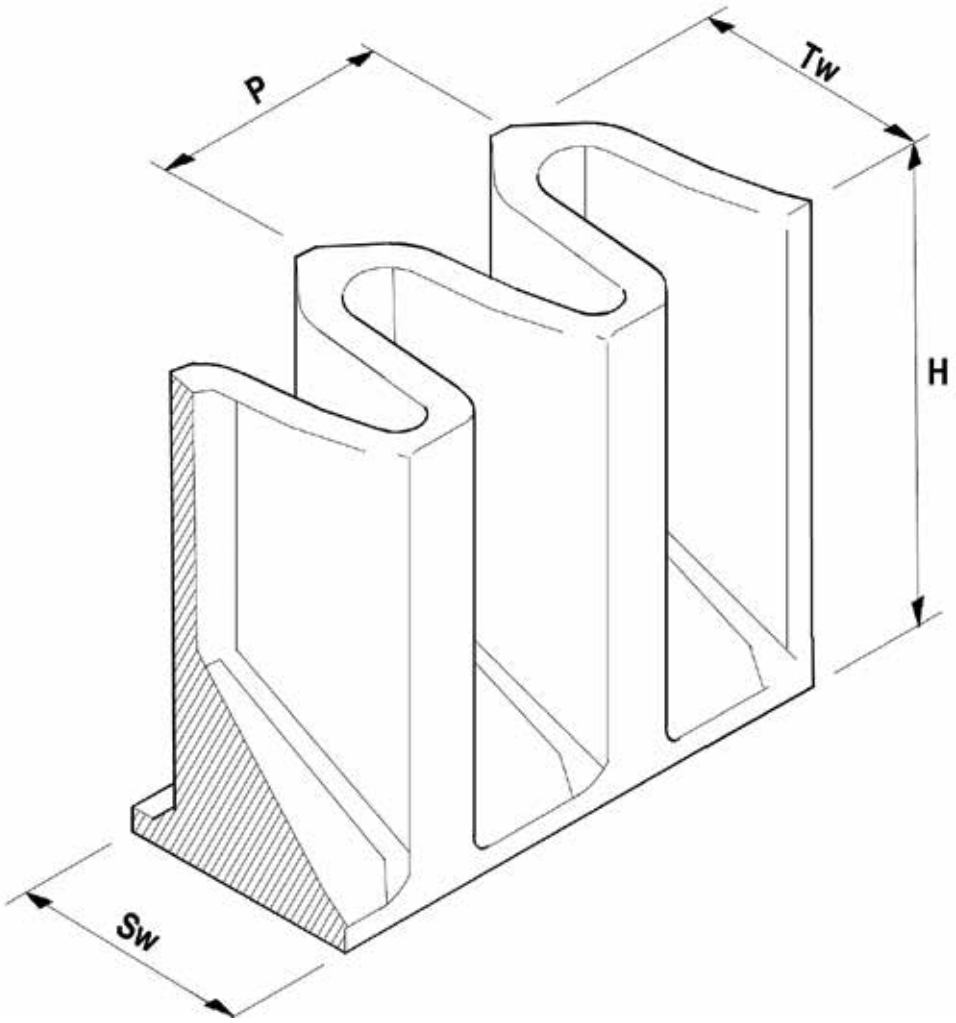
Type XHDSR

Heavy duty Special design including fabric reinforcement as standard in heights from 300mm to 630mm.

Rubber Qualities

Black Standard High Abrasion Resistant
Black Oil and Fat Resistant
Heat Resistant to 100°C
High Heat Resistant to 130°C
Flame Retardant

Sidewalls



Type	H	S_w	T_w	P	Min Pulley Dia. mm	Weight kg/m
S*	40	35	30	30	125	0.60
	60	50	45	40	160	1.80
	80	50	45	40	200	1.80
	120	50	45	40	250	2.23
	120	75	70	60	315	2.67
	160	75	70	60	400	4.77
HDS*	200	75	70	60	500	6.48
	250	75	70	60	630	7.55
	280	75	70	60	800	8.60
	300	75	70	60	800	9.30
XHDS**	300	100	90	75	800	12.50
	400	100	90	75	1000	18.75

* Denotes available with or without Fabric Reinforcement.
** Available only with Fabric Reinforcement.

Cleats

All S-Wall™ Cleats have been specifically design to give optimum performance. The shape of the 'C' and 'TC' types has been created to offer best conveying capacities along with excellent self-cleaning properties. S-Wall™ cleats are either of the extruded type for the smaller profiles, all larger cleats are moulded to give the best shape retention even when conveying high-density materials. Cleats are available in either 2.5 m for moulded and 3 m/5 m lengths for extruded profiles. Cleat profiles are shipped in non-returnable packing cartons, please refer to the price list for ordering details.

1. Type 'Tk'
Used as a drag-out cleats.

2. Type 'T'

3. Type 'MBT'
Separate moulded base, cleat blade can be of rubber or PU and can be of any height.

4. Type 'T-XS'
The cleat base is a moulded section and the blade is bolted into position.

5. Type 'C'

6. Type 'TC'

7. Type 'MBTC'
Separate moulded base, cleat blade can be of rubber or PU and can be of any height.

8. Type 'TC-XS'
The cleat base is a moulded section and the blade is bolted into position.

Side Blinkers.
Side Blinkers can be fitted in-between the ross cleats profile and the Sidewall to make a seal. Side Blinkers are used when the material is particularly free flowing.

Cleats

Cleat Types	Height mm	Base Width mm	Weight kg/m	Min Pulley Dia. mm	Production Length m
Type C 	35	55	0.50	100	3/5
	55	75	1.50	125	3/5
	75	80	2.00	150	3/5
	90	110	2.30	250	3/5
	110	110	2.50	315	3/5
Type TC 	75	80	1.80	150	3/5
	90	110	2.50	250	3/5
	110	110	2.80	315	3/5
	140	160	6.60	400	2.5
	180	160	8.30	500	2.5
	230	175	10.46	630	2.5
Type MBTC 	110	160	7.90	315	3
	140	160	9.25	400	3
	180	160	11.50	500	3
	230	160	13.50	630	3
	250	160	14.60	630	3
	280	160	17.65	800	3
	360	160	19.25	1000	3
Type TC-XS 	230	225	17.95	630	2.5
	250	225	18.90	630	2.5
	280	225	22.50	800	2.5
	360	230	26.00	1000	2.5

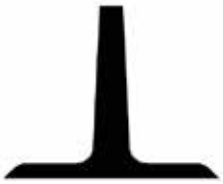
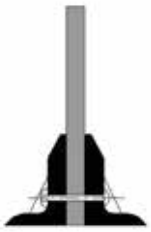
The above are standard heights, non-standard are available, please enquire.

Ancillary Equipment for S-Wall™ Cleat Profiles

Screw Reinforcement sets are available in a selection of sizes to suit specific Cleat designs as follows:

- Type 1 Cleat height 75 mm
- Type 2 Cleat heights 90 mm to 110 mm
- Type 3 Cleat height 110 mm
- Type 4 Cleat heights 140 mm to 180 mm
- Type 5 Cleat heights 180 mm to 230 mm

Cleats

Cleat Types	Height mm	Base Width mm	Weight kg/m	Min Pulley Dia. mm	Production Length m
Type Tk 	35	110	1.65	100	3/5
	40	110	1.80	100	3/5
	20	40	0.28	75	3/5
	25	40	0.3	75	3/5
	35	55	0.55	100	3/5
	40	70	0.60	125	3/5
Type T 	55	80	1.45	125	3/5
	75	80	1.80	150	3/5
	90	110	2.50	250	3/5
	110	110	2.80	315	3/5
	140	160	6.60	400	2.5
	180	160	8.30	500	2.5
	230	175	10.46	630	2.5
Type MBT 	110	160	7.90	315	3
	140	160	9.25	400	3
	180	160	11.50	500	3
	230	160	13.50	630	3
	250	160	14.60	630	3
	280	160	17.65	800	3
	360	160	19.25	1000	3
Type T-XS 	230	210	17.85	630	2.5
	250	220	18.60	630	2.5
	280	230	19.50	800	2.5
	360	230	22.50	1000	2.5

The above are standard heights, non-standard are available, please enquire.

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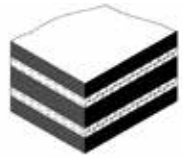
- Type 1 Cleat height 75 mm
- Type 2 Cleat heights 90 mm to 110 mm
- Type 3 Cleat height 110 mm
- Type 4 Cleat heights 140 mm to 180 mm
- Type 5 Cleat heights 180 mm to 230 mm

Base Belts

The SBS range of cross-stabilised base belts has been developed in conjunction with Europe's leading conveyor belt manufacturers. Please enquire as to the suitability of any given belt for the application for which you intend to use the belt, alternatively allow us to calculate the belt for you, please see the enquiry section for details.

Type 'XE'

This belt incorporates the cross-stabilising ply in the tensioning ply, mainly used for medium duty applications.

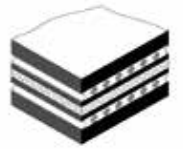


Type 'XE+2'

The cross-stabilising ply and tensioning plies are separate, in this case the belt has 2 crossstabiling plies, application areas are medium to heavy.

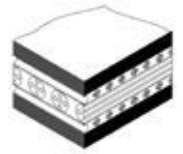
Type 'XE-SC+2'

This belt incorporates textile tensioning plies with Steelcord cross-stabilising members. The high ateral stiffness means the belt can be used in application areas where rigidity is an important factor, i.e., high lift heights and wide belts.



Type 'XST-SC'

This belt incorporates Steelcord tensioning with Steelcord cross-stabilising members. High tensile strengths can be achieved making the belt ideal for high vertical lift applications.



Base Belts

Base Belt Type	Strength N/mm	Cover Thickness mm	Weight kg/m	Min Pulley Dia. mm
Type XE 	250/2	2:2	9.40	200
	400/3	4:2	13.50	315
	500/3	4:2	13.75	400
	630/4	4:2	15.20	500
	800/5	4:2	16.85	630
Type XE+2 	400/3+2	4:2	12.10	315
	500/3+2	4:2	12.60	400
	630/4+2	4:2	14.40	500
	800/5+2	4:2	16.10	630
	1000/5+2	4:2	17.80	800
	1250/5+2	4:2	18.25	1000
Type XE-SC+2 	315/2+2	4:2	13.70	315
	400/3+2	4:2	14.50	315
	500/3+2	4:2	15.20	400
	630/4+2	4:2	16.70	500
	800/5+2	4:2	18.00	630
	1000/5+2	4:2	19.50	800
	1250/5+2	4:2	21.40	1000
Type XST-SC* 	1600	8:8	Please Enquire	1250
	2000	8:8		1250
	2500	8:8		1400
	3150	8:8		1400
	3500	8:8		1600
	4500	8:8		1600

*Belt weight will be decided by the final belt design which is dependant on the application.
The above are standard heights, non-standard are available, please enquire.

Belt Composition

X = Cross-Stabilised construction
E = Polyester Tension Plies
+2 = Number of Separate Cross-Stabilising Plies
SC = Steel Cord Cross-Stabilised
XST-SC = Steel Cord

Cover Thickness

Above are standard constructions, belts can be supplied with non-standard covers to special order.

Belt Strength

Above are standard items, others available to special order.

Note

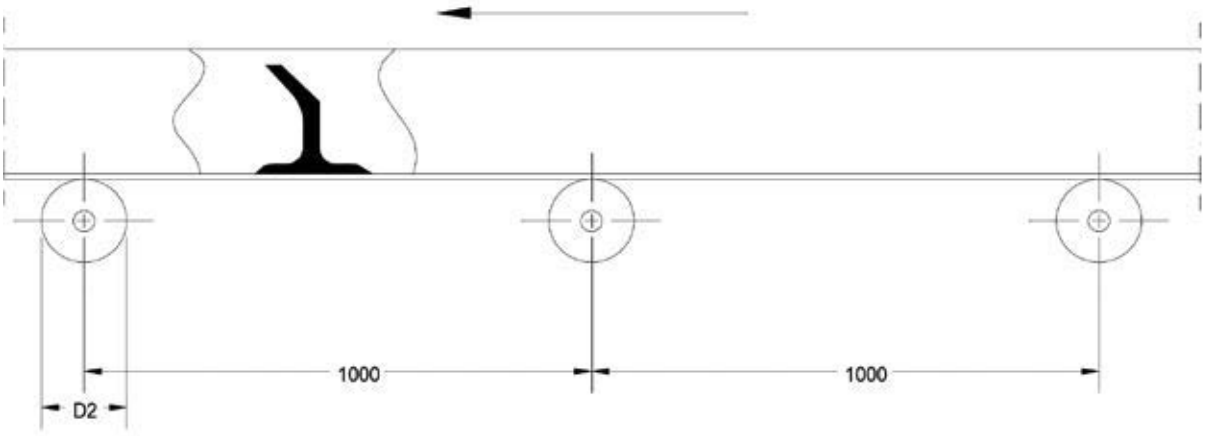
Pulley diameters shown are for normal quality, and standard cover thickness. Please enquire for recommended diameters on belts with special quality covers or different tensile ratings as these may require larger diameters.

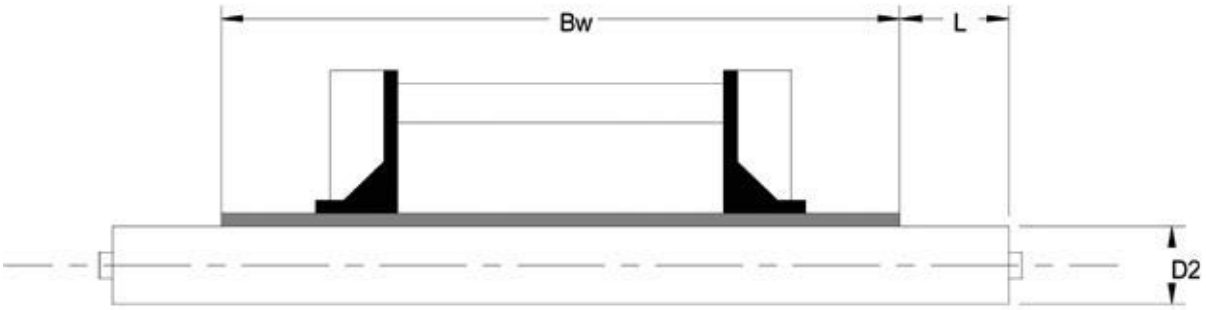
Design Information

The next section gives details on the basics of correct conveyor design for S-Wall™ steep inclineconveyors. Customers are strongly recommended to check with our technical department if unsureabout any aspect of belt selection or conveyor design.

Carrying Side Support

Generally idlers are pitched at a maximum of 1000mm along the carrying side. Additional idlers are required underneath the feed hopper to give sufficient support to the belt; it is recommended that they be rubber covered in case of high impact.





Idler Diameter D_2		Dimension L	
Sidewall Type	D_2 mm	B_w mm	L_{min} mm
S	89 ↔ 108	400 ↔ 700	50
HDS	108 ↔ 133	700 ↔ 1400	75
XHDS	Please enquire	1400 ↔ 2000	100

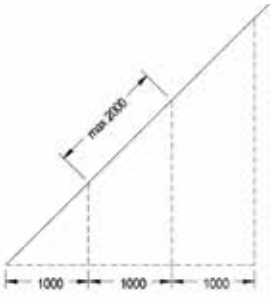
Note

The above are an indication only, the actual idler diameter needs calculating for the necessary load support, for the idlers at the deflection points please refer to the appropriate page for guidance on selecting the correct idlers.

Return Side Support

Method of determining return side idler pitch.

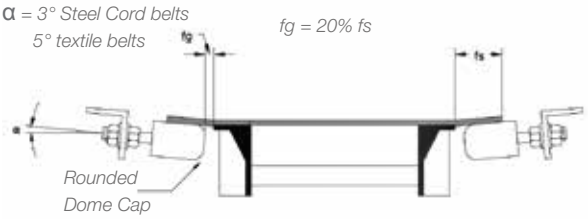
Generally on the horizontal sections the idler pitch is max 1000mm, however on the return side decline section the idlers can be spaced out according to the sketch shown opposite.



Method of determining idler pitch on return side.

Stub Idlers

Stub idlers are used mainly for heavy belts, or where return side space is limited, and where build-up on conventional idlers could occur. 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.

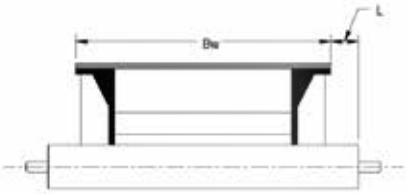


The pitch of the stub idlers on the return side is max 1000mm on the horizontal and for the decline section the pitch is determined as per the sketch. An allowance of 1% of the axle distance needs to be allowed for belt sag.

B_w. Please check for max. recommended widths.

Full Width Idlers

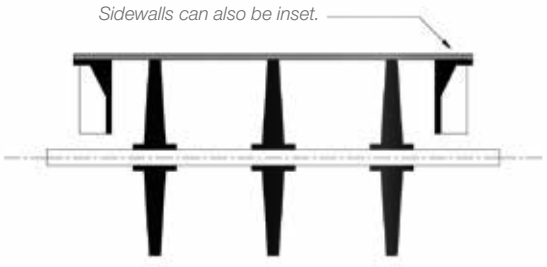
Idler diameter depends on belt weight and Sidewall type. For larger belts stub idler support is recommended. If insufficient sized idlers are used premature wear to the Sidewalls can occur. In certain cases the method of calculating return side pitch results insufficient support, i.e. low tension applications, to avoid excessive sag please contact the SBS technical department for advice.



B_w is dependant on base belt type.
Please check for max. recommended widths.
For L_{min} see page 14.

Belts Without Cross Cleats

The recommended method is by inner lying disc wheels or idlers. The number and positioning of these is dependent on belt width and base belt type. Particular care should be taken in ensuring sufficient support adjacent to the Sidewalls and in calculating clearance between Sidewalls andsupporting shafts.



Max. pitch 1000mm.

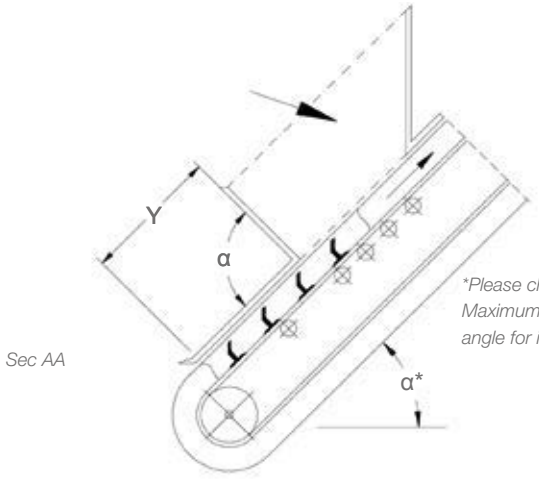
Belt Feeding and Feed Hopper

Feed Hopper

The design of the feed hopper is important in that it optimises the system's efficiency. Material can be fed into the belt from any direction (although in-line is the preferred direction), providing the belt pockets have an even fill. The capacity calculation for S-Wall™ belts assumes that material will be spread and distributed evenly across the pockets.

If possible the hopper should be adjustable in the vertical plane to optimise its position in relation to the top of the Sidewalls.

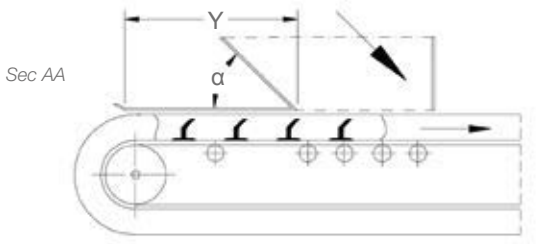
Belt support under the feed hopper should be increased to prevent belt sag and absorb impact. Rubber covered idlers are normally used although impact bars are an acceptable means of support.



Incline Feeding

Dimension Y

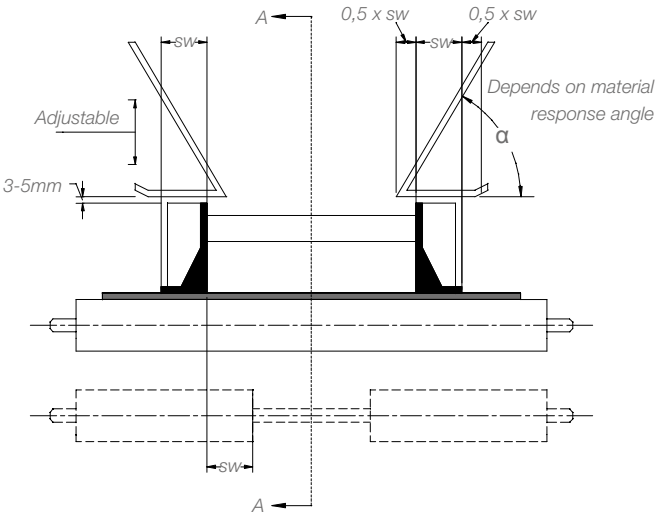
When loading onto the horizontal the length of the back plate is min 1.5 x Cleat pitch. If loading directly onto the incline section dimension Y needs to be increased to min 2.5 x Cleat pitch. It should be noted that normally the maximum angle for loading onto the incline section is 40° where after a horizontal feed station is required. If it is necessary to load at angles greater than 40° please contact our technical department.



Horizontal Feeding

Angle α

The angles of the hopper sides are normally determined by the material flow characteristics. Generally the hopper angle should be no less than 65°.



Note

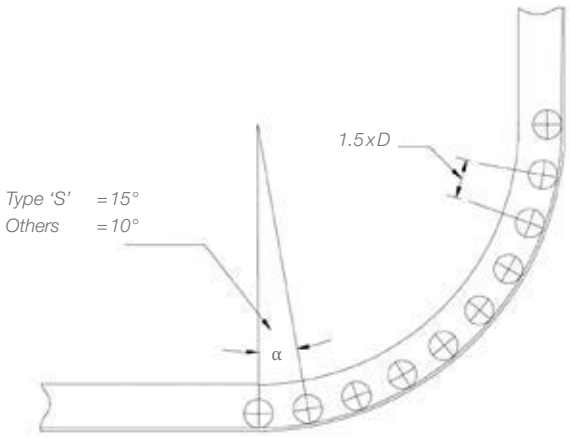
The shaded idler detail shows how you can use a split idler under the feed hopper to support the belt, this system is very good where heavy material impact is expected to occur, please consult our technical dept. for more information.

Upturn Deflection

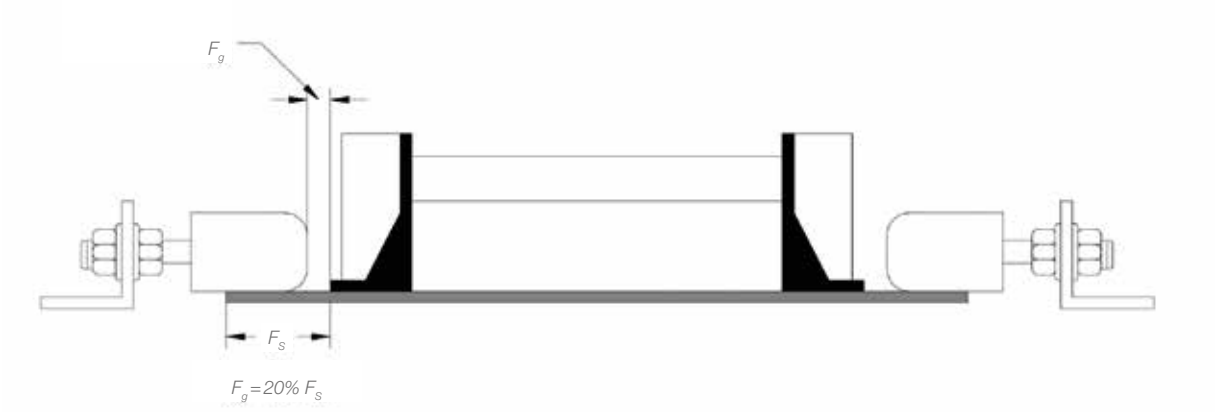
Stub Idler Upturn Deflection

The minimum recommended idler diameters for the corresponding sidewall heights are as follows:

Type	D mm
S40	63.5
S60	63.5
S80	89
S100	89
S120	89
HDS120	108
HDS160	108
HDS200	108
HDS250	133
HDS280	133
HDS300	133
XHDS300	Enquire
XHDS400	Enquire

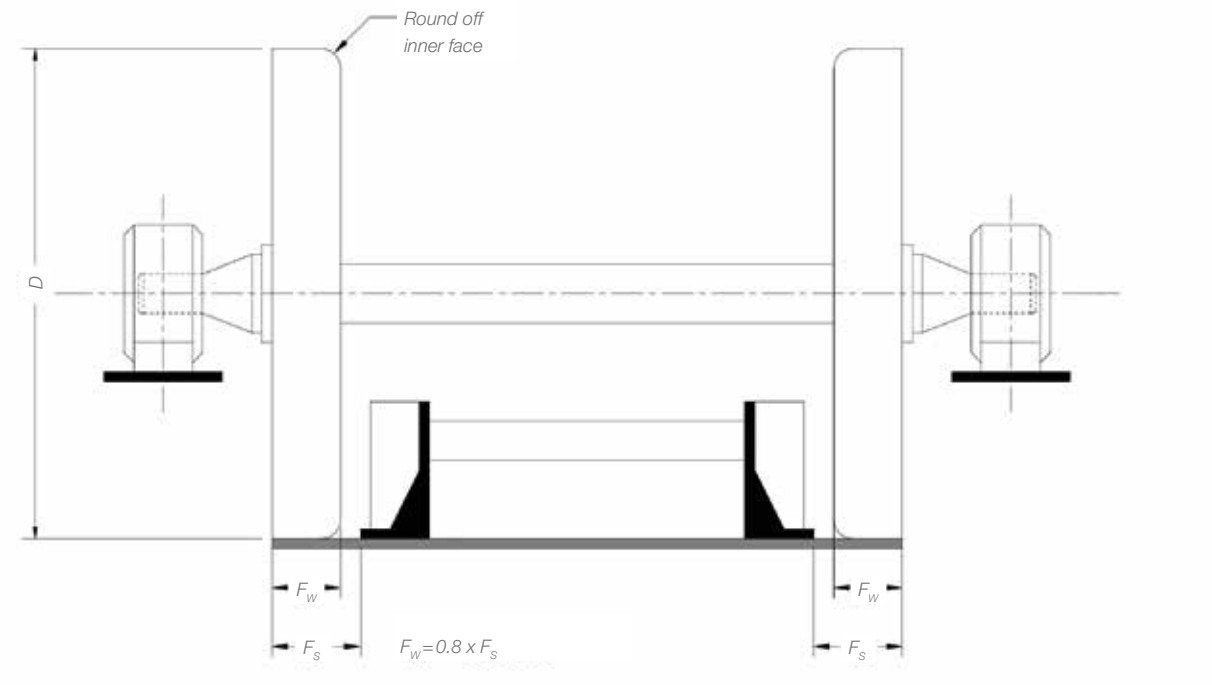


The diameter of the radius is determined by the belt speed, angle of inclination and the profile type / height, material lump size may also have some influence. At the deflection points it is essential that the stub idlers are set horizontally and the brackets are adjustable. For the downturn deflection point it is recommended to use the deflection wheel system.



Note that at deflection points the stub idlers are set horizontally to the belt.

Upturn Deflection



The general formula for determining 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 F_w shown above is normally the minimum value and can vary according to the required belt support. Allowances must be made for clearance between the deflection system and the Sidewalls. Normally this would be 20% of the free space F_s.

Deflection Wheel Diameters

Sidewall Type	Sidewall Height	D mm
S	40	200
	60	250
	80	350
	100	400
	120	500
HDS	120	500
	160	630
	200	800
	250	1000
	280	1200
	300	1200
XHDS	300	1200
	400	1600

Top Deflection Curve

The change in angle can be achieved either by a series of idlers positioned as per the sketch opposite or by a single pulley.

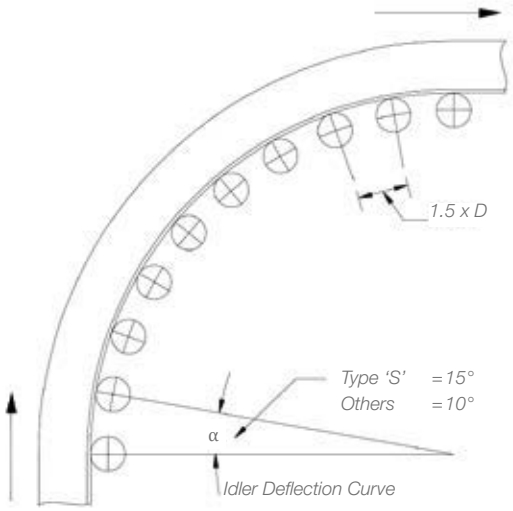
The minimum recommended idler diameters for the corresponding sidewall heights are as follows:

Type	D mm
S40	63.5
S60	63.5
S80	89
S100	89
S120	89
HDS120	108
HDS160	108
HDS200	108
HDS250	133
HDS280	133
HDS300	133
XHDS300	Enquire
XHDS400	Enquire

The amount of defection for each idler depends on the Sidewall type as follows:

Type S: **Max 15°**
Type HDS: **Max 10°**
Type XHDS: **Max 10°**

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

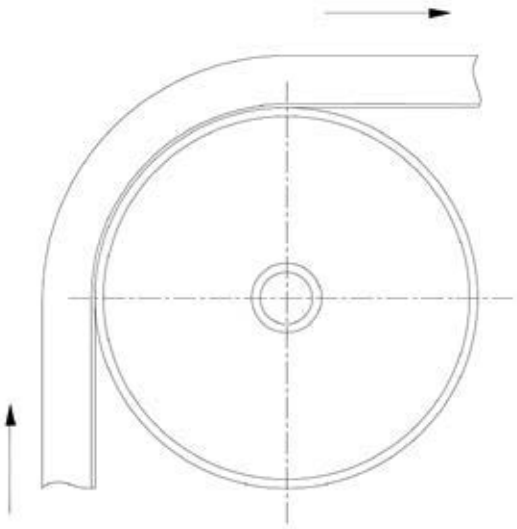


It is beneficial to have these idlers mounted on a single plate to enable easier adjustment for belt tracking.

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.

Single Drum Deflection

Special care must be taken when selecting this method of deflecting the belt, in particular the relationship between belt speed and the material type. We have a computer programme to determine the maximum belt speed for the chosen pulley diameter for this point. Please enquire regarding crowning of this pulley.

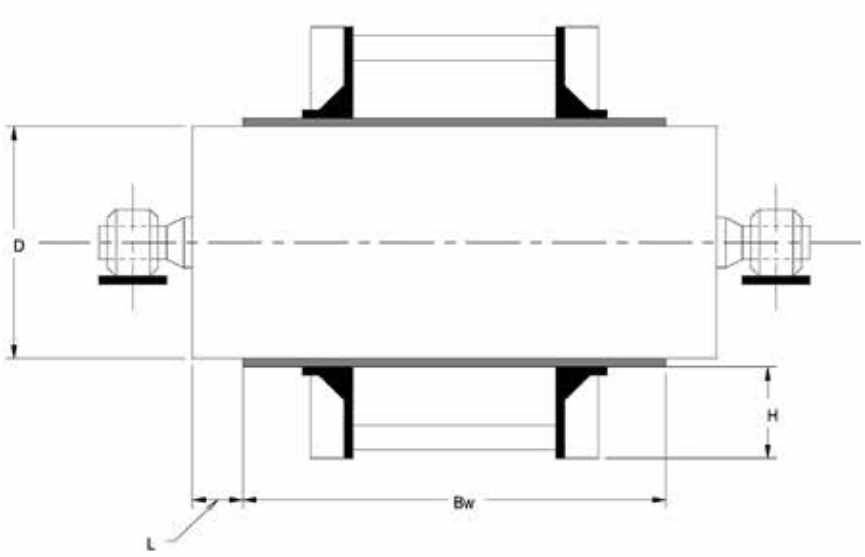


Single drum deflection.
The drum should be adjustable in the direction of belt travel.

Note

Both systems need to be adjustable to allow for belt tracking, please see the section on belt tracking on page 29.

Drive and Tail Pulley



Values for dimension L	
Belt Width B_w mm	L mm
400 ↔ 700	50
700 ↔ 1400	75
1400 ↔ 2000	100
2000 ↔ 2400	125

Drive Pulley

In the majority of cases the discharge drum is also the drive drum. The pulley is normally fixed after installation and requires no adjustment. For most applications the pulley face is crowned and rubber lagged. However, on some large belts, due to the type of tensile and cross-stabilising members, it is not advisable to crown the pulley as damage may result to the base belt, please contact the SBS technical department if in doubt.

Tail Pulley

The design and construction of the pulley can be of various types. Normally it is preferred that the pulley face is crowned and can be rubber lagged. (In larger belts as per the drive pulley this may not be the case, if in doubt please check.) The tail pulley is also the tensioning drum, tension normally being applied via screw adjusters. As a guide the maximum stretch of a belt will be 1.5%. When calculating the amount of take up this should be taken into account, plus an amount for safety.

Pulley Diameters

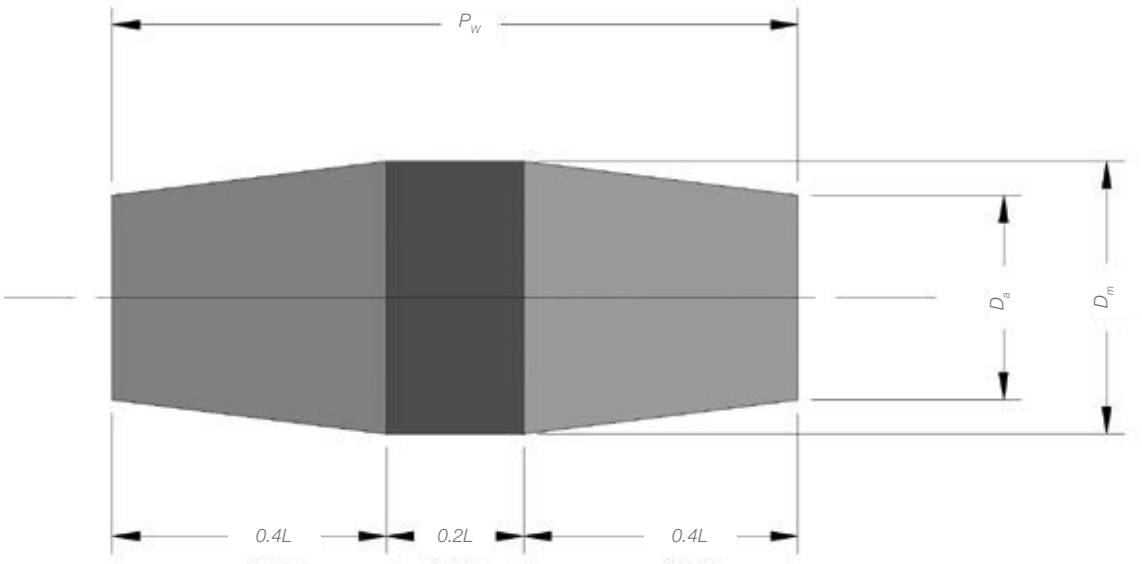
Sidewall Type	Sidewall Height H	Pulley Diameter D Black Normal	Pulley Diameter D Special Qualities
S	40	160	200
	60	200	250
	80	200	250
	100	250	315
	120	315	400
HDS	120	315	400
	160	400	500
	200	500	630
	250	630	800
	280	800	1000
	300	800	1000
XHDS	300	800	1000
	400	1000	1250

Notes

The above pulley diameters are based on 6 million bend changes Larger pulley diameters may be required dependant on the tensile strength of the base belt, please check.

Pulley Crowning

Formulae for the Determining the Degree of Crowning for Pulley's



Formulae

$D_a = D_m - (1 \times 0.006)$

Example:

Pulley, 500 mm diameter x 750 mm face width (P_w)

$D_a = 500 - (750 \times 0.006)$

$D_a = 500 - 4.5$

$D_a = 495.5$ mm

IMPORTANT!

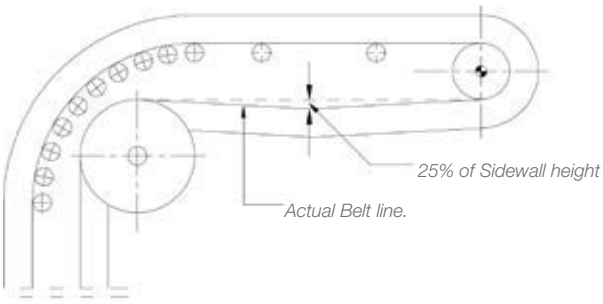
Note

Please check with us to ensure that crowning of the pulleys is applicable to the base belt type intended for use. In the case of belts with Textile Tension plies and Steel Cable cross stabilising plies and with Steel Cord Tension and Steel Cord cross-stabilised belts crowning the pulleys may cause damage to the belt.

Belt Snubbing

Snubbing of the Sidewalls

If full width return idlers are used to support the belt on the return side then an allowance must be made for belt sag in positioning these idlers. Due to the weight of the belt if the idlers are positioned incorrectly compression of the Sidewalls will take place causing excessive wear. As a guide idlers should be dropped by an amount equal to 25% of the Sidewall height.



Please not that if stub idlers are used to support the belt on the belt free spaces then belt sag need not be a point to consider as the base belt takes the weight of the belt and not the sidewalls.

Note

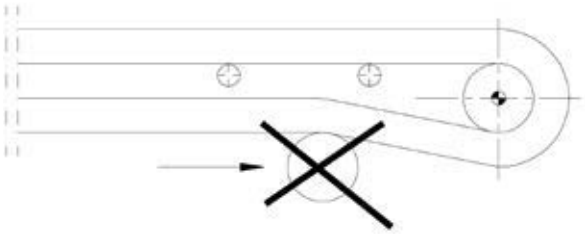
Whilst the sketch shows the top section of a conveyor, sag must also be considered along all horizontal sections.

Increasing the Angle of Wrap

Whilst it is general practice with most conventional belt conveying systems to snub the belt to increase the angle of wrap around the drive drum and thus increase the drive factor, with Sidewall belts this must not happen.

Under no circumstances must snubbing on the Sidewalls take place. The Sidewall profiles dynamic qualities are great, including lateral rigidity; however, they are not designed to withstand forces imposed by snubbing.

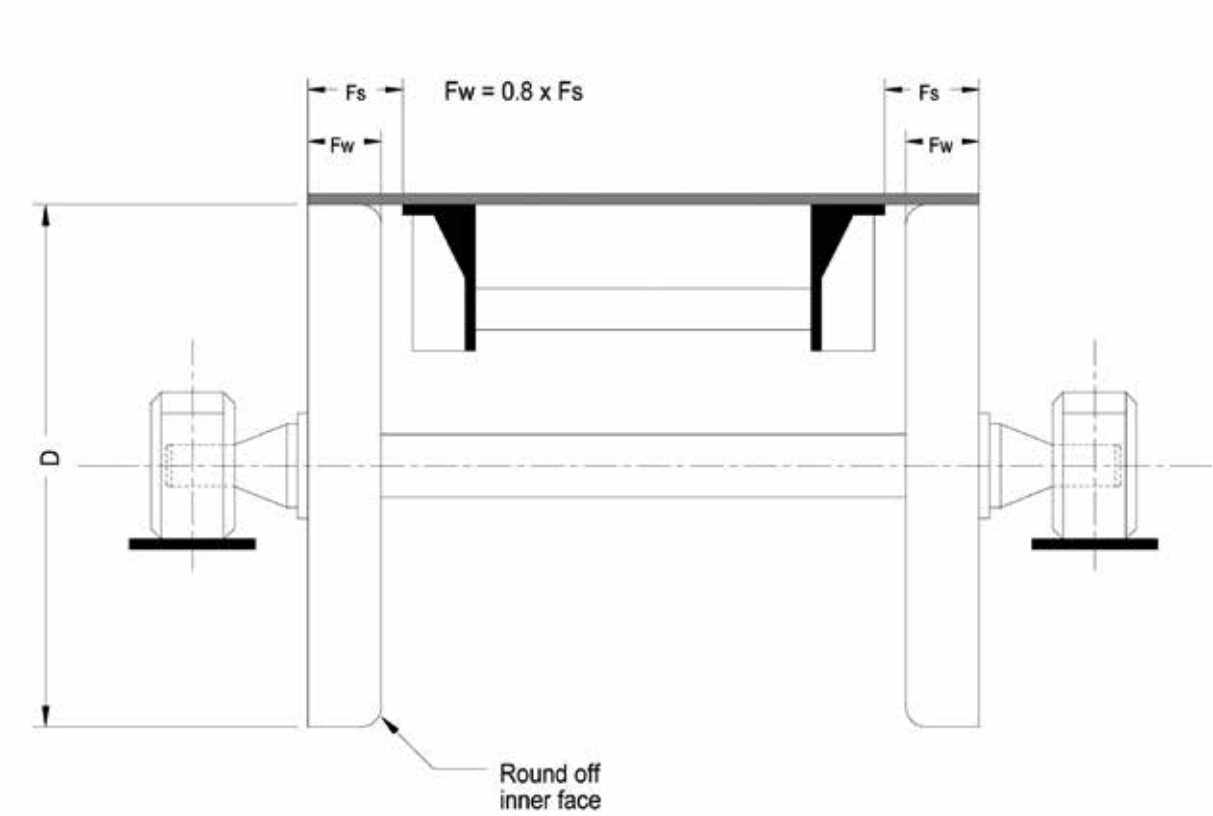
In principal the angle of wrap on the drive pulley is not greater than 180°.



DO NOT SNUB THE BELT !

Please not that if stub idlers are used to support the belt on the belt free spaces then belt sag need not be a point to consider as the base belt takes the weight of the belt and not the sidewalls.

Downturn Deflection



Deflection Wheel Diameter

At the downturn deflection point the deflection wheel system is the preferred method of changing belt direction.

The general formula for determining the deflection wheel diameter is 4 x H where H = Sidewall Height.

Dimension F_w shown above is normally the minimum value and can vary according to the required belt support. Allowances must be made for clearance between the deflection system and the Sidewalls. Normally this would be 20% of the free space F_s.

Sidewall Type	Sidewall Height	D mm
S	40	200
	60	250
	80	350
	100	400
	120	500
HDS	120	500
	160	630
	250	1000
	280	1200
	300	1200
	300	1200
XHDS	300	1200
	400	1600

Bottom Deflection Curve

The change in angle can be achieved either by a series of idlers positioned as the sketch opposite or by a single pulley as per the top deflection curve.

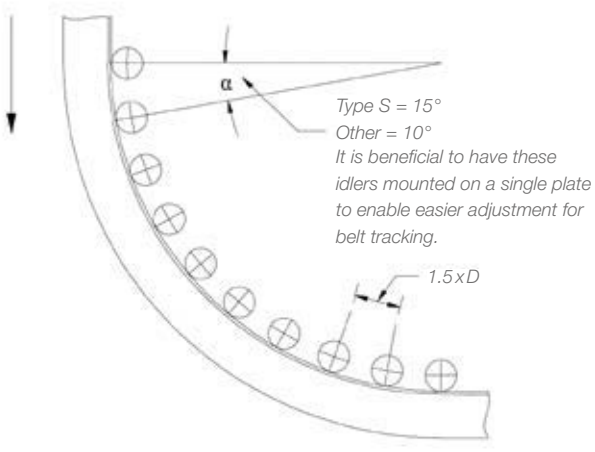
The minimum recommended idler diameters for the corresponding Sidewall heights are as follows:

Type	D mm
S40	63.5
S60	63.5
S80	89
S100	89
S120	89
HDS120	108
HDS160	108
HDS200	108
HDS250	133
HDS280	133
HDS300	133
XHDS300	Enquire
XHDS400	Enquire

As the loadings are normally much lower at this point conventional idlers will suffice. The amount of deflection for each idler depends on the Sidewall type as follows:

Type S: **Max 15°**
Type HDS: **Max 10°**
Type XHDS: **Max 10°**

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



Type S = 15°
Other = 10°
It is beneficial to have these idlers mounted on a single plate to enable easier adjustment for belt tracking.

Idler deflection curve

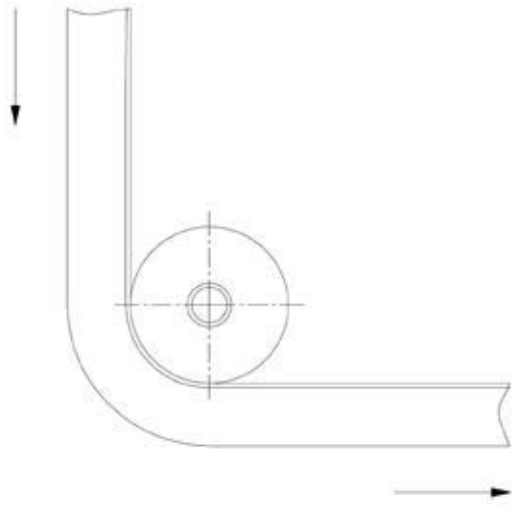
Single Drum deflection.

The single drum system is the preferred means of deflecting the belt at the bottom bend point. The drum may be rubber lagged for better frictional contact with the base belt aiding belt alignment at this point. For textile belts the drum can be crowned, for steel cord 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.

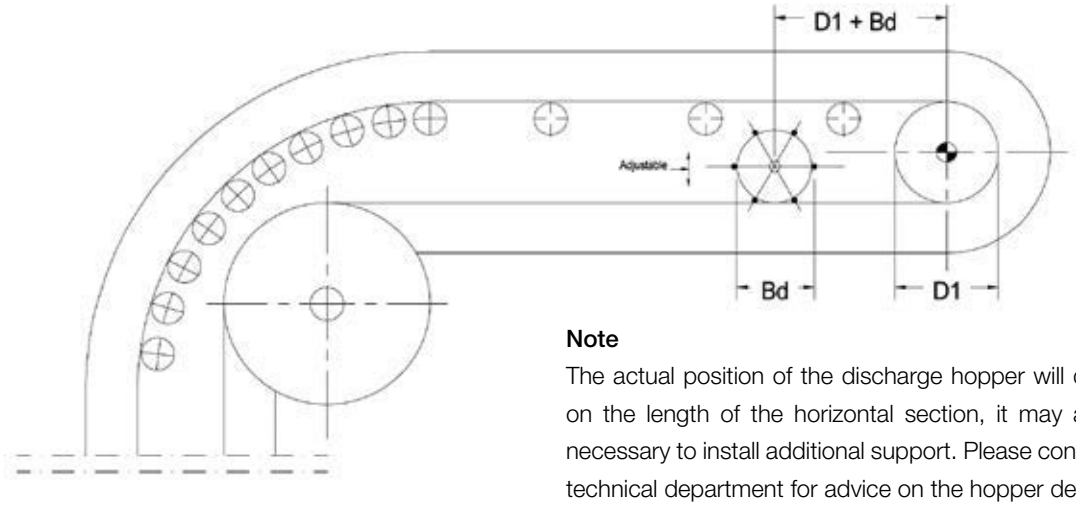
Note

Both systems need to be adjustable to allow for belt tracking, please see the section on belt tracking on page 29.



Single drum deflection.
Drum is adjustable in the direction of belt travel.
Please see page 19 for details.

Belt Cleaning



Note

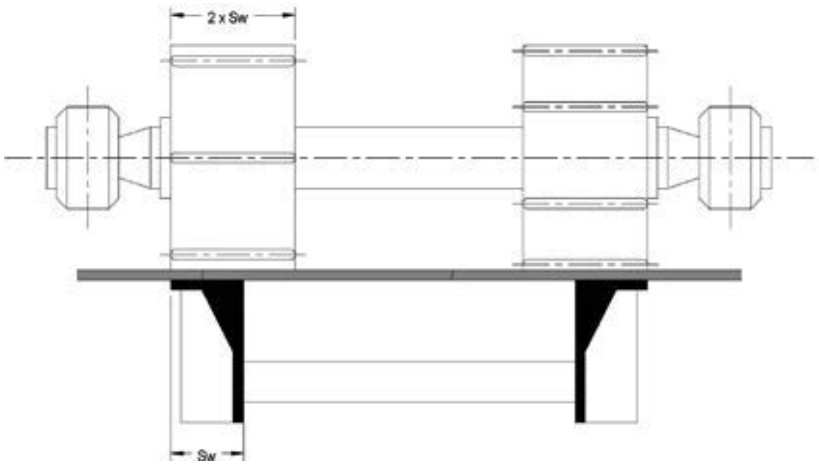
The actual position of the discharge hopper will depend on the length of the horizontal section, it may also be necessary to install additional support. Please consult our technical department for advice on the hopper design.

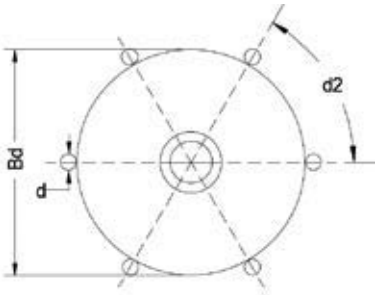
Belt Beater position at discharge point

The design of all PHOENIX S-Wall™ Sidewall Conveyor Belts assist in their self cleaning properties, but in the case of very sticky materials, assistance will be required from a cleaning device.

Note

With prior consultation many cleaning problems can be avoided by installing highly efficient clean-up systems, please refer to page 25 for more information.





B_d mm	d_2	d mm
250	6 x 60°	20
315	6 x 60°	20
400	6 x 60°	25
500	6 x 60°	25
630	8 x 45°	30
800	8 x 45°	30

Note

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

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

The steel rods (d_2) must be off hardened steel, when installing it is very important that the rods (d) are off-set. The system works best with belt speed over 1 m/sec. For particularly sticky material we recommend that the units are used as a pair (Tandem).

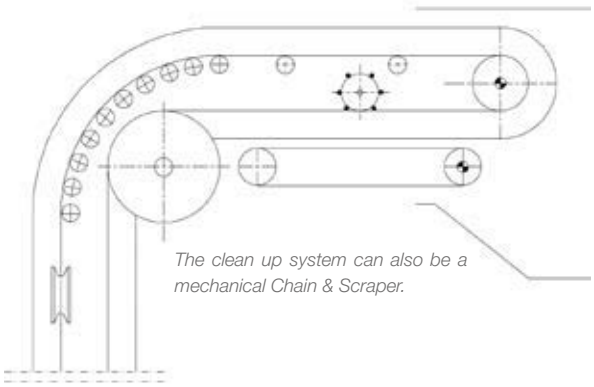
Belt Cleaning

Self-Cleaning, discharge section

The dribble conveyor positioned directly under the discharge section will effectively move any tailings bought back with the belt or those knocked out by the cleaning device. The device can be either a small driven belt conveyor or alternatively it may be a mechanical chain and scraper as per the bottom clean up system.

There needs to be sufficient clearance between the clean up system and the return run of belt allowing for any belt sag.

The actual positioning of the hopper should take into account such items as the belts speed and material repose angle and lump size. Please consult us for more details.

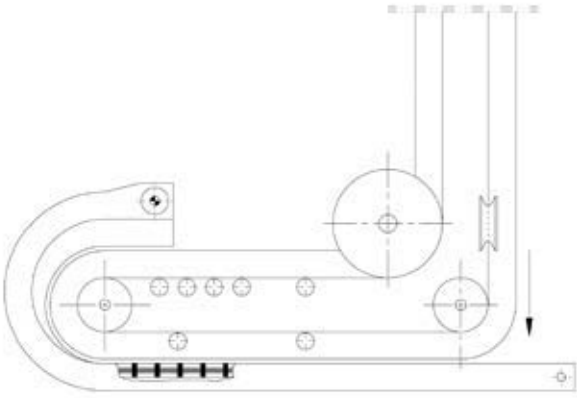


The clean up system can also be a mechanical Chain & Scraper.

Bottom Self-Cleaning system

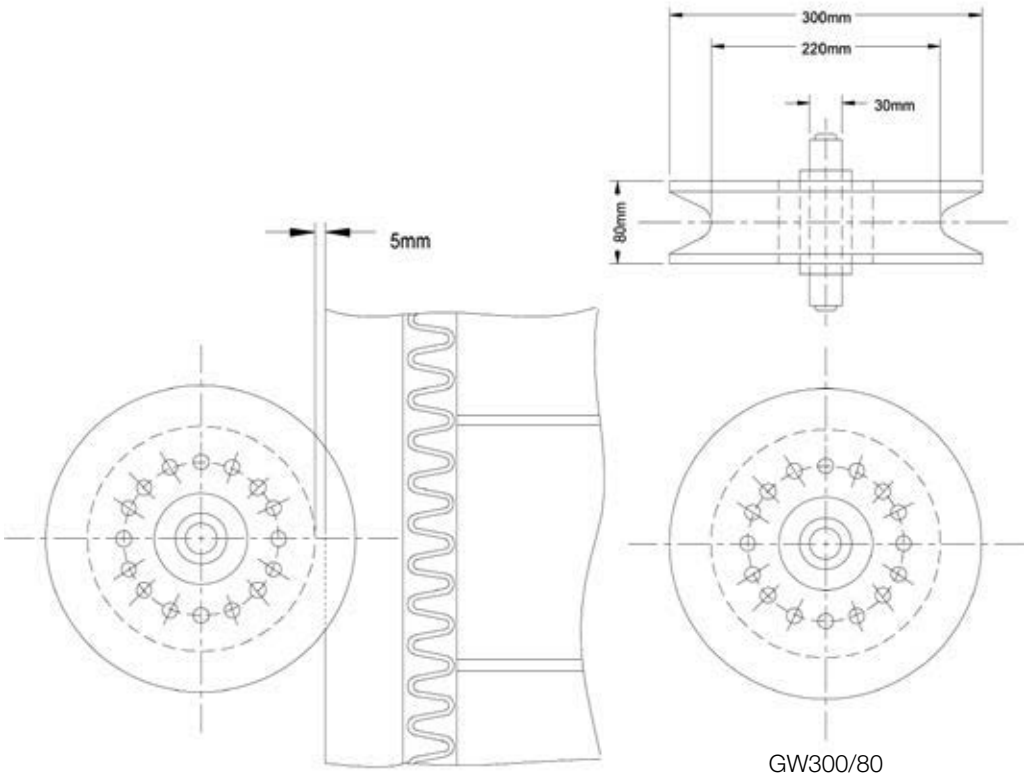
It is recommended to fit a mechanical system such as a chain and scraper type unit to return any material which has been carried back by the belt.

Details on the design of the clean-up system are available from our technical department.

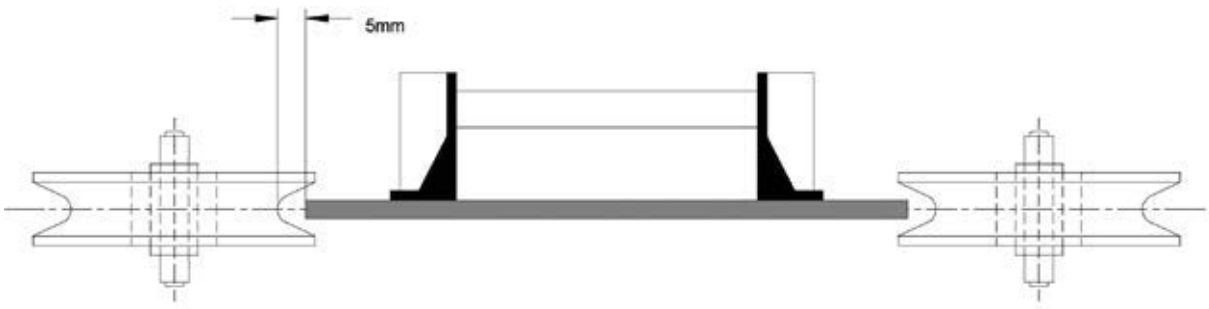


Guiding Wheels

SBS Guiding Wheels type GW300/80 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 from a high precision rubber moulding ensuring consistent quality. The wheels are available as standard with a 30 mm diameter shaft, if required they an be supplied without a shaft. The wheels are normally sold in sets of 4 but can be supplied as individual pieces. These wheels are highly recommended and ensure a high degree of security in both normal and difficult applications.



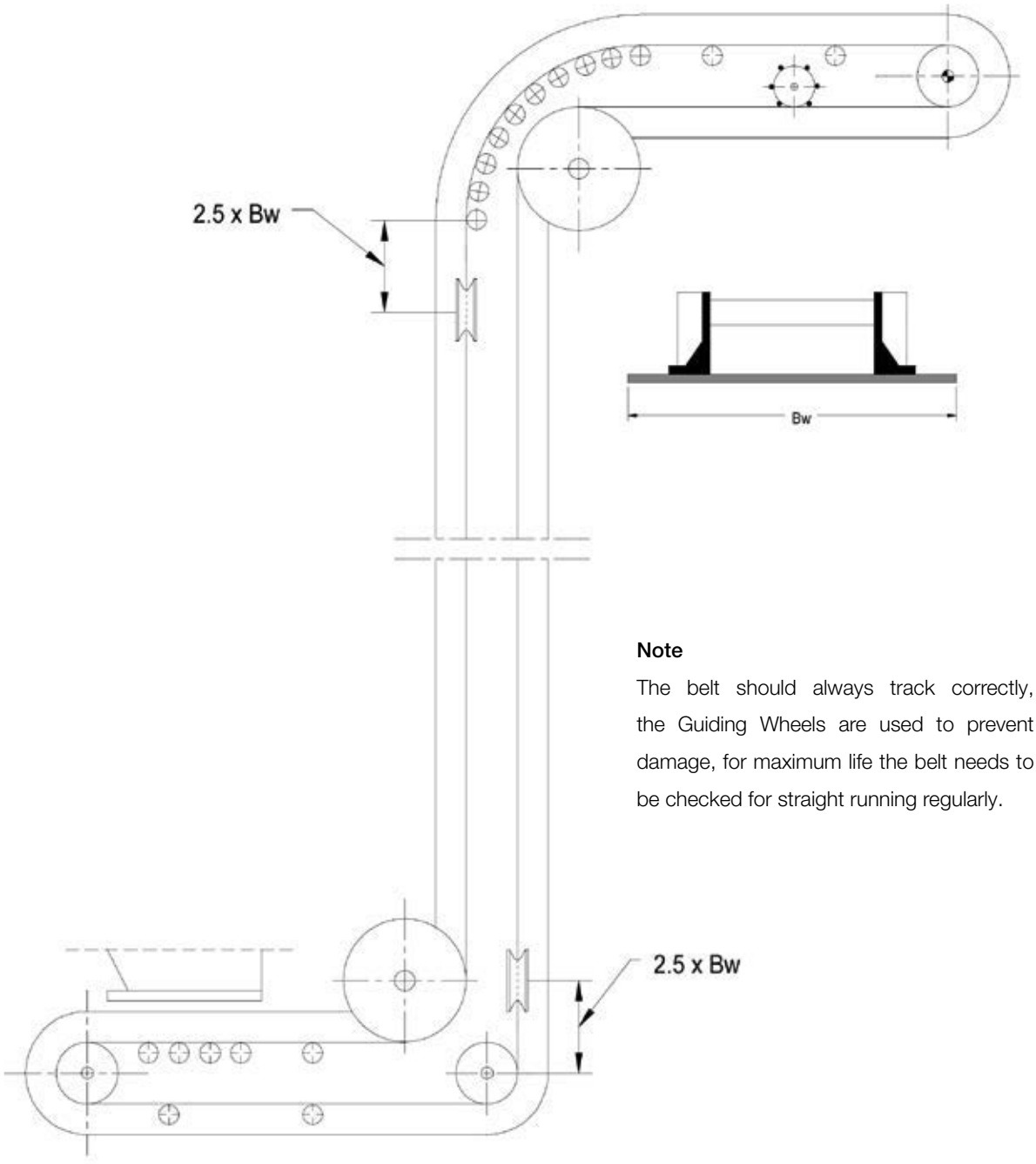
GW300/80



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

Guiding Wheels

The positioning of the Guiding 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 Guiding Wheel shafts be adjustable by +/– 50 mm. The dimension of 2.5 x B_w is an approximation and can be varied between 2 and 3 times belt width. If you are in doubt regarding the correct positioning of the Guiding Wheels please contact us for advice.



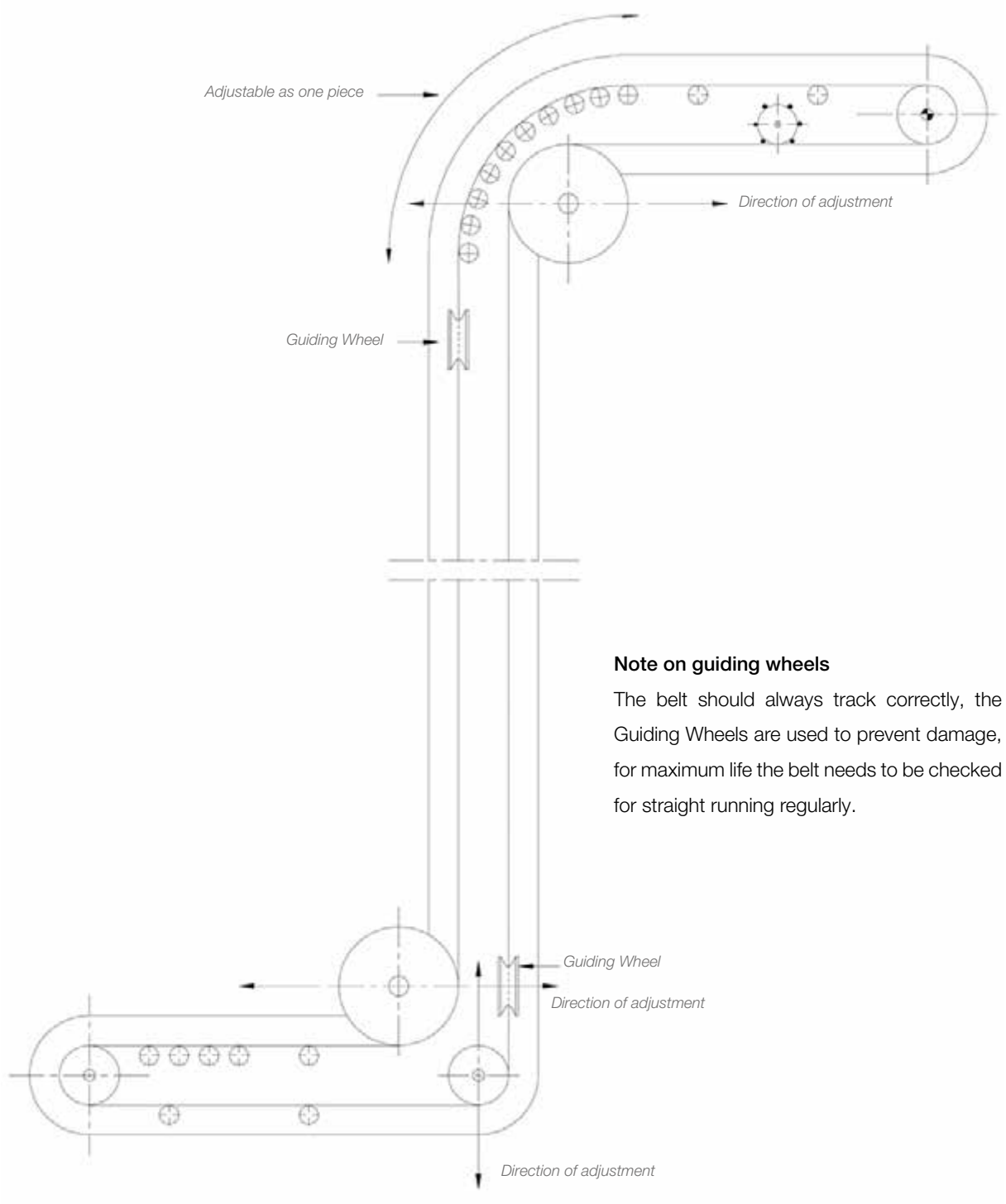
Note

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

Belt Tracking

Belt Tracking

The positioning of the guiding 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 Guiding Wheel shafts be adjustable by +/– 50 mm. The dimension of 2.5 x B_w is an approximation and can be varied between 2 and 3 times belt width. If you are in doubt regarding the correct positioning of the Guiding Wheels please contact us for advice.



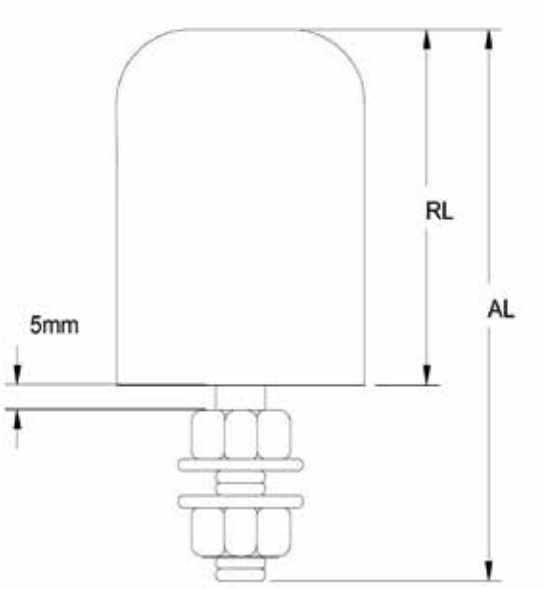
Note on guiding wheels

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

Ancillary Equipment

Stub Idlers

Diameter mm	R_L mm	A_L mm	Shaft
63.5	80	140	M20 x 55
63.5	150	210	M20 x 55
89	80	140	M24 x 55
89	150	210	M24 x 55
108	80	140	M24 x 55
108	150	210	M24 x 55
133	100	160	M30 x 55
133	150	210	M30 x 55

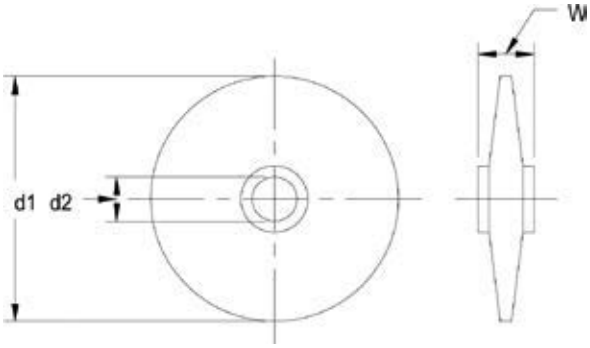


PHOENIX S-Wall™ Stub idlers are made with a special dome end cap to protect the Sidewalls in case of miss tracking.

Note

The above is the standard production range, different diameters and shaft details are available to special order as are Stainless Steel constructions,please enquire.

Rubber Return Disc



Type	d_1 mm	d_2 mm	Idler Diameter mm	W mm	Sidewall Height mm
RD63/80	250	61	63	35	80
RD89/90	275	86	89	35	80
RD63/120	330	61	63	40	120
Rd89/160	355	86	89	40	120

Installation, Tracking and Maintenance

Note

This manual is intended to give outline information only, due to the nature of site installation of conveyor belts it is not possible to cover for all eventualities. You are strongly recommended to check with our Service or Technical Departments if you are unsure about any aspect of the information given within this manual.

Disclaimer

SBS and its associate companies cannot accept any liability for advice and information given within this manual, it is intended for guide lines only. For definitive advice you are requested to contact SBS.

Jointing Instructions

The S-Wall™ conveyor belt incorporated with your conveyor system will provide long term service if correctly installed and maintained. Our experience shows that belt failures only occur where the installation is incorrect and where there is insufficient maintenance. In most cases, the belt specification selected has been the result of close co-operation with the designers and/or the manufacturers of the complete system. To ensure the success of the S-Wall™ Conveyor, the following instructions should be adhered to:

A. Initial Installation

1. Unpack the belt according to our information sheet on belt handling.
2. Ensure tail take-up pulley is at its' minimum position.
3. Thread belt round head and tail pulleys. (Where 'C' or 'TC' type inclined cleats are used, ensure these point in the direction of belt travel.)
4. Select the best position on the conveyor where the ends are to be spliced.
5. Clamp to the conveyor structure the trailing end of the belt. The clamp should be positioned 1.5/2.0m from the end of the belt.
6. On the leading end of the belt, attach a tensioning device 2.0m from the end. Tensioning the belt to remove as much sag as possible.

B. Jointing Procedure. (by splicing)

1. Place in position the bottom half of the vulcanising press.
2. Place both ends of belt over vulcanising platten ensuring the leading end is on top.
3. Remove excess belting and leave the overlap in accordance with the relevant splicing diagram.
4. Step-down the ends of the belt, accordingly to the measurements in the attached diagram, ensuring the leading end is folded back and stripped from the bottom and the trailing end is left on the vulcanising platten and stripped from the top.
5. Remove all remaining pieces of cured rubber from the exposed fabric without causing damage.
6. Apply vulcanizing solution to both ends (skin-gum to trailing end which has been stripped from the top), and bottom filler strip.
7. Place both ends of belt together, ensuring they are in line with the belt, and insert top filler strip.
8. Position a sheet of cellophane paper over the joint; lay a rubber mat over this and place in position on the top half of the vulcanising press and secure (as is common practice with all belt splicing, steelbars approximately 1mm thinner than the thickness of the belt itself must be positioned along the edges of the joint and secured).
9. Apply correct pressure, and follow vulcanising procedure in accordance with the quality of the belt.
10. Split and remove the vulcanising press at the required temperature; remove all excess rubber along the edges and the filler strip area.
11. Remove clamps and tensioning device.
12. Re-roughen thoroughly those areas where Sidewalls and cleats are to be fitted, using a rectangular hard board section under the belt to form a working base.

C. Joining Procedure (by fasteners)

1. Ensure ends are cut perfectly square and 'butt up' against each other.
2. Install fasteners to suit thickness and tensions, ensuring that the pulley diameters are sufficiently large.
3. Remove clamps and tensioning device.
4. Re-roughen where necessary those areas where Sidewalls and cleats are to be fitted.

Jointing Instructions

D. Finishing of Sidewalls and Cleats over Joint Area

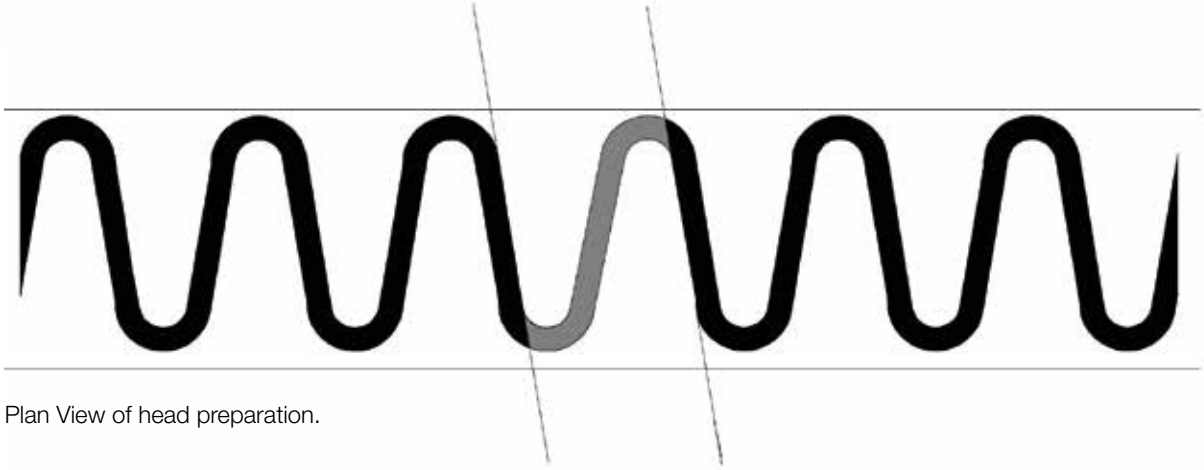
1. Place loose ends of the S-Wall™ Sidewalls across the joint area, matching the two ends and cutting in accordance with the diagram attached, i.e., so that the profile is one continuous curved line and not interrupted.
2. With a rotating wire brush, taper the two surfaces to be joined, so that when joined together, they form the same shape and thickness as the other parts of the Sidewalls.
3. All roughened areas of Sidewalls, base belt, and cleats, which are to have the cold cure adhesive applied must be cleaned by "Secondary Buffing". This process of using say a motor with flexible shaft and wire brush freshens the rubber by removing dust and oxidization.

   DO NOT USE ANY SOLVENTS TO CLEAN THE RUBBER, THESE MAY EFFECT THE BOND STRENGTH.
4. All these surfaces should be painted with two coats of adhesive. After the first coat has been applied, it should be left to dry for approx. 60 minutes before applying the second coat.
5. When the second coat is almost dry, but feeling slightly tacky, the parts to be joined are placed together in the following way:
   - I. A clean 10 cm wide strip of cellophane is placed a long that part of base belt where the Sidewalls are to be bonded. This enables the two matching end faces of the Sidewalls to be joined together as closely and accurately as possible.
   - II. When these faces are joined, they are pressed together using shaped pieces of wood.
   - III. The strip of cellophane paper is then removed and the base of the Sidewall is bonded to the base belt.
   - IV. Next the top of the Sidewall is then hammered with a rubber mallet to expel any trapped air.
   - V. Following this the base of the Sidewall is then hammered with a shaped piece of wood.
   - VI. The outer lip of the Sidewall base is rolled with a small steel roller to form a seal along the edge of the Side wall and base belt.
   - VII. The two joined end faces of the S-Wall™ Sidewalls are then compressed together using pliers or similar hand tools.
   - VIII. For additional security 2 steel plates with bolts are supplied with the belt to join the Sidewall heads.
6. The second coat of adhesive is then applied to the cleats and the areas of the base belt where cleats are to be fitted. Again, when this second coat is almost dry, but still feeling slightly tacky, the parts to be joined are placed together in the following way:
   - I. The cleats are placed in their correct position.
   - II. The upstand of the cleat is hammered securely with a rubber mallet.
   - III. The base of the cleat is rolled with a steel hand roller, starting against the upstand, and gradually working across to the outer edges of the base.
   - IV. Using a shaped piece of wood with a base of approx. 35 mm square, the cleat base is hammered firmly until the whole base area of the cleat has been covered.

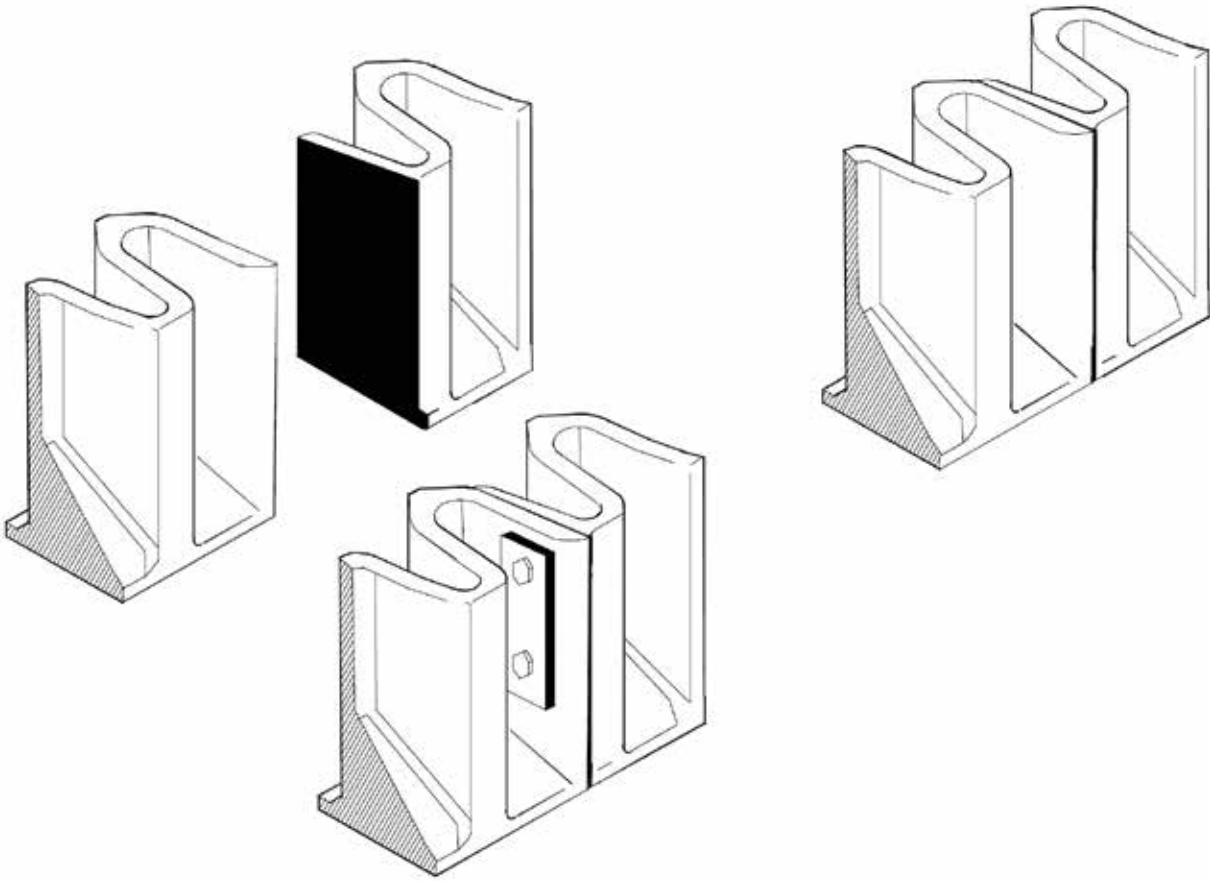
REMEMBER

1. Once areas to be bonded are placed together, they must not be moved.
2. The belt should not be moved or tensioned for 12 hours, the time necessary for the bond to cure completely, giving full strength, in the case of Heat Resistant belts this may need to be extended, please enquire.
3. The majority of S-Wall™ belt failures are due to incorrect joining of Sidewalls and cleats, therefore it is essential these instructions are carried out explicitly.
4. In more difficult locations the use of a 'Bonding Layer' will increase bond strength, please enquier with our service dept for details.

Sidewall Head Joining Method

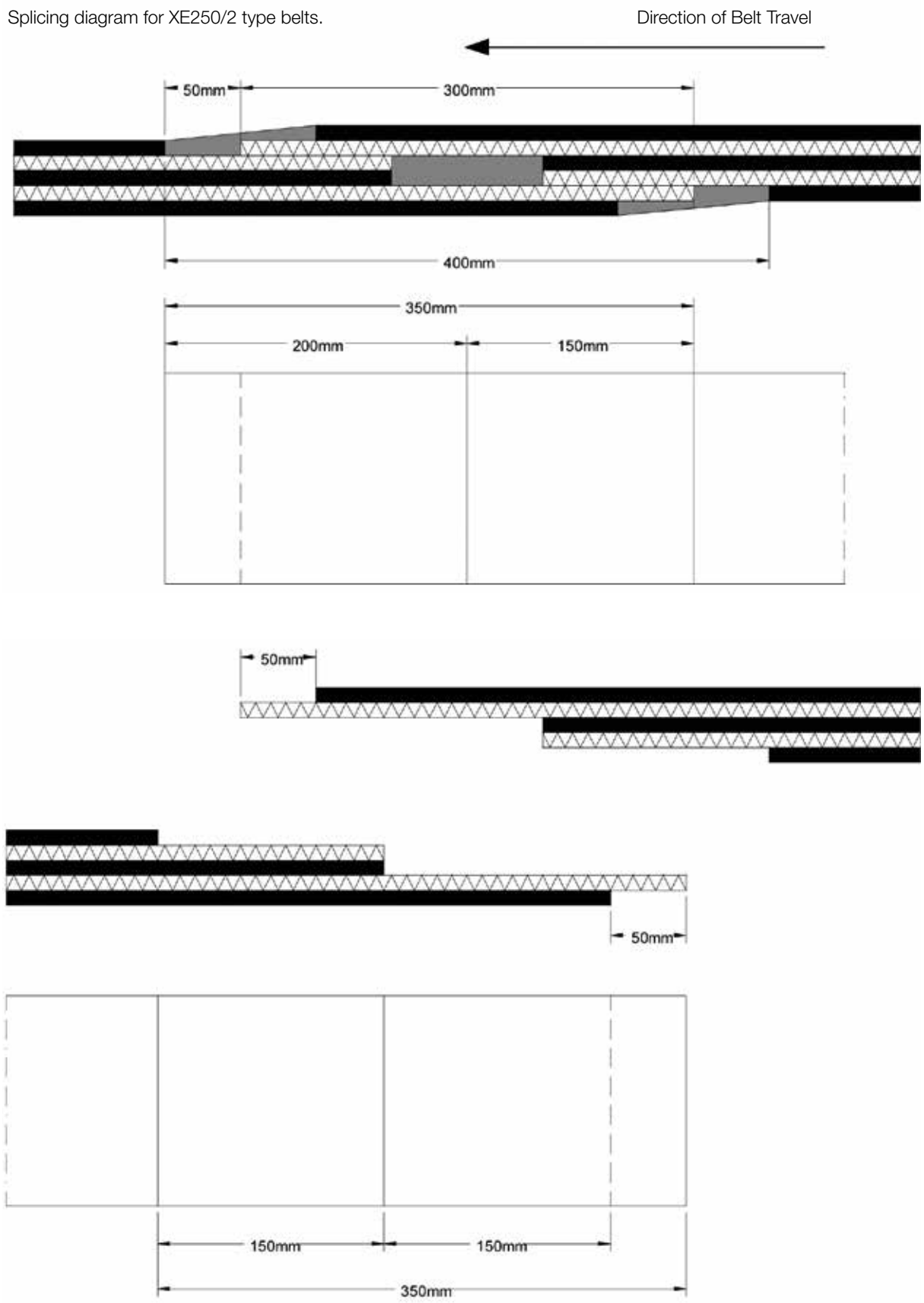


Plan View of head preparation.



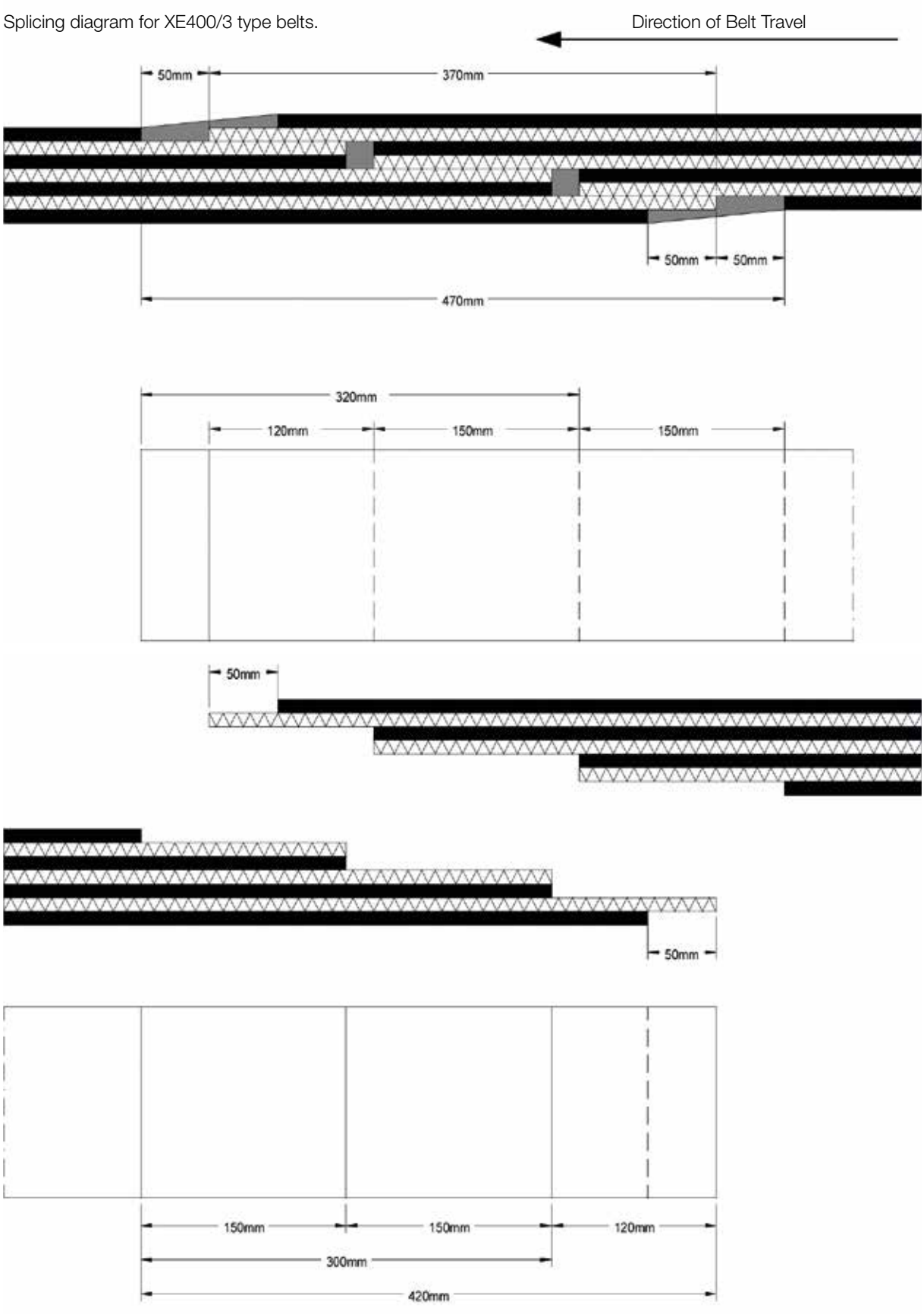
Splicing Diagram

Splicing diagram for XE250/2 type belts.



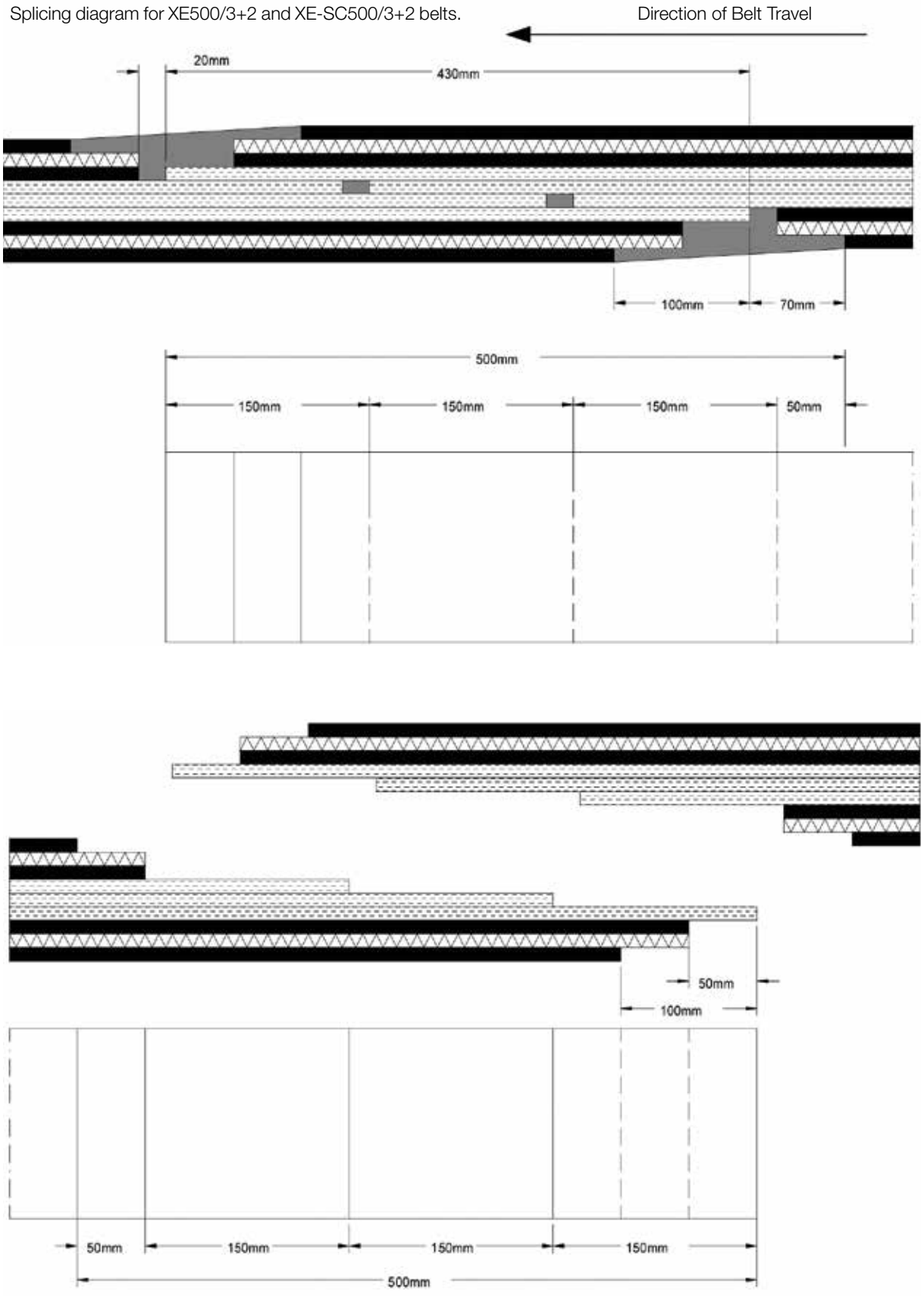
Splicing Diagram

Splicing diagram for XE400/3 type belts.



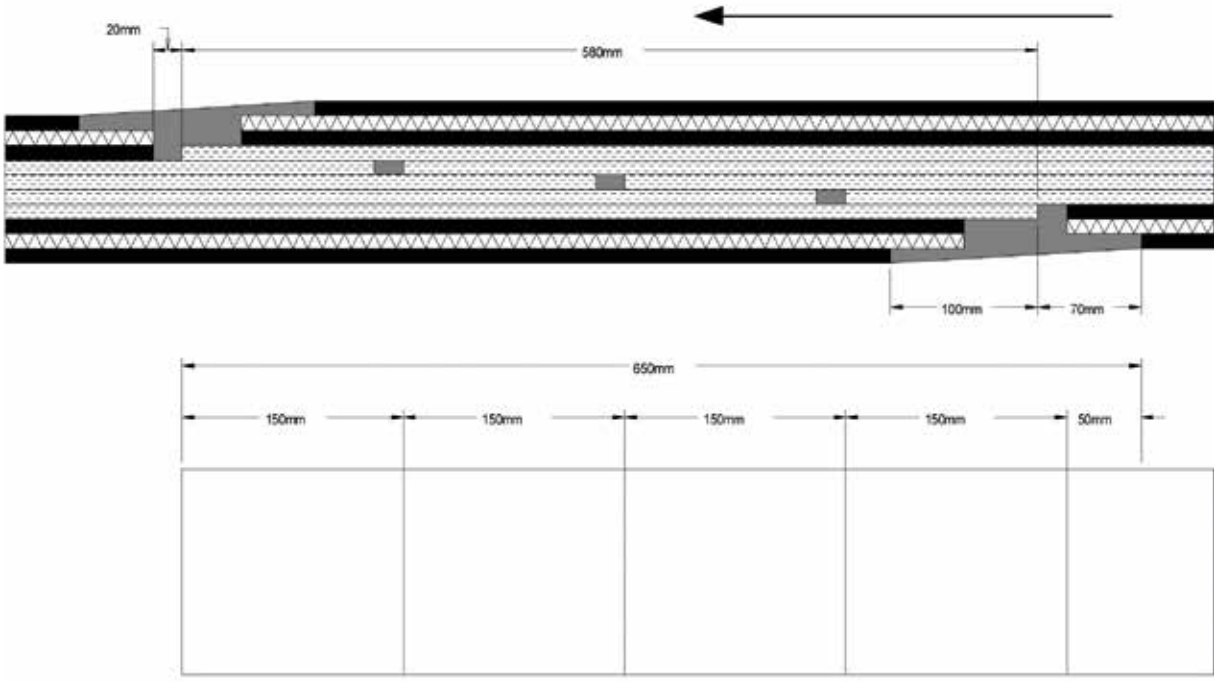
Splicing Diagram

Splicing diagram for XE500/3+2 and XE-SC500/3+2 belts.



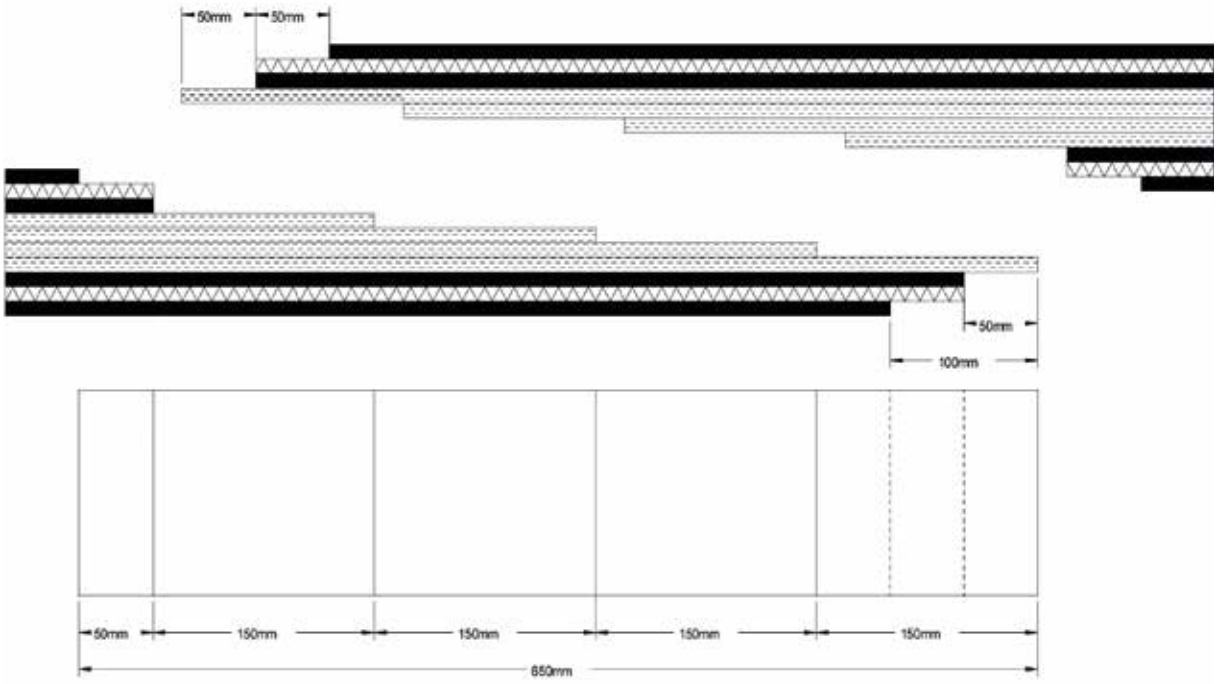
Splicing Diagram

Splicing diagram for XE630/4+2 and XE-SC630/4+2 belts



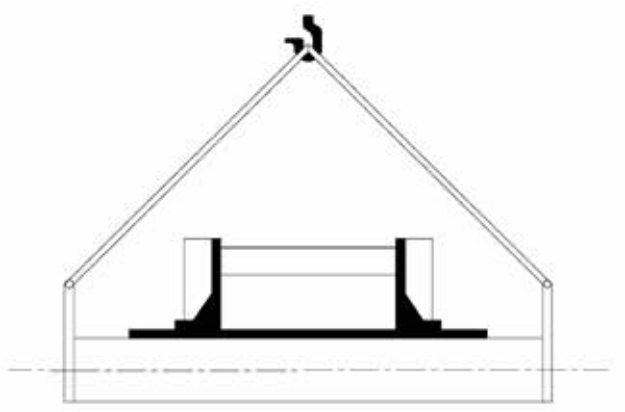
Note

For belts with more tensioning plies follow the diagram and add the required number of steps depending on the number of plies.

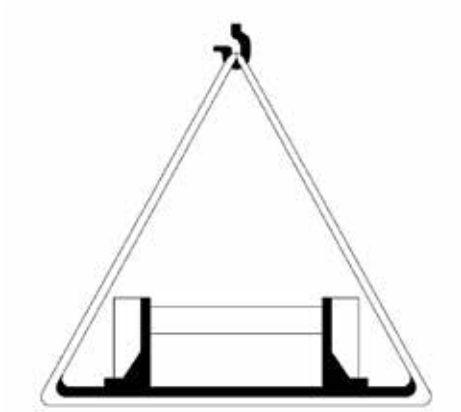


Belt Handling

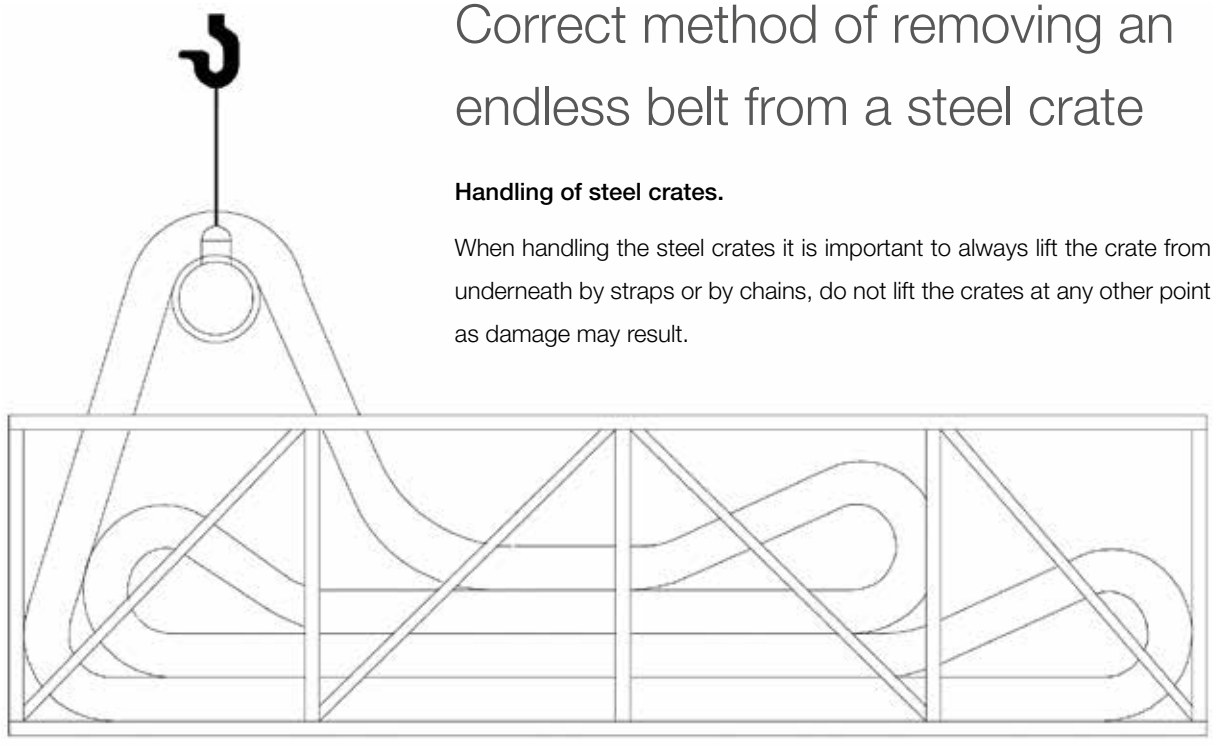
All SBS S-Wall™ Conveyor Belts leave the production line packed in such a way as to ensure safe transportation. It is essential that when off loading and unpacking the belt that the utmost care be taken not to damage the belt. The belt should be unpacked as the following sketches, it is most important that under **NO CIRCUMSTANCES** should a steel cable or rope be used to lift the belt either out of a crate or onto the conveyor.



CORRECT METHOD



NO!



Correct method of removing an endless belt from a steel crate

Handling of steel crates.

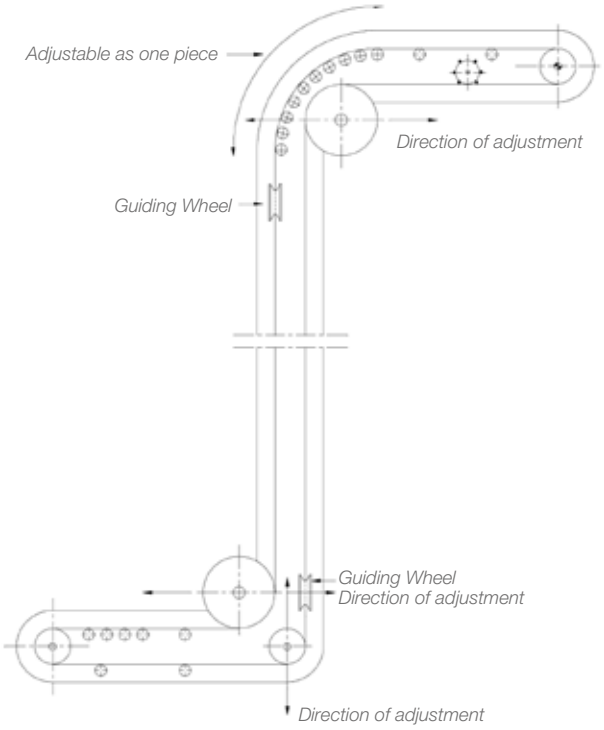
When handling the steel crates it is important to always lift the crate from underneath by straps or by chains, do not lift the crates at any other point as damage may result.

Tracking

To ensure accurate belt tracking, the following points are essential.

1. The conveyor structure must be square.
2. The terminal pulleys must be set square with the conveyor structure.
3. In general the head and tail pulleys must be crowned and lagged, the exception to this is with high tensile belts where the pulleys must not be crowned, please check with us first.
4. The correct number of idlers (or the required size of the drum) must be used at the deflection points.
5. The correct size of carrying and support idlers are used.
6. The vulcanized joint must be perfectly square.

Sufficient tension should be applied to the belt to enable it to be driven by “letting out” the screw adjustment at the tail pulley, ensuring that equal amounts of screw take-up are made on each side. When the belt is run, should any belt wander be evident, correction is made initially by the positioning of the idlers (or drums) at the bottom inner bend, this is the main point of tracking.



If belt wander still persists, correction is made by similar adjustments to the drum or idlers at the top deflection curve, if the belt still miss tracks the deflection wheels should also be adjusted. It should be remembered that it is the deflection point before the area where belt wander is occurring that is adjusted. Following this the carrying and return side idlers should be checked and adjusted as necessary. As previously stated our recommended design of feed hopper assists in belt tracking, particularly when feeding from the side, and the use of SBS Guiding Wheels type GS300/80 is recommended to protect the belt from damage caused by miss-tracking.

Belt Tracking

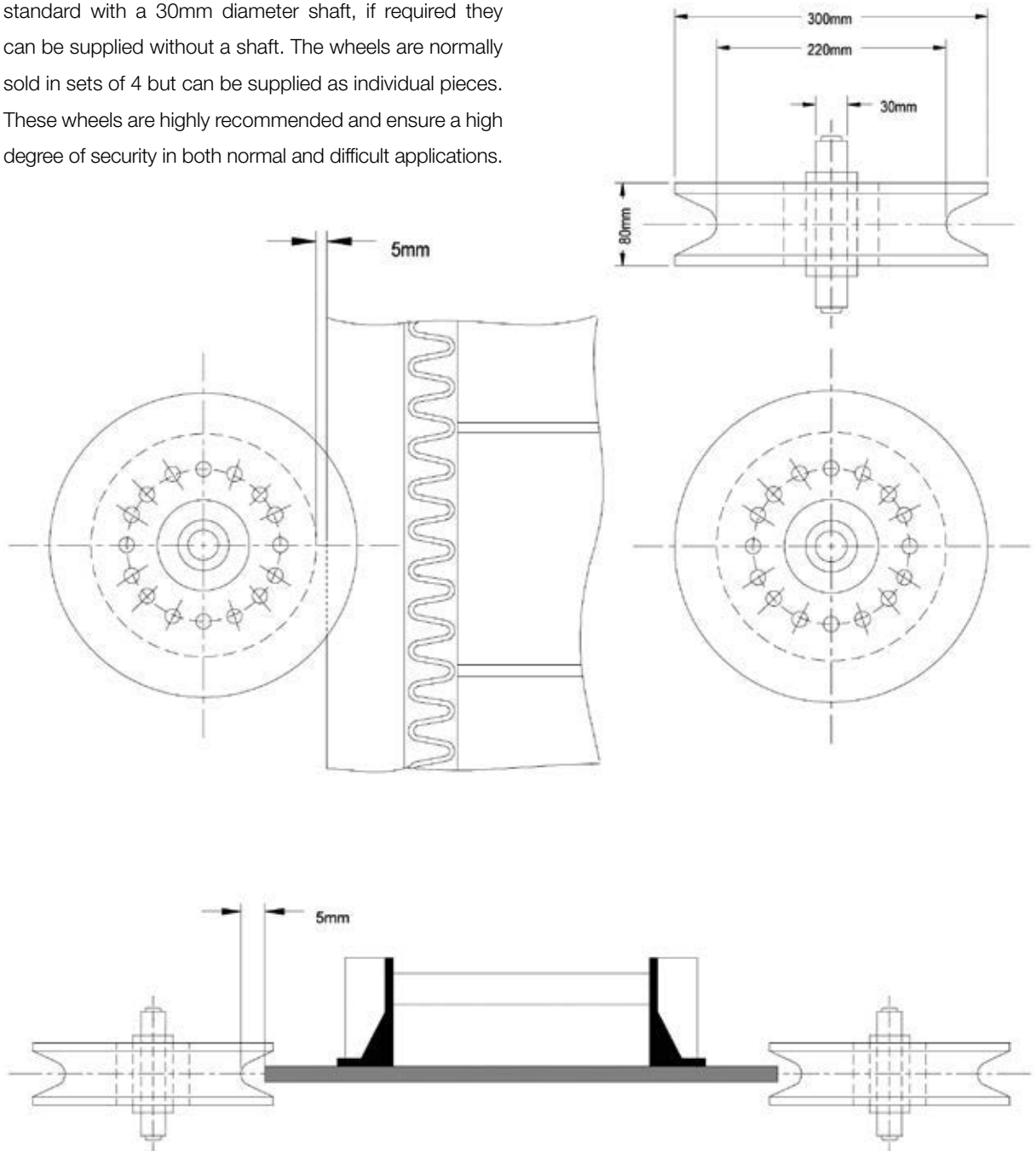
All components should be made adjustable. At the top inner deflection curve and the bottom inner bend drum it is important that the deflecting system is made adjustable as a complete unit. As the bottom inner bend drum is the main tracking point it is easier if a single drum is installed as per the drawing and not a series of idlers. Generally, providing that the installation and supporting members are square and that the belt joint is square, because the belt is cross stabilised in most cases this in its self will assist straight running. For the correct procedure in adjusting the relevant points please contact our service department if unsure as to what adjustments are required.

Note

The foregoing is only a summary, for detailed advice please contact our technical department.

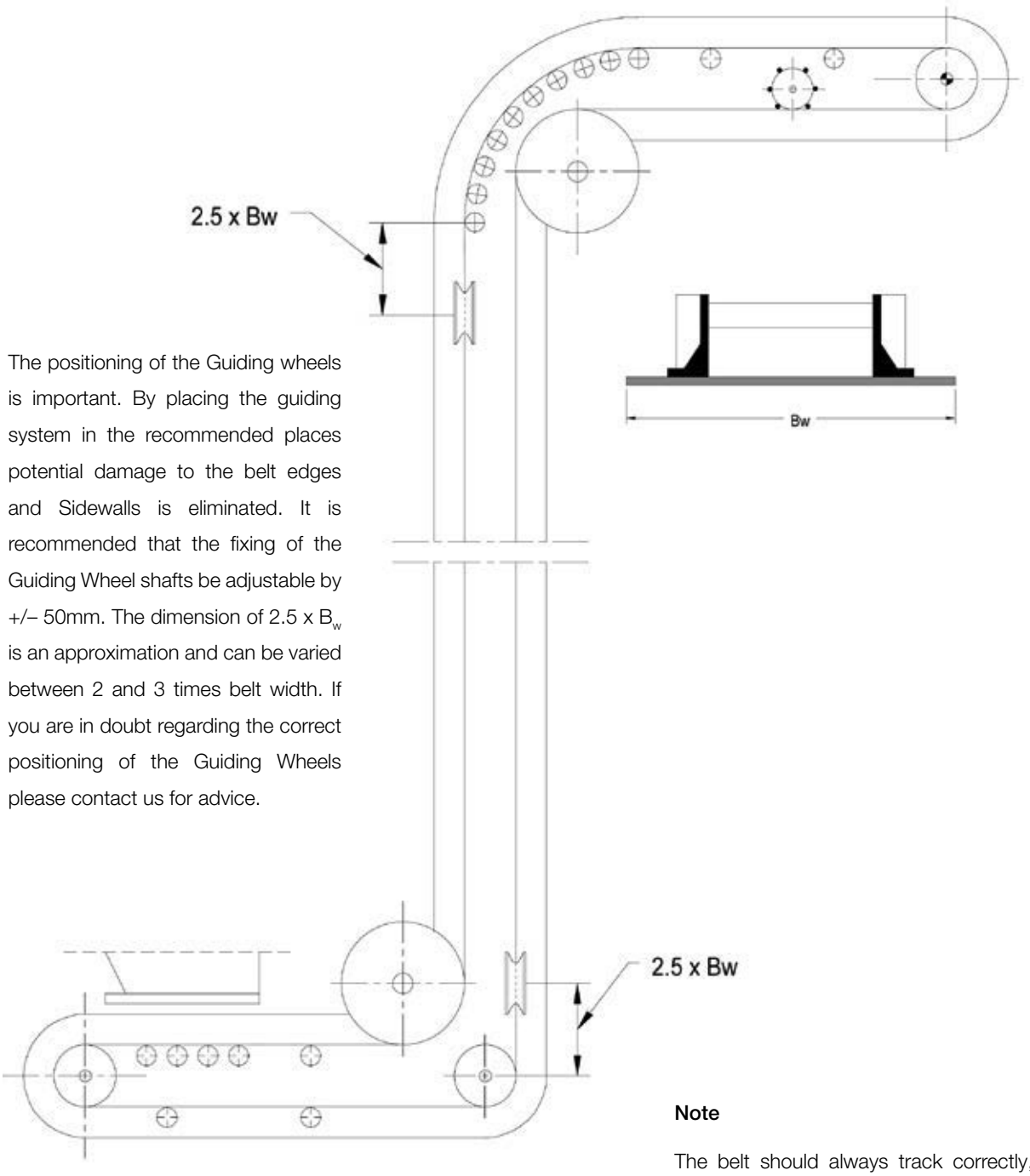
Guiding Wheels

SBS Guiding Wheels type GW300/80 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 from a high precision rubber moulding ensuring consistent quality. The wheels are available as standard with a 30mm diameter shaft, if required they can be supplied without a shaft. The wheels are normally sold in sets of 4 but can be supplied as individual pieces. These wheels are highly recommended and ensure a high degree of security in both normal and difficult applications.



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

Guiding Wheels



The positioning of the Guiding 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 Guiding Wheel shafts be adjustable by +/– 50mm. The dimension of 2.5 x B_w is an approximation and can be varied between 2 and 3 times belt width. If you are in doubt regarding the correct positioning of the Guiding Wheels please contact us for advice.

Note

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

Maintenance and Enquiry Form

Maintenance costs on conveyors are less than on ordinary troughed belt conveyors and bucket elevators, but it should be remembered that anything between 25% and 50% of the initial cost of the conveyor can be attributed to the cost of the belt, whereas troughed conveyors may only amount to 10% to 15%. Therefore it can be seen that the replacement of a S-Wall™ belt is an expensive operation, and it is in your interests to ensure that all S-Wall™ belts are regularly inspected for signs of wear caused by mechanical damage and spillage.

REMEMBER, most belts are torn out rather than worn out. In particular, the following points should be noted:

Idlers: These must rotate freely, and be free from any material build-up. Lubrication of all moving parts on a planned basis is essential for dependable operation and minimum maintenance. Component life will be extended by following the manufacturer lubrication instructions.

Pulleys: These should be free from any material build-up. The lagging on the drive pulley should be inspected on a regular basis. If the lagging is in poor condition it may be necessary to apply more tension than is normally necessary to drive the belt resulting in premature wear.

Deflection Gear: Again, these must be free to rotate freely.

Feed Hopper: It is important that this is just free from the top of the S-Wall™ Sidewalls, any rubber seals around the hopper need checking for wear to prevent excessive dust or spillage.

Tracking: The belt should run without touching any side members or deflection gear, please refer to the section on belt tracking if the belt is running out of alignment.

Good housekeeping: This is necessary for continuous operation and low maintenance. Spillage and build up of material can eventually cause the idlers to stop rotating and an accumulation of lumpy material can cause belt damage.

Check: The belt edges, Sidewalls, Cleats and the belt splice need to be checked on a periodic basis for wear or separation. Any minor areas of damage should be repaired as soon as is possible.

Contract: A maintenance contract may be available for your S-Wall™ belt either on a direct basis from SBS or from your local SBS approved service company, please ask for details.

The storing of S-Wall™ belts is also an important factor. They must be kept on the steel or wooden crates in which they are delivered, ensuring that the loops are not compressed by the weight of the belt. Ideally, the belts should be stored in normal factory conditions, away from the direct sunlight and heat. Please see DIN 7716 which is available on request for details on the recommended storage practice for rubber goods.

Enquiry Form

A careful study of simple and most difficult applications is all time guaranteed through the support of the Application Technology from Phoenix Conveyor Belt.

Please contact us for an individual offer.

Please use our online forms: www.phoenix-conveyor-belts.com/belt-enquiry

PHOENIX

Extreme Conveyor Belt Solutions

PHOENIX Conveyor Belt Systems GmbH has established a respected global market presence based upon innovative product design and cutting edge technology.

Our line of conveyor belt products is developed from engineered product designs that have been tested and proven to provide the highest level of performance in conveying applications worldwide. Dedication to all aspects of the manufacturing process and the highest level of quality control standards ensure that our products provide the best value to our customers. With over 100 years of experience and a multitude of world records, Phoenix Conveyor Belt Systems GmbH continues to demonstrate its position as the global leader in conveyor belt technology.

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