

Introduction

Sythetic fibre materials are increasingly superseding both the natural and semi-synthetic raw materials also in technical applications. PIONEER rubber conveyor belt with fully synthetic inserts based on polyester/ polyamide follows this trend. Only first class fabric is used for production.

This conveyor belt has the following important features:

- Highly resistant to dynamic stress
- Extremely puncture proof
- Capable of troughing up to 36 degree
- Low strain
- Non rotting



PIONEER rubber conveyor belts with EP inserts stand their daily tests under the tough conditions in the steel industry, in metallurgy, coal mining, in the chemical and potash industries and in lime and rock working fields, above all in the continuous handling of bulk goods. In connection with one or two puncture protective inserts (breakers) giving the belt a high weft strength, these heavy-duty conveyor belts can be extremely loaded under maximum stress.

Conveyor Belt Designs

Corresponding to our production programme, the following belt types, belt widths and cover panel thickness have proven themselves in the field.

Belt Width	Cover Panel Thickness		Kg/m ²	Carcass Thickness (mm)	Belt Thickness (mm)
	TS (mm)	LS (mm)			
EP 250/2	3	1.5	8	2.2	6.7
	5	1.5	10.4	2.2	8.7
EP 315/2	3	1.5	8.3	2.4	6.9
	5	1.5	10.7	2.4	8.9
EP 315/3	3	1.5	9	3	7.5
	5	1.5	11.4	3	9.5
	6	2	13.2	3	11
	8	3	16.8	3	14
EP 400/3	3	1.5	9.4	3.3	7.8
	5	1.5	11.8	3.3	9.8
	6	2	13.6	3.3	11.3
	8	3	17.2	3.3	14.3
EP 500/3	3	1.5	9.7	3.6	8.1
	5	1.5	12.1	3.6	10.1
	6	1.5	13.9	3.6	11.6
	8	3	17.5	3.6	14.6
	10	3	19.9	3.6	16.6
EP 500/4	3	1.5	10.7	4.4	6.9
	5	1.5	13.1	4.4	10.9
	6	2	14.9	4.4	12.4
	8	2	18.5	4.4	15.4
	10	3	20.9	4.4	17.4

Belt Width	Cover Panel Thickness		Kg/m ²	Carcass Thickness (mm)	Belt Thickness (mm)
	TS (mm)	LS (mm)			
EP 630/4	3	1.5	11.2	4.8	9.3
	5	1.5	13.6	4.8	11.3
	6	2	15.4	4.8	12.8
	8	3	19	4.8	17.8
	10	3	21.4	4.8	17.8
EP 800/4	3	1.5	11.6	5.2	9.7
	5	1.5	14	5.2	11.7
	6	6	2	5.2	13.2
	8	3	19.4	5.2	16.2
	10	3	21.8	5.2	18.2
EP 800/5	3	1.5	12.6	6	10.5
	5	1.5	15	6	12.5
	6	2	15.8	6	14
	8	3	20.4	6	17
	10	3	22.8	6	19
EP 1000/4	3	1.5	12.1	5.6	10.1
	5	1.5	14.5	5.6	12.1
	6	2	16.3	5.6	13.6
	8	3	19.9	5.6	16.6
	10	3	22.3	5.6	18.6
EP 1000/5	3	1.5	13.2	6.5	11
	5	1.5	15.6	6.5	13
	6	2	17.4	6.5	14.5
	8	3	21	6.5	17.5
	10	3	23.4	6.5	19.5
EP 1200/6	3	1.5	14.8	7.8	12.3
	5	1.5	17.2	7.8	14.3
	6	2	19	7.8	15.8
	8	3	22.6	7.8	18.8
	10	3	25	7.8	20.8
EP 1250/4	3	1.5	13.1	6.4	10.9
	5	1.5	15.5	6.4	12.9
	6	2	17.3	6.4	14.4
	8	3	20.9	6.4	17.4
	10	3	23.3	6.4	19.4
EP 1600/5	5	1.5	17.4	8	14.5
	6	2	19.2	8	16
	8	3	22.8	8	19
	10	3	25.2	8	21
EP 2000/5	5	15	18.6	9	15.5
	6	2	20.4	9	17
	8	3	24	9	20
	10	3	26.4	9	22

Selection of Rubber Cover Panels

The quality of Rubber cover panels is developed from natural rubber or blends of natural and synthetic rubber for most varied applications.

Cover Quality	Tensile Strength	Elongation at Failure	Abrasion	Remarks
	Min N/mm ²	Min %	Max mm ³	
Z	15	350	250	For conveyor belts up to type EP 1000/4 under low stress in temperature climates.
Y	20	400	150	For conveyor belts from type EP500/3 under high stress in temperature climates.
X	25	450	120	For conveyor belts from type EP 500/3 under high stress in arid, humid and alternate climates.
W	18	400	90	For conveyor belts from EP 500/3 under very high stress (abrasion).
WS	15	400	60	Best abrasion quality.
G	15	400	150	For oil – resistant applications.
SD	20	400	150	For flame – resistant applications.
R	17	450	100	For cold resistant applications up to -60°C.
T	10	300	180	For heat resistant applications 110– 130°C.
TW	10	200	200	For heat resistant applications 150– 170°C.
TH	10	200	200	For heat resistant applications 180– 200°C.
THS	10	200	200	For heat resistant applications 200– 220°C.

Rupture Strength

Of major importance to the service life of a conveyor belt is the interaction and interconnection between the individual fabric inserts and rubber cover panels. Modern impregnating and rubberising process in production for a uniform belt structure.

The following minimum rupture strengths are guaranteed:

- Between cover panels and carcasses 3.5 – 4.5 N/mm
- Between the individual fabric inserts of the carcass 5 N/mm

Rupture Strength

Rubber conveyor belts with EP inserts have a strain of 1.3 to 2%. Special processes in fabric production and further processing guarantee strain figures lying below 1.3% of the specified rupture force of 10%.

The added use of breaker inserts does not change the strain behaviour.

Application

PIONEER conveyor belts with EP inserts and breaker inserts are especially applicable to conveyors of production handling facilities and belt installations up to axle base of 1,500m.

Belt Speeds

The following belt speeds are permissible:

- Equipment with carrying roller stations 6m/sec
- Equipment with cable-braced garland stations and stations with single cushioning 8.5m/sec
- Equipment with solely cable-braced garland stations 10m/sec

Minimum Drum Diameter

To reach an optimum life of the conveyor belt and the joint, we recommend that the following minimum drum diameters be kept:

Belt Type	Minimum drum diameter for EP conveyor belt (mm)								
	Utilisation of the permissible belt tension								
	60%... Driving Drum	Return Drum	100%... Snub Drum	30%... Driving Drum	Return Drum	60%... Snub Drum	Under Driving Drum	Return Drum	30%... Snub Drum
250/2	200	160	125	160	125	100	125	100	80
315/2	200	160	125	160	125	100	125	100	80
315/3	315	250	200	250	200	160	200	160	125
400/3	315	250	200	250	200	160	200	160	125
500/3	315	250	200	250	200	160	200	160	125
500/4	400	315	250	315	250	200	250	200	160
630/3	400	315	250	315	250	200	250	200	160
630/4	500	400	315	400	315	250	315	250	200
800/4	630	500	400	500	400	315	400	315	250
1000/3	500	400	315	400	315	250	315	250	250
1000/4	630	500	400	500	400	315	400	315	315
1250/3	630	500	400	500	400	315	400	315	315
1250/4	800	630	500	630	500	400	500	400	315
1600/4	800	630	500	630	500	400	500	400	315
2000/4	1000	800	630	800	630	500	630	500	400
2500/4	1252	1000	800	1000	800	630	800	630	500
3150/5	1400	1250	1000	1250	1000	800	1000	800	630

Formulas

Belt Length	Belt Speed in Feet per Minute	Max Product Weight on Belt at any one Time
When pulleys are approximately the same size $L=(D+d)/2 \times 3.1416 +2C$ When one pulley is much larger than other(atleast 3 times larger) $L+(D+d)/2 \times 3.1416 +2C +((Dd)2)/4C$	$S = D \times RPM \times 2618 \times 1.021$	When load is known per square foot: $P + G1 \times C \text{ (in feet)} \times W \text{ (in feet)}$ When Load is known by lbs. per hour: $P= G2 / (S \times 60(\text{minutes})) \times C \text{ (feet)}$
Horsepower to Drive a Conveyor Belt	Effective Tension	Tight Side Tension
For level conveyors: Load $HP= (F \times S \times (P+M))/33,000$ For inclined conveyors: $HP= ((P \times B) + (P+M) \times F \times S)/33,000$	(pull need to move belt and load horizontally) $E = F \times (P+M)$	(total tension to move belt and load horizontally) $E2= E + E1$
	Effective Tension	Tight Side Tension
	(addition tension required to prevent slippage on pulley drive)	(determines working strength of belt to handle job on per inch width basis) $T= E2 / W$

Key Symbols

B	Sine of angle of include HP Horse Power	G1	Load per sq. Or cu. Ft. (lbs.) W Belt Width (inches)
C	Centre to centre distance (inches) K Drive factor (see table 2 below)	G2	Load per hour (lbs.)
D	Diameter drive pulley (inches) L Belt length (inches) d Diameter tail pulley (inches) M Belt weight (overall length not c2c)	HP	Horse Power
E	Effective tension (lbs.) P Product weight (lbs.)	K	Drive factor (see table 2 below)
E1	Slack side tension (lbs.) RPM Revolutions per minute	L	Belt length (inches)
E2	Tight side tension (lbs.) S Speed feet per minute	M	Belt weight (overall length not c2c)
F	Coefficient of friction (see table 1 below) T Operating tension PIW (lbs.)	P	Product weight (lbs.)
		RPM	Revolutions per minute
		S	Speed feet per minute
		T	Operating tension PIW (lbs.)
		W	Belt Width (inches)

Table 1 – Coefficient of Friction			Table 2 – Drive factor F				
Belt to slider bed or rollers			Screw belt wrap on	Gravity or	Take-up	Weighted	Takeup
Belt	Steel or Aluminium	Metal Rollers	Drive Pulley	Bare	Lagged	Bare	Lagged
Fs pulley side	.30 to .35	.10 to .15	180°	1.6	1.0	.84	.5
Bare Duck or BB side	.20 to .25	.10 to .15	180°	1.2	.6	.62	.35
Cover on pulley side	.50 to .55	.10 to .15	180°	1.0	.5	.547	.3