



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

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

Ensuring optimum performance and maximum life.



# MULLER BELTEX LEADING INTERNATIONAL SERVICE AND KNOWLEDGE SUPPLIER OF HIGH-QUALITY BUCKET ELEVATOR COMPONENTS



## SOLID PARTNERS FOR POWDER & BULK HANDLING COMPONENTS

The highest quality components to achieve the longest service life, prevent unexpected stops and increase capacity

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In the early 60's Muller Beltex was among the very first on the market with full synthetic rubber elevator belting for the animal feed processing plants and from that point on developed a wide range of reliable belt qualities to serve the industrial and agricultural industry. Together with a wide range of additional bucket elevators components and a vast field experience, we are able to provide products and services with the aim to achieve maximum durability and reliability of customers' equipment.

At Muller Beltex, we are all belting people and approach bucket elevators from a belt point of view, since the elevator belt is the most critical item in a bucket elevator and when operating it is subjected to various loads.

For that reason we offer a full service in providing capacity calculations and we engineer the most economic design recommendations for upgrading existing bucket elevators or for constructing new elevators. We present innovative solutions to reduce maintenance, prevent spillage, downtime, wear and improve efficiency. All according to the Total Cost of Ownership (TCO) concept. Our service is dedicated to provide the customer the lowest cost per tonne of processed product.

We operate worldwide with a network of 'Solid Partners'. These distributors are carefully selected and trained, which enables us to provide overall high-quality service to our international markets. They are experienced and understand how bucket elevators operate. But more important, they understand the heavy duty industry and customer demands so, offering a customised and sustainable solution with a maximum service life for a specific application.

Our focus on bucket elevators combined with a long history, an excellent track record and broad field experience has taught us that the heavy duty industry demands the utmost performance of the components used. Higher loads, longer centre distances, higher temperatures and tough applications require specific knowledge, and a different approach and solution. Involve us at an early stage so that we can offer the right solution.

The information provided in this brochure may contain inaccuracies or typographical errors. The information in this brochure is changed periodically. Information may be updated or modified at any given moment. For specific questions about the information in this brochure, please contact Muller Beltex.

## APPROACHING BELT BUCKET ELEVATORS FROM A BELT POINT OF VIEW

What lies at the heart of optimal and safe bulk processing is the elevator belt: to us, the elevator belt is the key. This is the most critical item in a bucket elevator and when operating subjected to various conditions.

Heavy duty industry demands the utmost performance of the components used in elevators. Higher loads, longer centre distances, higher temperatures and tough applications require specific knowledge, and a different approach and innovative solutions.

For that reason we offer experience, know-how and a complete range of components for belt bucket elevators.



BY NEVER COMPROMISING  
ON QUALITY, THE BEST  
POSSIBLE SOLUTION WITH  
A MAXIMUM SERVICE  
LIFE AND INCREASED  
CAPACITY IS ENSURED.



## OVERVIEW COMPONENTS FOR BELT BUCKET ELEVATORS



- 1 Polysur® Ferro steel cord elevator belt
- 2 Elevator buckets
- 3 Elevator bolts
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- 5 Drive pulley
- 6 Return pulley
- 7 Pulley lagging
- 8 Junction box large
- 9 Junction box small
- 10 Belt misalignment monitoring
- 11 Speed monitoring system
- 12 Product level sensor

## 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 cannot 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**

Polysur® Ferro elevator belts have been Muller Beltex's registered trademark since 1973 and are specially manufactured for use in belt bucket elevators, to withstand the belt deformation that occurs 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 quality, oil- and fat resistant quality and high temperature resistant qualities and offer excellent life in the most arduous applications.

SPECIALLY DESIGNED  
FOR USE IN HEAVY  
DUTY BELT BUCKET  
ELEVATORS



**DESIGNED  
ENGINEERED**  
by Muller Beltex

Based on know-how and vast field experience the Polysur® Ferro range offers the 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 continuous operating temperatures of +100°C.

### **Polysur® Ferro T130**

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

### **Polysur® Ferro T150**

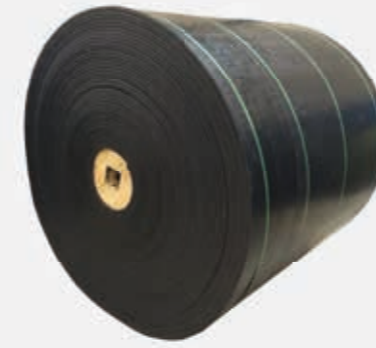
based on EPM rubber, suitable for continuous operating temperatures up to +130°C. **plus**

### **Polysur® Ferro G**

suitable for handling oily and fatty product at continuous operating 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 unvulcanised 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 an elevator belt is allowed to properly cool down in the head and return section of the elevator, 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 often 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.

**polysur®ferro**

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, reducing 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 BELT TECHNOLOGY POLYSUR® FERRO SW-RE

## The construction of the SW-RE steel carcass

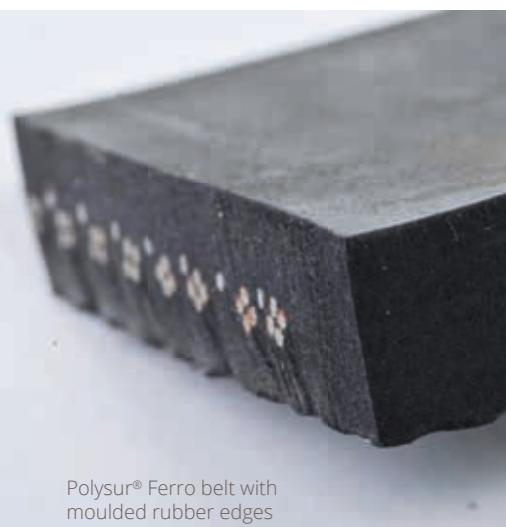
Polysur® Ferro belts are constructed with Fleximat® E-cords, flexible, specially designed straight warp, open type steel cords with built-in elasticity in the warp direction, onto which rigid weft cords are tied using a special weaving technique.

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.

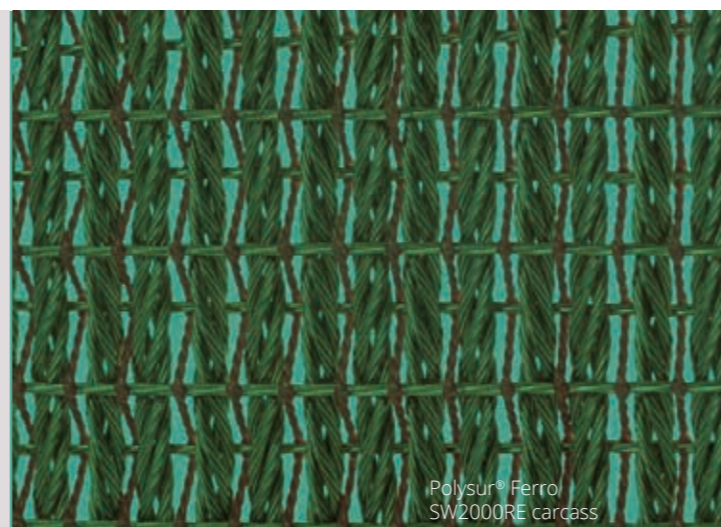
The elastic elongation is the 'give' in the belt, the variation in length when subjected to a load variation between 20% and 100% of the maximum permissible load at 10-fold safety factor.



Polysur® Ferro belt with moulded rubber edges

## 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



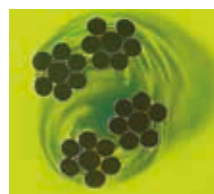
Polysur® Ferro SW2000RE carcass

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

- very cross rigid and dense weft construction with cords of Ø 1.29 mm 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 (E-CORD) CONSTRUCTION				
Strength	Construction	Belt thickness	Min. pulley	Appr. weight
SW630RE	3+3 mm	11 mm	Ø 400 mm	15,21 kg/m <sup>2</sup>
SW800RE	3+3 mm	12 mm	Ø 500 mm	17,20 kg/m <sup>2</sup>
SW1000RE	3+3 mm	13 mm	Ø 500 mm	17,93 kg/m <sup>2</sup>
SW1250RE	4+4 mm	14 mm	Ø 630 mm	22,37 kg/m <sup>2</sup>
SW1400RE	4+4 mm	14 mm	Ø 630 mm	23,12 kg/m <sup>2</sup>
SW1600RE	4+4 mm	14 mm	Ø 630 mm	23,97 kg/m <sup>2</sup>
SW1800RE	4+4 mm	14 mm	Ø 630 mm	24,67 kg/m <sup>2</sup>
SW2000RE	4+4 mm	14 mm	Ø 800 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 elevator belt 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 BELT TECHNOLOGY POLYSUR® FERRO SW-R/RE

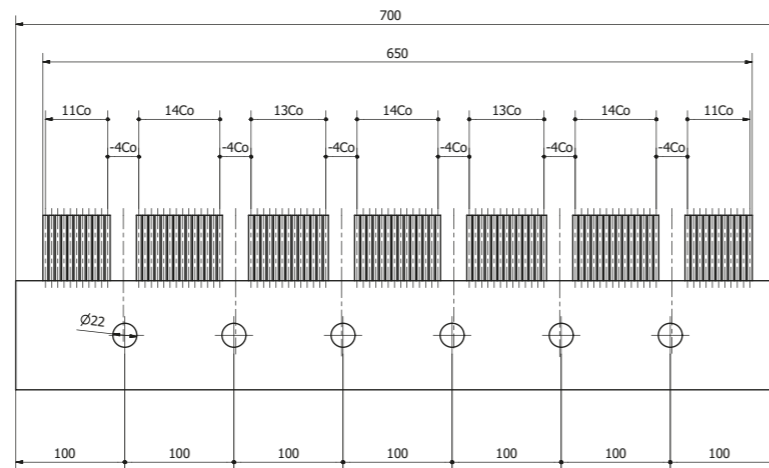
## The construction of the SW-R/RE steel carcass

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

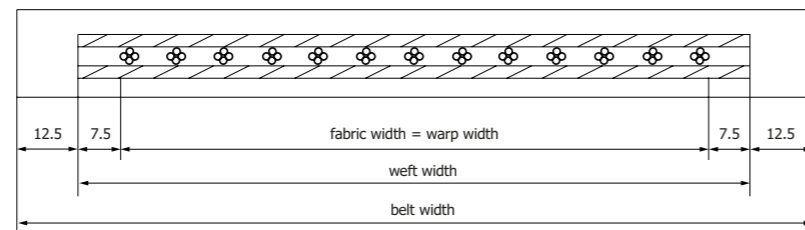
TECHNICAL SPECIFICATIONS - POLYSUR® FERRO SW-R/RE (CONVENTIONAL-CORD) CONSTRUCTION				
Strength	Construction	Belt thickness	Min. pulley	Appr. weight
SW3000R/RE	5+5 mm	18 mm	Ø 1000 mm	30,20 kg/m <sup>2</sup>
SW3200R/RE	5+5 mm	18 mm	Ø 1000 mm	31,14 kg/m <sup>2</sup>
SW3500R/RE	5+5 mm	18 mm	Ø 1000 mm	32,82 kg/m <sup>2</sup>
SW4000R/RE	5+5 mm	18 mm	Ø 1000 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
- max. width 2000 mm
- max. length depending on coil weight



Polysur® Ferro 'cable free zone' elevator belt 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 Ø 1.29 mm at 6.67 mm pitch.
- Acts as a barrier to ripping and tearing.
- The SW-R/RE belt can be drilled with bolt holes right through the steel cord carcass by means of a dry drilling process but can also be supplied with cable free zones in the belt. Due to the weft cables in the cable free zone belt, the elevator bucket bolts cannot 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 crowning to further improving straight running.



Loading a 8.2 tons Polysur® Ferro elevator belt with crane in a 20' ft. open top high cube container

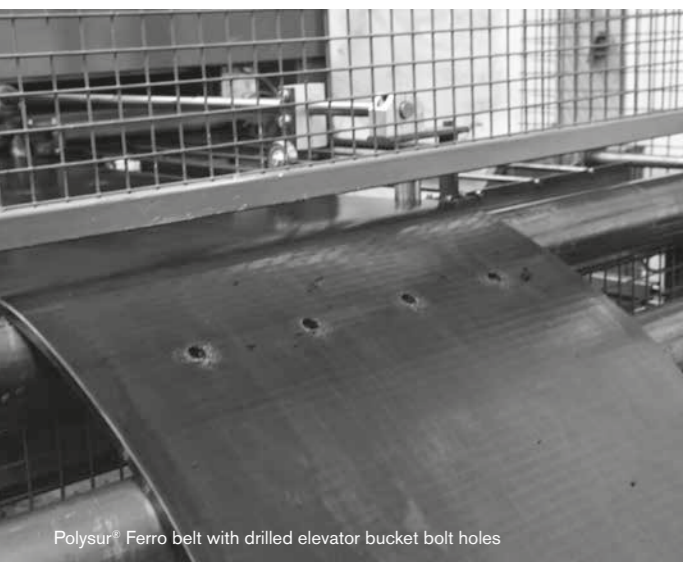
TECHNICAL SPECIFICATIONS - BELT CARCASS SW-R/RE (CONVENTIONAL-CORD) CONSTRUCTION				
Strength	Warp cords	Pitch	Weft cords	Pitch
SW3000R/RE	Ø 5.20 mm	9.00 mm	Ø 1.29 mm	6.67 mm
SW3200R/RE	Ø 5.20 mm	8.33 mm	Ø 1.29 mm	6.67 mm
SW3500R/RE	Ø 5.20 mm	7.35 mm	Ø 1.29 mm	6.67 mm
SW4000R/RE	Ø 5.20 mm	6.50 mm	Ø 1.29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



## ELEVATOR BUCKET BOLT HOLES IN POLYSUR® FERRO BELTS

### Automatic CNC bolt hole drilling machine dry process

Polysur® Ferro belts are usually supplied complete with bucket bolt holes. Holes for bucket bolts in our SW-RE and SW-R/RE belts are cut through full warp and weft cord carcass on an automatic cutting machine suitable for handling belts up to 2000 mm width. To order, bolt holes for the clamp fasteners can be cut into one belt end, or if exact belt working length is known, holes for clamp bolts can be cut into both belt ends.



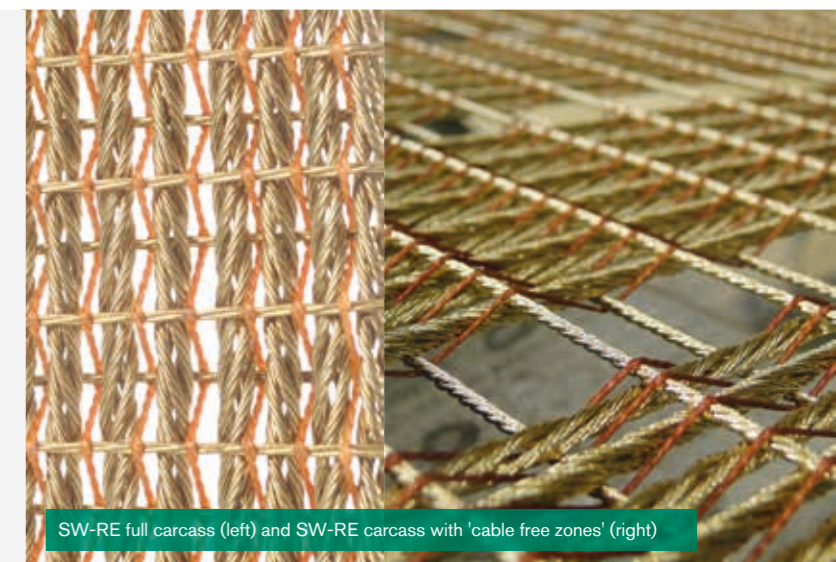
Polysur® Ferro belt with drilled elevator bucket bolt holes



Fully automatic bolt hole drilling/punching machine up to belt width 2000 mm

### Cable free zones (optional)

Polysur® Ferro belts in SW-RE construction can also be supplied with cable free zones in the belt as our belts with SW-R/RE steel cords construction. Please note that the 'cable free zones' belts still have weft cords. The bolt hole drilling process is a dry process, no water will come near the cut cords preventing them from corroding.



SW-RE full carcass (left) and SW-RE carcass with 'cable free zones' (right)



Decoiling the Polysur® Ferro belt in the CNC bolt hole drilling machine



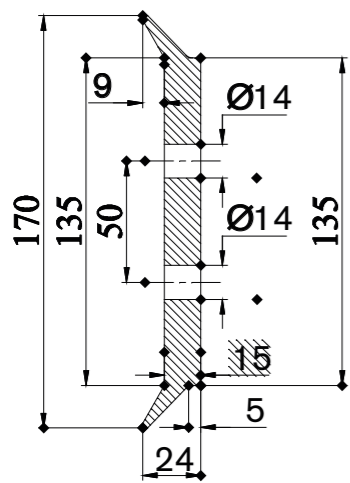


## RUBBER INSULATION PADS FOR USE BETWEEN THE BUCKET AND BELT

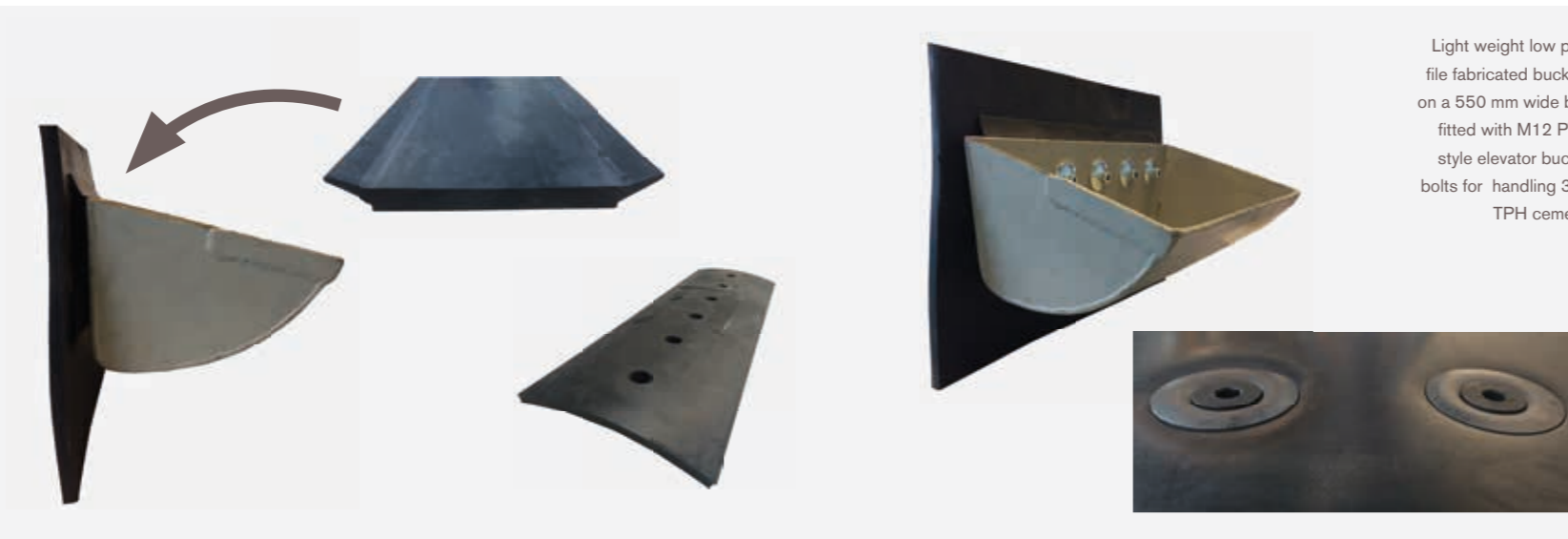
In industrial belt bucket elevators, heavy steel welded buckets are fitted on the belt. When the bucket travels over the drive pulley, a lot of forces and friction will be inflicted upon the elevator belt when the bucket reaches his highest point on the drive pulley (12 o'clock). The heavy elevator bucket will have a grinding effect on the surface of the elevator belt. To prevent the surface of the elevator against this wearing effect, a rubber insulation pad is fitted between the elevator bucket and the elevator belt as a wear rubber. This rubber pad will also prevent that the conveyed product gets trapped between the elevator bucket and the belt, because trapped product will also damage the rubber covers of the elevator belt.

### Hot product in the elevator bucket

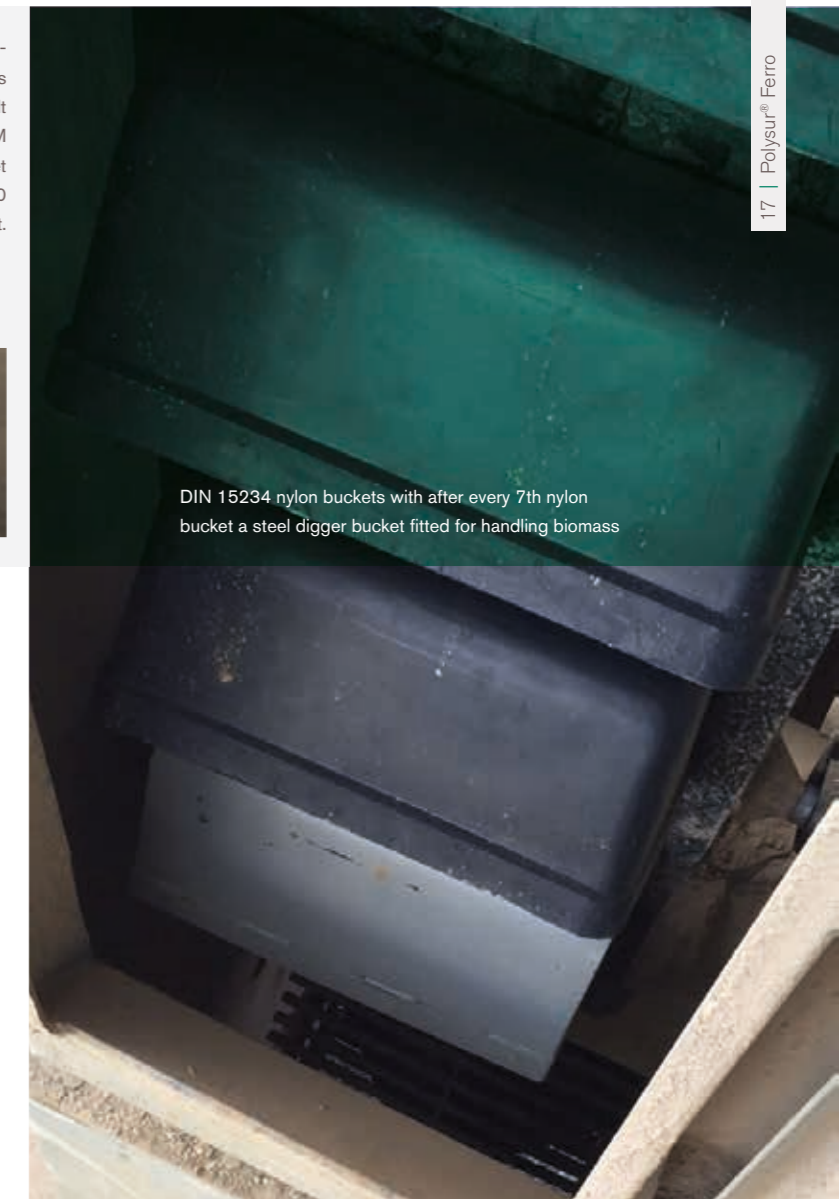
When the elevator bucket has to convey hot product, the thick heavy steel elevator buckets will not cool down easily and will radiate its heat upon the belt surface. Its therefore recommendable to insulate the hot elevator bucket from the elevator belt, by using an EPDM or EPM rubber insulation pad of around 8 mm in thickness between the elevator bucket and the elevator belt.



Our rubber insulation pads are available in EPDM and EPM rubber and can be rectangle flat insulation pads or profiled rubber. Please contact a Muller Beltex representative for advice and technical specification.



Light weight low profile fabricated buckets on a 550 mm wide belt fitted with M12 PTM style elevator bucket bolts for handling 300 TPH cement.



DIN 15234 nylon buckets with after every 7th nylon bucket a steel digger bucket fitted for handling biomass

### Elevator buckets

Buckets are foreign objects to the belt and the weight of buckets plays a role in the degree of injury they do to the belt. Also the method of attachment of buckets to belt is important as this also may cause damage to the belt. The lighter a bucket the less pressure it exercises on the belt and the least wear a bucket causes to the belt.

We offer all types of fabricated buckets as per various DIN specifications 15231, 15232, 15233, 15234 and 15235 or as per customer drawing. Besides the above well-known types, often used in rather heavy construction, and fitted at relatively large pitch, we have available light weight buckets that allow closer stacking on the belt, resulting in high capacities.

These smaller and lighter buckets are often suitable to replace heavy existing buckets fitted at larger pitch. Please consult our technical department for recommendations.

### Advantages of light weight buckets

- Fitted at shorter pitch reduce digging resistance in the boot.
- Reduces wear to the belt.
- Buckets cool down quicker.
- Buckets are easier to replace, lighter to handle.
- Less dead weight on the belt.
- More flexible will bend before being torn off the belt.

Ideally, to assure long belt life, light weight and flexible buckets made of high grade engineering plastic would improve belt life. Plastic buckets are available in polyethylene, polyurethane and polyamide (nylon) however plastic buckets have a temperature limitation of approx. 100°C and can only be used for cold product in handling sand and gravel, minerals, wood chips, fertilisers, grain and cereals. They are very abrasion resistant, non stick, relatively flexible and light weight and offer high capacities. The plastic bucket can be supplied with a steel digging lip, bolted to the bucket.

### Elevator bucket bolts

To fit elevator buckets standard DIN 15237 bolts are available in zinc, carbon black or steel quality. The quality choice depending on type of material conveyed.

Bolts are supplied standard with concave washer and standard hex nut. On request locknuts are available also in heat resistant quality type 980V. The special M12 bolts with  $\varnothing$  50 mm bolt head will provide 20-25 % increased holding ability compared to the standard M12 bolt with  $\varnothing$  42 mm bolt head.

#### AVAILABLE SIZES DIN 15237

M12 x 55 mm bolt head  $\varnothing$  42 mm

M12 x 60 mm bolt head  $\varnothing$  42 mm

M12 x 65 mm bolt head  $\varnothing$  42 mm

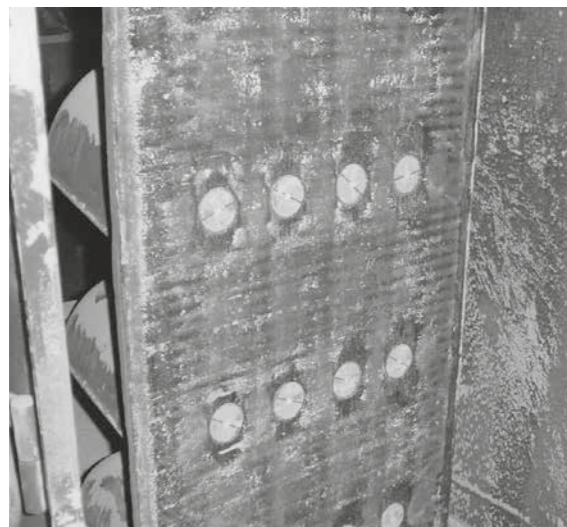
M12 x 55 mm bolt head  $\varnothing$  50 mm (PTM style 10.9 grade)

Standard Grade 4.6 ex stock

All sizes are available in various lengths and are preferably to be used with an allen key in the head, facilitating fitting and undoing, and with a locknut or lock washer.



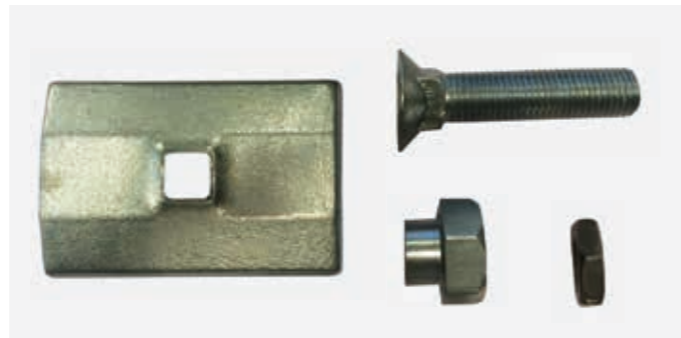
Bolt M12 with  $\varnothing$  50 mm bolt head covers 25% more warp and weft cables than standard  $\varnothing$  42 mm bolt head resulting in a stronger bucket to belt attachment.



DIN 15237 elevator bolts shown on the back of the belt.



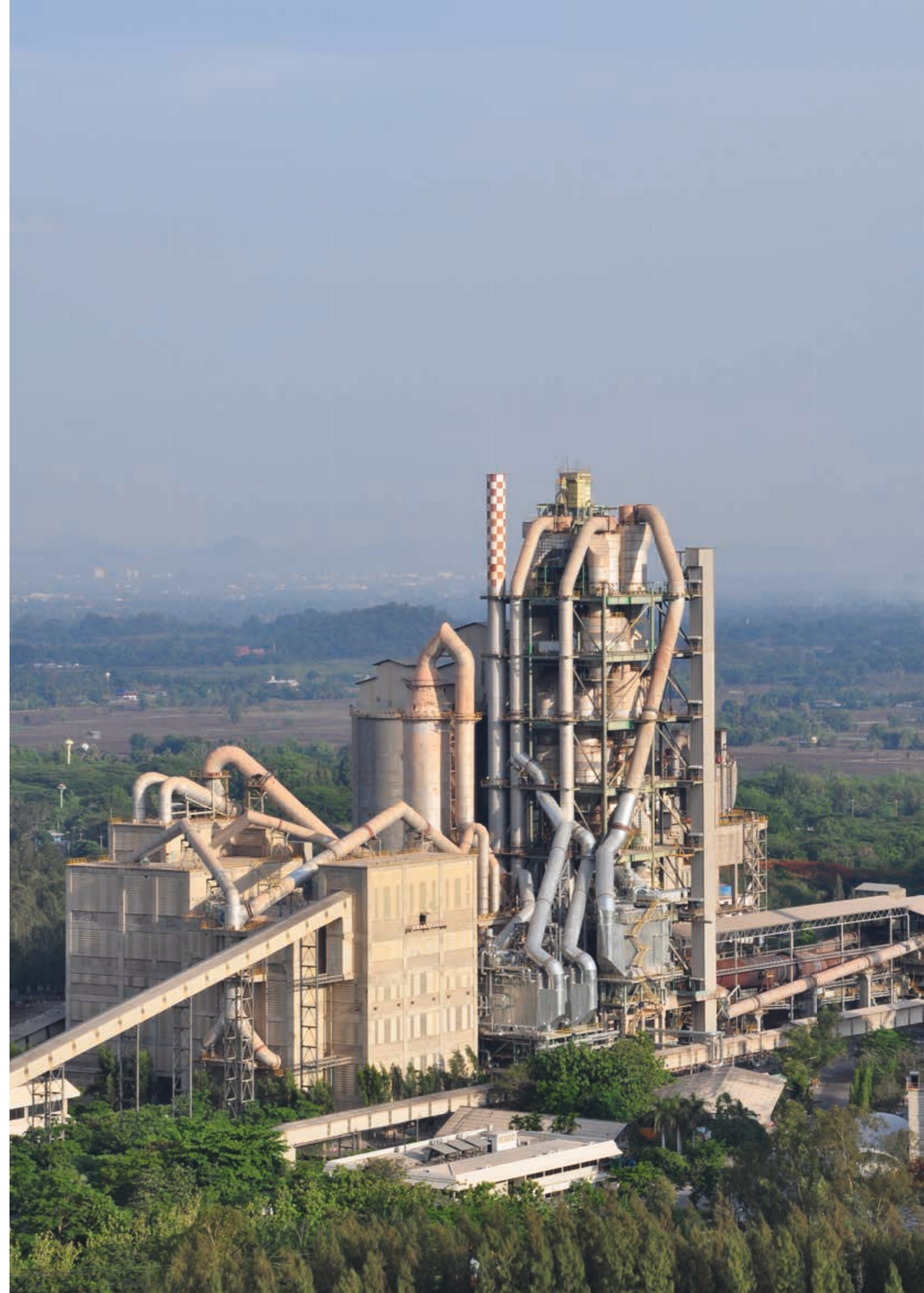
M12 bolt DIN 15237 grade 4.6 with  $\varnothing$  42 mm bolt head zinc with allen key.



M16 bucket elevator bolt set for elevator buckets with a mounting rail on the back of the bucket.



PTM style M12, 10.9 grade elevator bolt with  $\varnothing$  50 mm bolt head and allen key. Complete with heat resistant M12 DIN 980V locknut.





Polysur Solid® belt fastener shown with single steel vice-part



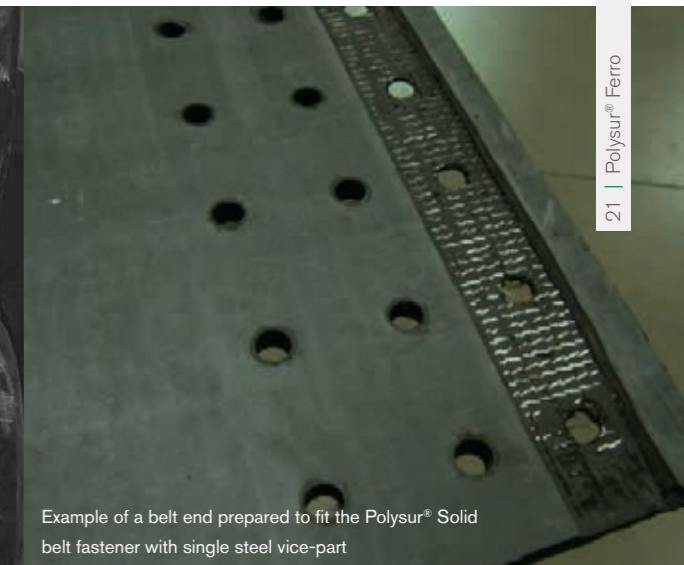
1  
for gross belt strength  
630 up to 2000 N/mm  
with single steel vice-part

2  
for gross belt strength 2500  
up to 2750 N/mm with  
double steel vice-part

3  
for gross belt strength  
3000 up to 4000 N/mm  
with triple steel vice-part



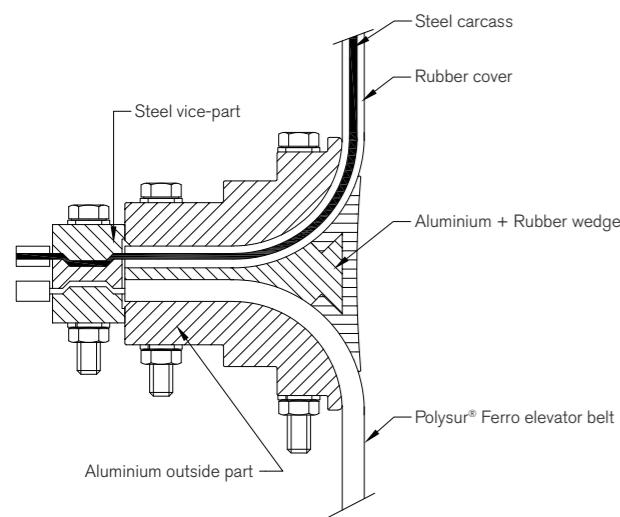
Polysur® Solid belt fastener shown with double steel vice-part



Example of a belt end prepared to fit the Polysur® Solid belt fastener with single steel vice-part

## BELT FASTENER FOR STEEL CORD REINFORCED ELEVATOR BELTS

The belt fastener, buckets and bucket bolts, attached to the belt, are in a sense foreign objects that do injury to the belt due to the pressure these parts exercise onto the belt while running over the pulleys. Every elevator belt will first develop wear and tear in those areas where these foreign objects are attached to the belt, whether the application is hot or cold. To avoid such premature wear, in particular in the cement industry, the belt should have maximum temperature resistance and the attachments should be as light as possible.



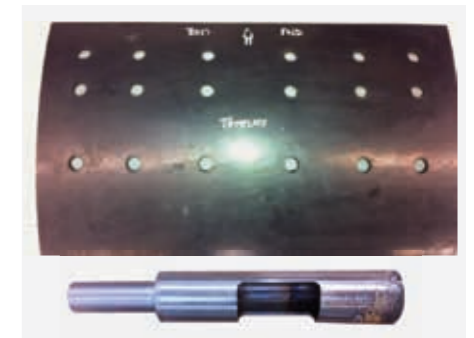
Cross section of the Polysur® Solid belt fastener with a single steel vice-part

### The belt fastener

Polysur® Ferro belts are preferably made endless with the Polysur® Solid belt fastener. This is a heavy duty mechanical clamping device with a three piece construction made of high quality aluminium and an additional steel vice-grip section.

The working is based on clamping forces and friction. The belt ends are bend off around a 75 mm radius and 90° angle. A central wedge part supports the clamp when riding over the pulleys. This central wedge part is equipped with a rubber section on the pulley side intended to prevent wear of the belt due to the pressure and friction when running over the pulleys. For belt constructions ranging up to 2000 N/mm the Polysur® Solid belt fastener with single steel vice-part can be used. From 2500 up to 2750 N/mm a fastener with a double steel vice-part and from 3000 up to 4000 N/mm one with a triple steel vice-part.

## BELT FASTENER FITTING TOOLBOX SERVICE IS INCLUDED IN OUR COMPONENTS



Rubber template and diamond tipped drill-bit for preparing other belt end on site



Muller Beltex Polysur® Solid belt fastener with single steel vice-part shown from pulley side. Please note the heat resistant rubber section on the central wedge part of the belt fastener which functions as a wear rubber



Complete toolbox for preparing other belt end on site to fit the Polysur® Solid belt fastener



Electric groove cutting tool for fitting the single, double or triple steel vice-part

### Belt fastener information

- Rubberised wedge section suitable for use up to +150°C.
- For temperatures exceeding +150°C the rubber segment is replaced by an available aluminium part.
- Clamp is supplied with M16 or M18 bolts in a variety of strength classes depending on belt strength.
- Polysur® Solid belt fastener are made of special aluminium and are noncorroding in normal operating conditions, and non-sparking.

- The belt fasteners are individually designed and the pitch of the bolt holes in the clamp is intended to match as much as possible the pitch of the bolt holes in the buckets, so as to avoid loss of belt strength.
- Templates required to drill belt fastener bolt holes in a belt end during fitting on site are included.
- The Polysur® Solid fastener is re-usable. It can be opened up and closed again by only changing the bolts, washers and nuts.
- A complete toolbox required to prepare the belt end on site for fitting the Polysur® Solid belt fastener can be offered.

A Muller Beltex supervisor can be made available at cost to guide local technicians in fitting a belt and belt fastener.

## PUSHING THE ENVELOPE ON BELT BUCKET ELEVATORS

Today's elevators are getting taller and taller. This requires an elevator belt which is suitable for this specific application so safe and reliable operating of the elevator is guaranteed. At Muller Beltex we have designed and engineered a range of elevator belts and matching belt fasteners which meets these demands.



Test rig at Mennens

### Test-set up

- Polysur® Ferro SW4000R/RE 5+5 mm T130-quality elevator belt installed in a specially manufactured test frame. Elevator belt wrapped around 2 x Ø 220 mm pulleys
- Belt width 270 mm, weft width 235 mm, fabric width/warp width 220 mm
- 4000 N/mm gross fabric strength
- Warp cords Ø 5.20 mm
- Warp cord breaking load average 28400 N
- Warp cord breaking load minimum 26700 N
- Warp cord break. Elongation 2.5%
- Warp cord pitch 6.50 mm
- Weft cords Ø 1.29 mm
- Weft cord breaking load average 1925 N
- Weft cord breaking load minimum 1775 N
- Weft cord pitch 6.67 mm
- Polysur® Solid belt fastener 270 mm wide containing 3 rows of M18 class 10.9 bolts at C/C \*80\*80\* mm. Total amount of bolts in the belt fastener is 12 pcs.
- The 270 mm wide elevator belt is containing a total of 33 warp cords
- In total 12 warp cords have been cut due to the belt fastener bolt holes that have been drilled in the belt to fit the Polysur® Solid belt fastener. For each M18 bolt hole 4 pcs. of warp cords are lost, which leaves a total of 21 pcs. of warp cords that not have been cut
- M18 class 10.9 belt fastener bolts torqued each at 360 Nm
- Pull test is done in stages. After every 100 kN 30 seconds rest

### Belt fastener test

Polysur® Solid belt fastener with triple steel vice-part fitted on a Polysur® Ferro steel cord reinforced SW4000R/RE 5+5 mm T130-quality elevator belt tested until breakage at certified test facility Mennens BV in Dongen, The Netherlands (NEN-EN ISO 9001:2015 and NEN-EN ISO 14001:2015).

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by Muller Beltex

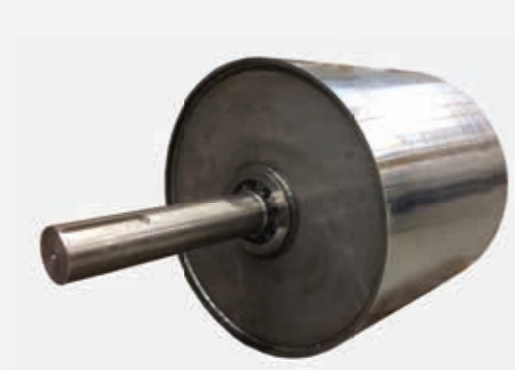
polysur<sup>®</sup>solid



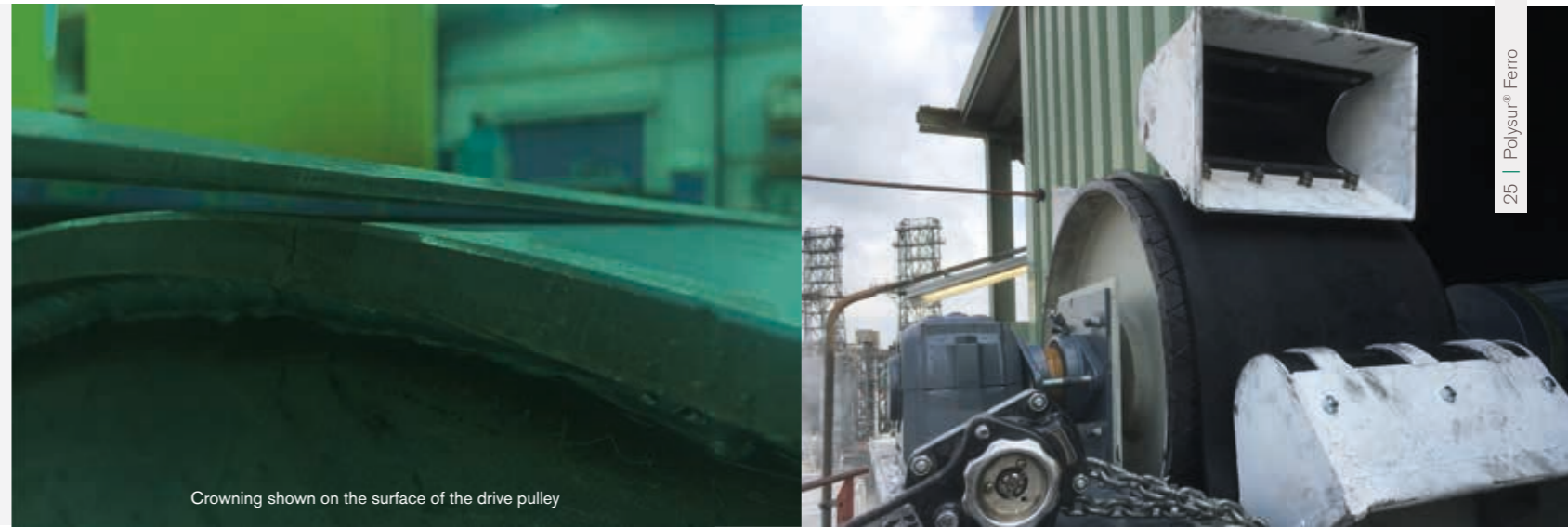
Specially manufactured test set-up



Elevator head section with drive pulley with 'Metallag' sintered all metal pulley lagging



Muller Beltex drive pulley



Crowning shown on the surface of the drive pulley

## DRIVE AND RETURN PULLEYS

We offer a range of pulleys made to individual order specifications, as spare parts for elevators, whereby special attention will be given to details such as product size handled and crowning in order to avoid belt damage or excessive stresses on buckets and belt.

## CROWNED PULLEYS

Generally, steel cable belts should run over cylindrical pulleys. Crowned pulleys cause the cables in the centre of the belt to overstretch and break, and broken cables cause internal damage to the belt.

Polysur® Ferro belts are manufactured with unique E-cords showing 0.15% elastic elongation, besides the 0.35% permanent elongation, and therefore they allow a low crowning on the pulleys to assist the straight tracking of the belts.

On a 1000 mm pulley diameter e.g. Polysur® Ferro belts with E-cords accept a crown on radius of 2 mm maximum.

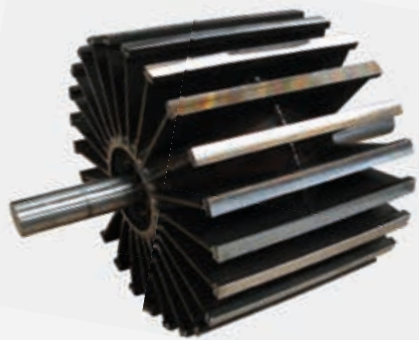
The construction of Polysur® Ferro belts is already very cross rigid, thanks to the 1.29 mm diameter weft cables at 6.67 mm pitch, alternating on both belt faces, which in itself already warrants straight running.

When using our SW-RE or SW-R/RE Polysur® Ferro belts, please consult our technical department for crowning recommendations.

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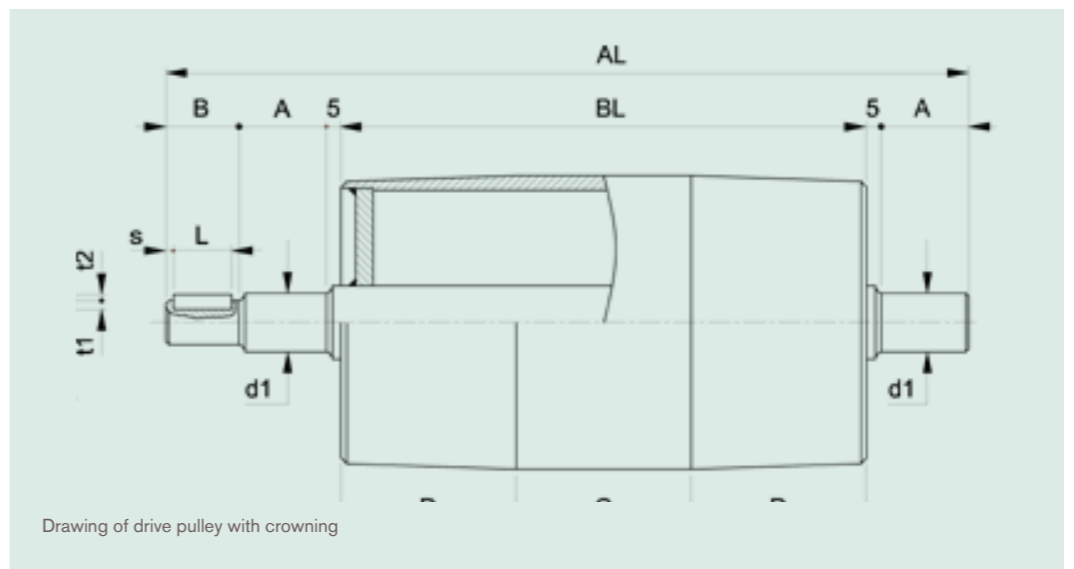
Muller Beltex bar boot pulley



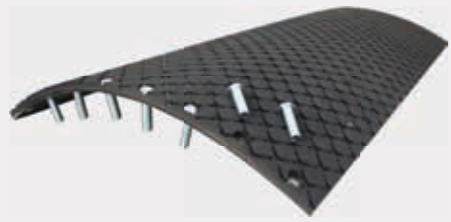
Muller Beltex wing boot pulley



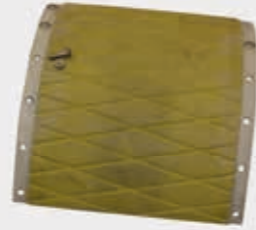
Dust-free elevator boot



Drawing of drive pulley with crowning



Diamond shaped rubber lagging on preformed steel segments bolted to the rim of the pulley



Ceramic on preformed steel segments to be bolted to the rim of the drive pulley



'Metallag' sintered metal segments preformed to pulley face.

### Pulleys and pulley laggings

Pulley laggings are often a 'must' to ensure that the drive pulley can exercise a positive grip on the belt due to friction.

In some high heat product handling elevators, the drive pulleys are lagged with rubber lagging. These laggings are also exposed to the high ambient temperature present in the elevator casing and they will suffer deterioration.

Rubber laggings are usually glued to the steel pulley face and the glue also has a temperature limitation. As part of the Polysur® Ferro range, we offer special pulley laggings for low and high heat applications, or fat and oily operating conditions.

### Various types of lagging are available

- Diamond profile rubber sheet glued onto preformed steel segments bolted to the rim of the pulley, available in normal rubber or in oil resistant quality. temperature limitation of +90°C.
- Ceramic on preformed metal segments bolted to the rim of the pulley face.
- 'Metallag' preformed metal segments with sintered all metal surface layer that are bolted to the rim of the pulley face, very good belt grip, no temperature limitation and minimum wear and recommended for high heat applications and extreme long life.



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## MULLER BELTEX 'FAIL SAFE' BUCKET ELEVATOR SAFETY MONITORING SYSTEM

A belt bucket elevator is an enclosed system. This means you can't see what's going on in the elevator during operation. Therefore, when the mechanical side of the elevator is secured, it is important to monitor the production process. Muller Beltex provides high quality safety monitoring systems which exist out of the following components to monitor a complete belt bucket elevator:

- Belt misalignment monitoring
- Belt speed monitoring
- Level monitoring



Product level indicator sensor to measure possible flooding of the elevator boot and blockages in the bucket elevator feeding chute and outlet (2 pcs. needed per bucket elevator)



Rub-Block stainless steel belt misalignment sensor. 2 on each side in the elevator head section and 2 on each side in the elevator boot section



Heavy duty belt speed sensor for monitoring shaft under speed and belt slip (1 needed per bucket elevator)



Junction box large with cable screw terminal (also available with head-transmitters 4-20 mA or digital converters) for connecting Rub-Block belt misalignment sensors, product level indicator sensors and belt speed sensor (2 pcs. needed per bucket elevator)



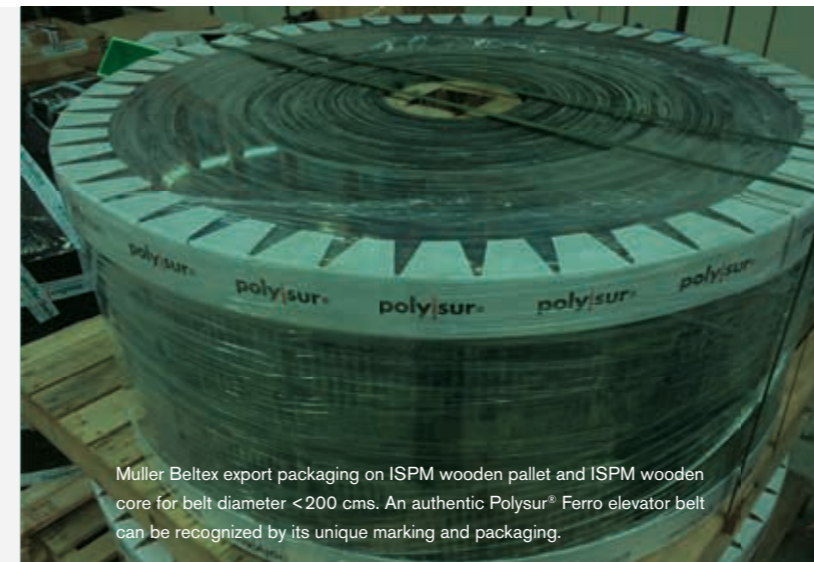
Nylon abrasion shield (+150° C.) for protecting the product level indicator sensors (2 pcs. needed per bucket elevator)

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## MULLER BELTEX EXPORT MANAGEMENT

In the bulk and process industry downtime is very costly. Our large stock of products ensures flexibility and means we can supply quickly, anywhere in the world. Our knowledge of and experience with logistics and transport ensures that export, including all documentation and handling, is always properly organised. This ensures your delivery is on time.

We are making sure that all our products are packed and marked for good protection, safe and easy handling.



Muller Beltex export packaging on ISPM wooden pallet and ISPM wooden core for belt diameter <200 cms. An authentic Polysur® Ferro elevator belt can be recognized by its unique marking and packaging.



Muller Beltex technical service engineer on site during supervision



Muller Beltex heavy duty export packaging for elevator belts with a coil diameter >200 cms.



Muller Beltex export packaging of additional bucket elevator components like rubber insulation pads, elevator bucket bolts, elevator belt fastener, etc.



Special fabricated steel frame made to order.

## MULLER BELTEX ENGINEERING, ADVICE AND SUPERVISION

We offer a full service in providing capacity calculations and engineer most economic design recommendations for upgrading existing bucket elevators or constructing new elevators with the aim to unlock the potential of your bucket elevators, by improving the duration of your belt life and other components to achieve maximum durability.

A Muller Beltex supervisor can be made available at cost to guide local technicians in fitting a belt and belt fastener.

### For an engineering proposal for existing elevators, please provide us with the following information

- Product type being transported;
- Product density;
- Ambient temperature in the elevator during production;
- Weight of an empty elevator bucket;
- Quantity of bolt holes per elevator bucket and bolt size;
- Elevator height measured centre shaft drive- and boot pulley;
- Belt speed or pulley RPM;
- Width of the elevator belt;
- Pulley diameter and face width;
- Motor capacity (kW);
- Capacity (tons per hour).

### For new elevators please advise following details

- Product type being transported;
- Product density;
- Capacity (tons per hour);
- Elevator height measured centre shaft drive- and boot pulley;
- Ambient temperature in the elevator during production



## READY DELIVERED PRODUCT

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



MULLER BELTEX  
VISION,  
EXPERTISE  
& QUALITY



**muller|beltex**

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