



POLYSUR<sup>®</sup> FERRO  
STEEL CORD  
REINFORCED  
ELEVATOR BELT

Steel cord reinforced elevator belts, designed for heavy duty and high heat industrial applications with long centre distances.

Assuring optimum performance and maximum life.

## POLYSUR® FERRO STEEL CORD BELT FOR BUCKET ELEVATORS

Polysur® Ferro steel cord reinforced elevator belts are designed for heavy duty industrial applications with long centre distances, requiring straight running and reliability with high safety factors. Their construction and characteristics differ from those of traditional steel cable belts. Their steel cord carcass consists of low elongation, yet high elasticity steel cords in the length and cross rigid cables in the width, all embedded in a solid rubber mass that can not delaminate. The built-in elasticity allows running over lightly crowned pulleys while the rigid weft construction warrants excellent straight tracking. Manufacturing norms: DIN 22102, DIN 22131-C and ISO norms.



Polysur® Ferro elevator belts has been Muller Beltex's registered trademark for elevators since 1973 specially manufactured for the use in belt bucket elevators, to withstand the belt deformation when forces are at play during operation. This apart from the characteristics of the material conveyed that have an effect on the belt. Polysur® Ferro stands for durability in performance and life expectation and is available in normal and high temperature resistant qualities and offer excellent life in the most arduous applications.

## SOLID PARTNERS FOR POWDER & BULK HANDLING COMPONENTS

Your service and knowledge supplier of reliable components for the bulk handling and process industry

**Based on know-how and vast field experience the Polysur® Ferro range offers following belt qualities**

### **Polysur® Ferro T60**

a very good abrasion resistant quality, based on SBR rubber for use at ambient temperature of +60°C.

### **Polysur® Ferro T100**

an improved version of the above suitable for product temperature of +100°C.

### **Polysur® Ferro T130**

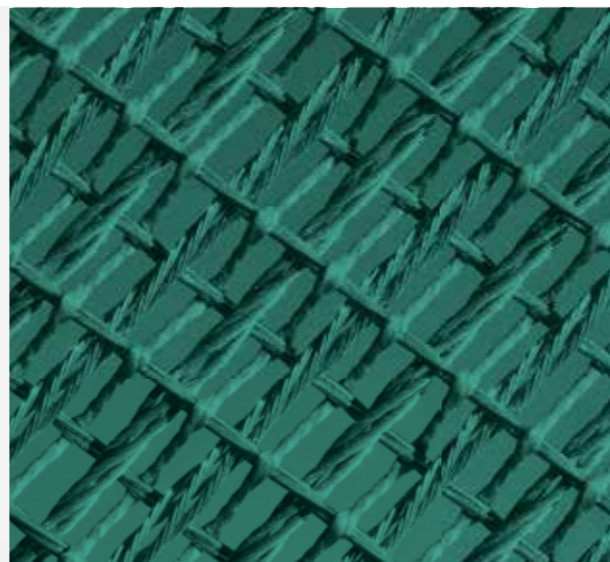
based on EPDM rubber, suitable for product temperatures up to +130°C.

### **Polysur® Ferro T150**

based on EPM rubber, suitable for product temperatures up to +130°C. **plus**

### **Polysur® Ferro G**

suitable for handling oily and fatty product at ambient temperatures up to +80°C.



NO CONCESSIONS  
TO THE  
QUALITY OF  
THE RUBBER



## MULLER BELTEX RUBBER TECHNOLOGY POLYSUR® FERRO

### Heat resistant elevator belts

Rubber belts are usually factory produced in a vulcanisation press at a temperature of approx. 145-150° C., sometimes at a somewhat higher temperature to accelerate the vulcanisation process. When the vulcanising temperature is lowered, the vulcanising process is slowed down, but will still continue.

Rubber in its fresh un-vulcanised state is like putty. Once vulcanised most synthetic rubbers will show a hardness of 60-70° shore A with usually a +/- 5° tolerance. Depending on belt thickness and rubber type, the vulcanisation process in the factory will take 20-45 minutes per pressing, which is usually 10-20 meters, the length of the press. Longer exposure of the belt to the vulcanisation temperature will lead to increased hardness of the belt.

Once a belt is installed in the conveying equipment and exposed to a temperature higher than normal ambient, the vulcanisation process will continue, the hardness of the rubber continues to increase. Exposure, continuous or intermittent, to temperatures close to, or higher than the vulcanisation temperature shall further and more rapidly continue the hardening process, the aging of the belt.

Heat resistant rubbers are not really 'heat resistant', but 'resist aging better' than normal rubber qualities. If they were truly heat

resistant, they would not age, not harden any further, under heat influence.

Permanent exposure of heat resistant rubber belts to temperatures approaching or exceeding their manufacturing temperatures (145-150°C.) should be avoided. Only when a belt is allowed to properly cool down in the return section, the effect of heat on the aging of the belt can be partly reduced.

### Inside the elevator casing

In the enclosed environment inside bucket elevators the cooling ability of a belt is very limited. The reigning air temperature in the system is usually on the high side compared to the temperature surrounding overland belt conveyors. Due to lack of a cooling airflow inside the elevator casing, the heat penetrating the belt inside the elevator casing has a hardening, vulcanising effect on the rubber belt.

Factors that aid the hardening process of a belt are: any ambient and product temperature over +80°C., temporary increased temperatures of the product handled (peak temperatures), increased volume of product handled, increased operating hours, reduced cooling airflow in the system, or a combination of these factors. Chemical elements in the product handled can also have a direct hardening effect on the belt (e.g. sulphur).

### Thickness and strength of the belt

As soon as a belt reaches a hardness of 85° shore A the covers will start to show cracks and at 90° shore A the rubber covers will lose their adhesion to the steel cables. The belt must soon be replaced. At a hardness of 85° shore A it is advisable to consider obtaining a spare belt in stock.

The resistance to ageing of an elevator belt can be improved by increasing the thickness of the rubber covers on both faces of the belt. The thicker cover will allow less heat penetration into the core of the belt that means that also the reduction in adhesion of

the rubber covers to the steel cables shall occur at a slower pace, resulting in later loss of rubber from the steel cables. Belts with minimum 4 mm covers are recommended, preferably 5 mm.

The choice of thickness of the rubber covers on an elevator belt also depends on the belt strength class. The strength class of the belt is chosen because of the load the belt has to carry, consisting of its own weight and bucket and product weight. If that total weight is so high that a very strong belt is required, this total weight spread over a belt area half the pulley circumference causes the steel cables in the belt to exercise a high pressure load on the rubber belt cover when passing the drive pulley.

This high pressure can lead to weakening a thin rubber cover, or weaken its adhesion to the cables. A thicker rubber layer will be able to better support a higher load than a thin layer of rubber, avoiding internal weakening of the belt and avoiding the slow process of the cover rubber splitting under the pressure. A higher number of cables supporting the total weight is to be preferred to a smaller number of cables, spreading the load per cable.

#### TECHNICAL SPECIFICATIONS

Rubber quality	Hardness: original (-/+5°)	90 days continuous exposure at +125°C.	90 days continuous exposure at +150°C.
T130 EPDM	67° A	78° A	86° A
T150 EPM	68° A	74° A	77° A

Lab test during 3 months at a constant temperature in an oven (no mechanical load or friction) shows above results

# MULLER BELTEX RUBBER TECHNOLOGY POLYSUR® FERRO SW-RE

## The construction of the SW-RE steel carcass

Polysur® Ferro belts are constructed with Fleximat® E-cords, flexible, specially designed straight warp, open type steel cords with built-in elasticity in the warp direction, onto which rigid weft cords are tied using a special weaving technique.

This special weaving technique means that neither warp nor weft cords are in any way deformed, but both lay perfectly straight all over the belt length resulting in maximum strength performance and high resistance to damage.

## Unique feature

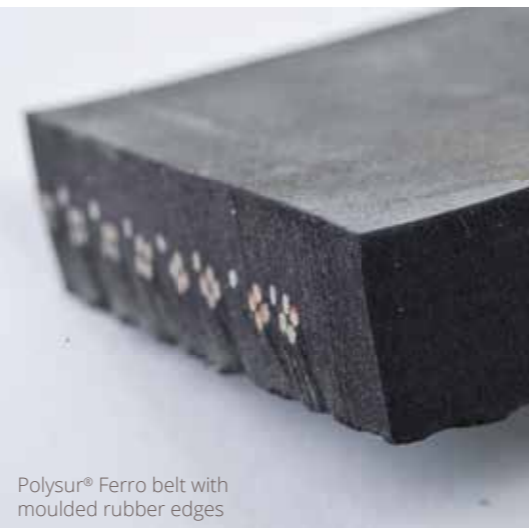
Polysur® Ferro SW-RE elevator belts display only max. 0.35% permanent elongation at maximum permissible working load (at safety factor 10), ensuring constant belt tension even at long centre distances. As an unique feature these E-cords show an elastic elongation of 0.15%, increasing shock resistance and allowing the belts to run over lightly crowned pulleys.

The elastic elongation is the 'give' in the belt, the variation in length when subjected to a load variation between 20% and 100% of the maximum permissible load at 10-fold safety factor.



## Advantages of the open e-cords in belt length (warp)

- highly flexible
- low permanent elongation max. 0.35% at 10-safety factor
- unique elastic elongation 0.15%
- improved shock resistance
- improved compression behaviour
- allows maximum rubber penetration
- minimising corrosion risk in case of belt damage; very high rubber to steel adhesion



Polysur® Ferro belt with moulded rubber edges



Polysur® Ferro SW2000RE carcass

## Advantages of the open e-cords in belt width (weft)

- very cross rigid and dense weft construction with cords of 1.29 mm diam. at 6.67 mm pitch
- acts as a barrier to ripping and tearing
- increases bucket bolt holding ability
- minimises risk of bucket bolts slitting through the belt
- produces a very cross rigid belt that offers excellent straight running abilities
- allows light pulley crown further improving straight running



SW1250RE carcass embedded in rubber



Warp E-cord



Rubber penetration in the steel cord.

## TECHNICAL SPECIFICATIONS - POLYSUR® FERRO SW-RE

Strength	Construction	Belt thickness	Min. pulley	Appr. weight
SW630RE	3+3 mm	11 mm	Ø 1400 mm	15,21 kg/m <sup>2</sup>
SW800RE	3+3 mm	12 mm	Ø 1500 mm	17,20 kg/m <sup>2</sup>
SW1000RE	3+3 mm	13 mm	Ø 1500 mm	17,93 kg/m <sup>2</sup>
SW1250RE	4+4 mm	14 mm	Ø 1630 mm	22,37 kg/m <sup>2</sup>
SW1400RE	4+4 mm	14 mm	Ø 1630 mm	23,12 kg/m <sup>2</sup>
SW1600RE	4+4 mm	14 mm	Ø 1630 mm	23,97 kg/m <sup>2</sup>
SW1800RE	4+4 mm	14 mm	Ø 1630 mm	24,67 kg/m <sup>2</sup>
SW2000RE	4+4 mm	14 mm	Ø 1800 mm	25,17 kg/m <sup>2</sup>
SW2500RE	5+5 mm	17 mm	Ø 1000 mm	27,71 kg/m <sup>2</sup>
SW2750RE	5+5 mm	17 mm	Ø 1000 mm	28,70 kg/m <sup>2</sup>

Recommended minimum covers, other combinations are possible. Thicknesses and weights are approximate.

min. belt width 250 mm

min. belt length 50 meter (exception 450 and 550 mm SW1250RE 4+4 mm T130)

max. width 2000 mm

max. length depending on coil weight



Polysur® Ferro SW-RE carcass during production

## TECHNICAL SPECIFICATIONS - BELT CARCASS SW-RE (E-CORD) CONSTRUCTION

Strength	Warp cords	Pitch	Weft cords	Pitch
SW630RE	Ø 2.00 mm	4.63 mm	Ø 1.29 mm	6.67 mm
SW800RE	Ø 2.85 mm	6.67 mm	Ø 1.29 mm	6.67 mm
SW1000RE	Ø 2.85 mm	5.38 mm	Ø 1.29 mm	6.67 mm
SW1250RE	Ø 3.90 mm	7.04 mm	Ø 1.29 mm	6.67 mm
SW1400RE	Ø 3.90 mm	6.25 mm	Ø 1.29 mm	6.67 mm
SW1600RE	Ø 3.90 mm	5.50 mm	Ø 1.29 mm	6.67 mm
SW1800RE	Ø 3.90 mm	5.00 mm	Ø 1.29 mm	6.67 mm
SW2000RE	Ø 3.90 mm	4.65 mm	Ø 1.29 mm	6.67 mm
SW2500RE	Ø 4.35 mm	6.33 mm	Ø 1.29 mm	6.67 mm
SW2750RE	Ø 4.35 mm	5.71 mm	Ø 1.29 mm	6.67 mm

# MULLER BELTEX RUBBER TECHNOLOGY POLYSUR® FERRO SW-R/RE

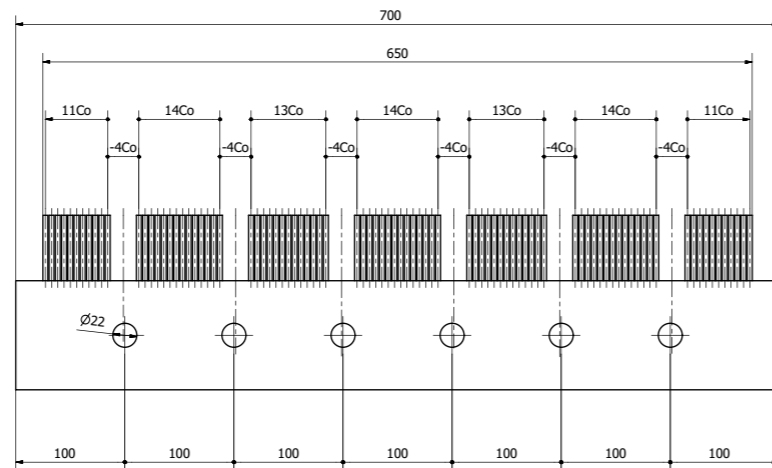
## The construction of the SW-R/RE steel carcass

Polysur® Ferro belts are constructed with Fleximat® conventional specially designed straight warp cords with minimum elasticity in the warp direction, onto which rigid weft cords are tied using a special weaving technique. These single layer steel cord elevators belts have been specially designed for belt bucket elevators with a very high long centre distance and bigger capacities.

This special weaving technique means that neither warp nor weft cords are in any way deformed, but both lay perfectly straight all over the belt length resulting in maximum strength performance and high resistance to damage.

## Advantages of the conventional steel cord belt in belt length (warp)

- still highly flexible
- max. 0.15% elastic elongation at safety factor 10
- suitable for elevators with a long centre distance
- the belt of choice for very high capacities



Drawing of a 'cable free zone' belt with bucket bolt hole layout supplied with order

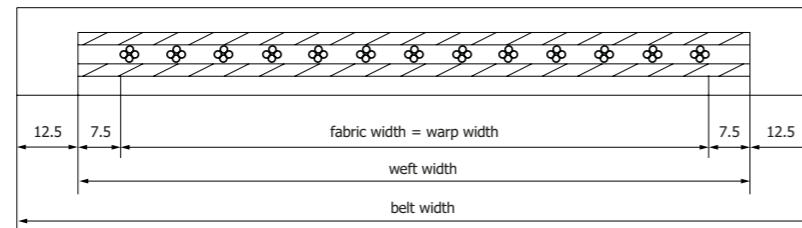
TECHNICAL SPECIFICATIONS - STANDARD BELT SW-R/RE (CONVENTIONAL-CORD) CONSTRUCTIONS				
Strength	Construction	Belt thickness	Min. pulley	Appr. weight
SW3000R/RE	5+5 mm	17 mm	Ø 11000 mm	30,20 kg/m <sup>2</sup>
SW3200R/RE	5+5 mm	17 mm	Ø 11000 mm	31,14 kg/m <sup>2</sup>
SW3500R/RE	5+5 mm	17 mm	Ø 11000 mm	32,82 kg/m <sup>2</sup>
SW4000R/RE	5+5 mm	17 mm	Ø 11000 mm	34,69 kg/m <sup>2</sup>

Recommended minimum covers, other combinations are possible. Thicknesses and weights are approximate.



Conventional warp cord

- min. belt width 250 mm
- min. belt length 50 meter (exception 450 and 550 mm SW1250RE 4+4 mm T130)
- max. width 2000 mm
- max. length depending on coil weight



Polysur® Ferro 'cable free zone' carcass during production

Polysur® Ferro SW-R/RE 'cable free zone' carcass

## Crowning of pulleys

Polysur® Ferro SW-R/RE elevator belts display a max. 0.15% elastic elongation at safety factor 10, ensuring constant belt tension at very long centre distances. Still this belt construction allows the belt to run over slightly crowned pulleys. Please consult Muller Beltex to advise you on the crowning of your pulleys.

## Advantages of the rigid cords in belt width (weft)

- very cross rigid and dense weft construction with cords of 1.29 mm diam. at 6.67 mm pitch
- acts as a barrier to ripping and tearing
- although the SW-R/RE belt construction require 'cable free zones' in the belt, due to the weft cables in the belt, the elevator bucket bolts can not shift in the belt in case of an obstruction in the boot of the elevator and therefore increases bucket bolt holding ability and minimises risk of bucket bolts slitting through the belt
- produces a very cross rigid belt that offers excellent straight running abilities
- allows very small pulley crown to further improving straight running



Loading a Polysur® Ferro elevator belt with crane in a 20' ft. open top container

TECHNICAL SPECIFICATIONS - BELT CARCASS SW-R/RE (CONVENTIONAL-CORD) CONSTRUCTION				
Strength	Warp cords	pitch	Weft cords	pitch
SW3000R/RE	Ø 5.20 mm	9.00 mm	Ø 1.29 mm	6.67 mm
SW3200R/RE	Ø 5.20 mm	8.33 mm	Ø 1.29 mm	6.67 mm
SW3500R/RE	Ø 5.20 mm	7.35 mm	Ø 1.29 mm	6.67 mm
SW4000R/RE	Ø 5.20 mm	6.50 mm	Ø 1.29 mm	6.67 mm

MULLER BELTEX  
VISION,  
EXPERTISE  
& QUALITY

The Polysur® Ferro elevator belt can be supplied ready drilled (steel cord belting) with bucket bolt holes according to a detailed Autocad drawing of the exact pattern. There is also an indication on the belt showing bucket and pulley side, one or two belt ends prepared for fitting the belt fastener, tools for preparing belt ends on site to fit the belt fastener, protective packaging and an elevator belt fitting manual.

Polysur® elevator belts are provided with a Polysur® logo after each 20 meter of elevator belt.



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