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# Fabryka Taśm Transporterowych Wolbrom S. A.



AB 169  
Laboratorium  
FTT WOLBROM S.A.



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



## Non- inflammable rubber fabric conveyor belts

### Application:

Non- inflammable rubber fabric conveyor belts are intended for transport of loose materials in increased fire hazard conditions e.g. for coal transport in coal processing plants on the surface for mining enterprises or for power plants and combined heat and power plants.

Non- inflammable rubber fabric conveyor belts can convey materials of any graining but taking into account operational safety of the conveyor and installed belt it is recommended to limit maximum diameter of grains of the conveyed material to 300 [mm].

### Construction:

Non- inflammable rubber fabric conveyor belts consists of rubber and fabric carcass, with 2-5 plies, rubber covers: carrying and running as well as rubber edges. Layer of interlayer rubber is located between textile plies.

Non- inflammable rubber fabric conveyor belts are manufactured on the basis of textile plies EP (polyester-polyamide) or PP (polyamide-polyamide).

Non- inflammable rubber fabric conveyor belts are produced according to the standards PN- EN ISO 14890 or DIN 22102.

Covers and edges can be manufactured in different classes of cover rubber acc. to **table 1**.

Depending on type of the belt, it fulfils the requirements for safety category 2A, 2B, 3A, 3B acc. to the standard PN- EN



12882. According to the standard ISO 433 belts has special properties:

- "K": non- inflammable with covers (testing acc. to standard ISO 340) or

- "S": non- inflammable with and without covers (testing acc. to standard ISO 340)

All manufactured types of non- inflammable belts are also anti-electrostatic.

### Cover Thickness

Minimum thickness of carrying cover ( $S_1$ ) and running cover ( $S_2$ ) is 2[mm]

Maximum thickness of carrying cover ( $S_1$ ) is:

- for types 400/3; 500/3- 8[mm]

- for types 630/3; 630/4; 800/3; 800/4; 800/5; 1000/3- 10[mm]

- for higher types- 12[mm]

Recommended maximal thickness of running cover ( $S_2$ ) is- 6[mm]

### Belt thickness

Approximated thickness of non- inflammable rubber fabric conveyor belt carcass is presented in the table 2.

Approx. total thickness of the belt with any thickness of the covers can be calculated using the formula:

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

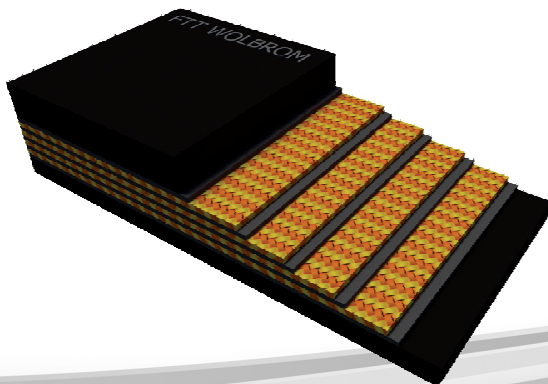
where:

$S$  – approximated total thickness of belt [mm]

$S_3$  – thickness of belt carcass taken from **Table 2** [mm]

$S_1$  – thickness of carrying cover [mm]

$S_2$  – thickness of running cover [mm]



## Belt weight

Approximated weights of non- inflammable rubber fabric conveyor belt carcass are presented in the table 2. Approximated weight of belt with covers of any thickness can be obtained from the formula:

$$M = m_1 + X \cdot (S_1 + S_2)$$

where:

- M – approximated weight of the belt [kg/m<sup>2</sup>]
- m<sub>1</sub> – weight of belt carcass taken from the Table 2 for the given type of belt [kg/m<sup>2</sup>]
- S<sub>1</sub> – thickness of carrying cover [mm]
- S<sub>2</sub> – thickness of running cover [mm]
- X – value depending on cover rubber class:

- for cover rubber class H - 1,36 [g/cm<sup>3</sup>]
- for cover rubber class D - 1,36 [g/cm<sup>3</sup>]
- for cover rubber class L and Z - 1,29 [g/cm<sup>3</sup>]
- for cover rubber class Y - 1,24 [g/cm<sup>3</sup>]

## Minimum pulley diameters - acc. to table 3

In Table 3 are given recommended minimum diameters of drums [mm] for belts, for the load factor range 60-100%, designated 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 moving direction ≤ 30°)

## Belt designation used for orders acc. to standard PN-EN ISO 14890

	<b>14890</b>	<b>450</b>	<b>1000</b>	<b>EP</b>	<b>800</b>	<b>4</b>	<b>6+2</b>	<b>LK</b>	<b>2A</b>
where:									
completion acc. to the standard									
length of the belt in [m]									
width of the belt in [mm]									
material of plies									
tensile strength (belt type) in [N/mm]									
number of plies in carcass									
thickness of rubber covers: carrying (S <sub>1</sub> ) and running (S <sub>2</sub> ) in [mm]									
class of cover rubber and special property of the belt									
safety class according to PN- EN 12882									

## Belt designation used for orders acc. to standard DIN 22102

	<b>DIN 22102</b>	-	<b>1000</b>	-	<b>EP</b>	-	<b>800</b>	/	<b>4</b>	<b>6/2</b>	<b>Y</b>	<b>S</b>
where:												
completion acc. to the standard												
width of the belt in [mm]												
material of plies												
tensile strength (belt type) in [N/mm]												
number of plies in carcass												
thickness of rubber covers: carrying (S <sub>1</sub> ) and running (S <sub>2</sub> ) in [mm]												
class of cover rubber												
special property of the belt acc. to DIN 22102												

**Table 1. Physical-mechanical properties of cover rubber of non- inflammable rubber fabric conveyor belts**

Parameter	Unit	Requirements for cover rubber of non- inflammable belts					Method of testing <sup>1</sup>	
		Acc. to PN- EN ISO 14890			Acc. to DIN 22102			
		H	D	L	Y	Z		
Tensile strength, min.	TS	[MPa]	24	18	15	20	15	PN-ISO 37 (sample type 2)
Elongation at break, min.	E <sub>b</sub>	[%]	450	400	350	400	350	PN-ISO 37 (sample type 2)
Abrasion resistance, max.		[mm <sup>3</sup> ]	120	100	200	150	200	PN-ISO 4649 (method A)
Heat ageing resistance, in air, in condition: +70 [°C] after 168 [h.], max.	ΔTS	[%]	±25					PN-ISO 188 (method B)
	ΔE <sub>b</sub>	[%]	±25					PN-ISO 37 (sample type 2)

<sup>1</sup> Tests acc. to current edition of standards.

**Table 2.** Range of manufactured types of belts, basic widths, weights and thickness of carcass of non- inflammable rubber fabric conveyor belt.

Belt type/ number of plies <sup>1</sup>	Basic widths of belt [mm] <sup>1</sup>										Approx. thickness of carcass S <sub>3</sub> [mm]		Approx. weight of carcass [kg/m <sup>2</sup> ]			
	500	600	650	800	1000	1200	1400	1600	1800	EP			PP			
										Safety category EN 12882 / special property acc. to DIN 22102		Safety category EN 12882 / special property acc. to DIN 22102				
	EP	PP	2A, 3A / K	2B, 3B / S	2A, 3A / K	2B, 3B / S										
400 /3	X	X	X	X	X	X	X	-	-	4,2	-	6,1	6,0	-	-	
500 /3	X	X	X	X	X	X	X	-	-	4,2	-	6,1	6,0	-	-	
630 /3	X	X	X	X	X	X	X	X	X	5,1	4,8	6,6	6,5	6,3	6,2	
630 /4	X	X	X	X	X	X	X	-	-	5,6	-	8,1	8,0	-	-	
800 /3	X	X	X	X	X	X	X	X	X	5,7	5,4	7,0	6,9	6,7	6,6	
800 /4	X	X	X	X	X	X	X	X	X	6,8	6,4	8,8	8,6	8,4	8,3	
800 /5	X	X	X	X	X	X	X	-	-	7,0	-	10,2	10,0	-	-	
1000 /3	-	-	X	X	X	X	X	X	X	6,0	5,7	7,7	7,7	7,2	7,1	
1000 /4	-	-	X	X	X	X	X	X	X	7,6	6,8	9,4	9,3	8,6	8,5	
1000 /5	-	-	X	X	X	X	X	X	X	8,5	8,0	10,9	10,8	10,5	10,4	
1250 /3	-	-	X	X	X	X	X	X	X	6,9	6,3	8,8	8,7	8,0	7,9	
1250 /4	-	-	X	X	X	X	X	X	X	8,0	7,2	10,3	10,2	9,0	8,9	
1250 /5	-	-	X	X	X	X	X	X	X	9,5	8,5	11,7	11,6	10,8	10,7	
1400 /4	-	-	-	X	X	X	X	X	X	8,4	7,6	10,9	10,8	9,6	9,4	
1600 /4	-	-	-	-	X	X	X	X	X	9,2	8,4	11,7	11,6	10,6	10,5	
1600 /5	-	-	-	-	X	X	X	X	X	10,0	9,5	12,9	12,7	12,0	11,8	
1800 /4	-	-	-	-	-	X	X	X	X	9,6	10,4	12,3	12,0	12,2	12,0	
1800 /5	-	-	-	-	-	X	X	X	X	10,5	10,5	13,7	13,5	13,3	13,1	
2000 /4	-	-	-	-	-	X	X	X	X	9,6	10,4	12,3	12,0	12,2	12,0	
2000 /5	-	-	-	-	-	X	X	X	X	11,5	10,5	14,7	14,5	13,3	13,1	
2500 /4	-	-	-	-	-	X	X	X	X	12,8	11,2	15,7	15,6	13,5	13,4	
2500 /5	-	-	-	-	-	X	X	X	X	13,0	13,0	16,3	16,2	15,2	15,0	

<sup>1</sup>Widths and types of the belt other than specified in Table 2 shall be agreed with the manufacturer

**Table 3.** Minimum pulley diameters [mm]

Belt type/number of plies	EP carcass			PP carcass		
	A	B	C	A	B	C
400 /3	400	315	250	-	-	-
500 /3	400	315	250	-	-	-
630 /3	500	400	315	400	315	250
630 /4	630	500	400	-	-	-
800 /3	630	500	400	500	400	315
800 /4	800	630	500	630	500	400
800 /5	800	630	500	-	-	-
1000 /3	630	500	400	500	400	315
1000 /4	800	630	500	630	500	400
1000 /5	1000	800	630	800	630	500
1250 /3	800	630	500	630	500	400
1250 /4	800	630	500	630	500	400
1250 /5	1000	800	630	800	630	500
1400 /4	1000	800	630	630	500	400
1600 /4	1000	800	630	800	630	500
1600 /5	1250	1000	800	800	630	500
1800 /4	1000	800	630	1000	800	630
1800 /5	1250	1000	800	1000	800	630
2000 /4	1000	800	630	1000	800	630
2000 /5	1250	1000	800	1000	800	630
2500 /4	1400	1250	1000	1250	1000	800
2500 /5	1400	1250	1000	1400	1250	1000

## Marking of belts

Typically on the carrying cover at the distance of 1÷3 [m] from the beginning and end of the belt, and approx. every 15 [m] according to the standard PN- EN ISO 14890 or approx. every 10 [m] acc. to DIN 22102, a permanent mark will be made in form of relief impression in rubber, containing the required information according to the standard PN- EN ISO 14890 or DIN 22102.

Permanent marking should include the following information:

- acc. to PN- EN ISO 14890: name (mark) of manufacturer, name of standard, type of textile, belt type, number of plies, rubber class, safety class, manufacturer's number of belt, two digits of manufacturing year.
- acc. to DIN 22102: name (mark) of manufacturer, number of standard, type of textile, belt type, number of plies, special property of belt, manufacturer's number of belt, two digits of manufacturing year.

## Packing

Typically, the belt is rolled up on wooden coil with diameter 450 [mm] which has an internal square hole with side 230 [mm]. Rolled up belts are protected against unwinding during transport by wrapping with polypropylene tape.

## Diameter of belt roll

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

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

**Table 4. Physical and mechanical parameters of non- inflammable rubber fabric conveyor belts are presented in the table 2.**

Parameter	Unit of measure	Safety category acc. to EN ISO 14890 or special property of the belt acc. to DIN 22102				Belt type										Method of Testing acc. to <sup>1</sup>	
						400	500	630	800	1000	1250	1400	1600	1800	2000		2500
Longitudinal tensile strength, min.	[N/mm]	2A, K	2B, S	3A	3B	400	500	630	800	1000	1250	1400	1600	1800	2000	2500	PN-EN ISO 283
Elongation at load equal to 10 [%] of nominal strength of the belt, max.	EP	2A, K	2B, S	3A	3B	1,5		2,5		3,0							
	PP					4											
Elongation at break, min.	[%]	2A, K	2B, S	3A	3B	10											
Adhesion strength: - average value of test results between textile plies, min. - average value of test results between covers and carcass, min.	[N/mm]	2A, K	2B, S	3A	3B	5,0 4,5										PN-EN ISO 252 (method A)	
Change of average adhesion strength of belt after accelerated thermal ageing, in air, in conditions: -70 [°C] x 168 [h]: - between plies, max. - between covers and carcass, max.	[%]	2A, K	2B, S	3A	3B	- 25 - 25										PN-ISO 188 (method B) PN-EN ISO 252 (method A)	
Combustion times determined by flame method: - total combustion time of each group of six samples with covers, shorter than: - maximum combustion time of single sample with covers	[s]	2A, K	2B, S	3A	3B	45 15										PN-EN ISO 340	
Combustion times determined by flame method: - total combustion time of each group of six samples without covers, shorter than: - maximum combustion time of single sample without covers		-	2B, S	-	3B	45 15											
Drum friction test, method A1	-	-	-	3A	3B	No flame										PN-EN 1554 (method A1)	
Electric resistance of belt, max.	[Ω]	2A, K	2B, S	3A	3B	3 x 10 <sup>8</sup>										PN-EN ISO 284	
Low temperature resistance	Rubber class H	[°C]	2A	2B	3A	3B	-25										PN-72/C-05011.06
	Rubber class L, D		2A	2B	3A	3B	-40										
	Rubber class Y, Z		K	S	-	-	-40										

<sup>1</sup> Tests acc. to current edition of standards.

## Procedure for used products

Recovery of used products through e.g. combustion or bulk storage in the yard with non-hazard or neutral wastes shall be applied.

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