

Conveyor Solutions
Flexocord® steelcord
conveyor belts





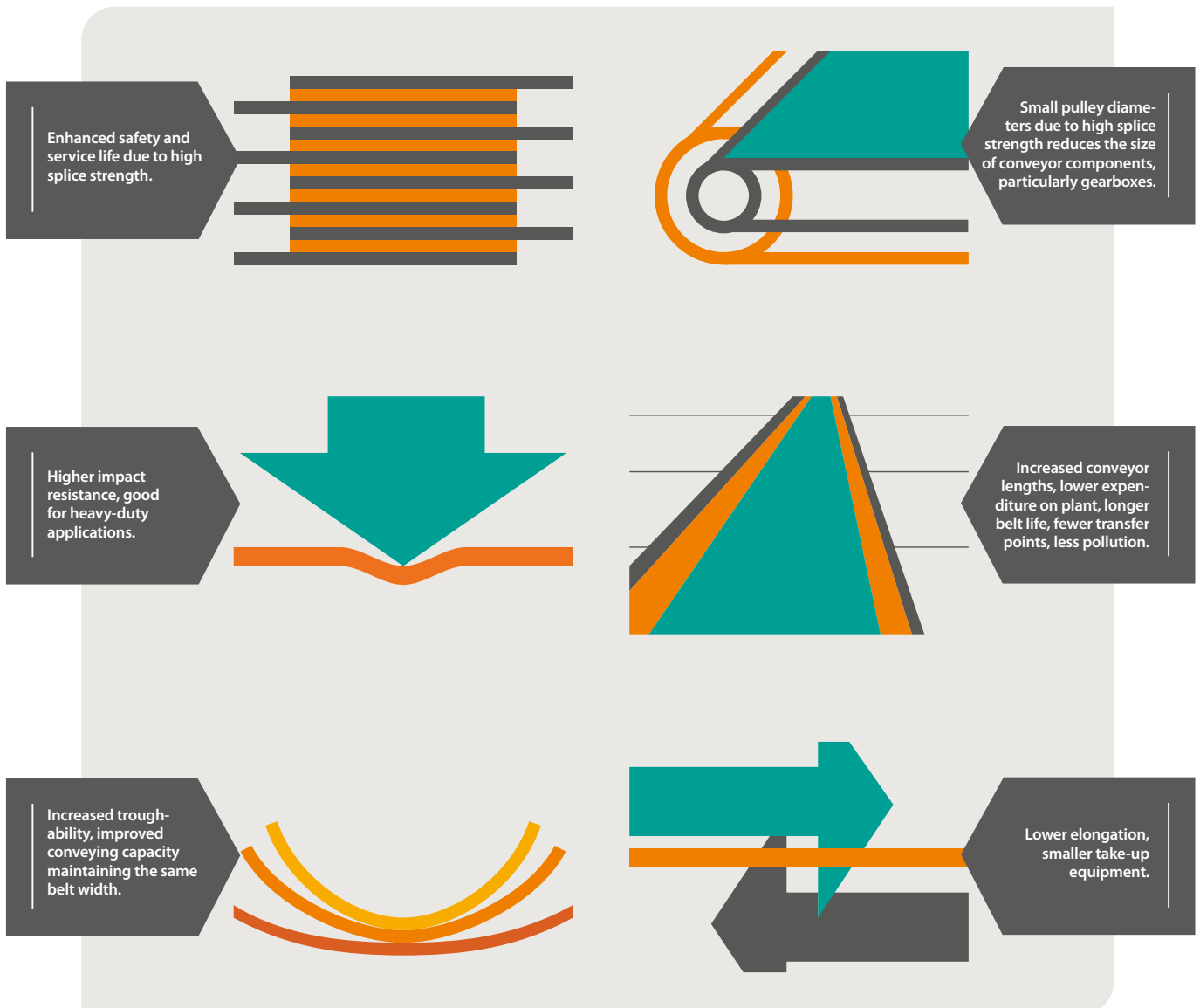
Flexocord® conveyor belts

Based on more than 110 years of experience in development, manufacturing and application know-how, Flexocord® conveyor belts meet specific end-user requirements for cost efficiency and reliability.

With subsidiaries in more than 50 countries, and more than 80 service centers in all parts of the world, Metso participates in the design, engineering, installation and service, thereby ensuring a maximum return on the customer's investment. Within the Flexocord® product range, steelcord belts are the ideal choice for long, high-tension or heavy-duty installations.



Advantages





Belt construction

Covers

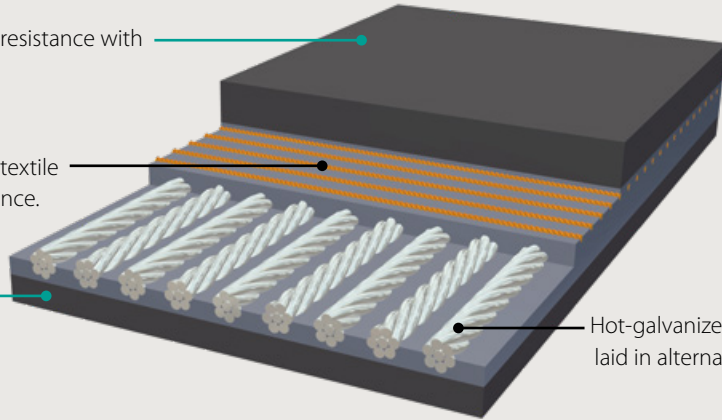
High wear resistance, good ageing and ozone resistance with covers made from natural or synthetic rubber.

Breaker

Optionally the belt can be manufactured with textile or steel breaker plies to improve impact resistance.

Core rubber

Excellent adhesion to galvanized steelcord and cover, improved steelcord impregnation, high structural strength and shear modulus, resistance to heating and fatigue.



Carcass

Hot-galvanized steelcords, laid in alternate directions



Steelcord and core rubber

The bond between the core rubber and the metallic surfaces as well as the complete filling of the spaces between the wires are essential for the long-term integrity of the belt carcass.

The quality of this bond is constantly observed by regularly performing a series of static and dynamic laboratory tests, such as adhesion, pull-out strength, differential pressure test or torsion-bending test.

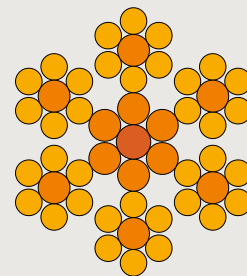
Standard cords of Flexocord® steelcord belts have an elongation of between 0,22% and 0,28%. Testing is carried out dynamically with loads between 2% and 20% nominal belt rating.

Special steelcord designs have been developed. The standard hot-galvanized cord types are 7x7 and 7x19 and range from 3,0 to 13,0 mm diameter. The open cross-lay design ensures that the rubber penetrates thoroughly.

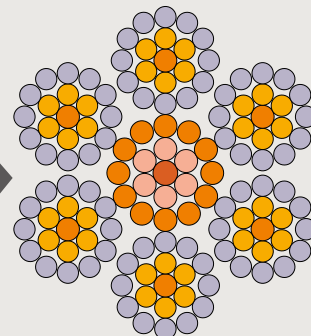
The chemical adhesive system achieves superior bonding to the steelcord. This bond, together with the open cord construction ensures a high pull-out strength between steelcord and core rubber as well as between center and outer strand.

Cover damages may result in the entry of moisture to the steelcord layer. To achieve optimum corrosion protection and long service life, the rubber must penetrate the entire steelcord and bond to every individual wire, thus preventing water from entering and propagating along the steelcords.

7 x 7
construction



7 x 19
construction



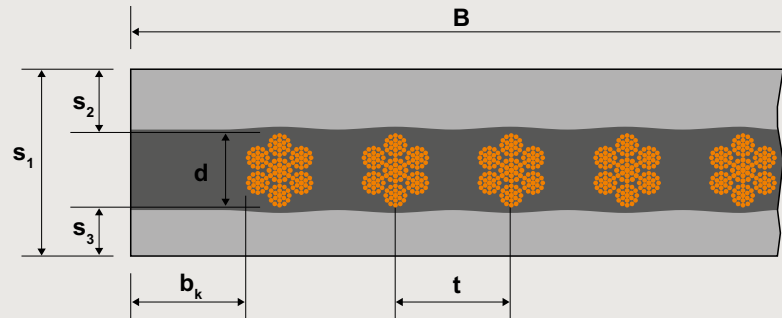


Product range

The Flexocord® standard range is shown in the table. It is based on DIN 22131 as well as on European standard EN ISO 15236, type A1.

Metso can supply most existing belt types following different international standards. Please contact us for enquiries about belt types according to the EN types A2, for belts wider than 2400 mm, or other types that differ from Metso's standard.

B	Belt width in mm
d	Cord diameter in mm
t	Cord pitch in mm
S₁	Belt thickness in mm (equivalent to $S_2 + d + S_3$)
S₂	Top cover thickness in mm
S₃	Bottom cover thickness in mm
b_k	Solid rubber edge



Specifications	St 500	St 630	St 800	St 1000	St 1250	St 1400	St 1600	St 1800	St 2000
Operating tension (N/mm)	75	90	110	140	175	200	225	255	285
Cord diameter standard (mm)	2,7	2,8	3,1	3,7	4,2	4,4	4,7	5,1	5,5
Cord diameter max. (mm)	3,0	3,0	3,5	4,0	4,5	4,8	5,0	5,5	6,0
Cord strength, min. (kN)	6,9	6,9	8,8	13,2	16,5	18,5	21,1	24,2	26,4
Cord pitch (mm)	12,0	10,0	10,0	12,0	12,0	12,0	12,0	12,0	12,0
Minimum cover thickness (mm)	4/4	4/4	4/4	5/5	5/5	6/6	8/6	8/6	8/6
Belt weight, min. covers* (kg/m ²)	15,7	16,5	17,6	21,6	23,0	25,2	29,0	30,2	31,5

* The belt weight is for the indicated minimum cover thickness. For each additional mm of cover thickness add 1,1 kg/m².

Belt width (mm)	Number of steelcords								
	St 500	St 630	St 800	St 1000	St 1250	St 1400	St 1600	St 1800	St 2000
800	63	75	75	63	63	63	63	63	63
1000	79	95	95	79	79	79	79	79	79
1200	95	113	113	95	95	95	95	95	95
1400	112	133	133	112	112	112	112	112	112
1600	128	153	153	128	128	128	128	128	128
1800			173	144	144	144	144	144	144
2000				161	161	161	161	161	161
2200					178	178	178	178	178
2400									194
2600									
2800									
3000									



St 2250	St 2500	St 2800	St 3150	St 3500	St 4000	St 4500	St 5000	St 5400	St 5800	St 6300	St 6700
320	355	400	450	500	570	645	715	760	830	900	950
5,7	6,8	7,3	7,6	8,0	8,6	9,1	10,5	10,8	11,5	12,0	12,7
6,2	7,2	7,8	8,1	8,6	8,9	9,7	10,9	11,3	11,8	12,3	13,0
30,0	41,2	46,0	51,9	57,1	66,0	79,2	93,5	101,0	109,0	118,0	133,0
12,0	15,0	15,0	15,0	15,0	15,0	16,0	17,0	17,0	17,0	17,0	18,0
8/6	8/6	8/6	8/8	8/8	8/8	8/8	8,5/8,5	9/9	10/10	12/10	12/10
32,3	33,9	36,0	39,8	41,8	45,5	46,7	54,0	55,7	62,2	67,5	70,6

Number of steelcords											
St 2250	St 2500	St 2800	St 3150	St 3500	St 4000	St 4500	St 5000	St 5400	St 5800	St 6300	St 6700
63	50	50	50	50							
79	64	64	64	64	64	59	55	55	55	55	52
95	76	76	76	76	77	71	67	67	67	67	63
112	89	89	89	89	90	84	79	79	79	79	74
128	102	102	102	102	104	96	90	90	90	90	85
144	116	116	116	116	116	109	102	102	102	102	96
161	129	129	129	129	130	121	114	114	114	114	107
178	143	143	143	143	144	134	126	126	126	126	118
194	156	156	156	156	157	146	137	137	137	137	129
	170	170	170	170	170	159	149	149	149	149	142
	184	184	184	184	184	171	161	161	161	161	153
	197	197	197	197	197	184	172	172	172	172	165



Cover grades

The most important factor for the selection of the type of rubber quality is the nature of the conveyed material: lump size, shape, hardness, density, temperature or oil/chemical content. Operating conditions, such as ambient temperatures, radiation or safety requirements also play a role in choosing the correct cover. Metso supplies rubber grades according to a wide range of international standards. Some standard cover grades are listed in the table below. All qualities are resistant against ozone, UV radiation, ageing and are antistatic according to ISO 284. Please consult us for special requirements.

The power consumption of a FLEXOCORD conveyor belt can be substantially reduced by using a low-energy compound as bottom cover.

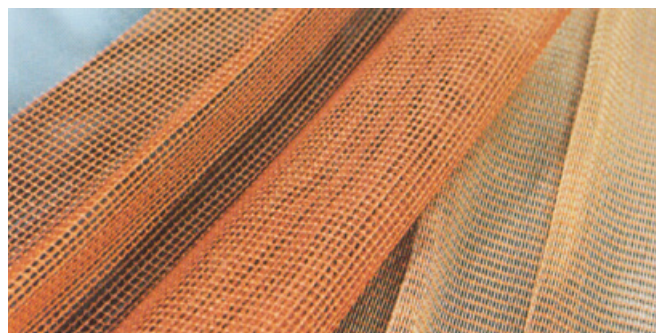
Savings can be achieved additionally using ESI idlers found in the Metso Components section.

In certain cases the use of aramid belts can maximize the energy savings of your conveyor.

Flexocord® grade	Tensile strength min. (N/mm)	Elongation at break min (%)	Abrasion max. (mm ³)	Characteristics and applications
Wear resistance				
X	25	450	120	Heavy duty cover for coarse and sharp materials Resistant against impacts and cuts Complies with: X (DIN), RMA1, H (ISO), M (AS), M24 (BS)
Y	20	400	150	Wear resistant cover for normal operating conditions Complies with: Y (DIN), RMA 1&2, L (ISO), N (AS), N17 (BS)
W	18	400	90	Cover with excellent resistance against erosive wear For small-sized, abrasive materials Complies with: W (DIN), RMA 1&2, D (ISO)
UAR	18	400	50	Ultra abrasive resistant cover
UAR25	18	400	25	Ultra abrasion resistant cover with max. abrasion of 25mm ³
Flame resistance				
K	20	400	150	Abrasion resistant cover with flame resistant characteristics according to ISO 340
VT	17	350	175	Cover with fire resistant properties according to DIN, vt
Heat resistance				
T120	15	400	175	Heat resistant, abrasion resistant cover for temperatures up to 120°C
T200	10	350	180	High heat resistant cover for max. material temperatures of 180°C



Breaker and rip detection



For applications where increased resistance against belt damage is required, Flexocord® belts can be equipped with more effective protection. Additional transverse reinforcements (breakers) offer higher

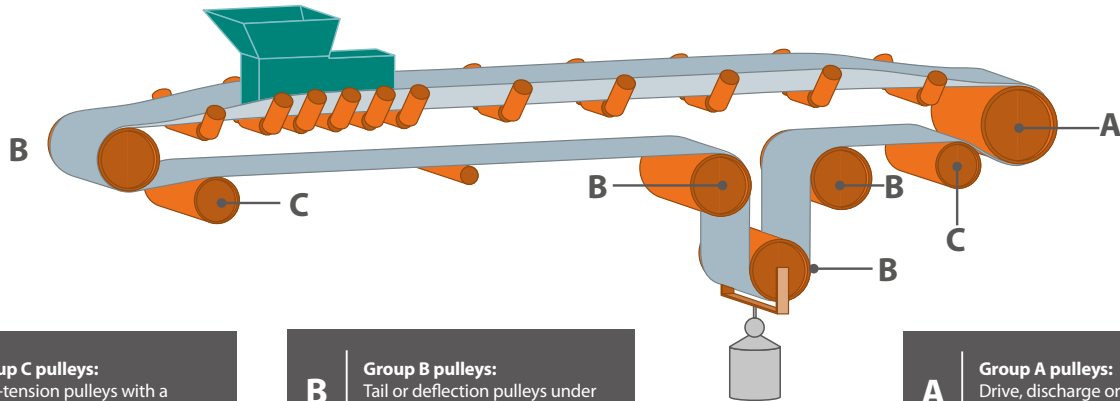
resistance to impacts or cuts and can be integrated in the top-, bottom- or both covers. Textile breakers consist of elastic polyamide cords with good capacity to absorb impact energy.

More transverse strength can be achieved with a breaker consisting of elastic steelcords. The open construction of breaker plies guarantees maximum adhesion between the rubber layers. Even though the usage of breakers can prevent objects from ripping the belt, they cannot provide complete protection.

A rip-detection system can be the choice for high-risk applications. The system consists of sensor loops, vulcanized onto the belt, and a detector that monitors the condition of the loops. Severe damage to the belt will cause one or more sensor loops to rupture. This condition is detected and can trigger an emergency stop.



Pulley diameters



C

Group C pulleys:
Low-tension pulleys with a deflection angle of 30° or less.

B

Group B pulleys:
Tail or deflection pulleys under low belt tension.

A

Group A pulleys:
Drive, discharge or other high-tension pulleys.

The recommended pulley diameters depend on the steelcord diameter, the actual belt tension and the pulley deflection angle.

The pulleys in a belt conveyor system are divided into groups according to their position and function, see illustration:

The table below indicates the minimum pulley diameters for steelcord belts depending on the belt rating, pulley group and strength utilization.

$$\text{Strength utilization in \%} = 105 \times S \times T / (B \times k_N)$$

S Safety factor (6,7 to 8 for steelcord belts)

B Belt width in mm

T Local belt tension in k_N

k_N Belt rating (nominal strength) in N/mm

Minimum pulley diameter in mm

Belt type	Strength utilization group A			Strength utilization group B			Strength utilization group C		
	> 60%	> 30 ... 60%	≤ 30%	> 60%	>30 ... 60%	≤ 30%	> 60%	>30 ... 60%	≤ 30%
St 500	400	315	250	315	250	250	250	200	200
St 630	500	400	315	400	315	315	315	250	250
St 800	500	400	315	400	315	315	315	250	250
St 1000	630	500	400	500	400	400	400	315	315
St 1250	800	630	500	630	500	500	500	400	400
St 1400	800	630	500	630	500	500	500	400	400
St 1600	800	630	500	630	500	500	500	400	400
St 1800	800	630	500	630	500	500	500	400	400
St 2000	1000	800	630	800	630	630	630	500	500
St 2250	1000	800	630	800	630	630	630	500	500
St 2500	1250	1000	800	1000	800	800	800	630	630
St 2800	1250	1000	800	1000	800	800	800	630	630
St 3150	1250	1000	800	1000	800	800	800	630	630
St 3500	1250	1000	800	1000	800	800	800	630	630
St 4000	1400	1000	800	1000	800	800	800	630	630
St 4500	1400	1250	1000	1250	1000	1000	1000	800	800
St 5000	1600	1250	1000	1250	1000	1000	1000	800	800
St 5400	1800	1400	1250	1400	1250	1250	1250	1000	1000
St 5800	1800	1400	1250	1400	1250	1250	1250	1000	1000
St 6300	1800	1400	1250	1400	1250	1250	1250	1000	1000
St 6700	2000	1600	1250	1600	1250	1250	1250	1000	1000



Splicing

Flexocord® steelcord conveyor belts are spliced by hot-vulcanization according to DIN standard. The splice length and number of steps depend on the belt rating. The standard splice is diagonal (approx. 17°), but rectangular splices are also possible. The pictures below illustrate the splice designs.

Particular attention must be paid to the splicing procedure. The method, conditions and the splicing kit have a great influence on the quality of the splice. For exact splicing instructions please contact Metso. It is strongly recommended to use splicing materials approved by the supplier.

B belt width in mm

d cord diameter in mm

t cord pitch in mm

l_{ST} step length

l_V effective splice length

One-step-splice

Belt type	Steps x step length l_{ST} (mm)	Splice length l_V (mm)
St 500	1 x 600	800
St 630	1 x 600	800
St 800	1 x 600	800
St 1000	1 x 600	800

Belt type	Steps x step length l_{ST} (mm)	Splice length l_V (mm)
St 1250	2 x 350	1050
St 1400	2 x 400	1150
St 1600	2 x 400	1150
St 1800	2 x 400	1150
St 2000	2 x 400	1150
St 2250	2 x 500	1350
St 2500	2 x 600	1550
St 2800	2 x 650	1650
St 3150	2 x 650	1650

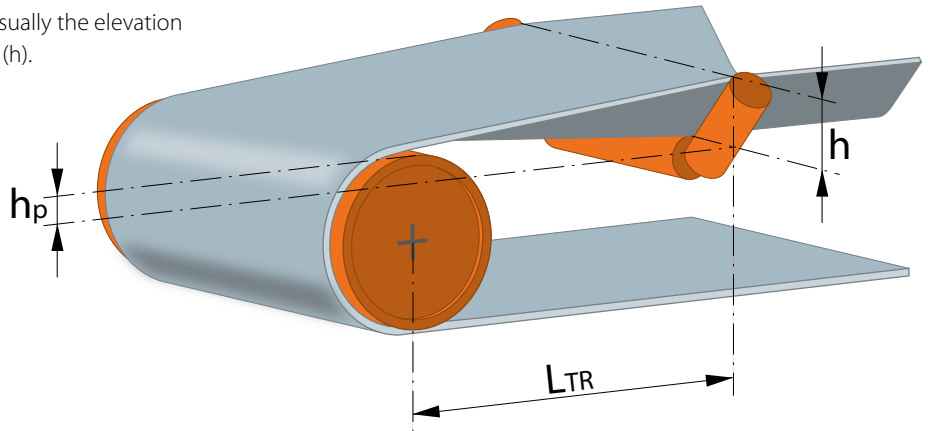
Two-step-splice



Transition lengths

A reliable way to calculate minimum transition lengths (distance between tail/discharge pulley and first/last troughing idler) is to use the factors given in the table. The factors depend on the troughing angle and arrangement and must be multiplied by the belt width. If the pulley is elevated with respect to the level of the center idler roll, the transition length can be decreased. Usually the elevation (h_p) is one third of the total troughing height (h).

Minimum transition distance L_{TR}		
Troughing angle	Pulley elevation	
	$h_p=0$	$h_p=h/3$
20°	$1,5 \times B$	$1,0 \times B$
25°	$1,8 \times B$	$1,2 \times B$
30°	$2,2 \times B$	$1,5 \times B$
35°	$2,5 \times B$	$1,6 \times B$
45°	$3,0 \times B$	$2,0 \times B$

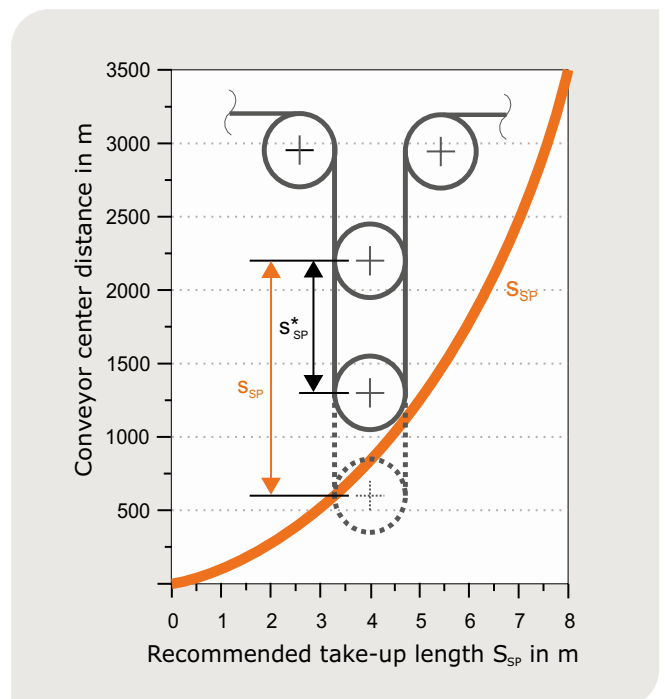


Travel of take-up pulley

A reliable way to calculate minimum transition lengths (distance between tail/discharge pulley and first/last troughing idler) is to use the factors given in the table. The factors depend on the troughing angle and arrangement and must be multiplied by the belt width. If the pulley is elevated with respect to the level of the center idler roll, the transition length can be decreased. Usually the elevation (h_p) is one third of the total troughing height (h).

Low elongation is one of the characteristics of Flexocord® steelcord conveyor belts. The travel of the take-up pulley is significantly less than for textile belts. When designing the take-up system, the take-up length S_{sp} should not only consider travel of the take-up pulley S_{sp}^* due to the elastic elongation of the reinforcement. It is recommended to add also some surplus length for emergency splices, to compensate for measuring errors or to correct the belt sag. When fitting the belt, make sure, that the take-up pulley has sufficient space in both directions to compensate maximum elongation when starting the conveyor under full load.

See the illustration for the recommended minimum take up length S_{sp} .





Name _____

Date _____

Material		
Bulk density	t/m ³	
Temperature	°C	
Material size	mm	
Material characteristics (e.g. abrasive, chem. aggressive, oil / grease)		
Drop height	m	

Troughing angle		°	
Idler weight	Carrying	kg	
	Return	kg	
Pitch	Carrying	m	
	Return	m	
Outer diameter	Carrying	mm	
	Return	mm	
Transition distance	Head	m	
	Tail	m	

Endless length	m	_____
Reinforcement type		_____
Tensile strength	N/mm	_____
Cover thickness	mm : mm	_____
Cover grade		_____
Special points		_____
Installed belt		_____

Remarks

A blank sheet of graph paper with a grid of squares. The grid consists of 20 columns and 10 rows of small squares. There are no margins or additional markings on the page.



For contact or information about
your nearest sales office please visit:
www.metso.com