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EN ISO 9001 | EN ISO 14001 | PN-N 18001 | PN-EN ISO/IEC 27001
PN-EN ISO/IEC 17025 Laboratorium

Rubber-fabric oil resistant conveyor belts

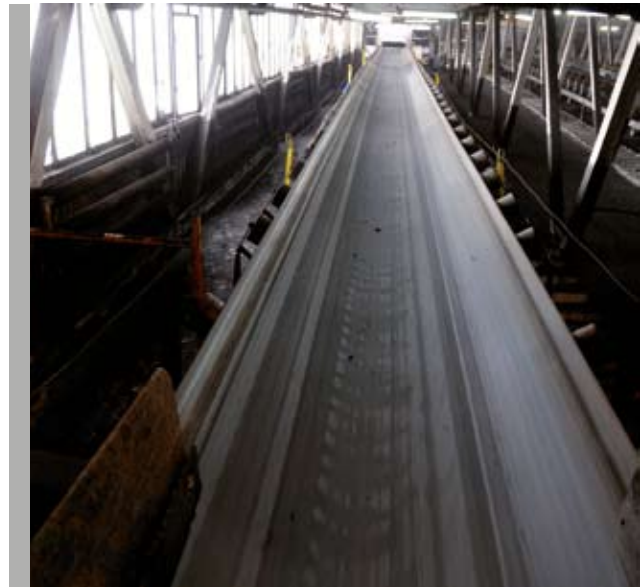
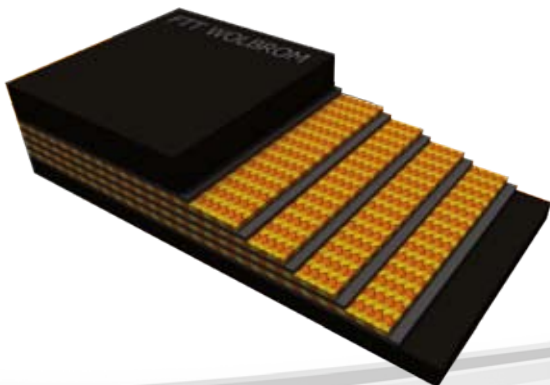
Application

Rubber-fabric oil resistant conveyor belts are designed for the transportation of loose materials of any granulation (considering the operational safety of the conveyor and belt, granulation is recommended not to exceed 300 [mm] of transported material) containing oil and fat of organic or mineral origin. Application details are provided in **Table 1**.

Structure

Rubber-fabric oil resistant conveyor belts are composed of 2- to 5-ply fabric and rubber carcass, carrying and running rubber covers and rubber edges. A layer of carcass rubber is placed between textile plies.

In terms of the design, dimensions of belts and their elements, tolerances of dimensions, joints of rubber-textile plies and strength parameters, belts comply with the PN-EN ISO 14890 standard. Depending on its type, the oil resistant conveyor belt meets requirements concerning 1, 2A or 2B safety category acc. to PN-EN 12882. To protect the carcass against high temperatures, TG 100 oil resistant belts are manufactured with rubber linings with a minimum recommended thickness of 4+2 [mm], while belts TG 150 with rubber linings with a minimum recommended thickness of 5+2 [mm].



Rubber-fabric oil resistant conveyor belts are manufactured in accordance with WT-6 and are generally made of an EP (polyester-polyamide) fabric ply. At the request of the customer, belts may be made of a PP (polyamide-polyamide) fabric ply.

Covers thickness

The minimum thickness of a carrying cover (S_1) for G, GG, GK, GS, FK, GRK belts is 2 [mm].

The minimum thickness of a carrying cover (S_1) for TG100 belts is 4 [mm].

The minimum thickness of a carrying cover (S_1) for TG150 belts is 5 [mm].

The minimum thickness of a running cover (S_2) for every type of belt is 2 [mm].

The maximum recommended thickness of a carrying cover (S_1) is 8 [mm].

The maximum recommended thickness of a running cover (S_2) is 6 [mm].

Belt designation used for ordering purposes

WT-6/18 450 1000 EP 800 4 6+2 G 1

where:

manufacturing acc. to FTT Technical Requirements

quantity of the belt [m]

width of the belt [mm]

ply material

tensile strength of the belt (its class) [N/mm]

number of plies in the carcass

thickness of carrying (S_1) and running covers (S_2) [mm]

class of the belt

safety category acc. to PN-EN 12882

Table 1. Classes of oil-resistant belts

Class of the belt	Transported material	Temperature of transported material [°C]	Ambient temperature [°C]	Additional properties of the belt	Additional properties of the belt carcass	Safety category
G	Containing mineral, vegetable oil and animal fat	from -15 to +60	from -15 to +60	-	-	1
GG	Containing mineral, vegetable oil and animal fat	from -15 to +60	from -15 to +60	-	oil resistant	1
GK	Containing mineral, vegetable oil and animal fat	from -10 to +60	from -10 to +60	non-inflammable	-	2A
GS	Containing mineral, vegetable oil and animal fat	from -10 to +60	from -10 to +60	non-inflammable	non-inflammable	2B
FK	Containing vegetable oil and animal fat	from -20 to +60	from -20 to +60	non-inflammable	-	2A
GRK	Containing vegetable oil and animal fat	from -30 to +60	from -30 to +60	non-inflammable	-	2A
TG100	Containing mineral, vegetable oil and animal fat	from -10 to +100	from -10 to +60	resistant to increased temperatures	-	1
TG150	Containing mineral, vegetable oil and animal fat	from -10 to +150	from -10 to +60	resistant to increased temperatures	-	1

Belt thickness

Table 4 shows approximate thickness of carcasses for rubber-fabric oil resistant conveyor belts of any type. Approximate total thickness of a belt containing covers of any thickness may be calculated using the following equation:

$$S = S_3 + (S_1 + S_2)$$

where:

S – approximate total thickness of the belt [mm]

S_3 – thickness of the belt carcass taken from Table 4 [mm]

S_1 – thickness of a carrying cover [mm]

S_2 – thickness of a running cover [mm]

Belt weight

Table 4 shows approximate weight of carcasses for rubber-fabric oil resistant conveyor belts of all types. Approximate weight of a belt containing covers of any thickness may be calculated using the following equation:

$$M = m_1 + X * (S_1 + S_2)$$

where:

M – approximate weight of the belt [kg/m²]

m_1 – weight of the belt carcass taken from Table 4 for a specific type of the belt [kg/m²]

S_1 – thickness of a carrying cover [mm]

S_2 – thickness of a running cover [mm]

X – value depending on the type of the belt:

- for G, GG – 1.18 [g/cm³]

- for GK, GS – 1.27 [g/cm³]

- for FK – 1.265 [g/cm³]

- for TG100 – 1.18 [g/cm³]

- for TG150 – 1.17 [g/cm³]

- for GRK – 1.39 [g/cm³]

Belt dimensions

Dimension tolerances - compliant with PN-EN ISO 14890.

Allowable tolerance for belt width is:

- for width exceeding 500 [mm]: $\pm 1\%$

- for width of up to 500 [mm]: ± 5 [mm]

Allowable tolerance for belt total thickness is:

- for thickness exceeding 10 [mm]: $\pm 10\%$

- for thickness of up to 10 [mm]: ± 1 [mm]

Allowable tolerance for cover thickness is:

- for lining thickness of up to 4 mm: $+1/-0.2$ [mm];

- for lining thickness exceeding 4 mm: $+1$ [mm]/ -5 [%].

Standard lengths: 100, 150, 200, 250, 300 [m].

Minimum diameter of drums

Table 5 shows recommended minimum diameters of drums [mm] for belts, for the load range of 60-100%, which were determined in accordance with DIN 22101:

A – drive pulleys and other pulleys in the range of high belt tensions

B – deflection pulleys and other pulleys in the range of low belt tensions

C – snub pulleys (change in belt movement direction by $\leq 30^\circ$)

Belt markings

Typically, a durable stamp in the form of a rubber relief is impressed on the carrying cover of the belt at the distance of $1 \div 3$ [m] from the beginning and the end of the belt and approximately every 20 [m]. The stamp includes manufacturer's name, markings acc. to the above-mentioned pattern (excluding length, width, or thickness of covers), belt serial number, and last two digits of the manufacturing year.

Packing

Typically, the belt is warped on wooden core being 450 [mm] in diameter and having an internal square hole with a 230 [mm] cheek. Warped belts are protected against unwinding during transport by wrapping with polypropylene tape.

Diameter of the roll

Approximate diameter of the roll D [m] with length L [m], and thickness S [mm] may be calculated using the following equation:

$$D = \sqrt{0,25 + \frac{1,27 \times L \times S}{1000}}$$

Table 2. Physical and mechanical properties of cover rubber for belts: G, GG, GK, GS, GRK, FK, TG100, TG150

Parameter		Unit	Requirements for cover rubber designed for specific types of belts								Testing method acc. to ¹
			G GG	GK	GS	GRK	FK	TG100	TG150		
a/ Tensile strength, min.	TS	[MPa]	15	12	12	15	12	15	15	PN-ISO 37 (sample type 2)	
b/ Elongation at break, min.	Eb	[%]	350	300	300	350	300	350	350		
c/ Abrasion resistance, max.	-	[mm ³]	200								PN-ISO 4649 (method A)
d/ Resistance to fluid expressed in mass change, max.	- oil IRM 903 ² (24 [h] x 100 [°C])	Δm100	[%]	±25	±25	±25	±60	±70	-±30	-	PN-ISO 1817
	- oil IRM 903 ² (24 [h] x 150 [°C])			-	-	-	-	-	-	±30	
	- soybean oil (24 [h] x 100 [°C])			±5	±5	±5	±25	±25	-	-	
e/ Resistance to heat, in air, in condition, max.	+70 [°C] x 168 [h]	Δ TS Δ Eb	[%]	±25 ±30					-	-	PN-ISO 188 (method B) PN-ISO 37 (sample type 2)
	+100 [°C] x 168 [h]	Δ TS Δ Eb		-	-	-	-	-	±25 ±60	-	
	+125 [°C] x 72 [h]	Δ TS Δ Eb		-	-	-	-	-	-	±30 ±75	

¹ Testing acc. to current standards.

² Reference oil is compliant with PN-ISO 1817.

Table 3. Oil resistance of carcass rubber for GG fabric-rubber oil resistant conveyor belts

Parameter	Type of media	Unit	Requirements for carcass rubber designed for GG belts	Testing method acc. to ₁	
Resistance to fluid expressed in mass change, max.	- oil IRM 903 ² (24 [h] x 100 [°C])	Δm100	[%]	±50	PN-ISO 1817
	- soybean oil (24 [h] x 100 [°C])			±15	

¹ Testing acc. to current standards.

² Reference oil is compliant with PN-ISO 1817.

Table 4. Range of manufactured belts, including standard width, weight and thickness of EP rubber-fabric oil resistant conveyor belts

Type of the belt/number of plies	Standard width of the belt [mm] ¹										Approximate thickness of carcass S ₃ [mm]		Approximate weight of the carcass [kg/m ²]							
	500	600	650	800	1000	1200	1400	1600	1800	G	GG, GK, GRK, GS, TG100, TG150	G	GG	GK, GRK	FK	GS	TG100	TG150		
400 /3	X	X	X	X	X	X	-	-	-	3,0	3,6	4,3	5,2	5,4	5,4	5,3	5,0	5,0		
500 /3	X	X	X	X	X	X	X	-	-	3,6	4,2	4,8	5,7	6,1	6,1	6,0	5,5	5,5		
630 /3	X	X	X	X	X	X	X	X	-	4,5	5,1	5,3	6,1	6,6	6,5	6,5	6,0	5,9		
630 /4	X	X	X	X	X	X	X	-	-	4,8	5,6	6,4	7,5	8,2	8,1	8,0	7,3	7,3		
800 /3	X	X	X	X	X	X	X	X	X	5,1	5,7	5,7	6,5	7,0	7,0	6,9	6,4	6,4		
800 /4	X	X	X	X	X	X	X	X	X	6,0	6,8	7,0	7,1	8,8	8,7	8,7	7,9	7,9		
800 /5	X	X	X	X	X	X	X	-	-	6,0	7,0	8,0	9,4	10,2	10,1	10,0	9,2	9,1		
1000 /3	-	-	X	X	X	X	X	X	X	5,4	6,0	6,4	7,0	7,7	7,7	7,6	7,1	7,0		
1000 /4	-	-	X	X	X	X	X	X	X	6,8	7,6	7,5	8,7	9,4	9,3	9,2	8,5	8,5		
1000 /5	-	-	X	X	X	X	X	X	X	7,5	8,5	8,8	10,1	11,0	10,9	10,8	9,9	9,9		
1250 /3	-	-	X	X	X	X	X	X	X	6,9	6,9	8,1	8,2	8,8	8,8	8,7	8,0	8,0		
1250 /4	-	-	X	X	X	X	X	X	X	7,2	8,0	8,5	9,3	10,3	10,3	10,2	9,4	9,4		
1250 /5	-	-	X	X	X	X	X	X	X	8,5	9,5	9,4	10,8	11,7	11,6	11,5	10,6	10,5		
1400 /4	-	-	-	X	X	X	X	X	X	8,4	8,4	10,0	10,2	10,9	10,9	10,8	9,9	9,9		
1600 /4	-	-	-	-	X	X	X	X	X	9,2	9,2	10,8	10,9	11,7	11,7	11,6	10,7	10,7		

¹ Types and width of the belts, other than determined in Table 4, shall be agreed with manufacturer. Information about requirements for belts made of PP fabric may be found in characteristics of the belts.

Table 5. Minimum drum diameters for EP oil resistant belts [mm]

Type of the belt/number of plies		G			G, GG, GK, FK, GS, TG100, TG150, GRK		
		A	B	C	A	B	C
400	/3	315	250	200	400	315	250
500	/3	400	315	250	400	315	250
630	/3	500	400	315	500	400	315
630	/4	500	400	315	630	500	400
800	/3	500	400	315	630	500	400
800	/4	630	500	400	800	630	500
800	/5	630	500	400	800	630	500
1000	/3	630	500	400	630	500	400
1000	/4	800	630	500	800	630	500
1000	/5	800	630	500	1000	800	630
1250	/3	800	630	500	800	630	500
1250	/4	800	630	500	800	630	500
1250	/5	1000	800	630	1000	800	630
1400	/4	1000	800	630	1000	800	630
1600	/4	1000	800	630	1000	800	630

Table 6. Physical and mechanical properties of EP rubber-fabric oil resistant conveyor belts

Parameter	Unit	Type of the belt								Requirements. Type of the belt ¹								Testing method acc. to ²	
										400	500	630	800	1000	1250	1400	1600		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
a/ Longitudinal tensile strength, min.	[N/mm]	G	GG	GK	FK	GS	TG100	TG150	GRK	400	500	630	800	1000	1250	1400	1600	PN-EN ISO 283	
b/ Elongation at the load equivalent to 10 [%] of nominal strength of the belt, max.	[%]	G	GG	GK	FK	GS	TG100	TG150	GRK	1,5			2,5		3,0				
c/ Elongation at break, min.	[%]	G	GG	GK	FK	GS	TG100	TG150	GRK	10									
d/ Adhesion resistance: - between textile plies, min. - between covers and carcass, min.	[N/mm]	G	GG	GK	FK	GS	TG100	TG150	GRK	4,5 3,5								PN-EN ISO 252 (method A)	
e/ Heat resistance for determination of adhesive strength between elements of the belt, in air, in condition: 70 [°C] x 168 [h]: - between plies, max.; - between covers and carcass, max.	[%]	G	GG	GK	FK	GS	-	-	GRK	± 30 ± 40								PN-ISO 188 (method B) PN-EN ISO 252 (method A)	
f/ Heat resistance for determination of adhesive strength between elements of the belt, in air, in condition: 100 [°C] x 168 [h]: - between plies, max.; - between covers and carcass, max.		-	-	-	-	-	TG100	-	-	-	± 50 ± 35								
g/ Heat resistance for determination of adhesive strength between elements of the belt, in air, in condition: 125 [°C] x 72 [h]: - between plies, max.; - between covers and carcass, max.		-	-	-	-	-	-	TG100	-	-	± 55 ± 35								
h/ Electric resistance, max.	[Ω]	G	GG	GK	FK	GS	TG100	TG150	GRK	3 x 108								PN-EN ISO 284	
i/ Low temperature resistance	[°C]	-	-	GK	-	GS	TG100	TG150	-	-10								PN-72/C-05011,06	
		G	GG	-	-	-	-	-	-	-15									
		-	-	-	FK	-	-	-	-	-	-20								
		-	-	-	-	-	-	-	-	GRK	-30								
j/ Combustion time determined by flame method: - total combustion time for each group of six samples with covers is shorter than: - maximum combustion time for a single sample, max.	[S]	-	-	GK	FK	GS	-	-	GRK	45 15								PN-EN ISO 340	
		-	-	-	-	GS	-	-	-	45 15									
k/ Combustion times determined by flame method: - total combustion time for each group of six samples without covers is shorter than: - maximum combustion time for a single sample, max.	[S]	-	-	-	-	GS	-	-	-	45 15								PN-EN ISO 340	
Safety category acc. to PN- EN 12882	-	1	1	2A	2A	2B	1	1	2A	-								PN-EN 12882	

¹ Other non-standard values of belt (types) strength, different from the above-mentioned ones, are allowed upon arrangements with the recipient.

² Current standards are in force.

PROCEDURE FOR WORN-OUT PRODUCTS

Disposal of worn-out products through recovery or disposal at landfill sites for waste other than hazardous or neutral shall be applied.

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