



FTT WOLBROM®

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



Rubber conveyor belt with steel cords ST for general purpose, non- inflammable T- ST, flame resistant GTP-ST

Application

Rubber conveyor belt with steel cords are intended for transport of loose materials of any granulation and can be operated (depending on type of the belt) within the ambient temperatures range from $-40[^\circ\text{C}]$ to $+60[^\circ\text{C}]$. Taking into account properties of steel-rubber carcass, this type of belt is recommended for use on long and inclined routes, where exceptional low elongation percentage and high lifetime are required.

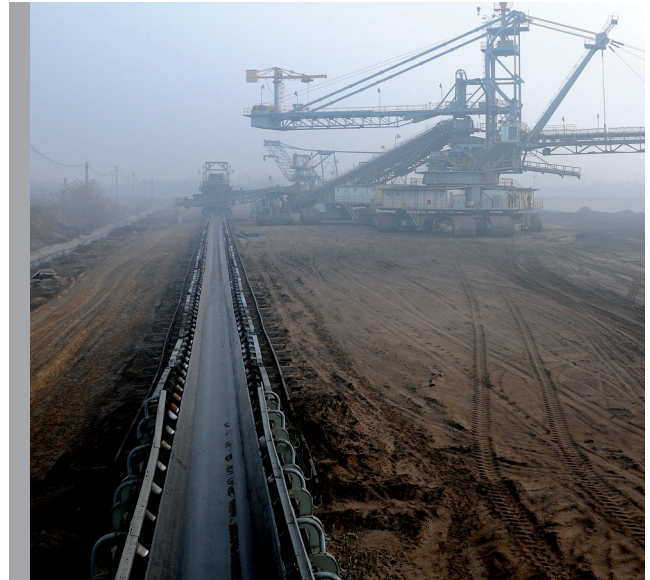
Construction

This belt as a standard are constructed of carcass consisting of lengthwise arranged hot-dip galvanized steel cords (fig. 1 presents the most often used structures), vulcanized in special carcass rubber and rubber covers. Additionally covers can have crosswise reinforcement in form of textile or steel breaker.

This belt is in accordance with the following standards in respect of structure, dimensions and individual elements as well as tolerances of these dimensions and resistance parameters:

EN ISO 15236-1,-2 or DIN 22131.

Rubber conveyor belt with steel cords ST for general purpose and non- inflammable T-ST are manufactured on the basis of the standards EN ISO 15236-1,-2 or DIN 22131 while flame resistant belt GTP-ST is manufactured according to the WT-3/11.



Type and kinds

Three types of rubber conveyor belt with steel cords are manufactured:

ST - general purpose rubber conveyor belt with steel cords are intended for transport of loose materials in conditions where there are no special requirements connected with operation environment and properties of the conveyed material. Can be used in all industry branches including: combustible and non-combustible minerals mining, in case when fire hazards are not present.

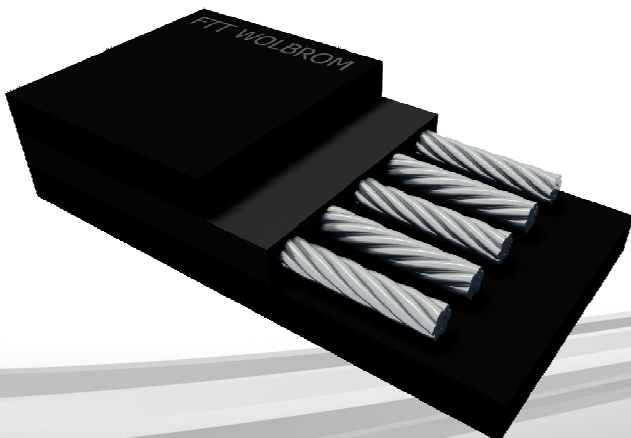
T-ST - non- inflammable rubber conveyor belt with steel cords are intended for transport of loose materials in conditions of increased fire hazards during operation on the surface - e.g. coal transport in power plants, coke plants, coal processing plants, harbours.

GTP-ST - flame resistant rubber conveyor belt with steel cords are intended for transport of loose materials in the underground excavations of mining enterprises mining combustible minerals (e.g. coal) and non-combustible minerals (e.g. metal ores, salt, aggregates). Properties of rubber mixtures used enable fulfilment by the GTP-ST belt harsh requirements within the scope of electric-fire safety.

Depending on type of belt's construction, according to the standard EN ISO 15236-2, the following types of belt can be distinguished: type A1 or type A2 (X for GTP-ST belt), differing between each other with number of steel cords in belt's cross-section and physical-mechanical parameters as well as scale of the cords.

Depending on longitudinal tensile strength of belt the following standard types of belt are manufactured:

ST 1000, ST 1250, ST 1600, ST 2000, ST 2500, ST3150, ST3500, ST 4000, ST 4500, ST 5000, ST 5400.



Marking of belt during ordering according to the standard EN ISO 15236-1

	<u>450</u>	<u>ISO 15236-1</u>	<u>1000</u>	<u>ST</u>	<u>2500</u>	<u>6+2</u>	<u>H</u> + <u>A1</u>
where:							
length of the belt in [m]							
execution according to the standard							
belt width in [mm]							
material of carcass							
nominal belt strength in [N/mm]							
thickness of rubber covers: carrying (S ₁) and running (S ₂) in [mm]							
cover class							
belt type acc. to ISO 15236-2							

Marking of belt during ordering according to the standard DIN 22131

	<u>250</u>	<u>DIN 22131</u>	<u>2000</u>	<u>ST</u>	<u>3150</u>	<u>10/7</u>	<u>Y</u>
where:							
length of the belt in [m]							
execution according to the standard							
belt width in [mm]							
material of carcass							
nominal belt strength in [N/mm]							
thickness of rubber covers: carrying (S ₁) and running (S ₂) in [mm]							
cover class							

Marking of belt during ordering according to the standard WT-3/11

	<u>GTP-ST</u>	<u>1250</u>	<u>12/6</u>	<u>1000</u>	<u>WT-3/11</u>	<u>GM-78/11</u>
where:						
belt type						
nominal belt strength in [N/mm]						
thickness of rubber covers: carrying (S ₁) and running (S ₂) in [mm]						
belt width in [mm]						
execution acc. to (Technical conditions FTT)						
admission mark (if required)						

Belt weight

Approximated weights [kg/m²] of normal belt with steel cords are presented in the **table 2**. Approximated weight [kg/rms] of belt of any width can be obtained from the formula:

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

where:

- S – approximated total thickness of belt [mm]
 - S₃ – thickness of belt carcass taken from Table 2 [mm]
 - S₁ – thickness of carrying cover [mm]
 - S₂ – thickness of running cover [mm]
- Recommended acc. to EN ISO 15236-1 or DIN 22131 the minimum value S² results from the specified type (strength) of belt and is within the range from 4[mm] to 8[mm].

Belt weight

Approximated weights [kg/m²] of normal belt with steel cords are presented in the **table 2**. Approximated weight [kg/rms] of belt of any width can be obtained from the formula:

$$M = m_1 \times B$$

where:

- M – approximated weight of the belt [kg/rms]
- m₁ – weight of belt taken from the Table 2 for the given type of belt [kg/m²]
- B – belt width in [m]

Minimum pulley diameters - acc. to table 3

The recommended minimum pulley diameters [mm], determined according to the standard DIN 22101 for the following pulleys, are presented in the **Table 3**:

- 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°)

Permanent marking of belt

To be agreed with the Customer or as a standard on carrying cover of the belt, about ~5 [m] from the beginning of the belt, 50÷100[mm] from sides of the belt, every 10÷20 [m] on one or both edges of belt (depending on width of belt) - permanent mark will be made in form of relief impression in rubber, containing, at least, the name of the manufacturer, belt type, thickness of covers, number of belt, two last digits of manufacturing year.

Packing

Belt is wound up on metal winding reel with diameter 500 [mm], with square opening in the centre, with length of

the opening's side 190 [mm]. Winded up belt is protected against unwinding during transport by clamping using polypropylene strip.

Diameter of wound

Approximated diameter of belt reel D [m] of length L [m], thickness S [mm] can be obtained using the formula:

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

Table 1. Mechanical and physical properties of cover rubber

Parameter	Unit	Requirements for cover rubber											Method of testing acc. to ¹	
		DIN 22131					PN-EN ISO 15236-1					WT-3/11 PN-EN ISO 15236-3		
		ST				T-ST	ST				T-ST	GTP-ST		
		X	Y	Y60 ²	W	K	H	D60 ²	D	L	K	V		
a/ Tensile strength, min.	TS	[MPa]	25	20	20	18	20	24	20	18	15	15	17	PN-ISO 37 (sample type2)
b/ Elongation at break, min.	E _b	[%]	450	400	450	400	400	450	450	400	400	350	350	PN-ISO 37 (sample type 2)
c/ Abrasion resistance, max.	-	[mm ³]	120	150	60	90	200	120	60	100	90	200	175	PN-ISO 4649 (method A)
d/ Thermal ageing, max. (70[°C]/ 168[h])	Δ TS Δ E _b	[%]						-25 -25					PN-ISO 188 (method B) PN-ISO 37 (sample type 2)	

¹ Tests carried out according to the current issues of the standards

² D60; Y60 - cover with increased abrasion resistance parameter

Table 2. Range of manufactured types of belt, basic widths, weights and thickness of belt carcass.

Basic types of belt ¹	Basic widths of belt B [mm] ²								Thickness [mm]			Approx. weight [kg/m ²]		
	1000	1200	1400	1600	1800	2000	2200	2400	Max. thickness of carcass S ³	Carrying cover S ¹	Running cover S ²	ST	T-ST	GTP-ST
1000	X	X	X	X	X	X	X	X	4,1	6	4	20,0	22,0	25,0
1250	X	X	X	X	X	X	X	X	4,9	6	4	22,0	24,0	27,0
1600	X	X	X	X	X	X	X	X	5,6	8	6	28,0	31,0	35,0
2000	X	X	X	X	X	X	X	X	5,6	8	6	30,0	32,0	36,0
2500	X	X	X	X	X	X	X	X	7,2	10	8	38,0	41,0	46,0
3150	X	X	X	X	X	X	X	X	8,1	10	8	41,0	44,0	49,0
3500 ³	X	X	X	X	X	X	X	X	8,6	10	8	43,0	47,0	-
4000	X	X	X	X	X	X	X	X	8,9	12	8	48,0	52,0	57,0
4500 ³	X	X	X	X	X	X	X	X	9,7	12	8	49,0	53,0	-
5000 ³	X	X	X	X	X	X	X	X	10,9	12	10	54,0	59,0	-

¹ Belt types not specified in Table 2 to be agreed with the manufacturer

² Belt widths other than specified in Table 2 to be agreed with the manufacturer

³ Does not apply to belt GTP-ST

Table 3. Minimum pulley diameters

Belt type	Maximum thickness of carcass [mm]	A	B	C	Belt type	Maximum thickness of carcass [mm]	A	B	C
1000	4,1	630	500	400	3150	8,1	1250	1000	800
1250	4,9	800	630	500	3500	8,6	1250	1000	800
1600	5,6	800	630	500	4000	8,9	1400	1250	1000
2000	5,6	800	630	500	4500	9,7	1400	1250	1000
2500	7,2	1000	800	630	5000	10,9	1600	1250	1000

Table 4. Physical and mechanical parameters for belt

Parameter	Unit of measure	Requirements Belt type											Method of Testing acc. to ¹
		1000	1250	1600	2000	2500	3150	3500	4000	4500	5000	5400	
a/ Minimum tensile strength KN min.	[N/mm]	1000	1250	1600	2000	2500	3150	3500	4000	4500	5000	5400	DIN 22131/ISO 15236-2
b/ Maximum diameter of cord	[mm]	4,1	4,9	5,6	5,6	7,2	8,1	8,6	8,9	9,7	10,9	11,3	DIN 22131/ISO 15236-2
c/ Minimum tensile strength of the cord $F_{bs\ min}$	[kN]	12,9	18,4	26,2	25,5	39,7	50,0	55,5	63,5	75,0	90,3	96,0	ISO 7622-2
d/ Minimum cord pull-out forces:													
- as-delivered state F_a	[N/mm]	80	95	105	105	130	140	145	150	165	175	180	ISO 7623
- after thermal treatment $F_v (145 \pm 5[^\circ C] \times 150 \pm 1 [min])$		75	90	95	95	120	130	140	145	160	170	175	
e/ Minimum adhesion strength: - between covers and carcass rubber	[N/mm]	12											ISO 8094
f/ Electric resistance of belt, max.	[Ω]	3×10^8											PN-EN ISO 284

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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