NATIONAL EXPORTS CORPORATION

AN ISO 9001:2015 COMPANY

SIDEWALL BELT

"When you think of steep incline conveying, think of NEC VERTSOL Sidewall Belts."

NATIONAL EXPORTS CORPORATION

Vertsol Sidewall belts, the proven high-performance and reliable mode of material handling, are becoming increasingly cost-effective and popular. We offer innovative solutions to specific material handing problems of steep incline using sidewall belts.

National Exports Corporation has the certifications of ISO 9001:2015 for quality management systems.

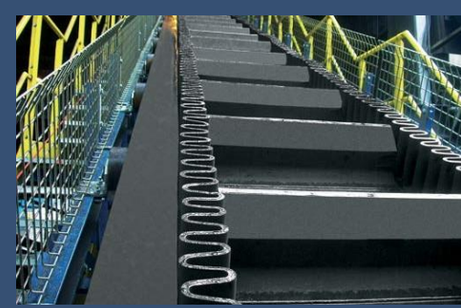
Introduction of NEC VertSol Sidewall Belt

NEC VertSol is a conveyor belt used for conveying material, specifically useful when there is steep inclination angle of the system.
The advantage of NEC VertSol Sidewall Belts are that it increases the handling capacity, no material spillage and low power & maintenance required.

The complete range of NEC belts is produced according to the international standards. Therefore the cross reinforcement of the carcass ensures the necessary transversal stiffness and prevents from hitting the full width return idlers.

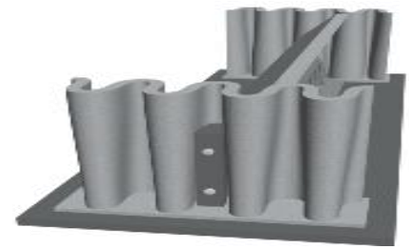
The main application fields of this belt are:

- Steel plants
- Cement Plant
- Foundries
- Batching plants
- Power plants
- Underground mining (coal or ore)
- Shaft conveying for tunnelling and underground mining
- Ship loading and unloading, ship to ship loading
- Sand preparation in foundry plants
- Waste recycling, soil purification and water treatment
- Handling of large material flows in the horizontal path



Functional Description

A number of different features and components are found on sidewall belt conveyors. The inclusion of some of these components depends on the particular application for example, whether or not the conveyor is totally enclosed.



The following details are however generally found on sidewall belt conveyors:

A. The Conveyor

As with all conveyors, the sidewall conveyor comprises a loading station , a conveying section , and a discharge station .

Material is loaded onto the tail-end of the conveyor via a loading chute and skirts . The loading section is usually horizontal although inclined loading stations of up to 10 degrees are used periodically.

Product drops into the various 'pockets' or compartments and is accelerated to belt speed. The length of this loading station depends on a number of factors. However typically, the loading section is between 2,5m and 5,0m in length. Single roll impact idlers support the belt at the loading station. From the loading point the belt is inclined to the desired angle, up to 90 degrees. This is achieved by installing a pair of disc-type deflection pulleys above the belt, which engage the base belt and, on larger conveyors, the top of the sidewalls.

Material slumps down into each pocket as it negotiates the transition from horizontal to inclined conveying. Along this inclined section the belt is supported on a series of flat idlers at intervals to suit the inclination of the belt (fewer on steeper belts) and to provide adequate support.

At the top of the incline of the belt negotiates a second vertical curve to horizontal. Due to the centrifugal force which could throw the product out of the pockets, the large bend radius required is achieved by a number of adjustable flat rolls.

From this deflection point the horizontal belt is supported on the flat idlers up to the head/discharge pulley where the material is discharged from the conveyor via the head chute into the receiving conveyor / silo / etc. . This drive pulley is continuous (a drum) and the shell is usually lagged.

The return belt passes under a rapping idler, which assists in cleaning residual material off of the belt before the belt leaves the discharge chute. Material carryover on sidewall belt conveyors is historically a problem. A number of techniques are available however, to improve belt cleaning and/or deal with spillage.

The return belt is supported on either edge by means of finger rolls spaced at suitable intervals along the horizontal and inclined sections. At the top and bottom deflection points the belt is supported on pulleys. The top deflection point comprises a pair of disc-type pulleys while the lower deflection pulley engages the smooth surface of the belt and is therefore a drum pulley. The shell is not usually lagged.

Finally, at the tail of the conveyor, the belt is supported on a drum-type screw take-up pulley , which is adjustable to achieve the required belt tension.

Functional Description

B. The Belt

The sidewall conveyor belt itself comprises a number of different applications and capacities.

Examples of generic features are provided below.

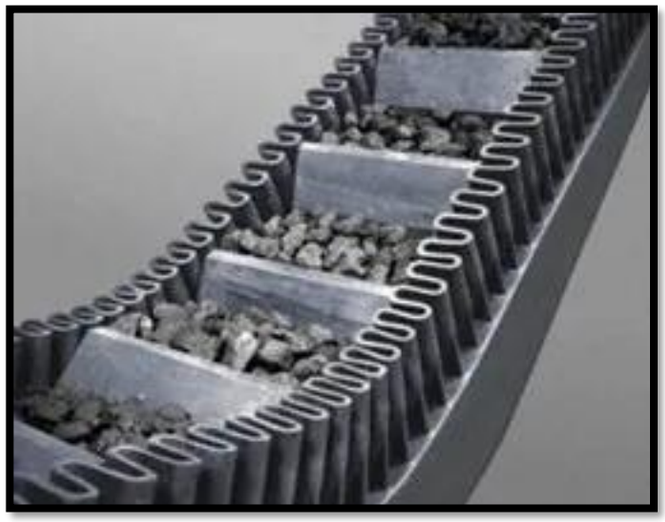
The belt comprises three main components as identified in the introduction of this section namely, the base belt, sidewalls and cleats or flights.

In terms of a belts' functional description, the base is a cross-stabilized belt meaning that the belt is rigid across its width but flexible longitudinally. The base belt selection criteria include the belt tension, the belt width and correct selection of the belts' covers to suit the application.

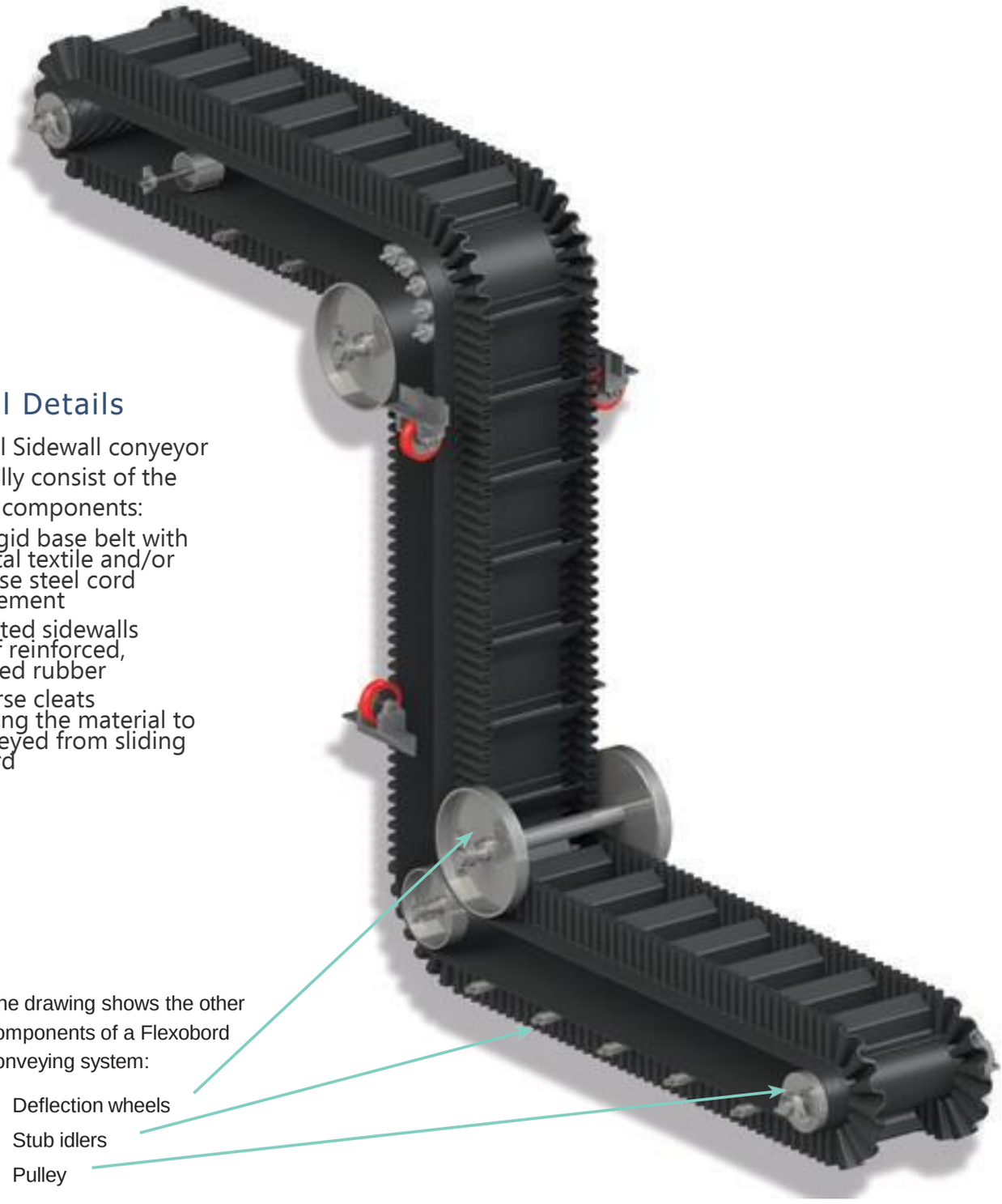
Two sidewalls are hot vulcanised onto the base belt and form the side panels of the conveyor, preventing material from slipping off the cleats. The sidewalls are convoluted and reinforced. The convolutions enable the belt to negotiate convex and concave radii imposed by the various pulleys. The design of the sidewalls ensures that minimal material is 'trapped' by the sidewalls and thus maximum cleanliness on the conveyor is achieved. The height of the sidewalls is a function of the capacity of the belt and depth / height of the cleats.

Cleats are also hot vulcanised onto the base belt. The shape, width, frequency and height of the cleats are determined during the design process. Factors affecting selection of cleats include the capacity of product to be conveyed, the materials' bulk density, particle size and the desired angle of inclination of the belt. These factors also determine the pitch or frequency of the cleats on the belt.

The shape of the cleats fitted to a belt is also important in the design process. As has been indicated above, factors affecting the selection of cleats include: volumetric capacity, inclination and particle size.



Look No Further for NEC Sidewall Belt



Technical Details

NEC VertSol Sidewall conyeyor belts basically consist of the following 3 components:

1. Cross-rigid base belt with horizontal textile and/or transverse steel cord reinforcement
2. Corrugated sidewalls made of reinforced, vulcanized rubber
3. Transverse cleats preventing the material to be conveyed from sliding backward

The drawing shows the other components of a Flexobord conveying system:

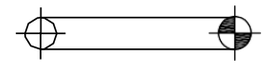
- Deflection wheels
- Stub idlers
- Pulley

Product Features

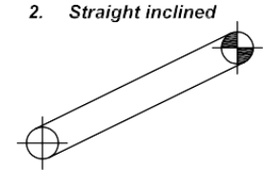
The correct choice of each component in relation to the final use is one of the most important contribution to the overall plant performances.

Sketches on the right show VertSol layouts; the belt designer must take into consideration these alternatives to guarantee correct plant performances.

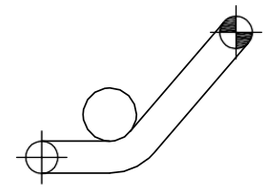
1. *Horizontal*



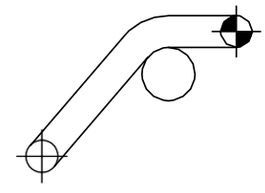
2. *Straight inclined*



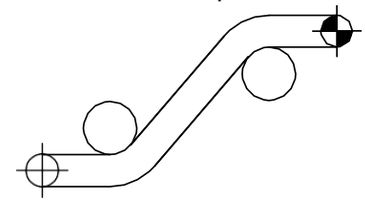
3. *"L" inverted*



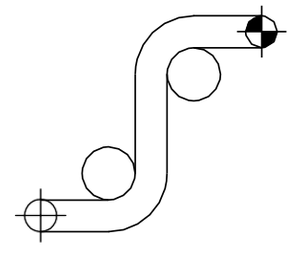
4. *Inclined + horizontal*



5. *"S" shape*

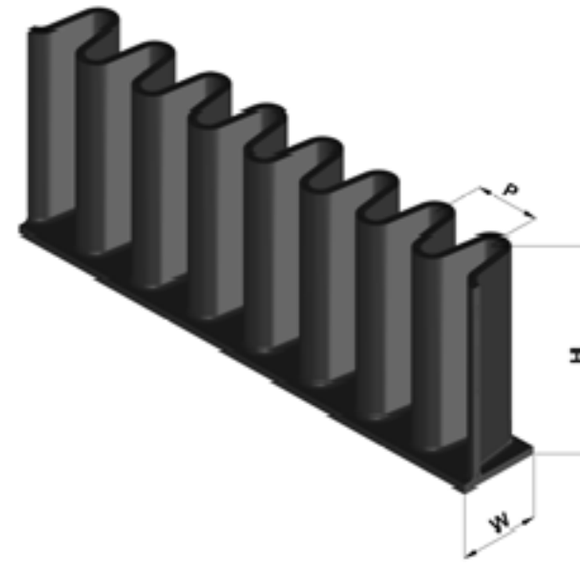


6. *"S" vertical shape*



Range and Types of Sidewall Belts

TYPE	Height H [mm]	Width W [mm]	Pitch P [mm]
40/30	40	30	25
40/50	40	50	50
60/50	60	50	50
80/50	80	50	50
100/50	100	50	50
120/50	120	50	50
160/70	160	70	55
200/80	200	80	65
200/75	200	75	60
240/80	240	80	65
240/75	240	75	60
250/75	250	75	60
280/75	280	75	60
300/100	300	100	85
300/75	300	75	60
400/100	400	100	83



Dimensions are only approximate.

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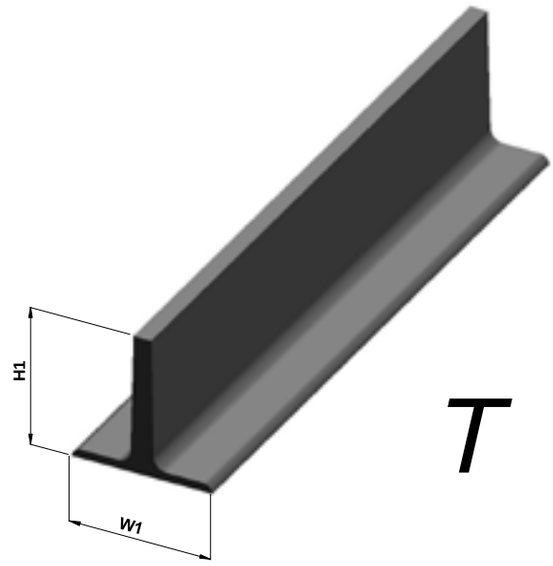
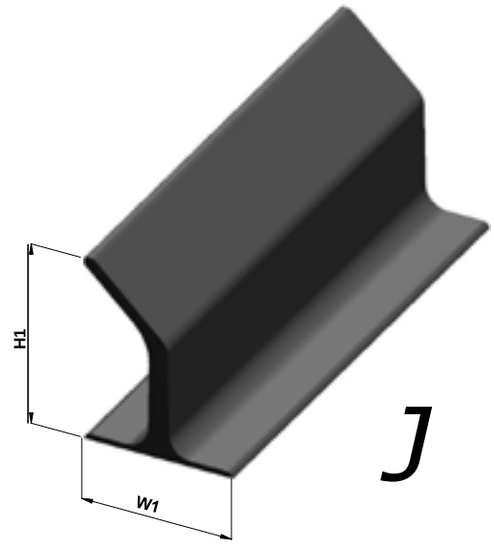
Cleats

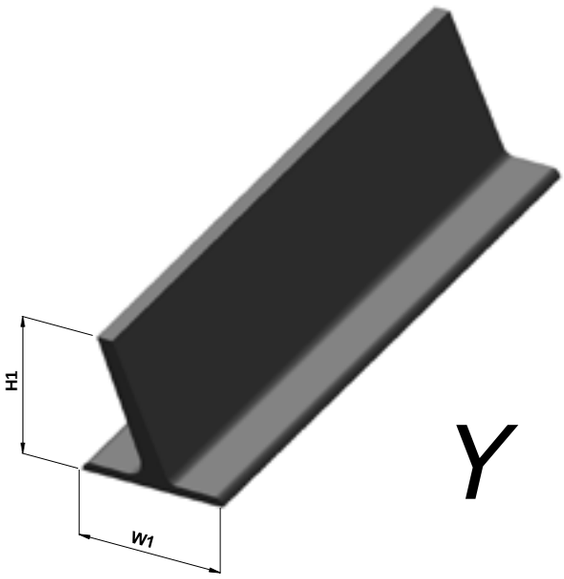
TYPE	Height H_1 [mm]	Width W_1 [mm]
T55	55	80
T75	75	100
T90	90	110
T110	110	110
T140	140	150
T180	180	150
J70	70	70
J90	90	110
J110	110	110
J140	140	140
J180	180	170
J220	220	175
J230	230	175
J240	240	175
J280	280	190
Y55	55	90
Y75	75	90
Y110	110	110
W180	180	228
W220	220	228
W280	280	228
W360	360	228
W380	380	228



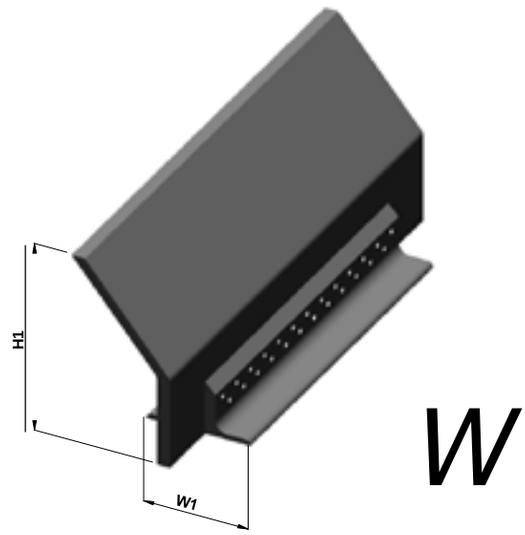
T



J



Y

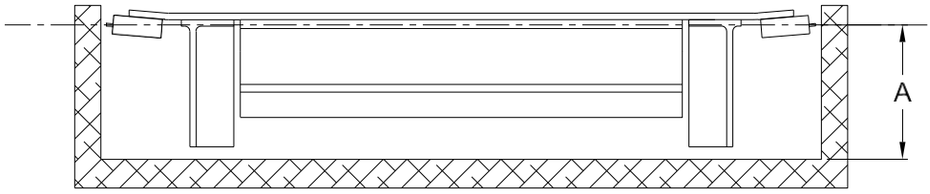


W

BASE BELT – THE CROSS STABILIZED CONSTRUCTION

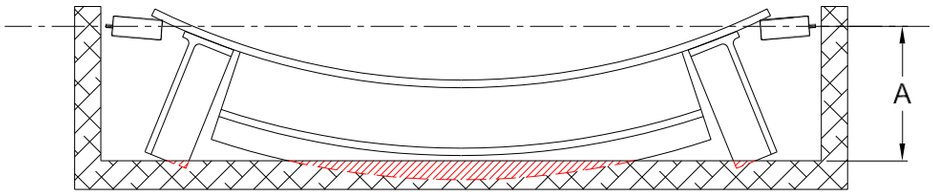
The main required characteristic of a base belt suitable for NEC Vertsol applications is the controlled transversal stiffness, also named cross stabilized construction.

The following sketches indicate the consequences due to a wrong choice of the base belt:



Correct

Cross stabilized base belt



Wrong

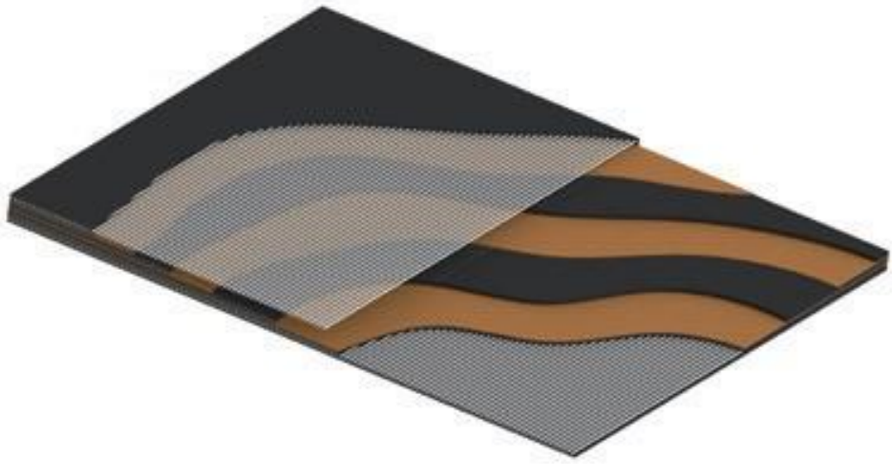
Common quality base belt

Standard base belt without any specific transversal stiffness can be used only for horizontal flat belts made with only corrugated sidewalls and without transversal cleats.

BASE BELT SELECTION

According to the heaviness of the application, the following base belt types are available:

NRx Composed by only textile fabrics with high transversal stiffness, feature provided by 2 additional special synthetic layers set in the cover rubber, assure the correct cross stabilizing properties.
They are provided with cut edges for light and medium applications.
This base construction can be sold as independent product . The sketch below shows the cross stabilized construction.



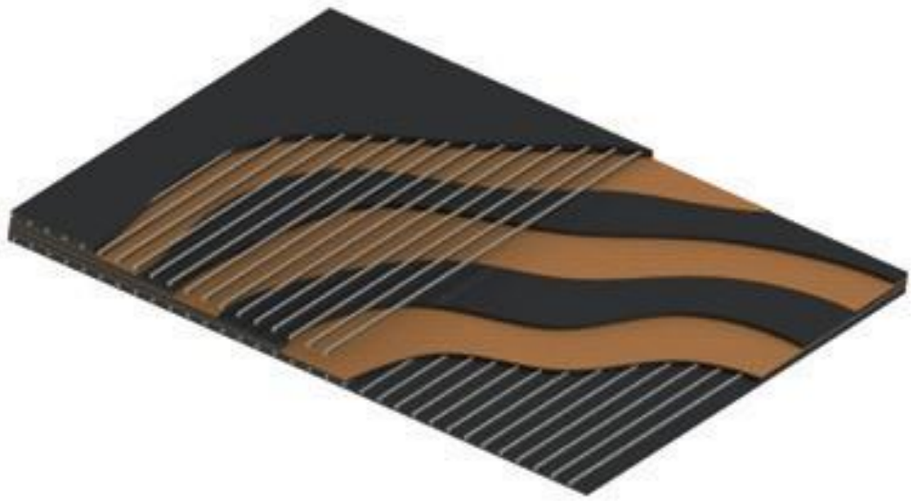
NRx Standard construction
500/3+2 4+2
630/4+2 4+2
800/5+2 4+2
1000/5+2 4+2
1250/5+2 4+2

where "4+2" are top and bottom covers thickness in mm

NRsx Composed by a mix of multi-ply synthetic carcass and suitable steel reinforcement to ensure high transversal stiffness for heavy VertSol applications.

They are provided only with moulded edges.

This cross stabilized base belt can be sold as independent product. The sketch shows the unique difference, i.e. the presence of transversal steel cord in the cover.

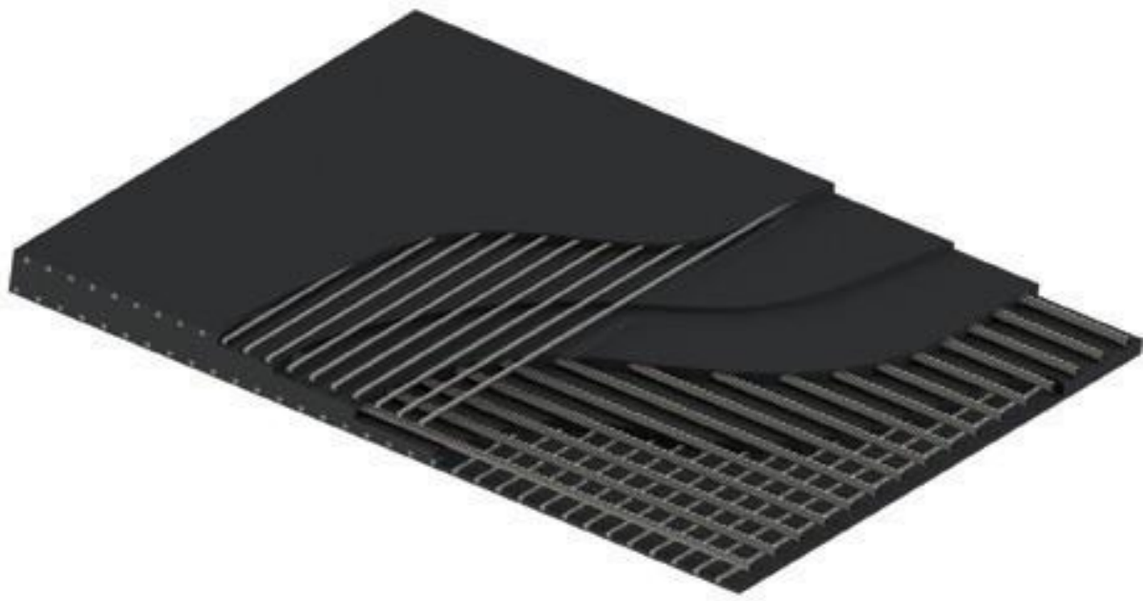


NRsx Standard construction
500/3 4+2
630/4 4+2
800/5 4+2
1000/5 4+2
1250/5 4+2

where "4+2" are top and bottom covers thickness in mm

NRst Designed for the heaviest applications where high elevation and/or conveying capacity are involved. It is composed by longitudinal steel cords with a special transversal steel reinforcement to assure the required stiffness. Full range is available from 800 to 1600 KN/m.

This cross stabilized base belt can be sold as independent product. This belt type has a steel cords internal structure.



MINIMUM SUGGESTED PULLEY DIAMETER RELATED ON BELT TYPE

Belt Type	Belt Class [kN/m]	Drive Pulley [mm]	Take-up Pulley [mm]
NRx / NRsx	500	400	315
	630	500	400
	800	630	500
	1000	800	630
	1250	1000	800

MINIMUM SUGGESTED PULLEY DIAMETER RELATED ON SIDEWALL TYPE

Sidewall Type	Drive Pulley [mm]	Take-up Pulley [mm]	Deflection Wheel [mm]
40/30	125	125	160
40/50	125	125	160
60/50	200	200	250
80/50	250	250	315
100/50	315	315	400
120/50	400	400	500
160/70	500	500	630
200/80	630	630	800
200/75	630	630	800
240/80	800	800	1000
240/75	800	800	1000
250/75	800	800	1000
280/75	1000	1000	1200
300/100	1000	1000	1200
300/75	1000	1000	1200
400/100	1250	1250	1600

The minimum pulleys diameter must be the highest values between those set in the tables, influenced by the belt construction and the sidewall type.

OTHER USEFUL INFORMATIONS FOR PLANT DESIGN

- Minimum cleat pitch = 1,5 x Max lump size
- Minimum cleat height = (1,5 to 2) x Max lump size
- Width of support idlers (mm) = Belt width (mm) + 100 mm
- Idler pitch – carrying side ≤ 1 m max
- Pitch of full width return idlers ≤ 2 m
- Pitch of short return idlers ≤ 1 m
- Lateral idlers for alignment: min 4 for each straight section; max distance = 12 m

COVERS SELECTION

Base belt, sidewalls and cleats can be provided with alternative rubber covers with reference to the specific application. Sidewalls and cleats are produced with the same compound of the base belt.

ABRASION SERVICE

AB (L grade ISO 10247 – Y grade DIN 22102 – RMA II grade, IS 1891/ Part I) - Standard abrasion resistance compound: AB is a cover rubber recommended for all ground applications and for the majority part of the materials, where resistance to abrasion is required. VertSol belts with AB compounds are suitable to handle heavy and/or abrasive material such as gravel, stone, sand, aggregates, coal, cement, etc.

EAB (D grade ISO 10247 – W grade DIN 22102 – RMA I grade, IS 1891/ Part I) - Extra abrasion resistance compound: EAB is superior quality cover rubber, especially designed where maximum resistance to abrasion is required. The characteristics of resistance to cut, tear and ozone cracking, together with long duration, improve the quality of this cover. EAB is expressly recommended for steel works and iron mines; however, it is recommended for heavy lump ore, coke, salt, limestone too.

OIL SERVICE

OR (G grade DIN 22102, IS 1891/ Part III) - Vegetable oil resistance compound: OR is a cover rubber that guarantees a good belt resistance against the chemically aggressive effects due to the transport of materials with moderate oil presence, like corn, fertilizers and general vegetable oily materials. OR is expressly designed to resist the terpene of wooden chips and to convey solid urban waste materials.

FIRE RESISTANT

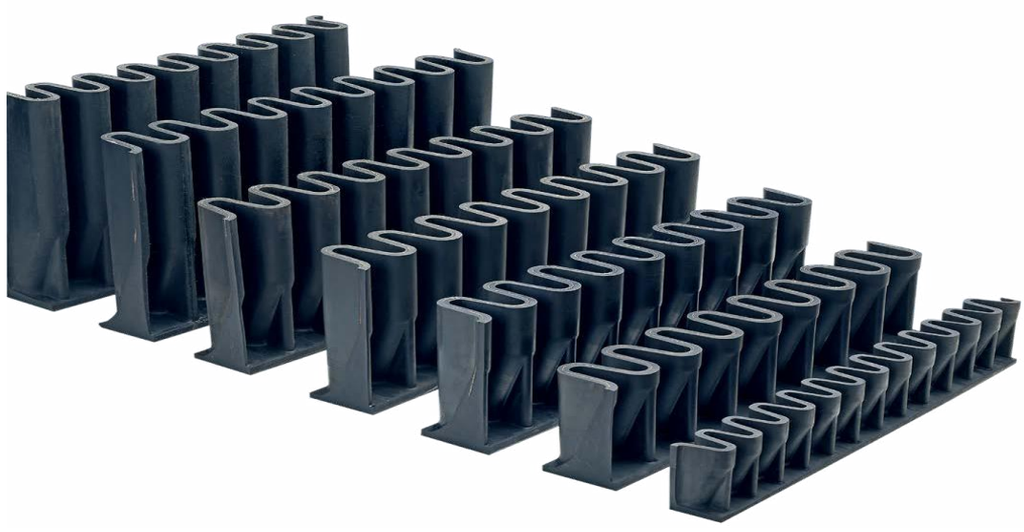
FR (K grade DIN 22102, class 2A EN 12882)- Self-extinguish product: FR is a product designed to service both underground and above ground application where safety is fundamental and fire risk is high. It is recommended in particular for coal and potash applications. FR is self-extinguish and antistatic according to ISO 340 and ISO 284 or equivalent.

HEAT SERVICE

H1 – Medium temperature resistance: H1 is a rubber compound assuring a medium degree of abrasion resistance; it is formulated for continuous service with hot coarse materials at a temperature of 130°C with peaks of 150°C as per IS 1891, Part II.

UHR – High temperature resistance: UHR is a rubber compound assuring a good abrasion resistance. It is designed for continuous service at a temperature of 150°C with peaks of 180°C as per IS 1891, Part II.

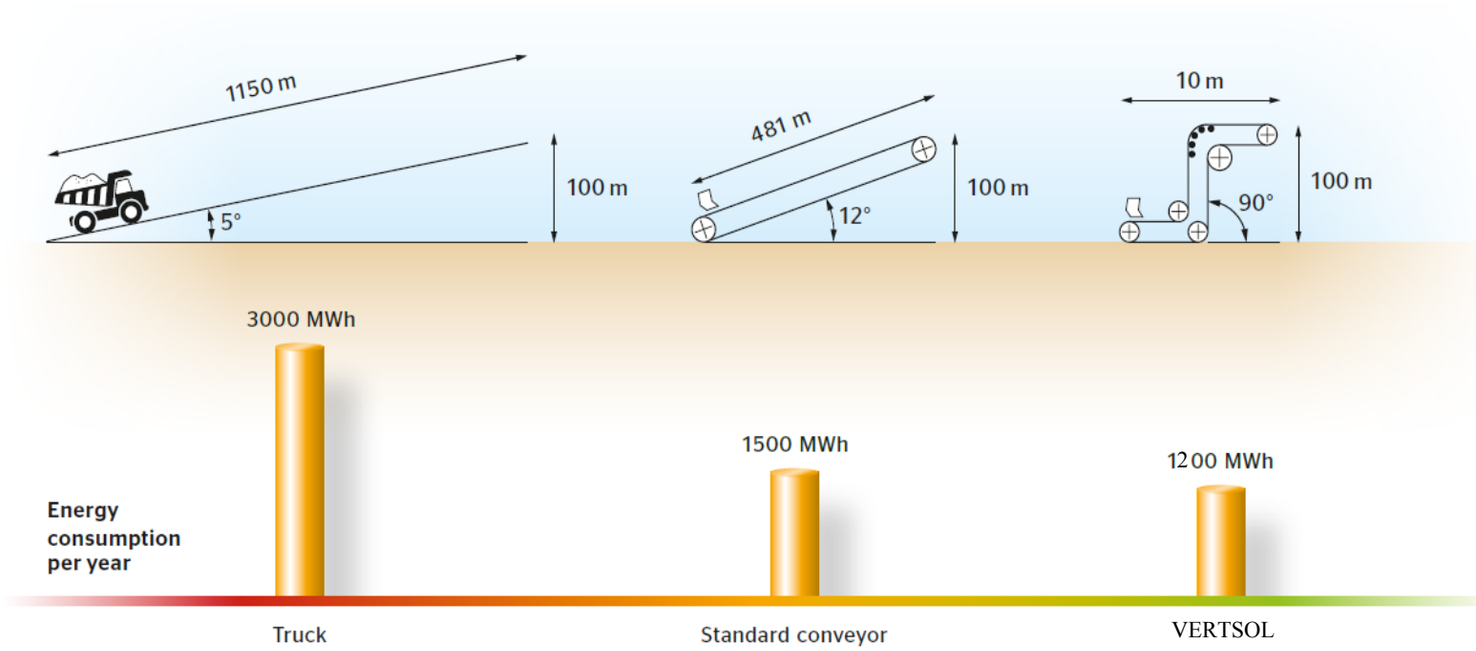
SIDEWALL BELT TROUBLESHOOTING



CAUSES	CURES
1. Belt Bowed	Avoid telescoping belt rolls while storing them, and avoid storing in damp locations. A new belt should straighten out when installed, or it must be replaced.
2. Belt improperly spliced	If improperly spliced, remove belt splice and make a new splice. Set up a regular inspection schedule.
3. Belt speed too fast	Reduce belt speed.
4. Belt strained on one side	Allow time for a new belt to settle in. If the belt does not settle in properly or is not new, remove strained section and splice in a new piece.
5. Breaker strip missing or inadequate	Install a fresh belt with proper breaker strip.
6. Take up tension too high	Recalculate tension and adjust the take up accordingly. Reduce take up tension to point of slip, and then tighten slightly.
7. Counterweight too light	Recalculate the counterweight required and adjust accordingly.
8. Damage by abrasives, acid, chemicals, heat, mildew, oil	Use belt with cover designed for specific condition. For abrasive materials working their way into cuts, make spot repairs with repair patches. Don't over lubricate idlers.
9. Edge worn or broken	Remove badly worn out section and splice in a new section.
10. Excessive impact of material on belt	Use correctly designed chutes and baffles. Install loading idlers. Where possible, load fines first.
11. Excessive tension	Recalculate and adjust tension.
12. Frozen idlers	Free idlers, lubricate them and improve maintainence.
13. Idlers or pulleys out of square with center line of conveyor	Realign, and if possible install limit switches for greater safety.
14. Idlers improperly placed	Relocate idlers or insert additional idlers to support the belt.
15. Improper loading, spillage	Feed should be in direction of belt travel and at belt speed, centered on the belt. Control flow with feeders, chutes, skirtboards.
16. Improper storage of handling	Ensure that belts are stored properly prior to installation.
17. Insufficient traction between belt and pulley	Lag drive pulley. In wet conditions, use grooved lagging. Install correct cleaning devices for safety.
18. Material between belt and pulley	Use skirtboards properly. Remove accumulation and improve system maintenance.
19. Material build-up	Remove accumulation. Install cleaning devices
20. Pulley lagging worn	Replace worn pulley lagging. Use grooved lagging for wet conditions.
21. Pulleys too small	Use larger diameter pulleys.
22. Relative loading velocity too high or too low	Adjust chutes or correct belt speed.
23 Side loading	Load in direction of belt travel, in center of the conveyor.
24. Skirts improperly place	Install skirtboards so they don't rub against the belt.

Complaint	Cause in Order of Likely Occurrence					
Belt runs off tail pulley	7	15	14	17	21	-
Entire belt runs off at all points of the line	25	17	15	21	4	17
One belt section runs off at all points of the line	2	11	1	-	-	-
Belt runs off at head pulley	15	22	21	16	-	-
Belt runs to one side of the entire length	15	16	21	-	-	-
Belt slip	19	7	21	14	22	-
Belt slip on starting	19	7	22	-	-	-
Excessive belt stretch, belt sagging	13	-	21	6	8	-
Vulcanised splice separation	2	23	13	20	12	26
Excessive wear, including rips, gauges, ruptures	12	24	17	21	8	5
Excessive bottom cover wear	21	14	5	19	20	22
Excessive edge wear, broken edges	25	4	17	8	1	21
Cover swells in spots or streaks	8	-	-	-	-	-
Belt hardens or cracks	8	23	22	18	-	-
Covers become checked or brittle	8	18	-	-	-	-
Longitudinal grooving or cracking of top cover	26	14	21	12	-	-
Longitudinal grooving or cracking of bottom cover	14	21	22	-	-	-
Fabric decay, carcass cracks, ruptures	12	20	5	-	-	-
Soft spots in belt	5	8	12	20	-	-
Ply separation	13	23	11	8	3	-

DATA FOR ORDERING



To avoid errors or misunderstanding in the order, we suggest to use the following belt designation:

150 m 120 500 / 3+2 5+ 3 1000

- **150 m** — length (m)
- **120** — Sidewall height (mm) Belt
- **500** — Tensile strength of base belt (N/mm)
- **3+2** — Number of plies + Number transversal breakers
- **5+ 3** — Top + Bottom cover thickness (mm)
- **1000** — Belt Width (mm)

Please also indicate the following information:

Cleat pitch (mm) and type (T, J, W, Y)

Transversal sketch (for example: 120 + 50 + 700 + 50 + 120 = 1040 mm)

or enclose the sketch filled in with all relevant elements.

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