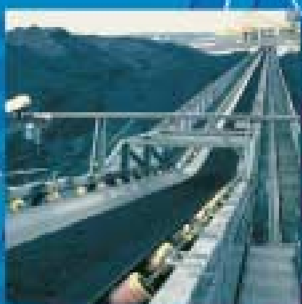
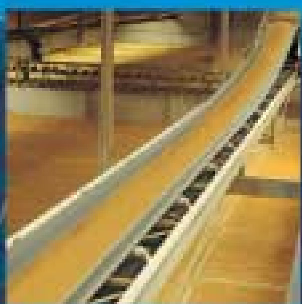
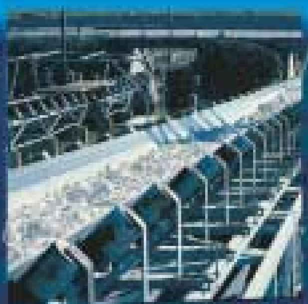
RUBBER
CONVEYOR BELTS







A/S ROULUNDS FABRIKER and its subsidiary POLYMAX ROULUNDS A/S are manufacturers of quality conveyor belts. The product range consists of all types of conveyor belts in rubber, PVC/PU and MAXOFLEX® sidewalls. Apart from the traditional conveyor belts POLYMAX ROULUNDS offers a wide range of special conveyor belts and profile belts. As a member of the ROULUNDS Group, POLYMAX ROULUNDS is an international company who serves its customers in more than 50 countries worldwide.

GUIDANCE FOR NAVIGATING AND READING THIS DOCUMENT

Choose the zoom-factor which suites you best for reading the document by using the zoom tool

Choose the zoom tool from the top menu and increase magnification by clicking your mouse on the page you are on. Decrease magnification by holding Ctrl and Shift buttons down whilst clicking with the mouse.

After a suitable magnification has been found choose the hand tool to explore the document. With the hand tool active the bookmarks in the left pane can be accessed thus giving direct links to the subject you wish to read. Furthermore the hand tool enables you to move the page vertically by holding the mouse button down moving the mouse up and down.

Unfold the bookmarks in the left pane to see all available links by clicking the + sign next to the bookmarks.

ROULUNDS FABRIKER A/S - Hestehaven 51, DK-5260 Odense S - Denmark

CONVEYOR BELTS
Conveyor belting for any purpose

HOW TO CHOOSE CORRECT BELT TYPE: SEE SYSTEM KEY

WEAR RESISTANT RUBBER CONVEYOR BELTS

PROGRAMME 1:	RO-PLY WEAR RESISTANT 2-PLY BELTS
PROGRAMME 2:	WEAR RESISTANT MULTIPLY BELTS, TYPE B, BW
PROGRAMME 3:	WEAR RESISTANT MULTIPLY BELTS, TYPE A, B, BW

HEAT RESISTANT RUBBER CONVEYOR BELTS

PROGRAMME 4:	HEAT RESISTANT MULTIPLY BELTS, TYPE K, N
PROGRAMME 5:	HEAT RESISTANT MULTIPLY BELTS, TYPE TCC
PROGRAMME 6:	OIL & HEAT RESISTANT FLAMEPROOF 2-PLY BELTS, TYPE GWF

OIL RESISTANT RUBBER CONVEYOR BELTS

PROGRAMME 6:	OIL & HEAT RESISTANT FLAMEPROOF 2-PLY BELTS, TYPE GWF
PROGRAMME 6A:	MEDIUM OIL RESISTANT 2-PLY BELTS, TYPE GWM
PROGRAMME 7:	OIL AND HEAT RESISTANT MULTIPLY BELTS, TYPE GW, GWF
PROGRAMME 7A:	OIL RESISTANT MULTIPLY BELTS, TYPE GWM, GWS

FOOD GRADE RUBBER CONVEYOR BELTS

PROGRAMME 8:	ANTISTATIC 2-PLY BELTS FOR CONVEYING FOOD - TYPE IWE

RUBBER CONVEYOR BELTS WITH PATTERN

PROGRAMME 9:	RO-PLY GRIP 4 2-PLY BELTS WITH PATTERN
PROGRAMME 10:	MULTIPLY BELTS WITH PATTERN

RUBBER CONVEYOR BELTS FOR INCLINED TRANSPORT

PROGRAMME 11:	RIB BELTS (CHEVRON-BELTS)
PROGRAMME 11A:	SPECIAL PROGRAMME FOR THE WOOD INDUSTRY

CROSS-STABILISED RUBBER CONVEYOR BELTS FOR INCLINED TRANSPORT

PROGRAMME 12:	MAXOFLEX SIDEWALL BELTS - SIDEWALLS - CLEATS

SPECIAL BELTING

PROGRAMME 13:	TERPENE RESISTANT MULTIPLY BELTS, TYPE GT
PROGRAMME 14:	FLAME PROOF BELTS, TYPE SF, KF STEELWIREMESH REINFORCED BELTS
PROGRAMME 15:	BUCKET ELEVATOR BELTS & BARE-BACKED (SLIDING) BELTS

PROGRAMME 1

BELT TYPE	COVER	MAX. WORKING TENSION (N/mm)	THICKNESS (mm)	WEIGHT per m^2 (Kg)	Belt width (mm)								
					400	500	650	800	1000	1200	1300	1450	1500
200/2	2+1	20	5.2	6.8	X	X	X	X	X	X	X		X
250/2	3+1	25	6.6	8.4	X	X	X	X	X	X	X	X	X
250/2	4+2	25	8.6	10.6		X	X	X	X		X		
315/2	3+1	31.5	6.8	8.6	X	X	X	X	X	X	X		X
315/2	4+2	31.5	8.8	10.8		X	X	X	X		X		
400/2	3+1	40	7.3	9.1		X	X	X	X	X	X		
400/2	5+1.5	40	9.8	11.7		X	X	X	X	X	X		X
630/2	5+1.5	63	10.5	13.4			X	X	X	X	X		

APPLICATION

RO-PLY has a wide field of application for the transport of moderately to very abrasive materials such as cement, coal, coke, earth, flint, grain, gravel, ore, phosphate, slag, stone materials and timber.

CONSTRUCTION AND PROPERTIES

RO-PLY is a 2-ply belt construction with cut edges and a carcass of synthetic EP fabric (polyester/polyamide). Between the fabric plies is an innerply of ROULUNDS patented STIFLEX - a rubber and textile fibre compound. The fibres are orientated lengthwise in the belt. This carcass combined with covers of standardized thicknesses and qualities adapted to the field of application provide the following good properties:

- High wear resistance
- Small elongation at highest working tension
- High impact resistance
- Excellent directional stability
- Good troughability
- Good weather resistance
- Not susceptible to humidity and microorganisms.

TECHNICAL DATA

Max. material temperature 100°C.
Ambient temperature max. 50°C, min. -30°C.
RO-PLY is antistatic according to ISO 284.
Maximum recommended trough angle for three-sectioned carrying idlers 45°.
Pulley diameters, see table 16 in belt selection basis (pdf-file).

Cover	
Min. elongation (%) Min. tensile strength (N/mm^2) Max. wear loss (mm^3)	400 20 120

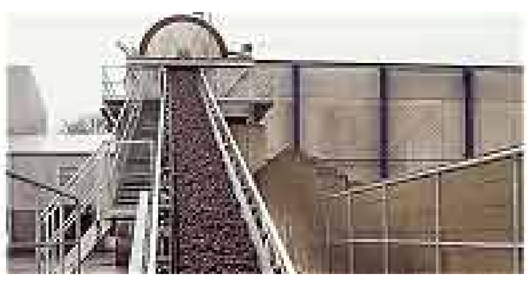
AVAILABILITY

Open or endless lengths - Max. length unit 400 m/roll or according to agreement.
Max. belt width 1500 mm. - Ribs according to programme 11.

For other wear resistant types see programmes 2 and 3.

PROGRAMME 2

BELT TYPE	Cover	Max. working tension (N/mm)	Thick-ness (mm)	Weight per m² (Kg)	Belt width (mm)									
					400	500	600	650	800	1000	1200	1300	1450	1500
EP200/2-B	2+1	20	4.8	6.2	X	X	X	X	X	X	X	X	X	X
EP250/2-B	3+1	25	6.0	7.5	X	X	X	X	X	X	X	X	X	X
EP315/3-B	3+1	31.5	6.7	8.6		X	X	X	X	X		X	X	
EP315/3-B, BW	4+2	31.5	8.7	10.8	X	X	X	X	X	X	X	X		X
EP400/2-B	3+1	40	7.0	9.1		X	X	X	X	X	X	X		
EP400/3-B, BW	4+2	40	9.0	11.3		X	X	X	X	X	X	X	X	X
EP500/3-B	3+1	50	7.6	9.4		X	X	X	X	X	X		X	
EP500/3-B, BW	4+2	50	9.6	11.6		X	X	X	X	X	X		X	
EP500/4-B, BW	5+1.5	50	10.1	12.2					X	X	X			
EP630/4-B, BW	5+1.5	63	11.4	13.7				X	X	X	X		X	
EP630/4-B, BW	6+2	63	12.8	15.2				X	X	X	X		X	X
EP800/4-B, BW	6+2	80	13.2	16.4				X	X	X	X		X	X
EP1000/4-B, BW	6+2	100	13.6	16.9					X	X	X		X	X


APPLICATION

This programme has a wide field of application for the transport of moderately to very abrasive materials such as crushed ice, cement, clay, coal, copper ore, crushed glass, eart, granite, gravel, iron ore, limestone, marl, mortar, potatoes, sacks, slags.
The programme includes belt constructions, which according to experience cover a considerable part of the most common transport applications.

CONSTRUCTION AND PROPERTIES

Belt with covered edges based upon carcass of synthetic EP fabric (polyester/polyamide) providing

- Small elongation at highest working tension
- High impact resistance
- Not susceptible to humidity and microorganisms.

Cover thickness and cover qualities are adapted to strength of carcass thus providing belts with good operational economy for the most common applications.

COVER TYPE B
Very wear resistant cover, suitable for transport of abrasive materials. Type B has a large field of application.
Fulfils DIN 22102 type Y.

COVER TYPE BW
Extremely wear resistant cover, for transport of highly abrasive materials.
Fulfils DIN 22102 type W.

TECHNICAL DATA

Max. material temperature
at lump size < 40 mm: 80°C
at lump size > 40 mm: 100°C
Ambient temperature max. 50°C, min. -30°C.
Antistatic according to ISO 284.
Maximum recommended trough angle for three-sectioned carrying idlers 45°.
Pulley diameters, see table 16 in belt selection basis (pdf-file).

Cover	B	BW
Min. elongation (%)	400	400
Min. tensile strength (N/mm²)	20	18
Max. wear loss (mm³)	120	90

AVAILABILITY

Open or endless lengths - Max. length unit 400 m/roll or according to agreement, however allowance must be made for practical handling possibilities (weight and roll diameter).
Regarding other belt widths, carcass strengths and cover combinations we refer to the programmes indicated below.
Ribs according to programme 11.

For other wear resistant belt types see programmes 1 and 3.

SPECIAL PROGRAMME WEAR RESISTANT MULTIPLY BELTS - Type B, BW

PROGRAMME 3

COVER TYPE	COVER COMBINATION (mm)	MAX. WORKING TENSION (N/mm)	CARCASS CONSTRUCTION				
			2 plies	3 plies	4 plies	5 plies	6 plies
B	2 + 1, 3 + 1	20	EP 200/2				
B, BW	2 + 1, 3 + 1, 4 + 2	25	EP 250/2				
B, BW	3 + 1, 4 + 2	31.5		EP 315/3			
B, BW	3 + 1, 4 + 2	40		EP 400/3	EP 400/4		
B, BW	3 + 1, 4 + 2, 5 + 1.5	50		EP 500/3	EP 500/4		
A, B, BW	4 + 2, 5 + 1.5, 6 + 2	63		EP 630/3	EP 630/4	EP 630/5	
A, B, BW	5 + 1.5, 6 + 2, 8 + 2	80			EP 800/4	EP 800/5	
A, B, BW	6 + 2, 8 + 2, 10 + 3	100			EP 1000/4	EP 1000/5	
A, B, BW	6 + 2, 8 + 2, 10 + 3	125				EP 1250/5	EP 1250/6
A, B, BW	6 + 2, 8 + 2, 10 + 3	160				EP 1600/5	EP 1600/6
A, B, BW	6 + 2, 8 + 2, 10 + 3	200				EP 2000/5	EP 2000/6
A, B, BW	6 + 2, 8 + 2, 10 + 3	250					EP 2500/6



APPLICATION

For transportation of all kinds of abrasive materials. Choice between 3 cover qualities depending on transport and running conditions. There are thus good possibilities of solving individual transport problems.

Programme 3 includes the belt types that are not included in the standard programmes 1 and 2 because of the requirements on strength, cover combinations and belt widths.

This programme also covers belts without cover for transportation of for instance cardboard boxes, letters, mail bags, parcels.

CONSTRUCTION AND PROPERTIES

Belts with covered edges based upon carcass of synthetic EP fabric (polyester/polyamide).

The EP carcass provides

- Small elongation at highest working tension
- High impact resistance
- Not susceptible to humidity and microorganisms.

COVER TYPE A
Very wear resistant cover, suitable for transport of materials with sharp edges.
Fulfils DIN 22102 type X.

COVER TYPE B
Wear resistant cover for transport of abrasive materials. Type B has a large general field of application.
Fulfils DIN 22102 type Y.

COVER TYPE BW
Extremely wear resistant cover, for transport of highly abrasive materials.
Fulfils DIN 22102 type W.

TECHNICAL DATA

Max. material temperature
at lump size < 40 mm: 80°C
at lump size > 40 mm: 100°C
Ambient temperature max. 50°C, min. -30°C.
Belts with cover are antistatic according to ISO 284.
For pulley diameters, belt weight and belt thickness as well as troughability we refer to the belt selection basis (pdf-file).

Cover	A	B	BW
Min. elongation (%)	450	400	400
Min. tensile strength (N/mm^2)	25	20	18
Max. wear loss (mm^3)	110	120	90

AVAILABILITY

Cover combinations and cover qualities according to specification. Open or endless lengths.
Max. length unit 400 m/roll or according to agreement, however, allowance must be made for practical handling possibilities (weight and roll diameter).
Max. carcass strength 3150 N/mm.
Max. belt width 2200 mm.
Ribs according to programme 11, pattern according to programme 10.

For other wear resistant types see programmes 1 and 2.

PROGRAMME 4

BELT TYPE	COVER	MAX. WORKING TENSION (N/mm) Vulcanized joining	Mechanical joining	CARCASS CONSTRUCTION 2 plies	3 plies	4 plies	5 plies
K, N	See table below	20	16	EP 200/2*			
K, N		25	20	EP 250/2			
K, N		31.5	25		EP 315/3*		
K, N		40	31.5		EP 400/3	EP 400/4*	
K, N		50	40		EP 500/3	EP 500/4	EP 500/5*
K, N		63	50		EP 630/3	EP 630/4	EP 630/5
K, N		80	63		EP 800/3	EP 800/4	EP 800/5
K, N		100	80			EP 1000/4	EP 1000/5

*) Are delivered in type K



APPLICATION

For transportation of hot abrasive materials such as blast furnace clinker, coke, foundry sand, ore, slag etc. with max. material temperature of 170°C.

Materials with higher initial temperature can under certain conditions be transported if sprinkled with water at loading.

CONSTRUCTION AND PROPERTIES

Belts with covered edges based upon carcass of synthetic EP fabric (polyester/polyamide).

The EP carcass provides

- Small elongation at highest working tension
- High impact resistance
- Not susceptible to humidity and microorganisms.

COVERS

The belt types K and N are covering different temperature areas, see technical data.
Both types have good wear resistant properties.

TECHNICAL DATA

The cover thickness is graduated according to lump size and temperature of material as follows:

TYPE	LUMP SIZE	COVER THICKNESS (mm) 3 +1	4 + 1.5	5 + 1.5	6 + 1.5
K	< 40 mm >40 mm	110°C 120°C	120°C 130°C	130°C 140°C	130°C 140°C
N	< 40 mm >40 mm	- -	130°C 150°C	140°C 160°C	150°C 170°C

The above table is based on 50°C ambient temperature. Ambient temperature max. 50°C, min. -30°C.

Antistatic according to ISO 284.

For pulley diameters, belt weight and belt thickness as well as troughability we refer to the belt selection basis (pdf-file).

For powdered materials such as for instance cement, we recommend an upgrading of the cover type:

K to N
N to TCC (programme No. 5)

AVAILABILITY

Cover combinations and cover qualities according to requirement and request.
Open or endless lengths.
Max. length unit 400 m/roll or according to agreement, however, allowance must be made for practical handling possibilities (weight and roll diameter).
Max. carcass strength 1600 N/mm.
Max. belt width 2200 mm.
Ribs according to programme 11.
Type K can be delivered with pattern according to programme 10.

For other heat resistant types see programmes 5, 6 and 7.

SPECIAL PROGRAMME   HEAT RESISTANT MULTIPLY BELTS - TYPE TCC

PROGRAMME 5

BELT TYPE	COVER	MAX. WORKING TENSION (N/mm) Vulcanized joining	Mechanical joining	CARCASS CONSTRUCTION 2 plies	3 plies	4 plies	5 plies
TCC	See table below	20.0	16.0				
TCC		25.0	20.0	EP 250/2			
TCC		31.5	25.0				
TCC		40.0	31.5		EP 400/3		
TCC		50.0	40.0		EP 500/3	EP 500/4	
TCC		63.0	50.0		EP 630/3	EP 630/4	EP 630/5
TCC		80.0	63.0		EP 800/3	EP 800/4	EP 800/5
TCC		100.0	80.0			EP 1000/4	EP 1000/5
TCC		125.0					EP 1250/5



APPLICATION

Belt types TCC are used for transportation of hot, abrasive materials, which are chemically inactive, such as cement clinker, blast furnace clinker, coke, limestone, sinter, slags, foundry sand, etc. with max. material temperature of 210°C.

The TCC cover resists momentarily temperatures considerably higher than 210°C, and for isolated pieces peak temperatures of up to 400°C.

CONSTRUCTION AND PROPERTIES

Belt programme with cut edges based upon synthetic EP fabrics (polyester/polyamide).

The EP carcass provides

- Small elongation at highest working tension
- High impact resistance
- Not susceptible to humidity and microorganisms
- High resistance against stress on the edges

COVER

The type TCC is a wear and heat resistant cover, which resists a high constant material temperature. Further, it resists momentary peak temperatures of up to 400°C for isolated large pieces of material.

TECHNICAL DATA

The cover thickness is graduated according to lump size and temperature of material as follows:

TYPE	LUMP SIZE	COVER THICKNESS (mm) 3 +1	4 + 1.5	5 + 1.5	6 + 2
TCC	< 25 mm >25 mm	150°C 160°C	170°C 180°C	180°C 200°C	190°C 210°C

Ambient temperature max. 70°C, min. -30°C.
Antistatic according to ISO 284.
For pulley diameters, belt weight and belt thickness we refer to the belt selection basis (pdf-file).

AVAILABILITY

Cover combinations according to requirement and request.
Open or endless lengths.
Max. length unit 400 m/roll or according to agreement, however, allowance must be made for practical handling possibilities (weight and roll diameter).
Max. carcass strength 1600 N/mm.
Max. belt width 2200 mm.
Ribs according to programme 11.

For other heat resistant types see programmes 4, 6 and 7.

STANDARD PROGRAMME OIL AND HEAT RESISTANT FLAMEPROOF - TYPE GWF

PROGRAMME 6

BELT TYPE	Cover	Max. working tension (N/mm)	Thick-ness (mm)	Weight per m^2 (Kg)	Belt width (mm)							
					400	450	500	600	650	800	1000	1200
250/2	3+1	25	7.0	9.3	X	X	X	X	X	X	X	
400/2	3 + 1	40	7.5	10.0	X		X	X	X	X	X	X



APPLICATION

The belt type is used within industries manufacturing and handling grain, fertilizers, fodder mixtures, refuse, soyabean cakes, tinned goods, wood containing resin and cellulose and applications where oily and fatty materials are transported.

RO-PLY GWF is very resistant to Lila-mins that are used in the fertilizer industry.

RO-PLY GWF is oil and heat resistant and flameproof.

RO-PLY GWF has good anti-sticking properties.

CONSTRUCTION AND PROPERTIES

2-ply construction with cut edges and carcass of synthetic EP fabric (polyester/polyamide). Between the fabric plies is an innerply of ROULUNDS patented STIFLEX - a rubber and textile fibre compound. The fibres are orientated lengthwise in the belt. This special carcass construction provides the following good properties:

- Small elongation at highest working tension
- High impact resistance
- Excellent directional stability
- Good troughability
- Not susceptible to humidity and microorganisms.

The special GWF cover provides the following advantages:

- Prevents damage caused by oil and fat
- Prevents the outbreak of fire caused by spark discharges from the belt (antistatic)
- Prevents the spreading of fires (self extinguishing cover)
- Good anti-sticking properties

TECHNICAL DATA

Material temperature max. 125°C, min. -30°C.
Ambient temperature max. 50°C, min. -30°C.
Flameproof according to ISO R 433, basic quality K, testing according to ISO R 340.
Antistatic according to ISO 284.
Max. recommended trough angle for three-sectioned carrying idlers 45°.
For pulley diameters, see the belt selection basis (pdf-file).

AVAILABILITY

Open or endless lengths.
Max. length unit 400 m/roll or according to agreement, however, allowance must be made for practical handling possibilities (weight and roll diameter).
Max. belt width 1300 mm.
Ribs according to programme 11.

For other oil resistant belt types see programmes 6A, 7 ,7A and 8.

PROGRAMME 6A

BELT TYPE	Cover	Max. working tension (N/mm)	Thick-ness (mm)	Weight per m^2 (Kg)	Belt width (mm)							
					400	450	500	600	650	800	1000	1200
250/2	3+1	25	6.8	8.6			X		X	X		



APPLICATION

Type GWM is a supplement to RO-PLY type GWF suitable for handling materials with moderate oil content, such as grain, fodder mixtures, refuse, and other materials containing moderate amounts of oil and fat.

For other special requirements for heat resistant and flameproof conveyor belt types see programmes 6 and 7.

CONSTRUCTION AND PROPERTIES

RO-PLY GWM is a 2-ply construction with cut edges. The carcass is made of synthetic EP fabrics (polyester/polyamide). Between the fabric plies is an innerply of ROULUNDS patented STIFLEX - a rubber and textile fibre compound. The fibres are orientated lengthwise in the belt and provide the following good properties:

- Small elongation at highest working tension
- Excellent directional stability
- Good troughability
- Not susceptible to humidity and microorganisms.

The special cover GWM provides the following advantages:

- Oil and fat resistant to moderate oily materials
- Antistatic

TECHNICAL DATA

Material temperature max. +80°C, min. -30°C.
Ambient temperature max. +50°C, min. -30°C.
Antistatic according to ISO 284.
Max. recommended trough angle for three-sectioned carrying idlers 45°.
For pulley diameters we refer to the belt selection basis (pdf-file).

AVAILABILITY

Open or endless lengths.
Max. production unit 400 m/roll or according to agreement. However allowance must be made for practical handling (weight and roll diameter).
Stock belting according to separate stock list.
Max. belt width 1300 mm.
Ribs according to programme 11.

Other oil resistant belt types, see programme 6, 7 ,7A and 8.

OIL AND HEAT RESISTANT MULTIPLY BELTS - TYPE GW, GWF

PROGRAMME 7

BELT TYPE	COVER COMBINATION (mm)	MAX. WORKING TENSION (N/mm)		CARCASS CONSTRUCTION			
		Vulcanized joining	Mechanical joining	2 plies	3 plies	4 plies	5 plies
GW, GWF	3 + 1,	20.0	16.0	EP 200/2			
GW, GWF	3 + 1, 4 + 2	25.0	20.0	EP 250/2			
GW, GWF	3 + 1, 4 + 2	31.5	25.0		EP 315/3		
GW, GWF	3 + 1, 4 + 2 5 + 1.5	40.0	31.5		EP 400/3	EP 400/4	
GW, GWF	3 + 1, 4 + 2 5 + 1.5	50.0	40.0		EP 500/3	EP 500/4	
GW, GWF	4 + 2, 5 + 1.5	63.0	50.0			EP 630/4	EP 630/5
GW, GWF	4 + 2, 5 + 1.5	80.0	63.0			EP 800/4	EP 800/5

APPLICATION

The two belt types are used for transportation of oily and comparatively hot materials such as clinkers, copra, fertilizers with Lila-min, fodder mixtures, meat and bone meal, refuse, slag etc.

Type GWF is particularly suitable for applications, which for safety reasons require a flameproof conveyor belt.

This programme is a supplement to the standardized stockprogramme RO-PLY GWF. It includes the belt types that fulfil special requirements on strength, cover combinations and belt widths, which are not fulfilled by the RO-PLY GWF standard programme

CONSTRUCTION AND PROPERTIES

The types GW and GWF are with carcass of synthetic EP fabric (polyester/polyamide) providing

- Small elongation at highest working tension
- High impact resistance
- Not susceptible to humidity and microorganisms

The types GW and GWF have a good wear resistance, are oil and heat resistant and antistatic.
Apart from that type GWF is flameproof according to ISO R 433, basic quality K.

TECHNICAL DATA

Max. material temperature GW: 100°C.
Max. material temperature GWF: 125°C.

Type GWF is flameproof according to ISO R 433, basic quality K, testing according to ISO R 340.
Antistatic according to ISO 284.
For pulley diameters, belt weight and belt thickness as wellas troughability we refer to the belt selection basis (pdf-file).

AVAILABILITY

Cover combinations according to requirement and request (however, for type GW min. 4 mm totally).
Open or endless lengths.
Max. length unit 400 m/roll or according to agreement, however, allowance must be made for practical handling possibilities (weight and roll diameter).
Max. carcass strength 1600 N/mm for GW.
Max. carcass strength 1000 N/mm for GWF.
Max. belt width 2200 mm.
Ribs according to programme 11.

For other oil resistant types see programmes 6, 6A, 7A and 8.

PROGRAMME 7A

COVER COMBINATION (mm)	MAX. WORKING TENSION (N/mm) Vulcanized joining	Mechanical joining	CARCASS CONSTRUCTION 2 plies	3 plies	4 plies	5 plies
3 + 1,	20.0	16.0	EP 200/2			
3 + 1, 4 + 2	25.0	20.0	EP 250/2			
3 + 1, 4 + 2	31.5	25.0		EP 315/3		
3 + 1, 4 + 2 5 + 1.5	40.0	31.5		EP 400/3	EP 400/4	
3 + 1, 4 + 2 5 + 1.5	50.0	40.0		EP 500/3	EP 500/4	
4 + 2, 5 + 1.5	63.0	50.0			EP 630/4	EP 630/5
4 + 2, 5 + 1.5	80.0	63.0			EP 800/4	EP 800/5



APPLICATION

The two belt types are supplement to type GW and GWF and suitable for handling materials with moderate fat and oil contents, such as grain, fodder mixtures, refuse, wooden chips, fertilizer, etc.

Type GWM is used for the transportation of material containing moderate amounts of oil, whereas type GWS is resistant to oil amines and terpenes as well.

For other special requirements for maximum oil resistant properties incl. heat and/or flameproof types see programmes 6 and 7.

CONSTRUCTION AND PROPERTIES

Type GWM and GWS are multiply constructgions with cut edges. The carcass is made of synthetic EP fabrics (polyester/polyamide) providing

- Small elongation at highest working tension
- Not susceptible to humidity and microorganisms

Type GWM is medium and type GWS medium to maximum oil resistant. Both types are antistatic.

TECHNICAL DATA

Material temperature max. +80°C
Ambient temperature max. +50°C, min. -30°C.
Antistatic according to ISO 284.
For drum diameters, belt weight, belt thickness and troughability, see belt selection basis (pdf-file).

AVAILABILITY

Cover combinations according to requirement.
Open or endless lengths.
Max. production unit 400 m/roll or according to agreement, however, allowance must be made for practical handling possibilities (weight and roll diameter).
Max. carcass strength 1000 N/mm.
Max. belt width 2200 mm.
Ribs according to programme 11. Conveyor belts for inclined transport, see programme no. 11A.

Other oil resistant belt types, see programmes 6, 6A, and 7.

ANTISTATIC 2-PLY BELTS FOR CONVEYING FOOD - TYPE IWE

PROGRAMME 8

BELT TYPE	COVER	MAX. WORKING TENSION (N/mm)	THICKNESS (mm)	WEIGHT per m^2 (Kg)	BELT WIDTH (mm)						
					300	400	450	500	650	800	1000
250/2	2+1	25	4.6	5.9			X	X	X	X	X

APPLICATION

Type IWE is used for transportation of all sorts of foods, such as sugar, meat, fish, bread, poultry, etc. and has also a wide field of application within light material handling.

The belt is non-staining and therefore also suitable for transport of for instance packaging, parcels, etc.

The antistatic properties of type IWE prevent the outbreak of fires and explosions, and it is therefore suitable for transport of materials such as sugar, grain, flour, etc.

Type IWE is particularly suitable for applications, which for safety reasons require a flameproof conveyor belt.

CONSTRUCTION AND PROPERTIES

Type IWE is a 2-ply construction with cut edges. The carcass is made of synthetic EP fabrics.

The cover rubber quality is tasteless and odourless and resistant to animal and vegetable oil.

Type IWE is easy to wash, does not absorb moisture from humidity and is not influenced by microorganisms.

Type IWE fulfils the German BGA as well as the American FDA recommendations.

TECHNICAL DATA

Max. material temperature
  at lump size < 40 mm: 100°C
  at lump size > 40 mm: 120°C
Ambient temperature max. 50°C, min. -20°C.
Antistatic according to ISO 284.
Maximum recommended trough angle for three-roll carrying idlers 45°.
Pulley diameters, min. 200 mm.
Type IWE is non-inflammable according to ISO R 433, quality K, tested according to ISO R 340.

AVAILABILITY

Open or endless lengths.
Cut edges only.
Max. length unit 250 m/roll.
Stock belting according to separate stock list.

RO-PLY GRIP 4 - 2-PLY BELTS WITH PATTERN

PROGRAMME 9

BELT TYPE	COVER	MAX. WORKING TENSION (N/mm)	THICK-NESS (mm)	WEIGHT per m^2 (Kg)	BELT WIDTH (mm)									
					300	350	400	450	500	600	650	800	1000	1200
200/2	2.5+0	20	5.5	4.5	X	X	X	X	X	X	X	X	X	X

APPLICATION

The RO-PLY Grip 4 pattern belt is used for inclined transport of packaged goods such as boxes, luggage, parcels, sacks, etc.

The belt is non-staining and therefore also suitable for transport within for instance the wood and cardboard industries.

CONSTRUCTION AND PROPERTIES

RO-PLY Grip 4 is a 2-ply construction with cut edges and a carcass of synthetic EP fabric (polyester/polyamide).

Between the fabric plies is an innerply of ROULUNDS patented STIFLEX - a rubber and textile fibre compound. The fibres are orientated lengthwise in the belt, which gives the belt a good stability.

The carrying side has a tan coloured cover with a deep pattern providing maximum grip of the material.

The running side consists of impregnated EP fabric of high wear resistance and low friction. Therefore the belt is also suitable for conveyors with sliding plate

When choosing angles of inclination allowance must be made for the shape of the conveyor such as support with carrying idlers, plain support, belt speed as well as character of material and loading method.

It is recommended to place a short horizontal loading belt (booster) in front of steeply inclined conveyors.

TECHNICAL DATA

Max. material temperature 80°C.
Ambient temperature max. 50°C, min. -30°C.

Angles of inclination:

Jute sacks	38°
Paper sacks	30°
Cartons and wooden boxes	30°
Goods packed in paper	32°
Goods packed in cellophane	30°
Boxes of synthetic material	25°
Goods packed in plastics	22°

The above angles of inclination are valid for indoor applications. For outdoor applications due consideration should be given the climatical influence on the surface friction.

Pulley diameters, see table 16 in belt selection basis (pdf-file).

AVAILABILITY

Open or endless lengths.
Max. length unit 250 m/roll or according to agreement.
Max. belt width 1300 mm.

For other pattern belts see programme 10.

MULTIPLY BELTS WITH PATTERN - SPECIAL PROGRAMME

PROGRAMME 10

PATTERN TYPE	Pattern 4	Fabric pattern
PROGRAMME	3	3, 4, 7
BELT TYPE	A, B	A, B, K, GW, GWF, GWS
MAX. WIDTH (mm)	1300	1300

APPLICATION

Pattern belts for inclined transport of packaged goods such as boxes, parcels, sacks etc.

To be used where the angle of inclination is so high that belts without pattern cannot manage the transportation because of too low friction between materials and belt.

CONSTRUCTION AND PROPERTIES

PATTERN 4

The deep pattern is the most frequently used pattern type. The highest angle of inclination for pattern belts can normally be reached by using this type

FABRIC PATTERN

This pattern gives a light patterned surface structure and a slight increase of the friction between material and belt. Suitable in connection with scrapers for transportation of for instance powdered materials.

TECHNICAL DATA

Material and ambient temperature as for the belt type in question.

Angles of inclination:
Pattern 4 .... 35°
Other types .... 15-25°

The angles of inclination depend on shape of material, belt speed, distance between carrying idlers etc. Therefore, the values are only recommendations.

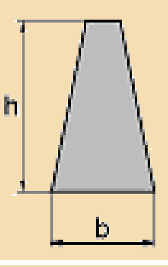
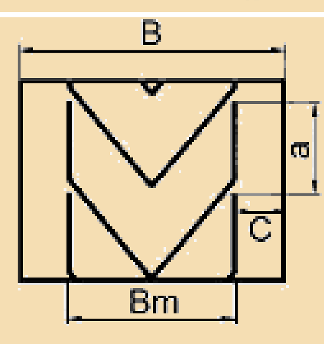
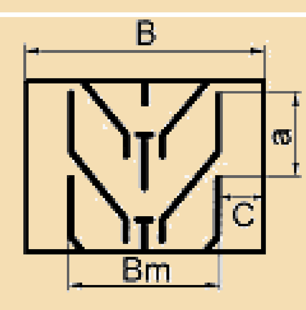
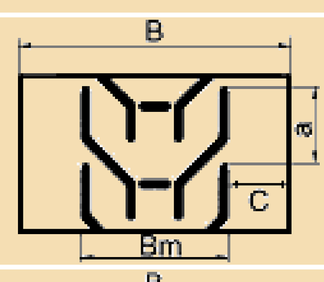
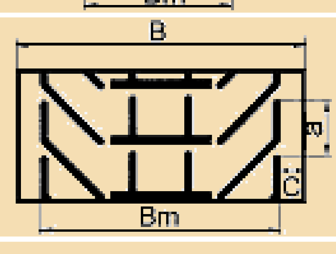
For pulley diameters and belt weight we refer to the belt selection basis for the belt type in question (pdf-file).

AVAILABILITY

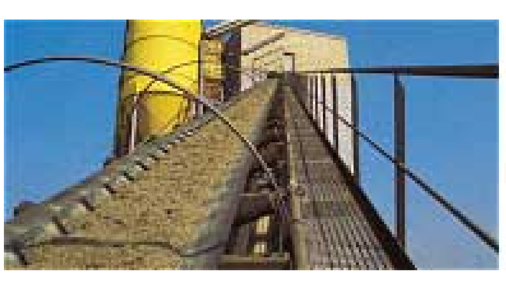
Open or endless lengths.
Max. length unit 250 m/roll or according to agreement.
Belt type and belt width as outlined above.
Belts with pattern 3 and 4 are with cut edges.

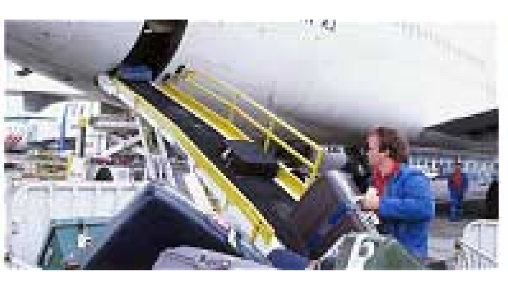
For other pattern belts see programmes 8 and 9.

PROGRAMME 11

RIB TYPE	RIB DIMENSIONS (mm) Width	Distance	Height	Thickness	BELT WIDTH (mm)		RIB PATTERN DIMENSIONS Tooth Dimension 	*Pulley diameter min. (mm)	Teoretical capacity m^3/h v = 1 m/s trough angle 30º inclination 30º	
	Bm	a	h	b	B	C			ß =10º	ß = 15º
501	250	150	13	13	300 400	25 75		250	12-16 24 - 28	15-20 30 - 35
502	310	200	10	13	400 450 500	45 70 95		250	24 - 28 32 - 36 40 - 44	30 - 35 40 - 45 50 - 55
503	380	250	13	13	450 500 600	35 60 110		250	32 - 36 40 - 44 56 - 60	40 - 45 50 - 55 70 - 75
504	550	300	15	13	600 650 800	25 50 125		250	56 - 60 64 - 68 104 - 112	70 - 75 80 - 85 130 - 140
511	420	275	20	15	450 500 600 650	15 40 90 115		315	36 - 40 48 - 52 64 - 68 72 - 76	45 - 50 60 - 65 80 - 85 90 - 95
512	550	300	25	20	600 650 800	25 50 125		400	64 - 68 72 - 76 120 - 128	80 - 85 90 - 95 150 - 160
513	750	333	25	20	800 1000 1200	25 125 225		400	120 - 128 190 - 200 240 - 264	150 - 160 230 - 250 300 - 330
521	450	300	35	30	500 600 650	25 75 100		315	60 - 68 76 - 80 80 - 84	75 - 80 95 - 100 100 - 105
** 525	1080	250	50	30	1200	60		630	272 - 288	340 - 360

*) concerns only the rib type.
**) on return part we recommend to place the return idlers in pairs 150 mm apart
For weight of ribs, see the belt selection basis.
Rib type 12 and 115, only for programme 1, 2 and 3.





APPLICATION

Rubber conveyor belts without ribs are used for inclined transportation of bulk goods up to approx. 22º dependent on the friction angle between material and belt.

If rib belts or belts with pattern are used the angle of inclination can be increased considerably, as in that case the max. angle of inclination depends on the internal friction of the material both in static and dynamic conditions. Guidance is given in table 17. Rib belts are used for bulk goods with unit size of 0-150 mm and for transportation of sacks. Belt and rib qualities are chosen on the basis of the individual belt programmes 1-8 + 12, whereas rib dimensions are shown in the table above.

TECHNICAL DATA

V-ribs are hot-vulcanized and have been developed to secure a steady running on flat return idlers.
Width of rib Bm depends on shape of the hopper and placing of the skirting. Height and width of ribs (h x b) depend on lump size, capacity, and desired robustness. Recommended capacities can be seen from the above data. In order to secure the best capacity at a given angle of inclination it is important that the material is at rest on the belt. This is achieved by feeding uniformly in the travelling direction at a speed equal to that of the belt. Further we recommend to reduce the carrying idler distance compared to normal conveyors. The belt speed should not exceed 2 m/s and should be kept as low as possible.

HIGH TRANSVERSE RIBS

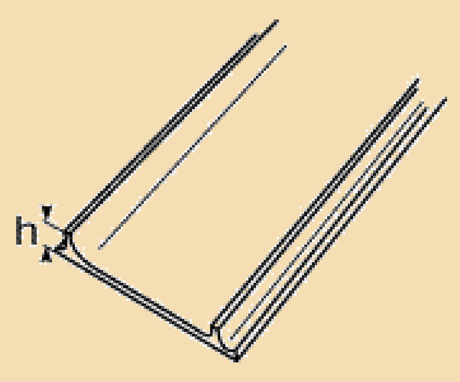
For inclined transportation of packaged goods, beets, coal, coke, potatoes etc.

Type	Thickness b (mm)	Height h (mm)	Width Bm (mm) standard	Distance a (mm)	Pulley diameter min. (mm)*	Are delivered for programme 1, 2, 3, 6, 6A, 7, 7A, 12
325	25	25	400 800	As re-quested	250	X
340	40	40			250	X
20	60	60			400	X
380	80	80			400	X
400	100	100			400	X

* concerns only the rib type.

SIDEWALLS

For transportation of powdered materials the use of flexible sidewalls can in some cases substitube rubber skirting on the conveyor.



The sidewalls can also be mounted on belts with straight transverse ribs and on belts with high transverse ribs.

Type	Height mm	Pulley diameter min. mm*
10G4712	25	375

*) concerns only the sidewalls.

The sidewalls are available for all belt programmes with the exception of the programmes 8, 9 and 10.

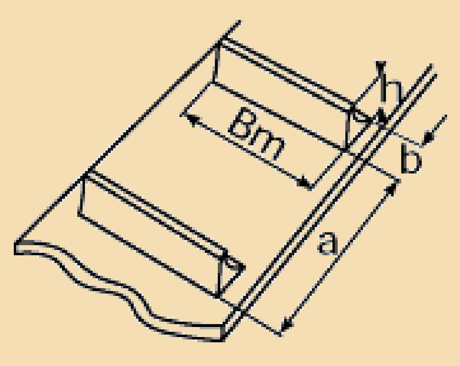
Max. belt width 1000 mm
Min. belt width 200 mm
Width interval 50 mm

Max. Angles of Inclination:

Angles of inclination are recommendations as they depend on kind of material and construction of conveyor:

Sand	30 - 35º
Sand, wet	40 - 45º
Fertilizer	35º
Coal < 100 mm	30º
Potatoes	30º
Beets	30º
Sacks, jute	35 - 40º
Sacks, paper	30 - 35º
Grain, dry	25º
Cement	35º
Salt < 100 mm	35º

The ribs in this programme are primarily to be used for transportation of light materials. However, the rib base of type 20 is so strong that it can transport heavier materials.

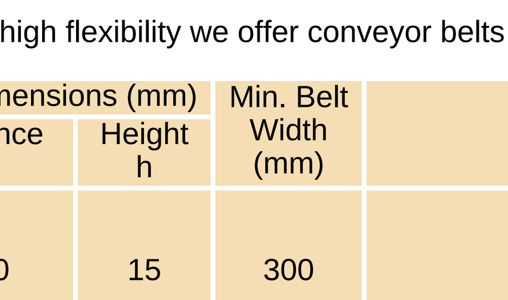


These ribs cannot be used for conveyors with normal return idlers, but require return idlers with supporting rings or free hanging return part.

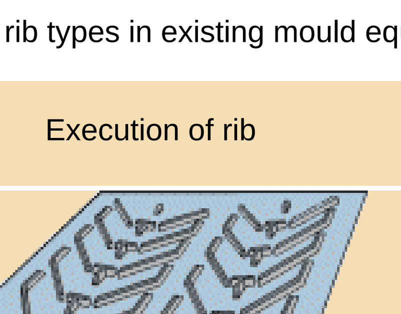
High transverse ribs are cold-vulcanized on the belt. They can be placed at distances which can be adapted to individual requirements.

Construction 1 is suitable where rubber skirting at the belt edge es required.

Construction 2 is normally used in connection with high transverse ribs.

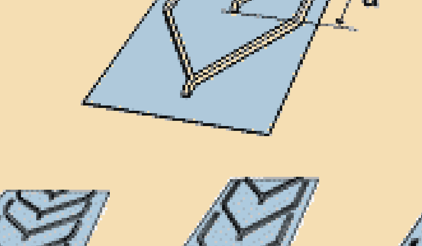
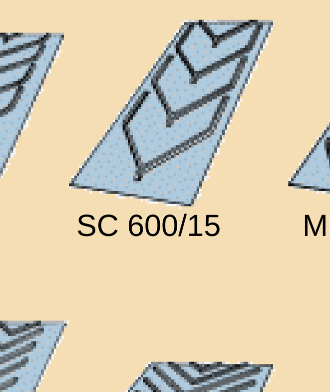
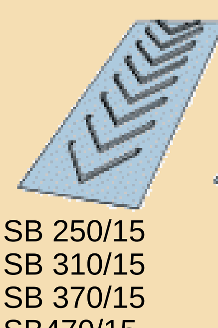
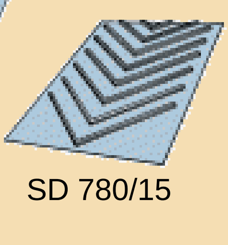
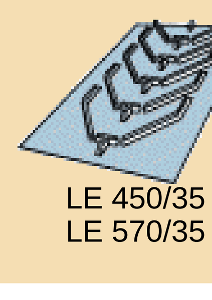
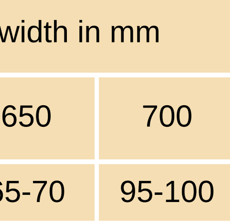


Construction 1



Construction 2

For fast delivery and high flexibility we offer conveyor belts with rib types in existing mould equipment.

Rib type	Rib dimensions (mm) Distance a	Height h	Min. Belt Width (mm)	Execution of rib	Pulley diameter Min. (mm)
SA 230/15 SA 420/15	250 330	15 15	300 450		250 250
SB 250/15 SB 310/15 SB 370/15 SB 470/15	150 200 250 250	15 15 15 15	300 350 400 500	 H W a   	250 250 250 250
SC 600/15	333	15	650	SA 230/15 SA 420/15 / SC 600/15 / MD 420/20	250
SD 780/15	170	15	800		250
MD 420/20 MD 550/20 MD 610/25	200 250 250	20 20 25	450 600 650	  SB 250/15 SB 310/15 SB 370/15 SB470/15 / SD 780/15 / MD 550/20 MD 610/25	315 315 400
LE 450/35 LE 570/35	250 300	35 35	500 600	 LE 450/35 LE 570/35	400 400

Theoretical capacity m^3/h of rib belts at differnt belt widths, v = 1 m/s, trough angle 30º, inclination 30º.

Rib type	Materials angle ß of inclination	Belt width in mm 300	400	450	500	600	650	700	800	1000	1200
SA-SB	10º	12-15	24-28	24-35	40-45	55-60	65-70	95-100	105-110	150-160	190-210
SC-SD	15º	15-20	30-35	30-44	50-55	70-75	80-85	115-125	130-140	170-180	230-260
MD	10º				45-50	60-65	70-75	90-95	120-125	170-180	220-250
	15º				60-65	80-85	90-95	115-125	150-160	190-200	270-300
LE	10º				55-60	70-75	85-90	105-115	140-150	185-195	250-270
	15º				70-75	95-100	105-110	135-145	180-190	200-220	300-340

APPLICATION

Above is shown a few examples of our unique programme of rib belts.
We can fulfil our customers requirements and deliver almost all lengths, widths, qualities and types up to 2000 mm width.

CONVEYOR BELTS FOR INCLINED TRANSPORT - WOOD INDUSTRY

PROGRAMME 11A

Pattern type	RO-KNOP				RIBS				
Programme	3 - 7 - 12				3 - 7 - 12				
Belt width (mm)	800	1000	1200	1400	600	650	800	1000	1200
Pattern width Bm (mm)	650	800	1000	1200	500	500	650	800	1000
Distance a (mm)	See sketch				600 or on request				



APPLICATION

Inclined transport of wooden chips requires a patterned surface, where icing up occurs.

The RO-KNOP pattern is used for angles of inclination of up to 18°, whereas ribs are used for angles up to 12°.

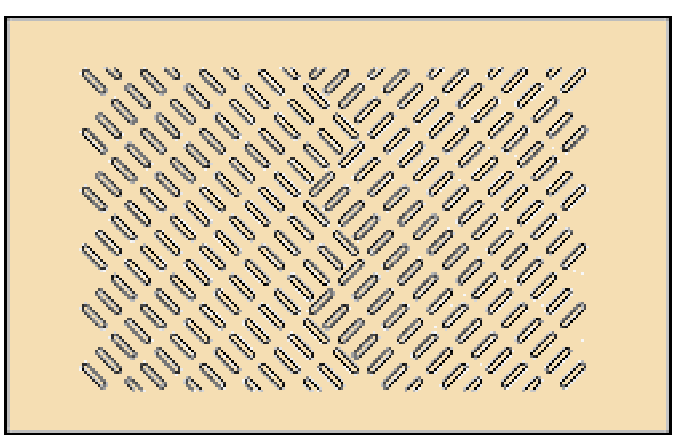
CONSTRUCTION AND PROPERTIES

The RO-KNOP pattern consists of 3 mm high knobs.
See pattern dimensions above.

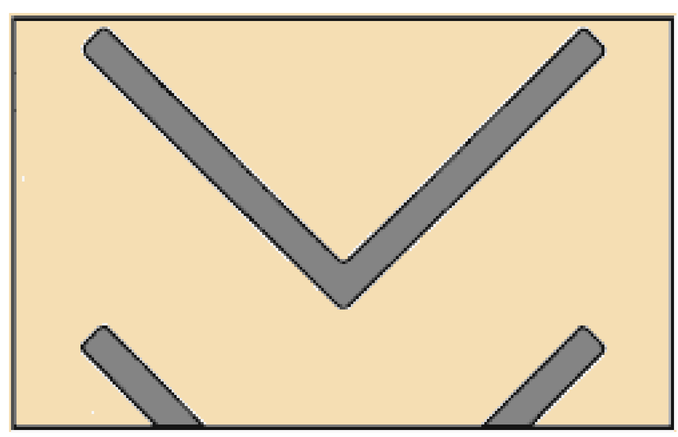
For efficient cleaning of the belt we recommend the use of rotating brushes.

The ribs are pressed into the cover in a thickness of 3 mm.
Pattern dimensions as outlined on the sketch below.

RO-KNOP



RIBS



TECHNICAL DATA

Material temperature and ambient temperature as for the belt type in question.

Angles of inclination:

RO-KNOP................................ 12 - 18°

RIBS .... 8 - 14°

The angles of inclination are dependant on material, loading conditions, distance between carrying idlers, belt speed etc. Therefore the values are only recommendations.

Pulley diameters, see table 16 in belt selection basis (pdf-file).

AVAILABILITY

Open or endless lengths

Max. production unit 400 m/roll or according to agreement. However allowance must be made for practical handling (weight and roll diameter).

Belt width and type according to the above table.
The belt types are with cut edges.

Min. cover thickness on material side = 3 mm.

Other pattern and rib belt types, see programmes 10 and 11.

PROGRAMME 12

COVER	MAX. WORKING TENSION (N/mm) Vulcanized joining	MAX. WORKING TENSION (N/mm) Mechanical joining	Thick-ness (mm)	Weight per m² (Kg)	CARCASS CONSTRUCTION 1 ply	2 plies	3 plies	4 plies
2 + 2	25	20	8.5	9.6	XE 250/1-2			
3 + 1.5	31.5	25	9.7	10.9		XE 315/2-2		
3.5 + 1.5	40	31.5	10.8	12.3			XE 400/3-2*	
4 + 2	50	40	12.9	14.6			XE 500/3-2	
4 + 2	63	50	13.8	15.6				XE 630/4-2
4 + 2	80	63	14.3	16.2				XE 800/4-2

*) IWE only deliverable as EE 400/3 2.5 + 1.5 (3 x cross stabile ply)



APPLICATION

These types of belts are used as base belts for specified purposes in the connection with MAXOFLEX® sidewalls and cleats.

The MAXOFLEX® is used for inclined conveying of loose material in all industries such as mining, agriculture and food industry.

The programme is also applicable for other purposes where cross stable belts are necessary, for example cover belts.

THE MAXOFLEX CONCEPT

MAXOFLEX® high-incline conveyor belts provide an efficient, safe way to transport all types of materials where accurate movement (filling and discharging) of the product is necessary.

The belts can be customized to specification e.g. three (3) sidewalls on one belt to form a double system with the same base belt. This provides the opportunity to convey two different products with the same belt.

The concept of using inclined and horizontal ('S' conveyor) transport with the same belt, eliminates the problems resulting from difficult transfer points.

The MAXOFLEX®-concept consists of a stabilized basebelt, with sidewalls and cleats attached to form a highincline or 'pocket' belt.

When an analysis is calculated based on the cost per meter lift, it is likely that the MAXOFLEX® belt will be more efficient costwise than using a custom made conventional incline belt.

Each MAXOFLEX® belt is designed and constructed for each individual application. Therefore, the combinations of differnt basebelts, sidewalls, and cleats provide for nuerous possibilities in problem solving.

More detailed information on the technical aspects of the MAXOFLEX® belt, can be found in our 'Maxoflex Handbook', which is available upon request.

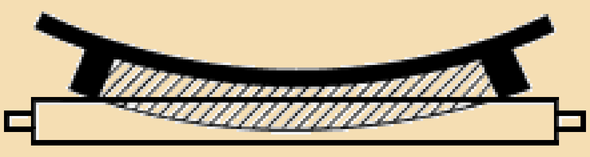
Advantages for MAXOFLEX® conveyor belts:

- ☑ Increases the transport capacity up to 4 times than that of a normal belt of the same width
- ☑ Saves space due to the possibility of inclining transport, up to 90 degrees.
- ☑ Protects the material from damage by providing better material handling control.
- ☑ Ability to change transportation direction with the same belt (the 'S' conveyor).

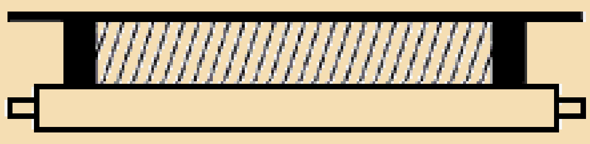
CONSTRUCTION AND PROPERTIES

XE is a multiply construction with cut edges based upon carcass of EP fabric (polyester/polyamide) and one monofilament ply on each side of the EP carcass integrated into the upper and lower cover providing:

- Saves on structural parts (conveyor)
- Saves place
- Excellent rigidity in the transverse direction



Cross section of a standard EP belt with sidewall



Cross section of a XE belt with sidewall

COVERS

Delivery according to specification in the qualities (B, GWF and IWE).

All covers are fulfiling DIN 22102.

TECHNICAL DATA

Max. material temperatures and ambient room temperature according to the satandard programs of the type B, GWF and IWE.

Antistatic according to ISO 284.

Pulley diameters, see belt selection basis.

AVAILABILITY

Cover combinations and cover qualities according to stpecifications.

Open or endless lengths.

Max. length unit 400 m/roll or according to agreement, however, MAXOFLEX® belts to be transported and storaged in special pallets.

Max. carcass strength 1600 N/mm²

Max. belt width 2000 mm.

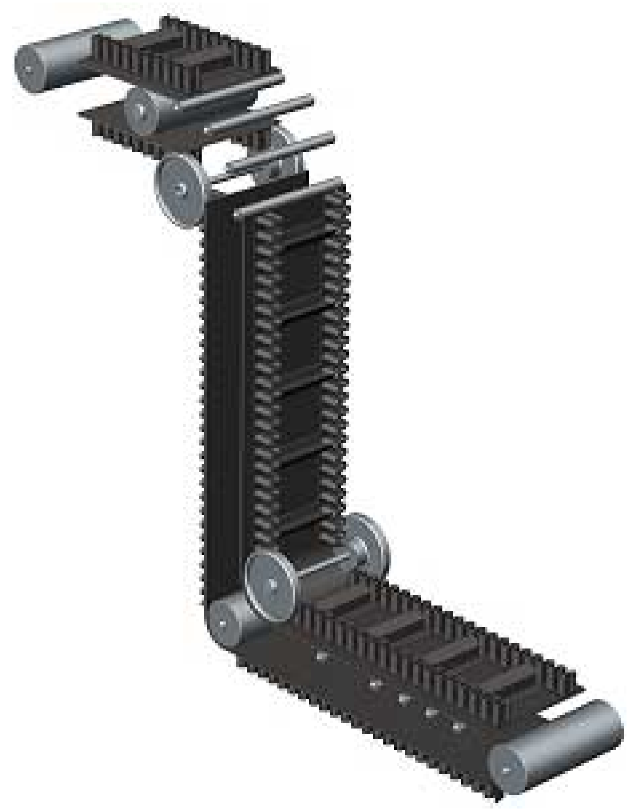
Cover / Useful load / %	XE 250/1-2 2 + 2	XE 315/2-2 3.5 + 1.5	XE 400/3-2 3.5 + 1.5	XE 500/3-2 4 + 2	XE 630/4-2 4 + 2	XE 800/4-2 4 + 2
60 - 100	Ø 315	Ø 315	Ø 400	Ø 500	Ø 630	Ø 800
30 - 60	Ø 250	Ø 250	Ø 315	Ø 400	Ø 500	Ø 630

MAXOFLEX® sidewalls are normally produced in black wear-resistant quality. However, upon request we can also offer product made from oil and fat resistant (OX), flame resistant (FL), and heat resistant (H100 & H130).

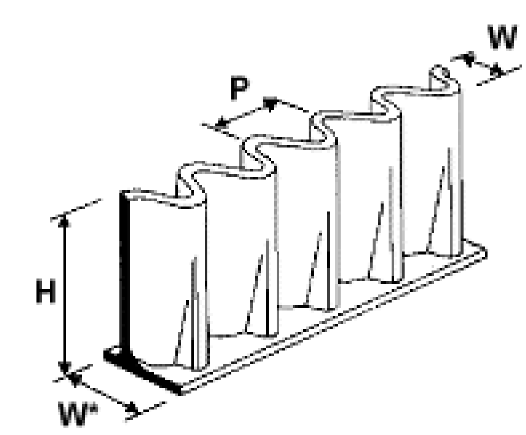
MAXOFLEX® sidewalls are produced in three categories: Light duty, non-fabric reinforced (M), Heavy duty, fabric reinforced (MWS) and Extra Heavy duty, fabric reinforced (MWSF). The fabric reinforcement in the MWS and the MWSF types, provide for greater strength and stability.

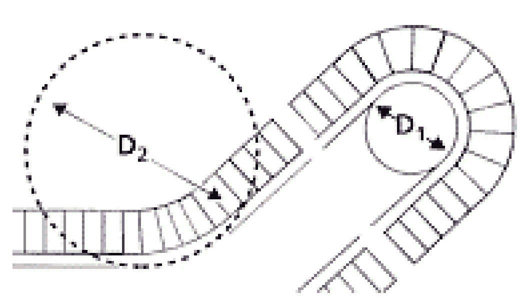
MAXOFLEX® sidewalls are characterized by being extremely stable in the transverse direction (from the side), but yet flexible in the running direction which allows for smaller pulleys. This also means that the sidewall is partially selfcleaning and therefore helps eliminate product 'carry-back':

MAXOFLEX® sidewall material can be delivered loose on a spool or attached to a basebelt.



Type	H mm	W* mm	W mm	P mm	D_1 min mm	D_2 min mm
M 40	40	35	30	35	Ø 120	Ø 200
M60	60	50	45	40	Ø 150	Ø 240
M80	80	50	45	50	Ø 200	Ø 320
M80S	80	50	45	40	Ø 200	Ø 320
M100	100	50	45	50	Ø 250	Ø 400
M100S	100	50	45	40	Ø 250	Ø 400
M120	120	50	45	50	Ø 300	Ø 480
M140	140	50	45	50	Ø 350	Ø 560
MWS120	120	75	70	60	Ø 300	Ø 480
MWS140	140	75	70	60	Ø 350	Ø 560
MWS160	160	75	70	60	Ø 400	Ø 640
MWS180	180	75	70	60	Ø 450	Ø 720
MWS200	200	75	70	60	Ø 500	Ø 800
MWS250	250	75	70	60	Ø 625	Ø 1000
MWS300	300	75	70	60	Ø 750	Ø 1200
MWSF250	250	110	100	80	Ø 750	Ø 1000
MWSF300	300	110	100	80	Ø 900	Ø 1200
MWSF350	350	110	100	80	Ø 1050	Ø 1400
MWSF400	400	110	100	80	Ø 1200	Ø 1600





In order to achieve maximum belt life, the minimum diameters for D1 and D2 must be observed.

D1 min. =

M	2.5 x height of sidewall
MWS	2.5 x height of sidewall
MWSF	3.0 x height of sidewall

Please note that the above figures are for normal quality. For other qualities we recommend D1 + 100.

D2 min. = 4.0 x height of sidewall

Diameters smaller than indicated in the table, will always result in a considerable decrease of belt life.

Standard Rubber Qualities:

N = Normal quality

OX = Fat- and oil resistant, heat resistant up to max. 100°C.

MWS(F) = Extra thick reinforced walls

On request we can supply following rubber qualities:

FL = Flame resistant quality

H = Heat resistant up to 130°C

Max. room temperature: -30°C to + 50°C

Types in bold writing are standard types.

MAXOFLEX® CLEATS

PROGRAMME 12



MAXOFLEX® cleats are produced in T, TC and TCW styles which can be combined with the sidewalls to provide numerous combinations.

The cleats are moulded in black wear resistant rubber, which guarantees optimal strenth and rigidity. Cleats can also be procuced as oil and fat resistant (OX), flame resistant (FL) and heat resistant (H100 & H130).

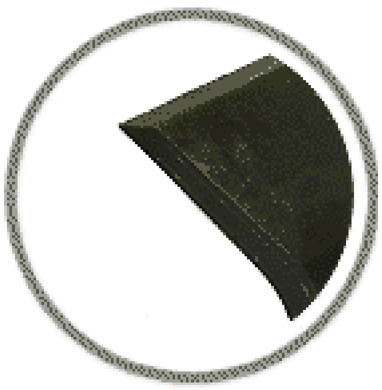
The TCW style is produced with fabric reinforcement, and is available in heights of 140 mm and higher. This provides greater stability and prevents 'back bending' of the cleats.

Cleats can also be used on belts without sidewalls.

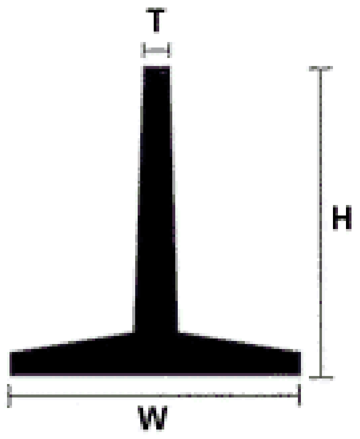
Stocked production length of cleat material is 2.8 m for cleat heights up to 230 mm. Over 230 mm, the production length is 2.4 meters.

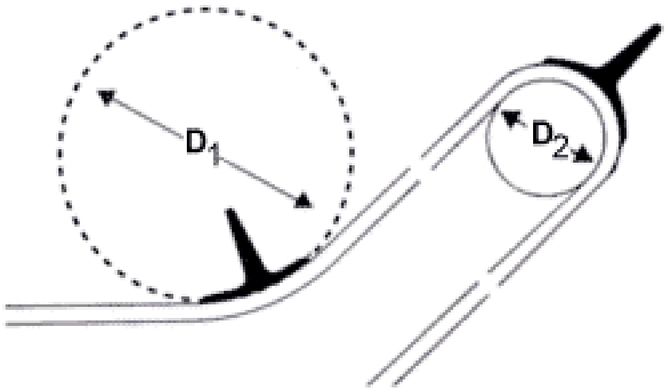
Cleats that are 230 mm or higher are produced as a 'two part' cleat, which is made of a base (foot) in rubber that is attached to the belt, then a 'blade' made of rubber or polyurethane that is inserted and bolted into the foot.





Type	H mm	W mm	T mm	D_1 min mm	D_2 min mm
T35	35	55	6	Ø 160	Ø 200
T55	55	80	7	Ø 160	Ø 250
T75	75	80	6	Ø 200	Ø 300
T90	90	105	11	Ø 275	Ø 400
T110	107	105	8	Ø 275	Ø 400
T140	140	160	18	Ø 400	Ø 450
T160	160	160	16	Ø 400	Ø 450
T180	180	160	14	Ø 400	Ø 450
C35	35	55	4	Ø 160	Ø 200
C55	55	80	5	Ø 160	Ø 250
C75	75	80	6	Ø 200	Ø 300
C90	90	110	10	Ø 275	Ø 400
C110	110	110	8	Ø 275	Ø 400
TC75	75	80	7	Ø 200	Ø 300
TC90	90	110	12	Ø 275	Ø 400
TC110	105	110	11	Ø 275	Ø 400
TC140	140	160	20	Ø 400	Ø 500
TC160	160	160	20	Ø 400	Ø 500
TC180	180	160	19	Ø 400	Ø 500
TC230	230	180	30	Ø 500	Ø 600
TCW280	280	230	30	Ø 700	Ø 900
TCW330	330	320	30	Ø 700	Ø 900
TCW360	360	230	30	Ø 700	Ø 900





Standard Rubber Qualities:

N = Normal quality
W = Qualities with reinforced fabric (example TCW 140).
OX= Fat- and oil resistant, heat resistant up to max. 100°C.

Types in bold writing are standard types.

Max. room temperature:
-30°C to +50°C

On request we can supply following rubber qualities:

FL= Flame resistant quality
H = Heat resistant up to 130°C

TERPENE RESISTANT MULTIPLY BELT - TYPE GT

PROGRAMME 13

BELT TYPE	COVER	MAX. WORKING TENSION (N/mm)	THICK-NESS (mm)	WEIGHT per m^2 (Kg)	BELT WIDTH (mm)								
					400	450	500	600	650	800	1000	1200	1400
250/2	3 + 1	25	6.0	7.8	X	X	X	X	X	X			
315/3	3 + 1	31.5	6.4	9.2		X	X	X	X	X	X	X	
400/3	3 + 1	40	7.0	9.4			X	X	X	X	X	X	
500/4	3 + 1	50	8.0	10.8					X	X	X	X	X
630/4	3 + 1	63	8.8	11.6						X	X	X	X
800/5	3 + 1	80	10.0	13.0						X	X	X	X



APPLICATION

The belt type is used in sawmills and cellulose industries for the transportation of wooden chips, bark, and cellulose.

The belt type was developed in close cooperation with the Swedish timber and cellulose industry. It is resistant to terpene, antistatic, and resistant to temperatures down to - 30°C.

CONSTRUCTION AND PROPERTIES

The carcass of this belt type is made of synthetic EP fabrics (polyester/polyamide) providing:

- Small elongation at highest working tension
- High tensile strength
- Not susceptible to humidity and microorganisms

The special GT cover provides the following advantages:

- Prevents damages caused by terpene
- A flexible cover that will keep flexibility and surface friction at low temperatures

TECHNICAL DATA

Max. material temperature of chips and cellulose pulp +80°C.

Ambient temperature max. +50°C, min. -30°C.

Antistatic according to ISO 284.

Terpene resistant according to SSG 1471 and tested according to SIS 162208.

For drum diameters, belt weight, belt thickness and troughability, see the belt selection basis (pdf-file).

AVAILABILITY

Cover combinations according to requirement.

Generally the belt is supplied with cut and thermofixed edges.

Open or endless lengths. Max. production unit 400 m/roll or according to agreement. However allowance must be made for practical handling (weight and roll diameter).

Max. carcass strength 800 N/mm. Max belt width 2200 mm.

Ribs according to programme 11.

FLAME PROOF BELTS, TYPE SF AND KF - STEELWIREMESH REINFORCED BELTS

PROGRAMME 14

APPLICATION

The belts, type SF and KF, are used at places where a fire must not spread using the belt as a media. Typical in mines, tunnels and various process industry.

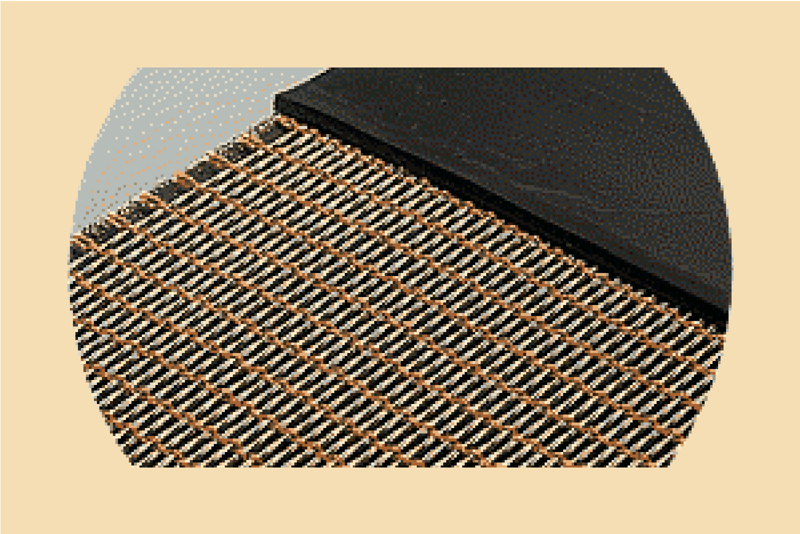
CONSTRUCTION AND PROPERTIES

The types SF and KF are with carcasses of synthetic EP fabric (polyester/polyamide) providing:

- Small elongation
- High impact resistant
- Not susceptible to humidity and micro organisms

The types SF and KF have a good wear resistance and are antistatic according to ISO 284 as well as type SF is flameproof according to ISO R433 grade S and KF is flameproof according to ISO R433 grade K.

REINFORCED STEELWIREMESH



The steel wire reinforced belts are normally based on an EP carcass with the wiremesh situated in the top rubber cover just above the carcass. The wiremesh then will protect the carcass from rips caused by sharp objects.

TECHNICAL DATA,TYPES SF AND KF

Max. material temperature 80°C.

Ambient temperature max 50°C min. -20°C.

Type SF is flameproof according to ISO R433 basic quality S, testing according to ISO R340.

Type KF is flameproof according to ISO R433 basic quality K, testing according to ISO R340.

Antistatic according to ISO 284

For pulley diameters, belt weight and belt thickness as well as troughability we refer to the belt selection basis (pdf-file).

TECHNICAL DATA AVAILABILITY STEELWIREMESH REINFORCEMENT

On request most of our black rubber based belts with min. 5 mm top cover can be steelwiremesh reinforced. The reinforcement claims that the drum diameters are one step higher than for the EP carcass only as well as the permissible through angle must be one step lower.

AVAILABILITY

Cover combinations according to requirement and request.

Open or endless lengths. Max. length unit 400 m/roll or according to agreement, however allowance must be made for practical handling possibilities (weight and roll diameter).

Max. carcass strength 2500 N/mm for SF.
Max. carcass strength 1600 N/mm for KF.

Max. belt width 2200 mm.

For type KF the thickness of the cover rubber shall be min. 2 times the thickness of the carcass.

BUCKET ELEVATOR BELTS & BARE BACKED (SLIDING) BELTS

PROGRAMME 15

BUCKET ELEVATOR BELTS		
BELT TYPE	WEAR RESISTANT COVER mm	OIL RESISTANT COVER mm
EP 500/4	0.2 + 0.2	1 + 1
EP 630/4	2 + 2	2 + 2
EP 630/5	0.2 + 0.2	1 + 1
EP 800/5	0.2 + 0.2	1 + 1
EP 1000/6	0.2 + 0.2	1 + 1

BARE-BACKED (SLIDING) BELTS		
BELT TYPE	WEAR RESISTANT COVER mm	OIL RESISTANT COVER mm
EP 250/2		2 + 0
EP 400/3	0 + 0	
EP 400/3	2 + 0	

BUCKET ELEVATOR BELTS

APPLICATION

Basis vertical transportation of grain, flour, stone and gravel.

CONSTRUCTION

Complete delivery programme of all types of elevator buckets, both in welded and weldless design. Buckets available in steel, stainless steel and plastic.

Stocked Bucket Elevator Belts

Maximum 1500 mm wide material made of prestretched EP fabrics are normally kept in stock indicated in the table above.

BARE-BACKED (SLIDING) BELTS

APPLICATION

Used where the belts run on steel, wood or some other low-friction surface (sliding bed), and for belts with low friction back and top cover. These belts allow easy scraping-off of parcels, sacks and other items.

Stocked Sliding Belts

Sliding belts are stocked in maximum 1300 mm widths based on prestretched EP fabrics indicated in the table above.

CUSTOM-MADE BELTS

Custom-made Elevator Cup Belts and Sliding Belts in our wear- and oil resistant qualities are produced on request.

FIELD OF APPLICATION	MATERIAL EXAMPLES	Temperature area/ material °C	STANDARD PROGRAMMES	PROGRAMME	SPECIAL PROGRAMMES	PROGRAMME
Abrasive material	Beets, cement, coal, coke, earth, flint, grain, granite, gravel, limestone, ore, potatoes, slag, stone materials, timber.	-30/100 -30/80	RO-PLY, 2 ply belts Multiply belts type B and BW	1 2	Multiply belts type A, B and BW	3
Hot, abrasive materials	Blast furnace, cement clinker, slag	-30/170 -30/210			Multiply belts type K and N Type TCC	4 5
Hot materials containing oil	Fertilizer, fodder mixtures, refuse	GW -10/100 GWF -30/125	RO-PLY GWF, 2-ply belts	6	Multiply belts typeGW and GWF	7
Materials containing moderate oil	Grain, fodder mixtures, refuse	-30/80	RO-PLY GWM, 2-ply belts	6A	Multiply belts type GWM and GWS	7A
Food	Bread, chocolate, fish, meat	-30/110	Type IWE	8		
Packaged goods, inclined transport	Luggage, parcels, sacks	-30/80	RO-PLY Grip 4, 2-ply belts	9	Multiply pattern belts	10
Packaged goods, goods in bulk, inclined transport	Beets, coal, coke, gravel, limestone, parcels, potatoes, sacks, stone				Rib programme	11
Goods in bulk, wood industry	Woodchips				Multiply pattern belts	11A
Goods in bulk	Maxoflex® sidewall belts	-30/130			Multiply belts type XE	12
Material containing terpene	Woodchips	-30/80			Multiply belts type GT	13
Goods in bulk, tunnel & mine industry	Coal & stone	-20/80			Multiply belts type SF, KF	14
Vertical transport, low fric. surfaces	Grain, flour stone, parcels , sacks				Bucket elevator belts, sliding belts	15

When choosing the belt type there will be several alternative possibilities of solving the transport application in question.

By means of ROULUNDS SYSTEM KEY including several belt programmes it will be rather simple to determine the belt type that gives the best operating economy.

ROULUNDS SYSTEM KEY contains:

STANDARD PROGRAMMES

2-ply and multiply belt types with cover combinations adapted to the individual transport applications.These programmes can be considered 'ready-made', and they are to a certain degree held in stock or can be delivered at a relatively short time of delivery. The standard programmes are composed on the basis of many years' experience in the conveyor belt field and cover a considerable part of this sector.

SPECIAL PROGRAMMES

Include multiply belt types that are 'tailored' to special, specific conditions in connection with a given transport. Thus these programmes make individual combinations of carcass strength, cover thickness, and cover quality possible.

ROULUNDS SYSTEM KEY starts with the material to be transported and continues to STANDARD PROGRAMMES or SPECIAL PROGRAMMES.

The application of the belt types, the technical data, and delivery possibilities are described in the programmes, and the right belt construction can thus be determined.

CONVEYOR BELT CONSTRUCTIONS

A conveyor belt is constructed of two components – carcass and covers.

CARCASS

The function of the carcass is to transmit and absorb the forces acting on the belt. It is primarily a question of tensile forces from the driving pulley. Secondly the carcass absorbs the impact that partly appears when the material is loaded onto the conveyor, and partly when the belt with material passes over the carrying idlers.

The carcass consists of one or more plies of textile fabric with rubber on each side to give adhesion and flexibility. The longitudinal direction is called warp and the cross direction is called weft, see fig. 1 and 2.

The conveyor belt fabrics can have the same or different material in warp and weft. One letter is designating each, for instance EP, in which E is Polyester in warp and P is Polyamide in weft.

In the following the most common carcass materials are described.

Cotton (B)

A natural fibre used in both warp and weft. Cotton is still used in conveyor belt fabrics, but it is being displaced by synthetic materials.

Polyester (E)

Synthetic fibres such as Terylene, Trevira, Diolen and Tetoron. Polyester fabrics are not influenced by moisture or micro-organisms. They are very flexible, have stability in length, and are acid resistant.

Polyamide (P)

Synthetic fibres known as Nylon and Perlon. This fabric has more or less the same characteristics as Polyester, but not the length stability.

Polyester-Polyamide (EP)

The EP fabrics have Polyester as the warp and Polyamide as the weft. This combination gives the best possible fabric characteristics with the following advantages:

– high strength in proportion to weight

– high resistance to impact

– negligible elongation

– great flexibility, excellent troughability

– not susceptible to humidity and micro-organisms

These technical advantages as well as many years' experience in the conveyor belt field is the reason why ROULUNDS prefer EP as carcass material in conveyor belts.

Polyamide-Polyester (XE)

The XE fabrics have Polyester as the warp and Polyamid as the weft. The Polyester is, in general, made up of heavy monofile threads. These fabrics have the same advantages as EP fabrics chemically wise. Mechanically, 2 plies, in combination with an EP carcass, makes a traditional EP belt cross-stabilized. This type of carcass is used in the manufacturing of sidewall belting, cover belting etc.

Steel net

Steel net, consisting of steel wires, is used as an extra ply in the carcass of the belt in order to protect the EP fabrics from longitudinal cuts while the ability for trough formation is kept.

Under speciel circumstances steel net can be used as carcass instead of EP.

COVERS

The covers protect the carcass and give the necessary friction between belt and driving pulley and between belt and material.

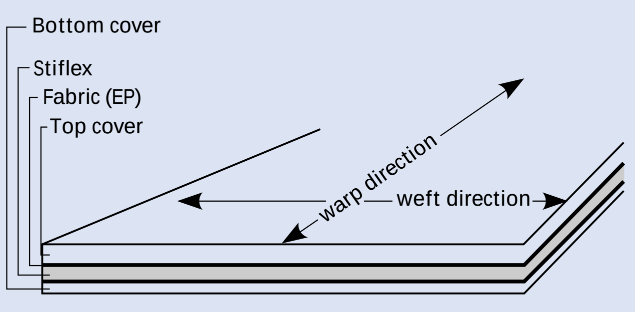
As the covers must resist influences from the transported material and the weather, cover types that are wear and live resistant, oil and/or heat resistant, antistatic or that combine two or more of these properties are required.

BELT CONSTRUCTIONS

Belt construction means the combination of carcass and covers. The combination determines whether the belt construction is harmonious and works without problems.

In the harmonious belt construction the transmission of the necessary power, material type, lump size, height of fall, weight etc. are taken into consideration. Furthermore the carcass must give the belt stability, so that it is easy to guide on the conveyor. Increased carcass strength is normally followed by increased thickness and quality of the covers to ensure a balanced life between carcass and covers.

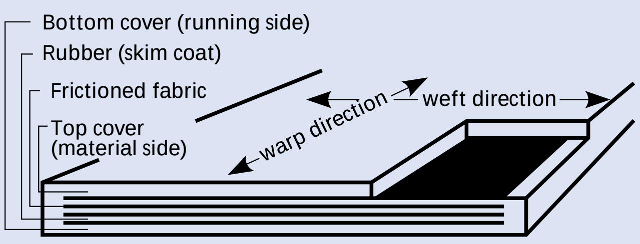
Fig. 1



2-ply belts

Such carcass constructions consist of 2 fabric plies and an innerply of rubber. In the 2-ply belt programme RO-PLY, ROULUNDS use an innerply – STIFLEX – consisting of rubber and textile fibres. The construction, which is patented, gives the belt excellent troughability and directional stability.

Fig. 2



Multiply belts
have three or more fabric plies in the carcass. The necessary strength and stability is secured by using sufficient number of fabric plies in the carcass.

To reach a harmonious combination of belt width, number of plies in carcass, and cover thickness, the following general lines can be used:

Belt Width (mm)	**Number of Plies in Carcass**
- 800	3-4
800-1400	4-5
1400-2200	5-6

Tensile Strength of Carcass Newton per mm belt width (N/mm)	**Cover Thickness (mm)** recommended minimum
- 200	2 + 1
250- 400	3 + 1
400- 630	5 + 1,5
630-1000	6 + 2
1000-	8 + 3

It should be stressed that these lines are only **general,** and variations can easily be found depending on material, belt speed, loading conditions etc.

CONVEYOR BELTS, ASSORTMENT

ROULUNDS

With the RO-PLY programme's combination of cover thichness and carcass strength we have created an assortment with a very wide field of applications.

RO-PLY is also supplied with ribs.

RO-PLY Grip 4 is with patterned surface.

The table indicates the RO-PLY programme.

In the system key and in each single programme more detailed information is given.

APPLICATION			RO-PLY PROGRAMME		
	Examples of material	Max. temp.	Type	Cover mm	Max. standard belt width*) mm
Abrasive materials	Slightly abrasive, small height of fall at loading. Grain, cement, loose earth, crushed coal.	100°C	200/2	2 + 1	800
Abrasive materials	Moderately to very abrasive, normal height of fall . at loading Gravel, stone, coal, coke, crushed ore, wood.	100°C	250/2 315/2 400/2	3 + 1 3 + 1 3 + 1	1000 1200 1200
Abrasive materials	Very and extra abrasive, great height of fall at loading. Flint, stone materials, coke, ore, slag, wooden logs.	100°C	400/2 630/2	5 + 1,5 5 + 1,5	1200 1200
Hot materials containing oil	Refuse, fodder mixtures, wood containing resin, clinkers, copra, meat- and bone meal, slag, soya cakes, wooden chips. Fertilizer with Lilamine. Requirement for flameproof belt.	125°C	250/2 GWF 400/2 GWF	3 + 1 3 + 1	1000 1200
Moderate oily material	Refuse, grain	80°C	250/2 GWM	3 + 1	800
Inclined transport	Luggage, boxes, sacks, parcels, cellophane wrapped goods.	80°C	200/2 Grip 4 Other RO-PLY types with ribs		1200

*) Other belt widths can be delivered on request, however, max. 1500 mm.

ROULUNDS multiply conveyor belts are supplied with covers and carcass strength adapted to the individual requirements.

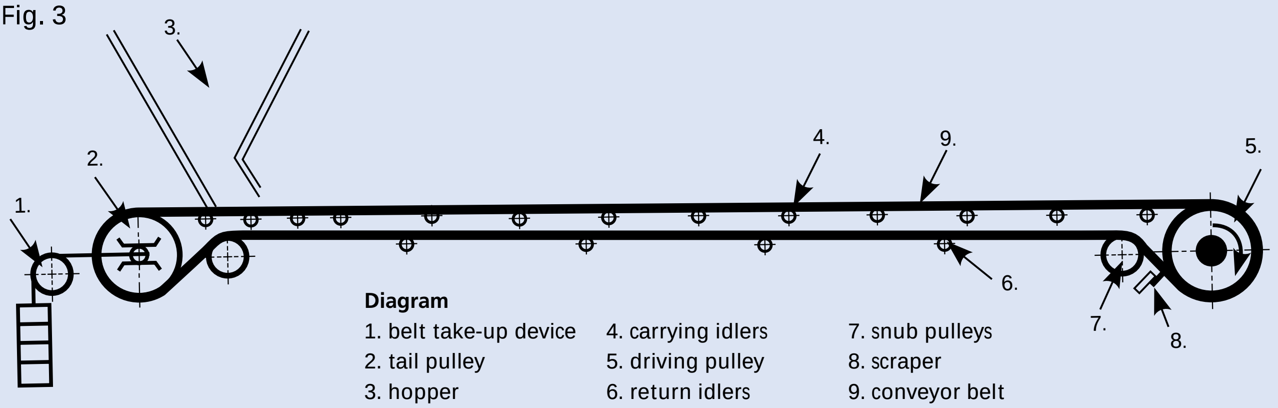
ROULUNDS conveyor belts are also supplied with ribs or patterned surface for inclined transport.

The table indicates ROULUNDS multiply conveyor belt programme.

In the system key and in each single programme more detailed information is given.

APPLICATION			BELT PROGRAMME		
	Examples of material	Max. temp.	Type	Carcass strength max. N/mm	Belt width max. mm
Abrasive materials	Very abrasive, sharp edges. Granite, iron, broken stone, slag, gravel, limestone, coke, ore, coal.	80°C	A	3150	2200
Abrasive materials	Moderately to very abrasive. Ashes, cement, limestone, earth, coal, coke, lignite, potatoes, clay, marl, mortar, concrete.	80°C	B	3150	2200
Abrasive materials	Highly abrasive material. Granite, iron, broken stone, slag.	80°C	BW	3150	2200
Hot, abrasive materials	Abrasive, hot/wet. Ashes, coke, malt, slag, blast furnace clinker, cement clinker, foundry sand.	140°C 170°C 210°C	K N TCC	1600 1600 1600	2200 2200 2200
Hot materials containing oil	Refuse, fodder mixtures, wood containing resin, clinkers, soya cakes, copra, meat- and bone meal, wooden chips , slag. Fertilizer with Lilamine. Requirement for flameproof belt.	100°C 125°C	GW GWF GWF	1600 1000	2200 2200
Moderate oily material	Grain, fodder mixture, refuse, wodden chips,fertilizer.	80°C	GWM GWS	1600	2200
Food	Containing animal and/or vegetable oil and fat. Bread, chocolate, drops, fish, cheese, meat, margarine, butter.	110°C	IWE	250	1400
Wood	Wood, chips, containing resin	80°C	GT	1400	2200

Fig. 3

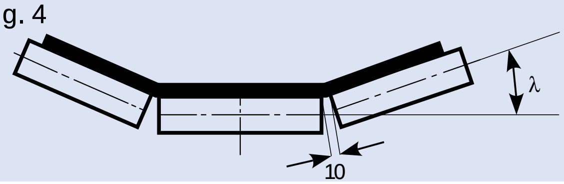


CARRYING PART
can be supported by

troughed idlers
flat idlers
sliding plate

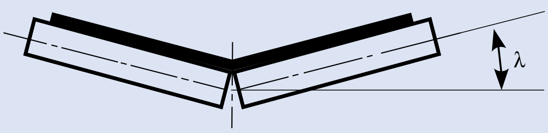
Troughed idler set
with 2-5 idlers is used for transportation of goods in bulk. Troughed idlers ensure high capacity, small risk of spillage of material and effective belt guiding.

Fig. 4



The three-sectioned idlers
are the most commonly used type. The optimum capacity is obtained at 45° trough angle (λ), and the idlers being of the same length. Distance between idlers is standardized at max. 10 mm.

Fig. 5

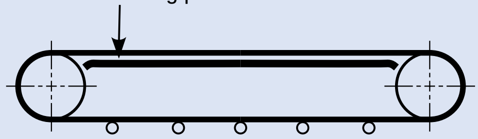


The two-sectioned idlers
are normally only used for belt widths under 650 mm. A trough angle (λ) larger than 25° is inexpedient because of the influences on the belt. Distance between idlers is standardized at max. 10 mm.

Fig. 6

Flat idler set
is mainly used for transportation of packaged goods, and in such cases when the material is loaded and unloaded from the side, and for belts with sidewalls.

Fig. 7

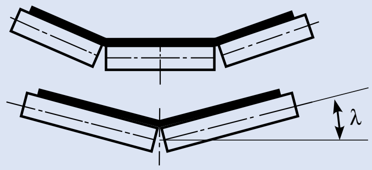


Sliding plate
can be used for transportation of packaged goods and goods in bulk. The sliding plate can be made of steel, plastics or hard wood.

Normally belts with low friction on the bottom side are used because of the friction forces between belt and sliding plate.

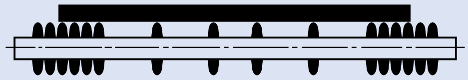
RETURN PART
is normally supported by flat idlers. However, on long conveyors it can be an advantage to use two-sectioned idlers, which makes the belt guiding easier. Trough angle 10-15° (λ).

Fig. 8



When transporting sticky materials return idlers with supporting rings or rubber lagging are used to reduce build-up of material on the idlers.

Fig. 9



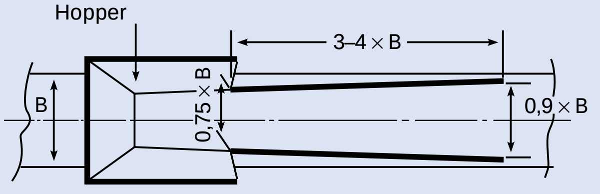
Because of the guiding of the belts both carrying and return idlers must be adjustable in the travelling direction of the belt.

LOADING OF GOODS IN BULK

Feeding should take place in the travelling direction of the belt at a speed equal to the belt speed. Material should be distributed symmetrically across the middle of the belt, as unsymmetrical material stream is often the cause of oblique travel.

After a few metres' running the material stream will flatten out and assume the load stream cross section that is natural for the material. To avoid waste of material a hopper should therefore as a maximum cover 0,75 × belt width, see fig. 10.

Fig. 10



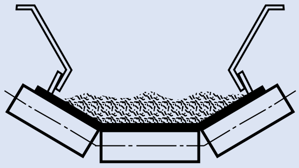
In connection with the hopper, rubber skirting is often mounted to avoid spillage of material. The skirting must be of rubber or some other material, the hardness of which is lower than that of the belt cover.

A hardness of approx. 45° Shore A will normally be suitable.

Scraps of belt should not be used as rubber skirting. The distance between the rubber skirting being gradually increased from 0,75 to 0,9 x belt width, see fig. 10, a selfcleaning effect will occur, as the belt will pull out the material between skirting and belt.

The rubber skirting must be placed at right angles to the belt to avoid the material pressing it on to the belt with consequent wear of the cover, see fig. 11.

Fig. 11



The height of fall of the material should be the smallest possible in order to reduce the impact effect on the belt. The consequences of the impact can be reduced by supporting the belt in an appropriate way by means of for instance closely placed rubberized carrying idlers, shock absorbing rubber mat, or other devices.

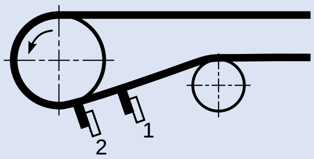
MAINTENANCE OF BELT AND CONVEYOR

Build-up of the material on the belt, pulleys and idlers causes increased wear of covers and spillage of material at the return idlers as well as guiding difficulties.

The belt can be kept clean by means of scrapers, brushes or vibratory equipment, water jetting, or combinations of these. It will often be necessary to experiment to find the most effective solution.

Rubber scrapers as shown in fig. 12 can be made as single or double scrapers, which are kept in position by counterbalance or adjustable screw springs. The surface pressure between belt and scraper should be adapted to the transported material to avoid unnecessary wear of the cover.

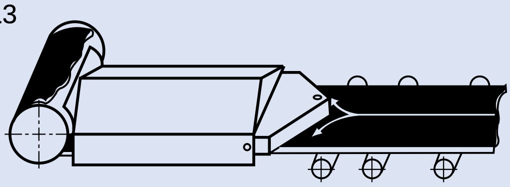
Fig. 12



In connection with very sticky materials the scraper can be placed with the pulley as a counter-balance (2). In this way the scraper becomes more effective, but at the same time it must be able to rock to reduce the risk of damaging the belt in case of material between belt and pulley.

The pulley side of the belt is kept clean by means of diagonal or plough-shaped scrapers. An adjustment device should be made to prevent the rubber holder from getting into contact with the belt. Scraps of belt should not be used as scrapers.

Fig. 13



Build-up of materials on pulleys must be avoided. A possibility is scrapers on the pulleys.

Covering of the return part under the loading point can give an effective protection of the belt and can be recommended for transportation of goods in bulk.

BELT TENSIONING SYSTEM

The purpose is to give the belt the pre-tension ensuring

– that the driving pulley drives the belt under all running conditions.

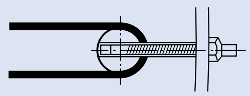
– that the belt sag between carrying and return idlers is limited. In this way waste of material and bending resistance at belt passage over the idlers is reduced.

Correct pre-tension is thus important to ensure troublefree operation of the conveyor.

Depending on the mode of operation the belt tensioning systems are divided into two main groups.

Fixed belt tensioning system
Screw take-up is often used for short, moderately loaded conveyors.

Fig. 14



The screw take-up cannot absorb all momentary elongations that may occur due to sudden variations of load and in the acceleration phase. Conveyors with centre distance of more than approx. 50 m should therefore have selfadjusting take-up.

Self-adjusting belt tensioning system
keeps the pre-tension constant and ensures at the same time that the permissible belt tension is not exceeded. The most common system is gravity take-up, and the best effect is normally obtained when the gravity take-up is placed close to the driving pulley.

Fig. 15

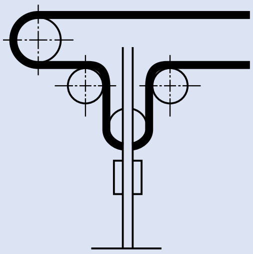
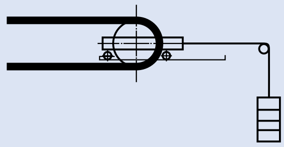


Fig. 16



In connection with large heavily loaded conveyors the gravity take-up will not be sufficient (it acts too slowly), and instead electrical, pneumatic or electro-hydraulic systems can be used.

The possibility of adjusting the belt tension should in general be 0,8-1,2% of the centre distance under normal running conditions.

A real calculation of the necessary adjustment of belt tension may be required, and ROULUNDS shall be at your disposal in this respect.

SELECTION OF CONVEYOR BELTS

Selection of conveyor belts implies knowledge of
- existing conveyor data and running conditions

or of projecting data consisting of
- capacity of conveyor in t/h or m^3/h
- transport distance and belt travel
- type of material, weight per m^3, lump size, chemical activity, temperature and consistency
- loading conditions.

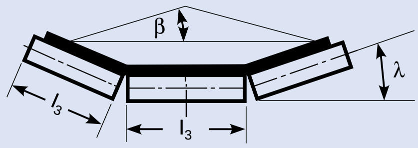
In the following the use of the **calculation formulas** and the procedure with both projecting and selection is described.

Belt width B (mm)
Minimum belt width is determined taking into consideration kind of material and lump size. Table 1 indicates guiding values for B min. (mm).

Belt speed v (m/s)
Max. belt speed is determined taking into consideration density of material, lump size, height of fall and belt width. Table 2 indicates guiding values for max. belt speed v max. (m/s).

Capacity Q_t (m^3/h)
The theoretical capacity Q_t (m^3/h) of the conveyor belt is calculated according to cross section of load stream and belt speed v (m/s). The basic angle β is part of the cross section of load stream, and experience shows that for most materials a suitable safety margin is obtained by $\beta = 15°$. For dry, powdered material $\beta = 10°$ is recommended.

Fig. 17



The tables 4, 5 and 6 indicate theoretical capacity Q'_t (m^3/h) at a belt speed of 1 m/s, horizontal transport and continuous operation with regular uniform feeding. Intermittant operation and dissimilar feeding must be taken into consideration when stipulating the required capacity.
Table 3 indicates correction factor for inclined or falling transport.
Regarding capacity for rib belts we refer to the programme for ribs on page 49.
With min. belt width B (mm) and Q'_t (m^3/h) at 1 m/s as input values for table 4, 5, and 6 the theoretical capacity Q_t (m^3/h) is determined.

$$Q'_t = \frac{Q_2}{v \times \gamma \times k} = \frac{Q_1}{v \times k} \qquad (m^3/h)$$

Q'_t	= theoretical capacity at 1 m/s	(m^3/h)
Q_1	= required capacity	(m^3/h)
Q_2	= required capacity	(t/h)
γ	= density of material, table 17	(t/m^3)
v	= max. recommended belt speed, table 2	(m/s)
k	= correction factor for inclined/falling transport, table 3	(-)

Generally the trough angle (λ) should be chosen in the upper area, the waste problems being thus minimized. The belt type being finally determined control that the empty belt can run in the chosen trough angle, see table 15, selection of conveyor belts.
Theoretical capacity $Q_t = Q'_t \times v \times k$ (m^3/h)

Power requirement Nn (kW)
The theoretical power N_n (kW) necessary for the transport is composed by

N_1 = power required to drive empty conveyor

N_2 = power required to convey material on the level

N_3 = power required to elevate or lower material

N_4 = additional power required from rubber skirting, scrapers, tripper etc.

$$N_n = N_1 + N_2 \pm N_3 + N_4 \quad \text{(kW)}$$

Formulas for power, see calculations.

Motor capacity

$$N_m = \frac{N_n}{\eta} \quad \text{(kW)}$$

The transmission efficiency can, if not known, be put at η = 0,85-0,95.

Working tension p (N/mm)
When the theoretical necessary power N_n (kW) is known, the effective tension P (N), max. belt tension T_1 (N) and working tension p (N/mm) of the belt are calculated.

The working tension p (N/mm) is used for determination of belt type, and the following points are taken into consideration:

Is the **starting torque** limited to **max. 1,4 × normal torque** the normal power N_n (kW) can be used for calculating the working tension.

On larger conveyors, when large masses are to be started **allowance must be made for acceleration** and the acceleration forces belonging to it.

If further information about the calculation of acceleration forces as well as starting systems is required, please contact ROULUNDS.

Under normal **running conditions** the working tension p (N/mm) has the highest influence on the belt.

The belt programmes indicate max. permissible working tension p (N/mm), and belt type is chosen according to the calculated p (N/mm).

If the belt is exposed to extraordinary tension under loading or in transport these influences may result in local belt tensions exceeding the calculated working tension. In such cases a heavier belt construction should be chosen.

Choice of belt type
The belt type can now be determined by means of:

- the system key, referring to belt programmes
- the calculated working tension p (N/mm)
- recommended cover dimensions, tables 12 and 13 in selection of conveyor belts.

Control of »G« (kg/m) – weight of moving parts of conveyor
Belt type and conveyor data having been determined the real G value of the moving parts of the conveyor can be calculated and compared with the G value from table 7 used for the calculation.

If the comparison gives so great a difference that it will influence the working tension p (N/mm) considerably the calculation should be repeated with the real G value.

Pre-tension gravity take-up G_k (kg)
The pre-tension must be so that the belt can operate on the conveyor under all running conditions.

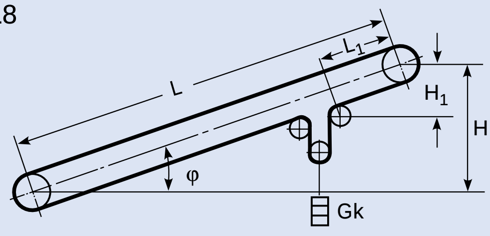
In connection with centre distance above 50 m automatic take-up is recommended.

The size of the pre-tension depends on the position of the take-up system on the conveyor.

The best function is achieved if the automatic take-up system is placed right after the driving pulley.

The following formula can generally be used for calculation of gravity take-up.

Fig. 18



$$G_k = \frac{2N_n\,(m-1)\,102}{v} + 2\left(L_1\left(G_b + \frac{G_{RU}}{S_2}\right) f - H_1 \times G_b\right) \text{(kg)}$$

Explanation of symbols:

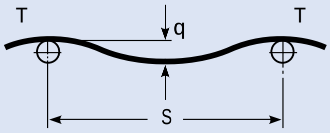
If G_k becomes negative the max. belt tension T_1 can be calculated according to the real pre-tension:

$$T_1 = P + H_1 \times G_b \times g - L_1\left(G_b + \frac{G_{RU}}{S_2}\right) f \times g \text{ (N)}$$

MAX. PERMISSIBLE BELT SAG
The belt sag between carrying idlers and return idlers is dependant on distance between carrying idlers, belt tension as well as weight of belt and material.

In practice a sag $(q/s)_{perm}$ = 0,005 to 0,02 is accepted.

Fig. 19



The belt tension T_{min} (N), which is necessary in order to keep the limit for the belt sag $(q/s)_{perm}$, can be calculated according to the following formula:

Carrying part

$$T_{min} = \geq \frac{s_1\,(G_b + G_m)\,g}{8\,(q/s)_{perm}} \text{ (N)}$$

Return part

$$T_{min} = \geq \frac{s_2 \times G_b \times g}{8\,(q/s)_{perm}} \text{ (N)}$$

Explanation of symbols:

Values for belt tension lower than T_{min} (N) should not be used in any point of the conveyor.

Are lower values reached, the distance between the carrying idlers should be reduced, or the pre-tension should be increased.

In both cases the working tension p (N/mm) should be checked to see that it does not exceed p_{perm} (N/mm).

CALCULATION FORMULAS

DETERMINATION OF	FORMULAS	REFERENCE
Min. belt width B (mm) Max. belt speed v max. (m/s) Required capacity Q_1 (m^3/h) Required capacity Q_2 (t/h)	$Q_1 = \frac{Q_2}{\gamma}$ $Q_2 = Q_1 \times \gamma$	Min. belt width, table 1 Max. speed, table 2 Is determined in consideration of intermittant operation γ according to table 17.
Theoretical capacity at 1 m/s Q'_t (m^3/h) Theoretical capacity Q_t (m^3/h) Theoretical capacity Q_t (t/h)	$Q'_1 = \frac{Q_2}{v \times \gamma \times k} = \frac{Q_1}{v \times k}$ $Q_t = Q'_t \times v \times k$ $Q = Q_t \times \gamma$	Correction factor k for inclined/falling transport, table 3. Final belt width B (mm) and trough angle (λ) to be determined according to capacity tables 4, 5, and 6. Table value Q'_t (m^3/h) to be used when calculating Q_t (m^3/h).
Power required to drive empty conveyor N_1 (kW) Power required to convey material on the level N_2 (kW) Power required to elevate or lower material N_3 (kW)	$N_1 = \frac{G\,(L + l)\,f \times v}{102}$ $N_2 = \frac{Q\,(L + l)\,f}{367}$ $N_3 = \frac{Q \times H}{367}$	G – table 7 L – centre distance (m) l – table 8 f – table 9 H = L sin φ (m) is the vertical height to elevate or lower material. H is positive for inclined and negative for falling transport.
Additional power requirement N_4 (kW)		N_4 – table 10
Theoretical necessary motor capacity N_n (kW)	$N_n = N_1 + N_2 \pm N_3 + N_4$	N_3 is positive for inclined and negative for falling transport.
Motor capacity N_m (kW)	$N_m = \frac{N_m}{\eta}$	If not known, the degree of efficiency of drive can be calculated at η = 0,85-0,95.
Effective tension P (N) Max. belt tension T_1 (N) Drive factor m (-) Pre-tension T_2 (N) Working tension p (N/mm) Choice of belt type	$P = \frac{N_n \times 1000}{v}$ $T_1 = P \times m$ $m = 1 + \frac{1}{e^{\mu\alpha} - 1}$ $T_2 = T_1 - P$ $p = \frac{T_1}{B}$	m – table 11 or according to formula for drive factor. According to directions see selection of conveyor belts. SYSTEM KEY. Cover dimensions table 12-13.
Control of G-value (kg/m)	$G = 2G_b + \frac{G_{RO}}{s_1} + \frac{G_{RU}}{s_2}$	If the real G-value deviates considerably from the value used in table 7, N_1, N_n and p should be corrected. G_b see table 14.
Pre-tension G_k (kg) Max. belt tension T_1 (N)	$G_k = \frac{2N_n\,(m - 1)\,102}{v}$ $+ 2\,(L_1(G_b + \frac{G_{RU}}{s_2})\,f - H_1 \times G_b)$ $T_1 = P + H_1 \times G_b \times g$ $- L_1\,(G_b + \frac{G_{RU}}{s_2})\,f \times g$	See drawing on previous page. G_{RU}, s_2 and G_b see tables 7 and 14. If G_k becomes negative T_1 is calculated according to the real pretension in the belt.
Belt sag Max. permissible belt sag Min belt tension on: carrying part T_{min} (N) return part T_{min} (N) Pulley diameters	$(q/s)_{perm}$ = 0,005-0,02 $T_{min} \geq \frac{s_1\,(G_b + G_m)\,g}{8(q/s)_{perm}}$ $T_{min} \geq \frac{s_2 \times G_b \times g}{8(q/s)_{perm}}$	Values for belt tension lower than T_{min} should not be used in any point of the conveyor. If lower values are reached, the distance between carrying idlers should be reduced or the pretension increased. T_1 and p are adjusted and compared with p_{perm} for chosen belt type. See table 16.

Table 1
RECOMMENDED MIN. BELT WIDTH B (mm)

	Min. belt width (mm)										
Material	400	500	650	800	1000	1200	1400	1600	1800	2000	2200
Sorted, length of largest edge (mm)	50	75	125	175	250	350	400	450	550	600	600
Unsorted, length of largest edge (mm)	100	150	200	300	400	500	600	650	700	750	750

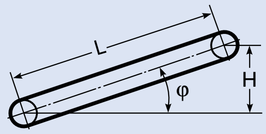
Min. belt width is determined according to kind and lump size of material. Coarsegrained material will reduce the capacity, especially in connection with narrow belt width. The widths indicated should be adhered to as far as possible. A few big lumps – till 10% of the total quantity – can, however, be allowed.

Table 2
RECOMMENDED MAX. BELT SPEED v max. (m/s)

	Belt width B (mm)										
Material	400	500	650	800	1000	1200	1400	1600	1800	2000	2200
Light, fine-grained	2,5	3,15	3,15	3,55	4,0	4,0	4,0	4,0	4,5	4,5	4,5
Moderate, abrasive	1,6	2,0	2,5	2,5	3,15	3,15	3,15	3,55	3,55	3,55	3,55
Heavy, very abrasive	1,25	1,6	1,8	1,8	2,24	2,24	2,24	2,5	2,5	2,5	2,5

Wear and cuttings of the cover will primarily take place while the material accelerates to belt speed. Thus a moderate belt speed should be chosen in connection with coarsegrained materials and big lump sizes.

Table 3
CAPACITY FACTOR k (-)

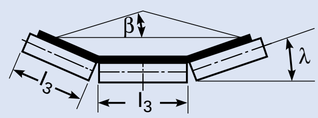


φ (°)	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
$\frac{H}{L}$	0,03	0,07	0,10	0,14	0,17	0,21	0,24	0,28	0,31	0,34	0,37	0,41	0,44	0,47	0,50
k	1	0,99	0,98	0,97	0,95	0,93	0,91	0,89	0,85	0,81	0,76	0,71	0,66	0,61	0,56

In connection with inclined or falling transport the effective load area is reduced by factor k. Are rib belts used, please see the capacity tables in programme 11.

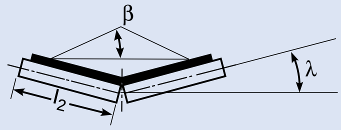
Table 4
THEORETICAL CAPACITY Q'_t (m^3/h) at v = 1 m/s

THREE-SECTIONED CARRYING IDLERS



B (mm)	l_3 (mm)	λ°	20		25		30		35		40		45	
		β°	10	15	10	15	10	15	10	15	10	15	10	15
400	160		36	43										
500	200		60	73	67	79								
650	250		110	132	123	145	134	155	145	164	153	171	160	176
800	315		172	207	193	226	211	243	227	257	240	268	250	276
1000	380		281	337	315	369	345	396	371	419	391	437	407	449
1200	465		412	493	461	540	505	581	543	614	573	640	597	658
1400	530		573	685	642	750	703	807	755	803	797	888	829	913
1600	600		758	907	851	993	932	1068	1000	1128	1056	1075	1097	1208
1800	670		970	1160	1088	1270	1196	1365	1279	1443	1350	1502	1402	1544
2000	750		1204	1435	1351	1577	1479	1695	1588	1791	1676	1865	1742	1917
2200	800		1476	1740	1656	1930	1813	2074	1946	2191	2052	2281	2131	2342

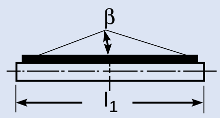
Table 5
THEORETICAL CAPACITY Q'_t (m^3/h) at v = 1 m/s



TWO-SECTIONED CARRYING IDLERS

B (mm)	l_2 (mm)	λ°	15°		20°		25°	
		β°	10°	15°	10°	15°	10°	15°
300 400 500	200 250 300		18 30 60	21 43 72	21 41 69	24 48 80	23 46 76	26 52 87
650 800 1000	375 465 600		107 168 270	129 202 325	123 193 310	144 225 363	136 213 344	155 244 392

Table 6
THEORETICAL CAPACITY Q'_t (m^3/h) at v = 1 m/s

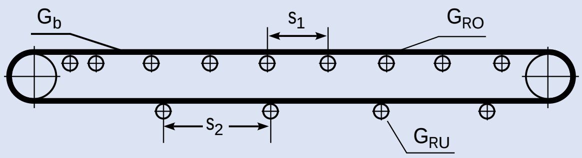


FLAT CARRYING IDLERS

B (mm)	l_1 (mm)	β = 10°	β = 15°	B (mm)	l_1 (mm)	β = 10°	β = 15°
300 400 500	400 500 600	8 15 25	12 23 39	1200 1400 1600	1400 1600 1800	168 232 307	256 353 466
650 800 1000	750 950 1150	45 71 115	69 108 174	1800 2000 2200	2000 2200 2400	391 406 591	594 739 898

Table 7
WEIGHT OF MOVING PARTS OF CONVEYOR G (kg/m)

$$G = 2Gb + \frac{G_{RO}}{s_1} + \frac{G_{RU}}{s_2} \text{ (kg/m)}$$



s_1 (m)	s_2 (m)	Type of Conveyor		Belt width (mm) 300	400	500	650	800	1000	1200	1400	1600	1800	2000	2200
1,0	2,0	light heavy	$\gamma < 1,5$ $\gamma > 1,5$	9 12	11 15	13 20	17 28	28 43	37 57	52 77	69 100	82 120	108 143	128 164	145 186
1,25	2,5	light heavy	$\gamma < 1,5$ $\gamma > 1,5$	8 11	10 14	12 18	15 25	25 39	33 52	48 71	62 90	75 109	96 131	115 148	131 169
1,5	3,0	light heavy	$\gamma < 1,5$ $\gamma > 1,5$	8 10	10 13	11 17	14 23	23 36	31 48	45 67	58 84	70 102	89 122	107 138	121 156
Trough Shape															
Recommended diameters and weight of carrying idlers and return idlers	light conveyor	∅ (mm) $G_{RO} = G_{RU}$ (kg)		51 2,5	51 3	51 3,5	63 5,5	89 11	89 13	89 15	108 22	108 25	133 39	133 43	133 47
	heavy conveyor	∅ (mm) $G_{RO} = G_{RU}$ (kg)		63 3,5	63 4	63 5,5	89 10	108 14	108 18	108 20	133 31	133 35	159 47	159 52	159 56

In the values for G the recommended values for G_{RO} and G_{RU} are used. Can one or more of these factors included in G be determined in the dimensioning phase they should be used when calculating the G-value.

Table 8
ADDITION l (m) FOR CENTRE DISTANCE L (m)

L (m)	< 30	< 80	< 100	> 100
l (m)	50	70	80	100

The centre distance L is increased by l to include the resistances caused by the bending of belt over pulleys, friction and inertia torque at loading and the scrapers.

Table 9
COEFFICIENT OF FRICTION OF ROLLING PARTS f (-)

Good conveyors with easily running idlers and small internal friction in material	0,017
Standard value for conveyors in normal quality	0,020
For unfavourable running conditions, dusty operation, periodic overload	0,023-0,030
Descending transport requiring braking by means of brake motor (40% of f for driven belt)	0,012

The standard value f = 0,020 is increased at the following conditions:

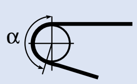
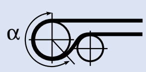
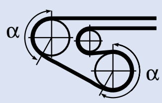
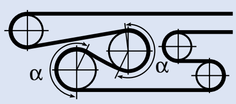
- high internal friction in material
- trough angles > 30°
- carrying idlers < 108 mm
- belt speed > 5 m/s
- temperature < 20°C
- lower belt tension
- flexible belts and high cover thicknesses

Table 10
ADDITIONAL POWER REQUIREMENT N_4 (kW)

Addition per	Belt width B (mm)	at v = 1 m/s	N_4 (kW)
Discharge by tripper or scraper	≤ 500 ≤ 1000 > 1000	0,8 kW 1,5 kW 2,2 kW	0,8 × v 1,5 × v 2,2 × v
Rubber skirting length in contact with belt		0,08 kW	0,08 × v × length of skirting

The values are recommendations and may be increased with extraordinary running conditions.

Table 11
DRIVE FACTOR m (-)

$m = 1 + \frac{1}{e^{\mu\alpha} - 1}$			Driving pulley arrangement												
															
Driving pulley		μ	Arc of contact α (°)												
			120	150	180	210	220	230	240	360	380	400	420	440	450
Lagged	dry	0,40	1,76	1,54	1,40	1,30	1,27	1,25	1,23	1,09	1,08	1,07	1,06	1,05	1,04
	humid	0,35	1,92	1,67	1,50	1,39	1,35	1,33	1,30	1,12	1,11	1,10	1,08	1,07	1,07
Bare	dry	0,35	1,92	1,67	1,50	1,39	1,35	1,33	1,30	1,12	1,11	1,10	1,08	1,07	1,07
	humid	0,20	2,92	2,45	2,14	1,93	1,87	1,81	1,76	1,40	1,36	1,33	1,30	1,27	1,20

The values m in the table are valid for automatic take-up (e.g. gravity take-up).
For screw take-up from α = 120° to α = 220° the values are multiplied by 1,20.

For belts with non-rubberized running side, see calculation of belts for conveyors with sliding plate.

Table 12
RECOMMENDED VALUES FOR COVER THICKNESS, CARRYING SIDE, WEAR RESISTANT BELTS

$\frac{30 \times v}{L}$ v = m/s L = centre-distance m	Cover type	Slightly abrasive materials grain, cement, loose earth, crushed coal etc.		Moderately abrasive materials: coal, limestone sand, superphosphate, crushed coke etc.				Very abrasive materials: flint, gravel coke, crushed ore, etc.				Extra abrasive materials: ore aggregate, slag etc.			
		grain size (mm)		grain size (mm)				grain size (mm)				grain size (mm)			
		to 10	10 to 50	to 10	10 to 50	50 to 200	200 and over	to 10	10 to 50	50 to 200	200 and over	to 10	10 to 50	50 to 200	200 and over
0,25	A, B BW	1,5 1,5	2,5 2,5	1,5 1,5	3,0 3,0	4,0 4,0	5,0 5,0	1,5 1,5	3,0 3,0	4,0 5,0	5,0 5,5	1,5 1,5	3,0 3,0	5,0 5,0	6,5 6,5
0,33	A, B BW	1,5 1,5	2,5 2,5	1,5 1,5	3,0 3,0	4,0 4,0	5,0 5,0	1,5 1,5	3,0 3,0	4,0 5,0	5,0 5,5	1,5 1,5	3,0 3,0	5,0 5,0	6,5 6,5
0,50	A, B BW	1,5 1,5	2,5 2,5	1,5 1,5	3,0 3,0	4,0 4,0	5,0 5,0	1,5 1,5	3,0 3,0	4,0 5,0	5,0 5,5	1,5 1,5	3,0 3,5	5,0 5,0	6,5 8,0
0,67	A, B BW	1,5 1,5	2,5 2,5	1,5 1,5	3,0 3,0	4,0 4,0	5,0 5,0	1,5 1,5	3,0 3,0	5,0 5,0	5,5 6,5	1,5 1,5	3,0 3,5	5,0 6,5	7,0 8,0
1,00	A, B BW	1,5 1,5	2,5 2,5	1,5 1,5	3,0 3,0	4,0 4,0	5,0 5,0	1,5 1,5	3,0 3,0	5,0 6,5	6,5 8,0	1,5 2,5	3,0 5,0	6,5 8,0	8,0
1,25	A, B BW	1,5 1,5	2,5 2,5	1,5 1,5	3,0 3,0	4,0 5,0	5,0 7,0	1,5 1,5	3,0 4,0	5,5 8,0	8,0	2,5 3,0	4,0 5,5	7,0 8,0	8,0
1,67	A, B BW	1,5 1,5	2,5 2,5	1,5 1,5	3,0 3,0	5,0 6,5	6,5	2,5 3,0	4,0 5,5	6,5 8,0	8,0	3,0 5,0	5,5 8,0	8,0	8,0
2,50	A, B BW	1,5 1,5	2,5 2,5	1,5 2,5	3,0 5,0	6,5 8,0	8,0	3,0 5,0	6,5 8,0	8,0	8,0	4,0 5,5	8,0	8,0	8,0
5,00	A, B BW	1,5 2,5	3,0 5,0	3,0 5,0	6,5	8,0	8,0	5,5 8,0	7,0	8,0	8,0	8,0 8,0	8,0	8,0	8,0

Type of material, lump size, height of fall and variation of speed between belt and material are influencing the wear of the cover decisively.

The table gives a guide for determination of cover thickness on carrying side for wear resistant belts. Although the cover thicknesses are sometimes identical, the same wear resistance cannot be expected for the types A, B and BW.

Cover thicknesses for special belts such as for instance heat resistant belts are determined according to the indications in each single belt programme.

Table 13
RECOMMENDED VALUES FOR COVER THICKNESS, RUNNING SIDE

Material Properties	Cover Thickness, Running Side (mm)
Slightly abrasive materials	1
Moderately to very abrasive materials	1-1,5
Very abrasive and coarsegrained materials	1,5-2

The cover thicknesses on the running side must be in harmony with the chosen thickness on the carrying side.

The belt programmes indicate recommended cover combinations.

Table 14
BELT WEIGHT AND THICKNESS

MULTIPLY BELTS

Fabric types	EP100	EP125	EP160	EP200	EP250	EP315	EP400	EP500	EP630
Approx. weight/ply kg/m^2)	1,35	1,50	1,60	1,70	1,90	2,00	2,50	2,80	3,50
Approx. thickness/ply (mm)	0,9	1,0	1,2	1,3	1,4	1,6	1,8	2,2	2,6

Approx. weight kg/m^2 pr. 1 mm	A	B	BW	K	N	TCC	GW	GWF	GWM	GWS	GT	IWE
	1,11	1,14	1,14	1,14	1,14	1,11	1,11	1,23	1,16	1,18	1,18	1,38

Example:

EP 500/4, 6 + 2, type A
EP 500/4 = 4 EP125

Weight of carcass	=	$4 \times 1{,}50$	=	6,00 kg/m^2
Weight of cover	=	$8 \times 1{,}11$	=	8,88 kg/m^2
Belt weight	=		approx.	14,88 kg/m^2

Thickness of carcass	=	4×1.0	=	4,0 mm
Thickness of cover	=			8,0 mm
Belt thickness	=			approx. 12,0 mm

2-PLY BELTS with STIFLEX

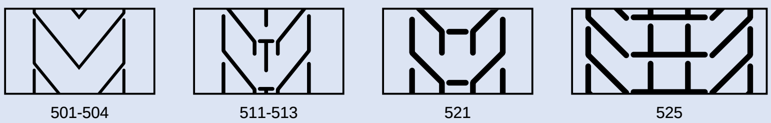
	RO-PLY 200/2 2 + 1	RO-PLY 250/2 3 + 1	RO-PLY 315/2 3 + 1	RO-PLY 400/2 3 + 1	RO-PLY 400/2 5 + 1,5	RO-PLY 630/2 5 + 1,5	RO-PLY GWF 250/2 3 + 1	RO-PLY GWF 400/2 3 + 1	GWM 250/2 3 + 1	RO-PLY Grip 4
Approx. belt weight (kg/m^2)	6,8	8,4	8,6	9,1	11,7	13,4	9,3	10,0	8,6	4,5
Approx. belt thickness (mm)	5,2	6,6	6,8	7,3	9,8	10,5	7,0	7,5	6,8	5,5

Example:

RO-PLY 250/2, 3 + 1 – 650 mm
Ribs type 504

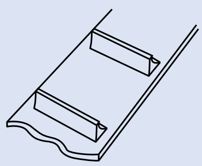
Belt weight	=	$0{,}65 \times 8{,}4$	=	5,46 kg/m
Ribs type 504			=	0,75 kg/m
Total weight	=		approx.	6,21 kg/m

V-RIBS



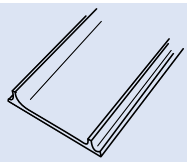
Type					501	502	503	504	511	512	513	521	525
Approx. weight (kg/m) belt					0,50	0,40	0,50	0,75	1,60	2,30	2,70	4,20	7,00
Type	SA230	SA420	SB250	SB310	SB370	SB470	SC600	SD780	MD420	MD550	MD610	LE450	LE570
Approx. weight (kg/m) belt	0,76	0,90	1,145	0,65	0,525	0,88	1,10	1,60	1,20	1,60	2,40	3,15	3,40

HIGH TRANSVERSE RIBS



Type	325	340	20	380	400
Approx. weight kg/pc. per 800 mm rib length	0,22	0,43	1,64	1,65	1,92

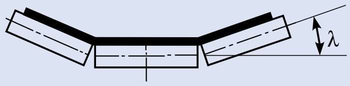
SIDEWALLS



Approx. weight (kg/m) belt	0,75

Table 15
MAX. PERMISSIBLE TROUGH ANGLE λ (°)

MULTIPLY BELTS



Belt Type	Belt Width (mm) 300	400	500	650	800	1000	1200	1400	1600
EP 200/2	45	45	45	45	45				
EP 250/2		45	45	45	45	45			
EP 315/3		45	45	45	45	45	45		
EP 400/3		45	45	45	45	45	45		
EP 400/4		45	45	45	45	45	45		
EP 500/3		30	45	45	45	45	45	45	
EP 500/4		30	45	45	45	45	45	45	
EP 630/3			30	45	45	45	45	45	
EP 630/4			30	45	45	45	45	45	45
EP 630/5			30	45	45	45	45	45	45
EP 800/3			30	45	45	45	45	45	45
EP 800/4			30	45	45	45	45	45	45
EP 800/5			30	45	45	45	45	45	45
EP 1000/4				30	45	45	45	45	45
EP 1000/5				30	45	45	45	45	45
EP 1250/5					30	45	45	45	45
EP 1250/6					30	45	45	45	45
EP 1600/5					30	30	45	45	45
EP 1600/6					30	30	45	45	45
EP 2000/5						30	30	45	45
EP 2000/6						30	30	45	45

The table is based on troughability according to ISO 703 and includes values for the most common width-strength relations. Regarding trough angles for widthstrength relations not indicated we recommend you to contact ROULUNDS. Troughability for 2-ply belts according to the belt programmes.

Table 16
RECOMMENDED MIN. PULLEY DIAMETERS (mm)
2-PLY BELTS

Dependence of minimum pulley diameter on the degree of utilization of permissible working tension		RO-PLY, PROGRAMMES 1, 6, 6A and 9							TYPE IWE, PROGRAMME 8
		200/2 2 + 1	250/2 3 + 1	315/2 3 + 1	400/2 3 + 1	400/2 5 + 1,5	630/2 5 + 1,5	Grip 4	EP 250/2 2 + 1
70-100%	driving pulley = D_1 mm	200	250	315	400	400	500	200	200
	tail pulley = D_2 mm	160	200	250	315	315	400	160	160
	snub pulley = D_3 mm	–	160	200	250	250	315	–	160
50-70%	D_1	160	200	250	315	315	400	160	200
	D_2	160	160	200	250	250	315	160	160
	D_3	–	160	160	200	200	250	–	160
< 50%	D_1	160	160	200	250	250	315	160	160
	D_2	160	160	160	200	200	250	160	160
	D_3	–	160	160	160	160	200	–	160

Example: Belt type RO-PLY 250/2,3 + 1, working tension 60% of max. permissible.
Driving, pulley D_1 = 200 mm,
tail pulley D_2 = 160 mm,
snub pulley D_3 = 160 mm.

MULTIPLY BELTS, see next page.

RECOMMENDED MIN. PULLEY DIAMETERS (mm)
MULTIPLY BELTS

Utilization of max. permissible belt tension	Number of plies	Fabric types																				
		EP 100			EP 125			EP 160			EP 200			EP 250 EP 315			EP 400 EP 500			EP 630		
		D_1	D_2	D_3	D_1	D_2	D_3	D_1	D_2	D_3	D_1	D_2	D_3	D_1	D_2	D_3	D_1	D_2	D_3	D_1	D_2	D_3
65-100%	2	160	160	125	200	160	160	250	200	160	315	250	200									
	3	200	200	160	315	250	200	400	315	250	500	400	315	630	500	400	800	630	500			
	4	315	250	200	400	315	250	500	400	315	630	500	400	800	630	500	1000	800	630	1250	1000	800
	5	400	315	250	500	400	315	630	500	400	800	630	500	1000	800	630	1250	1000	800	1600	1250	1000
	6				630	500	400	800	630	500	1000	800	630	1250	1000	800	1600	1250	1000	2000	1600	1250
30-65%	2	160	125	125	200	160	160	200	160	160	250	200	160									
	3	200	160	160	250	200	160	315	250	200	400	315	250	500	400	315	630	500	400			
	4	250	200	160	315	250	200	400	315	250	500	400	315	630	500	400	800	630	500	1000	800	630
	5	315	250	200	400	315	250	500	400	315	630	500	400	800	630	500	1000	800	630	1250	1000	800
	6				500	400	315	630	500	400	800	630	500	1000	800	630	1250	1000	800	1600	1250	1000
under 30%	2	125	125	125	160	160	160	160	160	160	200	200	160									
	3	160	160	160	200	160	160	250	200	160	315	250	200	400	315	250	500	400	315			
	4	200	160	160	250	200	200	315	250	200	400	315	250	500	400	315	630	500	400	800	630	500
	5	250	200	200	315	250	250	400	315	250	500	400	315	630	500	400	800	630	500	1000	800	630
	6				400	315	315	500	400	315	630	500	400	800	630	500	1000	800	630	1250	1000	800

D_1 = driving pulley.
D_2 = tail pulley – heavily loaded snub pulley.
D_3 = snub pulley – moderately loaded.

Example: belt type EP 500/4 = 4 EP 125.
Working tension: 50% of max. permissible working tension.
D_1 = 315 mm, D_2 = 250 mm, D_3 = 200 mm

MATERIAL DATA

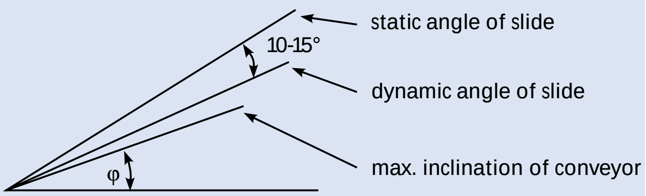
The list covers bulk density, static angle of slide as well as max. angle of inclination φ (°), under which the material can be transported on conveyor belts without ribs.

The angle of inclination is determined by the friction between material and belt, but decisive is the static and dynamic angle of slide of material, which depends on its internal friction.

The max. angle of inclination is lower than the dynamic angle of slide of material, which is rather difficult to determine exactly.

For most materials it can be said that the dynamic angle of slide is 10-15° lower than the static angle, which is formed horizontally by the material when it falls down shaping a free pile.

Fig. 20



Ribs can increase the angle of inclination in case the friction between belt and material is lower than the internal dynamic friction of the material, which determines the max. angle of inclination.

The bulk density, the angle of slide and max. angle of inclination being highly dependent on lump size, content of humidity etc., the values indicated in the table must be considered recommendations.

Table 17

Material	bulk density γ (t/m³)	max. angle of inclination φ (°)	static angle of slide (°)
Agricultural lime	1,1-1,2	20	30
Alum lumps	0,8-0,96	17	27
powder	0,72-0,8	23	30-45
Aluminium oxide	0,8-1,0		
hydrate	0,3	25	
sulphate	0,86	17	
Ammonia sulphate granulated	0,7-0,9	10	
Ammonium sulphate dry	0,72-1,28	20	32
moist	1,3	33	45
Ammonium chloride	0,72-0,83	12	
Ammonium nitrate	0,72	15	
Asbestos loose	0,3-0,4	30	45
pressed	0,6-0,8		
Ashes dry from coal	0,5-0,7	25	35-40
moist from coal	0,7-0,9	30	50
Asphalt for road metal	1,3-1,4	30	
solid	1,6		
Bakelite powder	0,45-0,65	33	45
Barley dry	0,6-0,7	15	25-40
Baryta coarse-grained	2,4-2,9		
fine-grained	1,9-2,3	18	30
Bauxite from quarry	1,3-1,44	17	31
fine-grained, dry	1,04-1,12	18	35
Beet unwashed	0,65-0,77	12-15	35-40
washed	0,5-0,6	10-12	30-45
mass, wet	0,4-0,7	18-20	31
slices		20	35
Bone meal	0,9-0,96	20	
Briquette lignite	0,7-0,85	18	
anthracite	0,8-1,0	10	
Broken stone, flint or granite	1,3-1,6	18	40
Cement portland	1,2-1,36	20	39
aereated	0,8-1,2	6	
clinker	1,2-1,5	18	33
slurry	1,4-1,7	12	

Material	bulk density γ (t/m^3)	max. angle of inclination φ (°)	static angle of slide (°)
Chile saltpetre	1,0-1,3	25	
Clay dry	1,6-1,9	20-22	35
dry in lumps, 75 mm	1,0-1,2	18-20	35
moist, 50 mm	1,52-1,6	18	15-24
Coal anthracite, coarse	0,8-0,96	16	27
bituminous, coarse	0,7-0,9	18	38
lignite	0,72-0,88	22	38
fine crushed	0,7-0,8	22	
Cocoa beans	0,53-0,6	15	28
Coffee beans, dried	0,35-0,42	20	35
beans, fresh	0,51	10-15	25
Coke and furnace coke	0,4-0,55	20	45
Concrete light-weight concrete	0,3-1,5		
wet	1,6-2,4	25	20-30
dry	2,1-2,4		
Copra lumps	0,32-0,35	9	20
Corn	0,75	10	30
Dolomite stone	1,2-1,6	22	40
Earth filling, moist with clay	1,5-1,8	22	45
filling, dry	1,15-1,20	20	35
Feldspar	1,2-1,7	23	40
Fish	0,8-1,0		
Fishmeal	0,55-0,65	20	
Flour from grain	0,55-0,65	21	45
Flour-spar coarse	1,7-1,9	30	
fine-grained	1,4-1,7	25	
Foundry sand prepared	1,3-1,45	24	32
knocked out	1,45-1,6	22	39
core sand	1,04	26	41
Fullers earth, dry	0,5-0,6	15	23
oily	0,96-1,04	20	
Glass crushed	1,3-1,6	20	35
broken	1,1	15	20-30
Granite broken stones	1,4-1,8	20	35
pebble, 10 mm	1,28-1,44	20	40
Graphite crushed	1,4		
flakes	0,65	5	
Gravel dry	1,44-1,76	16	35
moist	1,84-2,1	20	32
Gypsum powder	0,95-1,4	20	40
crushed. 3-10 mm	1,12-1,28	21	40
Ice crushed	0,6-0,7	5	30
Kaolin lumps	1,0	20	35
powder	0,7-0,9	23	45
Lead ore, fine	3,2-4,3	15	30
sulphate	1,6	33	45
oxide	1,0-2,4	20	
Lime lumps	1,2-1,28	18	40-45
burnt, 2 mm	1,0	22	
burnt, 2-20 mm	0,96	15	5
Limestone from quarry	1,35-1,45	18	30-45
Marble crushed	1,3-1,6	10-15	20-30
Marl	1,3-1,5	20	35
Millet, dry	0,6-0,7	15	25
Moler crushed, dry	0,6-0,7		
Mortar, wet	2,4	20-22	
Oats, dry	0,4-0,6	12	35-40
Ore lead	3,2-4,3	15	30
iron	1,6-3,2	18-20	35
copper	1,6-2,5	20	
manganese	2-2,3	20	39
molybdenum		25	
zinc, crushed	2,4-2,6	22	38

Material	bulk density γ (t/m^3)	max. angle of inclination φ (°)	static angle of slide (°)
Peanuts with shells	0,25-0,3	8	20-30
without shells	0,55-0,7	8	
Peas,dried	0,7-0,8	8	30
Phosphate fractional	1,2-1,4	12-15	25-30
pulverized	0,96	13	26
Potassium from quarry	1,2-1,35	12-15	
Potatoes	0,7-0,8	12-15	
Quartz coarse-grained, 30-75 mm	1,35-1,52	18	35
pulverized, 1-2 mm	1,3-1,45	20	35
Rice grain	0,7-0,8	8	20
Rye, dry	0,67-0,73	8	23
Salt refined, fine	1,1-1,3	11	25
refined, coarse	0,65-0,9	18	30
Saltpetre	1,1		30-45
Sand fine, dry	1,45-1,75	16-18	30-40
fine, moist	1,75-2,1	20-22	45
Sandstone, crushed	1,36-1,44	18	40
Saw, dust	0,15-0,21	22	36
Slag coarse, blast furnace	1,28-1,44	16	30
crushed, dry	0,96-1,04	16	30
crushed, wet	1,44-1,6	20-22	45
Slate, crushed	1,3-1,5	18	
Soya bean whole	0,7-0,8	12-16	21-28
broken	0,48-0,64	15-18	35
cakes, 10 mm	0,65-0,7	17	32
Stone shingle	1,4-1,5	20	35
pebble gravel	1,5	20-25	35
crushed, 100/250 mm	1,4-1,6	20	38
pebble	1,8	15	
Sugar refined	0,8-0,96	10-15	30
unrefined	0,88-1,04	23	
Sulphur lumps	1,2-1,4	18	
powder	0,8-1,0	21	
Superphosphate, granulated	0,8-0,9	15-17	33
powder		18-20	30
Wheat, dry	0,5-0,7	12	40
Wood-chips	0,2-0,5	22-24	30

EXAMPLE OF BELT SELECTION

The following projecting data are known:

Material	Limestone
Bulk density	$\gamma = 1{,}40$ t/m^3
Capacity	$Q_2 = 800$ t/h, continuous operation
Lump size	50-250 mm
Centre distance	L = 250 m
Angle of inclination	$\varphi = 6°$
Height of fall at loading	0,75 m
Material temperature	Ambient temperature –30/30°C

Belt Width and Belt Speed

B min = 800 mm	table 1 (unsorted material)
v max = 2,5 m/s	table 2 (moderate, abrasive)

Capacity Q_t (m^3/h)

Required capacity $Q_2 = 800$ t/h, continuous operation

Theoretical capacity

$$Q'_t = \frac{Q_2}{v \times \gamma \times k} = \frac{800}{2{,}5 \times 1{,}40 \times 0{,}98} = 233 \text{ m}^3/\text{h}$$

With $Q'_t = 233$ m^3/h, B = 800 mm and basic angle $\beta = 15°$ as input values the job – ref. table 4 – can be solved by 3-sectioned idlers and trough angle $\lambda = 30°$.

$Q_t = Q'_t \times v \times k = 243 \times 2{,}5 \times 0{,}98 = 595$ m^3/h

$Q = Q_t \times \gamma = 595 \times 1{,}40 = 833$ t/h $> Q_2$

Is a lower belt speed than v max. required, the trough angle or the belt width can be increased.

Power Requirement

Power required to drive empty conveyor N_1 (kW)

$$N_1 = \frac{G\,(L + l)\,f \times v}{102} = \frac{25\,(250+100)\,0{,}020 \times 2{,}5}{102} = 4{,}29 \text{ kW}$$

G	= 25 kg/m	table 7
s_1	= 1,25 m	table 7
s_2	= 2,50 m	table 7
l	= 100 m	table 8
f	= 0,020	table 9

Power required to convey material on the level N_2 (kW)

$$N_2 = \frac{Q\,(L + l)\,f}{367} = \frac{833\,(250 + 100)\,0{,}020}{367} = 15{,}88 \text{ kW}$$

Power required to elevate material N_3 (kW)

$$N_3 = \frac{Q \times H}{367} = \frac{833 \times 26{,}1}{367} = 59{,}24 \text{ kW}$$

$H = L \times \sin\varphi = 250 \times \sin 6° = 26{,}1$ m

Additional Power Requirement N_4 (kW), table 10

$N_4 = 0{,}08 \times v \times$ length of skirt boards = $0{,}08 \times 2{,}5 \times 12 = 2{,}40$ kW

Length of skirt board 6 m each side

Theoretical Necessary Motor Capacity N_n (kW)

$N_n = N_1 + N_2 \pm N_3 + N_4 = 4{,}29 + 15{,}88 + 59{,}24 + 2{,}40 \simeq 82{,}0$ kW

Motor Capacity N_m (kW)

$$N_m = \frac{N_n}{\eta} = \frac{82}{0{,}85} = 96{,}47 \simeq 100 \text{ kW}$$

Effective Tension P (N)

$$P = \frac{N_n \times 1000}{v} = \frac{82 \times 1000}{2{,}5} = 32800 \text{ N}$$

Max. Belt Tension T_1 (N)

$T_1 = P \times m = 32800 \times 1{,}35 = 44280$ N

m is taken from table 11 according to the following:

- at a centre distance over 50 m gravity take-up is chosen
- arc of contact α is fixed at 220°
- driving pulley to be lagged with rubber
- running conditions estimated to be humid

m = 1,35 according to table 11.

Working Tension p (N/mm)

$$p = \frac{T_1}{B} = \frac{44280}{800} = 55 \text{ N/mm}$$

CHOICE OF BELT TYPE
The procedure for the choice of belt type is indicated in selection of conveyor belts.

The initial torque is limited at max. 1,4 × normal torque of motor when choosing squirrel-cage motor and hydrodynamic clutch.

Recommended cover dimensions according to tables 12 and 13 in selection of conveyor belts.

Material: Limestone

Carrying part

$\frac{30 \times v}{L}$	Cover types	Moderately abrasive, grain size 50-250 mm
$\frac{30 \times 2{,}5}{250} = 0{,}3$	B, BW	5 mm

Return part

Moderately to very abrasive	1-1,5 mm

System key page 23
Limestone that belongs to the group abrasive materials gives three programme possibilities.

The standard programmes 1 and 2 have p max. permissible working tension = 63 N/mm, vulcanized joint.

Programmes 1 = RO-PLY 630/2, 5 + 1,5

Programme 2 = EP 630/4, 5 + 1,5, type B, BW

Both belt types satisfy the demand on cover dimensions, and they are sufficiently robust to manage the loading conditions. As to technical use they are equally suitable, and the final choice will thus depend on wishes regarding standardization, delivery possibilities etc.

If the demands on cover dimensions, cover type, or working tension are outside the standard programmes 1 and 2, we refer to special programme 3.

WE CHOOSE RO-PLY 630/2, 5 + 1,5 FROM PROGRAMME 1

CONTROL OF G-VALUE

If $G = 2G_b + \frac{G_{RO}}{s_1} + \frac{G_{RU}}{s_2}$ deviates considerably from the G-value used in table 7, N_1, N_n and p should be corrected.

Belt weight G_b = 13,4 kg/m² ~ 10,7 kg/m for 800 mm belt, table 14.

Carrying and return idlers, G_{RO} and G_{RU}
Diameter is chosen at ∅ 89 mm: $G_{RO} = G_{RU}$ = 11 kg, table 7

$$G = 2 \times 10{,}7 + \frac{11}{1{,}25} + \frac{11}{2{,}5} = 21{,}4 + 8{,}8 + 4{,}4 = 34{,}6 \text{ kg/m}$$

$$N_1 = \frac{34{,}6\ (250 + 100)\ 0{,}020 \times 2{,}5}{102} = 5{,}9 \text{ kW}$$

Original N_1 = 4,29 kW. The increased power requirement of empty conveyor is in this example without appreciable importance.

The motor capacity N_n is increased from 82 kW to 84 kW, but will not influence the chosen belt construction.

PRE-TENSION G_k (kg)
In the example G_k is calculated with the gravity take-up placed at driving pulley and tail pulley.

Fig. 21

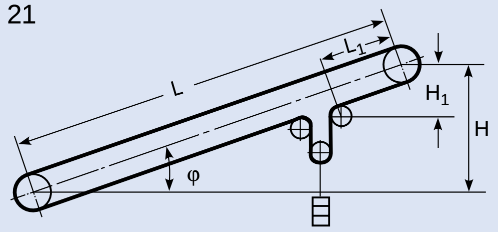
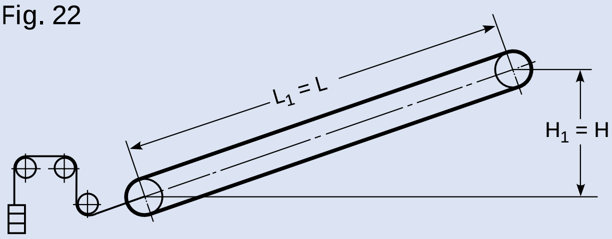


Fig. 22



G_k at driving pulley, fig. 21

$$G_k = \frac{2 \times N_n\ (m\text{-}1)\ 102}{v} + \frac{2 \times 82\ (1{,}35\text{-}1)\ 102}{2{,}5} = 2342 \text{ kg}$$

G_k at tail pulley, fig. 22

$$G_k = \frac{2 \times N_n\ (m\text{-}1)\ 102}{v} + 2\ (L_l\ (G_b + \frac{G_{RU}}{s_2})\ f - H_1 \times G_b)$$

$$G_k = \frac{2 \times 82\ (1{,}35\text{-}1)\ 102}{2{,}5} + 2\ (250\ (10{,}7 + \frac{11}{2{,}5})\ 0{,}02\text{-}26{,}1 \times 10{,}7)$$

$$G_k = 2342 + 2(76\text{-}279) = 1936 \text{ kg}$$

Max. permissible belt sag (q/s)perm
Max. belt sag q/s is fixed at 0,010

Requirement of min. belt tension T_{min} (N) is calculated:
Carrying part

$$T_{min} = \frac{s_1\ (G_b + G_m)\ g}{8 \times (q/s)perm} = \frac{1{,}25\ (10{,}7 + 93)\ 10}{8 \times 0{,}01} = 16203 \text{ N}$$

$$G_m = \frac{Q}{v \times 3{,}6} = \frac{833}{2{,}5 \times 3{,}6} = 93 \text{ kg/m}$$

Belt tension at tail pulley, calculated

$$T = \frac{G_k \times g}{2} = \frac{1936 \times 10}{2} = 9680 \text{ N} < T_{min}$$

To keep the belt sag (q/s)perm = 0,01 the pre-tension must be increased by T_{min}-T = 16203-9680 = 6523 N

$$G_k \text{ tail pulley} = 1936 + 2 \times \frac{6523}{10} = 3241 \text{ kg}$$

$$G_k \text{ driving pulley} = 2342 + 2 \times \frac{6523}{10} = 3646 \text{ kg}$$

T_1 = 45165 + 6523 = 51688 N

$$P = \frac{51688}{800} \simeq 64 \text{ N/m} \simeq p_{perm} \text{ for RO-PLY 630/2, 5 + 1,5}$$

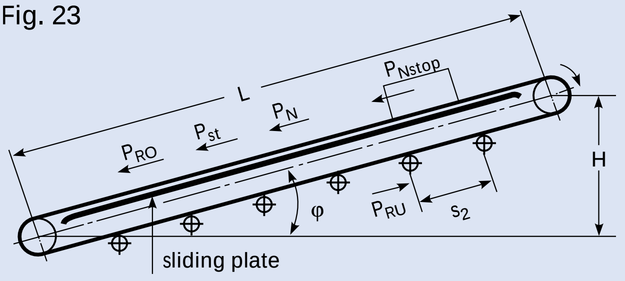
Pulley diameters, table 16
Driving pulley D_1 = 500 mm
Tail pulley D_2 = 400 mm
Pulleys at gravity take-up min. as D_2

CALCULATION OF BELTS FOR CONVEYORS WITH SLIDING PLATE

Sliding belt conveyors are mainly used for light internal transport of packaged goods and goods in bulk. The advantages of sliding belts are quiet running without vibrations and belt sag.

On sliding belt conveyors the main forces are primarly produced by the frictional resistance between belt and sliding plate. Other forces are travelling friction on return part, lifting load and various secondary frictional resistances.

Fig. 23



CALCULATION FORMULAS

DETERMINATION OF	FORMULAS	REFERENCE
Belt width B (mm)		Goods in bulk see table 1. Packaged goods max. specific pressure 3 kN/m^2
Belt speed v (m/s)		Normally 0,2-0,8 m/s
Weight of material G_m (kg/m)	$G_m = \frac{Q}{v \times 3{,}6}$	Capacity Q goods in bulk table 4, 5 and 6 For packaged goods convert to kg/m
FRICTIONAL RESISTANCES: Carrying part P_{RO} (N)	$PRO = g \times \mu \times L\ (G_b + G_m)$	µ according to table 19 G_b according to table 14
Return part, idlers P_{RU} (N)	$P_{RU} = g \times f \times L\ (G_b + \frac{G_{RU}}{s_2})$	G_{RU} according to table 7 f according to table 9
Return part, sliding plate P_{RU} (N)	$P_{RU} = g \times \mu \times L \times G_b$	The most normal is return part with idlers
Lifting or lowering load P_{st} (N)	$P_{st} = g \times H \times G_m$	
Breaking P_{Nstop} (N)	$P_{Nstop} = g\ (\mu \times G_m \times \cos\varphi - G_m \times \sin\mu)$	Braking of material is often used in connection with transport of packaged goods
Effective tension P (N)	$P = C\ (P_{RO} + P_{RU}) \pm P_{st} + P_{Nstop}$	C according to table 18
Theoretical necessary motor capacity N_n (kW)	$N_n = \frac{P \times v}{1000}$	
Motor capacity N_m (kW)	$N_m = \frac{Nn}{\eta}$	If not known, the degree of efficiency of drive can be calculated at 0,85-0-95
Max. belt tension T_1 (N)	$T_1 = P \times m$	m according to table 20, or according to formula for drive factor m
Working tension p (N/mm)	$p = \frac{T_1}{B}$	
Choice of belt type		SYSTEM KEY and particularly programme 3 and 9
Pre-tension G_k (kg)	$G_k \simeq 2\ (T_1 - P)\ \frac{1}{g}$	

Table 18
FACTOR C (-)

Mean specific pressure belt and material (kN/m^2)	Centre distance L (m)					
	2,5	5	10	25	50	> 100
≤ 0,1	1,8	1,4	1,2	1,09	1,05	1
< 3,0	1,04	1,02	1,01	1,0	1,0	1,0

1 kg/m^2 ≃ 10 N/m^2

Table 19
COEFFICIENT OF FRICTION µ (-)

Bottom side of belt	Support – surface temperature					
	Bright steel plate				Plastics + 18°C	Hard wood + 18°C
	-20°C	0°C	+ 18°C	+ 40°C		
EP non-rubberized	0,30	0,30	0,30	0,25	0,28	0,28
B60 non-rubberized	0,75	0,70	0,45	0,35	0,40	0,35
B60 rubberized			0,70		0,60	0,60
Rubber cover			0,90			

Friction between belt and slide bed at specific pressure p < 3 kN/m^2, belt speed v = 0,2-0,8 m/s

Table 20
DRIVE FACTOR m (-)

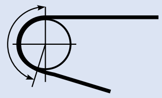
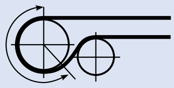
$m = 1 + \frac{1}{e^{\mu\alpha}-1}$	Driving pulley arrangement			α 			α 		
Bottom side of belt	Driving pulley		μ	Arc of contact α (°)					
				150	180	210	220	230	240
Rubberized	lagged	dry	0,30	1,84	1,64	1,50	1,46	1,43	1,40
		humid	0,25	2,09	1,83	1,67	1,62	1,58	1,54
	bare	dry	0,22	2,08	2,00	1,81	1,75	1,71	1,66
		humid	0,20	2,46	2,14	1,93	1,87	1,81	1,76
Non-rubberized EP or cotton	lagged	dry	0,25	2,09	1,83	1,67	1,62	1,58	1,54
		humid	0,22	2,08	2,00	1,81	1,75	1,71	1,66
	bare	dry	0,15	3,08	2,66	2,36	2,30	2,22	2,13
		humid	0,10	4,34	3,71	3,26	3,14	3,02	2,92

Table values are for screw take-up.

SYMBOLS

- B = belt width (mm)
- C = factor for sliding belts, table 18 (-)
- D = roll diameter of belt (m)
- D_1 = driving pulley diameter, table 16 (mm)
- D_2 = tail pulley diameter, table 16 (mm)
- D_3 = diameter of snub pulley, table 16 (mm)
- d = diameter of belt roller drum (m)
- e = 2,7183, the base of natural logarithms
- f = coefficient of friction of rolling parts, table 9 (-)
- G = weight of moving parts of conveyor, table 7 (kg/m)
- G_b = weight of belt, table 14 (kg/m)
- G_k = gravity take-up (kg)
- G_m = weight of material, kg per m belt (kg/m)
- G_{RO} = weight of carrying idlers, table 7 (kg)
- G_{RU} = weight of return idlers, table 7 (kg)
- g = acceleration due to gravity (m/s²)
- H = lifting or falling height (m)
- H_1 = height from driving pulley to gravity take-up (m)
- k = correction factor, inclined transport, table 3 (-)
- L = centre distance (m)
- L_1 = distance from driving pulley to gravity take-up (m)
- l_1 = length of idler, flat idlers (mm)
- l_2 = length of idler, two-sectioned idlers (mm)
- l_3 = length of idler, three-sectioned idlers (mm)
- m = drive factor, table 11 – for sliding belts, table 20
- N_1 = power required to drive empty conveyor (kW)
- N_2 = power required to convey material on the level (kW)
- N_3 = power required to elevate or lower material (kW)
- N_4 = additional power requirement (kW)
- N_n = theoretical necessary power requirement (kW)
- N_m = motor capacity (kW)
- p = working tension (N/mm)
- P = effective tension (N)
- P_{RO} = frictional resistances, carrying part on sliding belts (N)
- P_{RU} = frictional resistances, return part on sliding belts (N)
- P_{st} = lifting or lowering load, sliding belts (N)
- P_{Nstop} = braking of material, sliding belts (N)
- Q_1 = required capacity (m³/h)
- Q_2 = required capacity (t/h)
- Q'_t = theoretical capacity at v = 1 m/s (m³/h)
- Q = theoretical capacity (t/h)
- q = belt sag between idlers (m)
- s_1 = distance between carrying idlers (m)
- s_2 = distance between return idlers (m)
- T = belt tension (N)
- T_1 = max. belt tension when approaching driving pulley (N)
- T_2 = belt tension when leaving driving pulley (N)
- T_{min} = lowest permissible belt tension (N)
- t_d = thickness of cover (mm)
- t_b = thickness of belt (mm)
- v = belt speed (m/s)
- v_{max} = max. belt speed, table 2 (m/s)
- α = arc of contact on driving pulley (°)
- β = basic angle of load stream cross section (°)
- γ = bulk density, table 17 (t/m³)
- η = degree of efficiency of the transmission (-)
- μ = coefficient of friction, table 11 – for sliding belts, table 19 and 20 (-)
- λ = trough angle, carrying idlers, table 4 and 5 (°)
- φ = angle of inclination of conveyor (°)

SPECIFICATION OF CONVEYOR BELT TYPE

The below mentioned examples indicate the data for unambiguous specification of conveyor belts.

BELT CHOICE FROM PROGRAMME 1

Conveyor Belt Type RO-PLY

Open 300 m × 800 mm × 400/2, 5 + 1,5

Belt Length (open or endless)

Belt Width

Belt Strength (N/mm)

Number of Plies

Top Cover (mm)

Bottom Cover (mm)

Belt Type

BELT CHOICE FROM PROGRAMME 2
RIBS FROM PROGRAMME 11

Conveyor Belt Type B

Ribs Type 512

Endless 80,00 m × 650 mm × EP 400/3, 3 + 1

Belt Length (open or endless)

Belt Width

Fabric Type

Belt Strength (N/mm)

Number of Plies

Top Cover (mm)

Bottom Cover (mm)

Rib Type (programme 11)

Belt Type

BELT CHOICE FROM PROGRAMME 12

Conveyor Belt Type XE

Open 200 m × 1000 mm × XE 630/3-2, 4 + 2

Belt Length (open or endless)

Belt Width

Fabric Type

Belt Strength (N/mm)

Number of EP plies

Number of monofilament plies

Top Cover (mm)

Bottom Cover (mm)

Belt Type

THE INTERNATIONAL SYSTEM OF UNITS (SI)

A system for technical measuring is being introduced. It is the SI (Système internationale d'unités) which is compiled by the International Committee of Measure and Weight.

The introduction of SI, which is based upon the basic units metre (m), kilo (kg), second (s) and ampere (A), will also influence those circles working with conveyor belts. Thus SI indicates power in kilowatt (kW), instead of the previously used horse power (HP).

In SI the tensile strength for conveyor belts will be indicated in Newton/millimetre (N/mm) against previously kilogrammeforce/centimetre (kp/cm).

The relations between the previously used units in the technical system and the SI-units are mentioned below. For the sake of clearness we have only mentioned the units that are most common for conveyor belts.

1N = 0,102 kp ~ 0,1 kp
1N/mm = 1 kp/cm
1 N/mm^2 = 10 kp/cm^2
1 kW = 1,36 HP

CONVEYOR BELT STANDARDS

		ISO	DIN	BS	SMS	NF
Carcass	Adhesion fabric/fabric	252	22102	490	2472	M 81-671
	Warp strength	283	22102	490	2329	M 81-671
	Mechanical joining	1120	22110			M 81-671
	Weft strength	283	22102	490		M 81-671
	Elongation	283	22102	490		M 81-671
Cover	Tensile strength	10249	22102	490		M 81-671
	Elongation at break	10247	22102	490		M 81-671
	Thickness	583	22102	490	2329	M 81-671
	Wear loss	10247	22102			M 81-671
Entire belt	Belt width	251	22102	490	2329	M 81-671
	Straightness		22102			M 81-671
	Belt thickness	583	22102	490	2329	M 81-671
	Adhesion fabric/fabric	252	22102	490	2472	M 81-671
	Belt length	251	22102	490	2329	M 81-671
	Adhesion cover/fabric	252	22102	490	2472	M 81-671
	Troughability	703		490	2469	M 81-671
Belt properties	Antistatic	284	22104	3289	2474	M 81-671
	Flameproof	340	22103	3289		M 81-671

Conveyor belt data are standardized in a number of national and international standards. The following standards are indicated in the survey:

ISO – International Organization for Standardization
DIN – Deutsche Normen
BS – British Standard Institution
SMS – Sveriges Mekanförbunds Standardcentral
NF – Association Française de Normalisation

Table 21. STANDARDS FOR CONVEYOR BELTS

Cover	ISO 10247			DIN 22102, 1991				BS 490	
	H	D	L	W	X	Y	Z	M24	N17
Min. elongation at break (%)	450	400	350	400	450	400	350	450	400
Min. tensile strength (N/mm^2)	24	18	15	18	25	20	15	24	17
Max. wear loss (mm^3)	120	100	200	90	120	150	250		

The tables indicate the most commonly used data for conveyor belts.

Table 22

Adhesion	ISO 252 Natural fibres	ISO 252 Synthetic fibres	DIN 22102	BS 490, Part 1, 1972
Cover/fabric (N/mm)	0,8 < t_d < 1,5 mm: 2,4 t_d > 1,5 mm: 3,0	0,8 < t_d < 1,5 mm: 3,5 t_d > 1,5 mm: 3,9	0,8 < t_d < 1,5 mm: 3,5 t_d > 1,5 mm: 4,5	0,8 < t_d < 1,6 mm: 2,35 t_d > 1,6 mm: 2,80
Fabric/fabric (N/mm)	3,5	5,0	5,0	3,15

ROULUNDS

Table 23. THICKNESS TOLERANCE

COVER THICKNESS	ISO 583	DIN 22102	BS 490
$t_d \leq 4$ mm	+ none – 0,2 mm	– 0,2 mm	+ none – 0,2 mm
$t_d > 4$ mm	+ none – 5%	– 5%	+ none – 5%

Table 24. VARIATION OF THICKNESS

BELT THICKNESS	ISO 583	DIN 22102	BS 490
$t_b \leq 10$ mm	1 mm	± 1 mm	1 mm
$t_b \leq 10$ mm	10%	± 10%	10%

The max. difference between the values of the total thickness measured on two arbitrary points on the belt.

Table 25. WIDTH TOLERANCE

BELT WIDTH (mm)	ISO 251	DIN 22102	BS 490
300- 500	± 5 mm	± 5 mm	± 6,5 mm
650-1600	± 1%	± 1%	± 1%
1800-2200	± 1%	± 1%	± 1%

Table 26. LENGTH TOLERANCE

BELT LENGTH (mm)	ISO	DIN 22102	BS 490
Endless belts: up to 15,000 over 15,000 to 20,000 over 20,000	± 0.5%	± 50 mm ± 75 mm ± 0.5%	± 0.5%
Open belts: One length	+ 2% – 0.5%	+ 2,5% – 0%	+ 2% – 0%
More than one length: Each length Sum of part lengths	+ 2/– 0.5% + 2/– 0.5%	± 5% + 2.5/0%	+ 2/– 0% + 2/– 0%
Stock lengths	–	± 5%	–

*) Endless length is measured inside on a belt without tension.

TRANSPORT AND STORAGE

It is important that conveyor belts are transported and stored correctly, as the opposite may result in damages even before the belts are mounted.

Roll weight and roll diameter
Because of the handling it is useful to know the weight and diameter of the belt roll.

The roll weight is calculated as follows:

    Carcass weight (kg/ m² per ply) see table 14
\+ cover weight (kg/m² per 1 mm) see table 14
    belt weight (kg/m²)

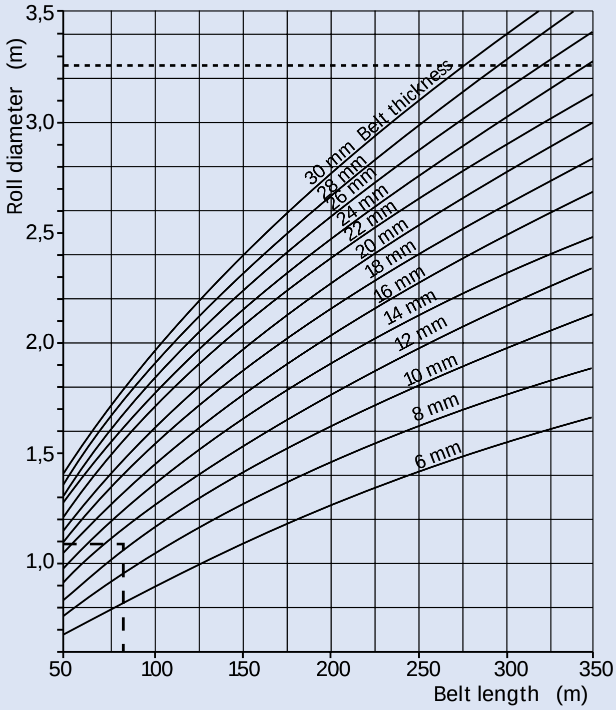
Roll weight = belt weight (kg/m²) × belt width (m) × belt length (m)

Example:
Roll weight
85 m × 650 mm × EP 500/4, 5 + 1,5 GWF

Carcass weight	1,50 × 4	= 6,00 kg/m²
Cover weight	1,23 × 6,5	= 8,00 kg/m²
Belt weight =		14,00 kg/m²
Roll weight =	14,00 × 0,65 × 85 ≅ 774 kg	

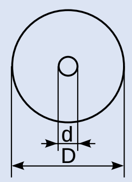
The roll diameter can be taken from the diagram fig. 24. For belt thickness between the values indicated, you can interpolate between the curves.

Fig. 24



The roll diameter can also be calculated according to the following formula:

$$D = \sqrt{\frac{4 \times t_b \times L}{\pi} + d^2} \ (m)$$



t_b = belt thickness in metres
L = belt length in metres
d = diameter of roller drum in metres

Example:
85 m × 650 mm × EP 500/4, 5 + 1,5 GWF

Carcass thickness	1,0 × 4	=	4,0 mm, see table 14
Cover thickness			6,5 mm
Belt thickness			10,5 mm

In the diagram fig. 24 for belt thickness 10,5 mm and belt length 85 m the roll diameter is read at approx. 1,1 m.

Packing
If nothing else is specified the conveyor belts for European destinations are normally shipped unpacked.

For overseas destinations the conveyor belt rolls are normally wrapped in plastic foil. In connection with roll diameters of more than approx. 1,8 m a wooden cross is used.

If requested, the belts can be packed in wooden drums, see photo.

Narrow belts with large diameter are supplied with wooden cross to secure that the roll does not give way, see photo.

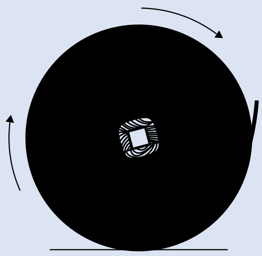
Long, endless belts as well as belts with ribs are also packed on wooden cross mounted on sledge, see photo.

The price for wooden packing and special packing is charged separately.

Transport
When conveyor belts are transported the following should be observed:

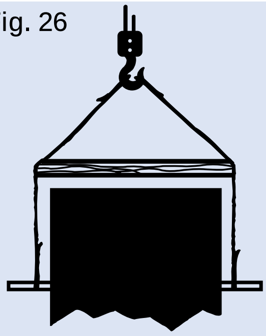
Belt rolls should never be thrown from the truck, waggon etc.

Fig. 25



Unprotected belts must as far as possible only be rolled over plane surfaces and only in the rolled up direction of the belt.

Fig. 26



When lifting by crane a traverse must always be used in order not to damage the belt carcass.

Unprotected belt rolls must not be tipped onto their side, and they must not be turned on the spot.

Storage
If the belts are to be stored for a long period the following should be observed:

The warehouse must:

- be dry and cool – 10 to 20°C – and be well airiated.
- have a relative humidity of approx. 65%.
- be screened from direct sunlight.
- not be used for storage of acids, lubricants, and dissolvents, the vapours of which may damage the rubber cover of the belts.

Position:

- belt rolls must never be placed direct on floor and never laid on their edges which may cause obliquities of belt.
- when storing for long periods the rolls should be fitted with a transverse shaft and be placed on a bearing frame. At intervals the rolls should be turned in order that the inner pressure does not continuously affect the same spot.

ROULUNDS

MOUNTING OF BELT

Preparation of conveyor
Before monting a belt it must be checked that the conveyor is in order.

All carrying idlers and return idlers must have an easy and untroubled running, they must be at right angles to the travelling direction of the belt and level with each other. The same applies to driving and tail pulleys. All pulleys and idlers must be intact and without grease and build-up of material.

Scrapers, rubber skirting, and hoppers are dismounted, or their distance from the belt is increased so much that the belt can be mounted unhindered. Rubber on skirt boards, hoppers and scrapers are checked.

Screw take-up is adjusted at shortest centre distance. On conveyors with gravity take-up the suspension and the movable parts of the system are checked. After that the gravity take-up is locked in the uppermost position.

Mounting of belt
Unpacked belts must as far as possible only be rolled over plane surfaces and only in the rolled up direction. When lifting by crane traverse should always be used. The new belt is placed on trestles at the end of the conveyor.

The belt is pulled on to the conveyor by means of rope/tackle or it can be attached to the previous belt. It is normally appropriate first to pull the belt on to the return part, also with inclined conveyors.

Make sure that the belt is placed »the right way« round the snub idlers, and that the material side is away from the carrying idlers.

Joining of belts
With regard to joining of conveyor belts by hot and cold vulcanizing we refer to our instructions for the different belt types. The joining material indicated should be used.

When joining belts with ribs the ribs should be mounted over the joining by cold vulcanizing after the belt has been joined.

It must be pointed out that materials for cold vulcanizing cannot be used for joining of heat resistant belts, if the temperature of the transported material exceeds 90°C. For warmer materials hot vulcanizing or mechanical joining is recommended.

With regard to mechanical joining we refer to instructions for the fastener type in question.

Running-in
For trouble free operation when the belt has been mounted ensure that it is run-in correctly:

- make sure that all tools etc. have been removed from both belt parts.
- give the belt a suitable initial tension. On installations with gravity take-up it may be an advantage to reduce the weight during initial start-up.
- the belt should be set in motion unloaded and fine adjusted.
- the load is gradually increased up to full load, and further adjustments should be made concurrently with increasing load. Necessary adjustment of initial tension is made.
- make sure that the driving pulley drives the belt under all conditions. On conveyors with gravity take-up ensure that the travel is sufficient. This must be checked regularly.

Concerning reversible conveyors great care should be taken with running-in. Corrections made to obtain straight running in one direction may have the opposite effect when the belt is reversed. Consequently you may be forced to accept a compromise.

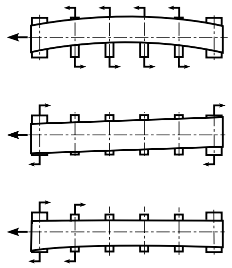
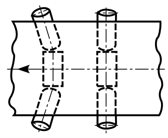
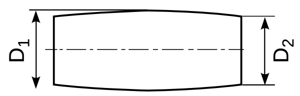
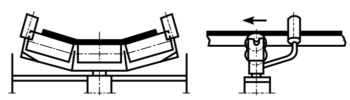
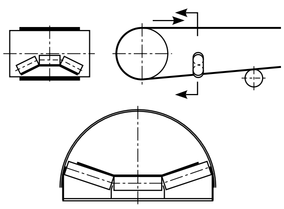
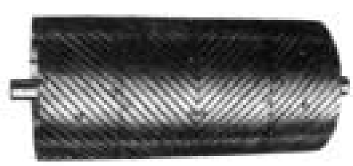
Maintenance

Belts in operation will provide the longest life-time if you tend to them regularly as follows:

- remove any built-up material from all rotating parts.
- remove any built-up material from underneath the conveyor.
- check that all idlers move easily.
- replace worn carrying idlers and return idlers.
- grease rotating parts and remove superfluous grease.
- check rubber skirtings and scrapers.
- check pulley lagging.
- adjust belt travel.
- check belt tension.
- repair damage in belt if any.

TROUBLE TRACING

Oblique travel may cause a fast deterioration, although the quality of the belt is very high. In order to assist you we have compiled some of the reasons for oblique travel with appropriate corrective action.

REASON FOR OBLIQUE TRAVEL		REMEDIES
1) Insufficient aligning of pulleys and idlers		a) align all pulleys, carrying idlers and return idlers at right angles to the travelling direction of the belt. b) check that all pulleys and idlers are level to each other. Adjustment is made as indicated on drawing by turning pulleys and carrying idlers in direction of arrow, until the belt is running straight and centered on the conveyor. Also return idlers may cause oblique belt travel, and therefore they must be aligned at right angles to the travelling direction of the belt, and after that adjustment can be made.
2) Malalignment of frame		c) oblique travel can be reduced by turning forward outer carrying idlers 1-3° in travelling direction of the belt. d) align the frame.
3) Material built-up on pulleys and idlers		e) clean idlers and pulleys. Check belt cleaners and replace if necessary. Possibly change to more efficient type.
4) Discharge of material, sidewards	 The crowing must be regular and symmetrical. Max. permissible crowing: $\frac{D_1\text{-}D_2}{2} < 0{,}005 \; \frac{D_1}{2} \sim D_2 \geq 0{,}995\, D_1$	See above point c). f) head pulley is crowned.
5) Oblique or sideways loading of material		g) feeder must be changed so that the material falls in the middle and in the travelling direction of the belt.
6) Wet patches on the pulley side of the belt due to rain or snow (causes friction variations between the belt and the pulleys)		See above points c) and f). h) use self-adjusting carrying and return idlers. Roofing the conveyor may be necessary.
7) Side influences due to wind		See above points c), f) and h). i) run belt correct on to tail pulley by mounting a »reverse trough frame« immediately before pulley. The frame must be adjustable in all directions. j) strong winds may lift even comparatively heavy belts from uncovered conveyors. Arched wind screens can be mounted at a distance of 10-20 metres.
8) Oblique joining of belt. Inspection almost always shows minor obliquities in the joint, but will seldom result in oblique travel. In connection with an oblique joining of a belt the joint section of the belt is drawn to the same side during the whole length of the belt travel. If there are obliquities of the conveyor, or if the carrying and/or return idlers are maladjusted the belt travel will only be oblique on the oblique section of the conveyor.		See above points c), f) and h). k) lagged driving pulley can – due to the increase of friction – have a stabilizing effect on the belt travel. l) the joining is opened and corrected.

SERVICE FACILITIES

As part of our service we can offer:

- technical support in connection with dimensioning and choice of conveyor belts
- education of your staff concerning application and maintenance of conveyor belts
- vulcanizing assistance and education af vulcanizers.

Apart from the above we can offer to help our customers to get a better transport economy by standardizing their belts. On the basis of technical data and/or drawings we limit the belt variants to a minimum of belt types. Such standardization provides evident advantages with regard to maintenance, spare belt stock and re-ordering.

Contact our importer/dealer or
A/S ROULUNDS FABRIKER.