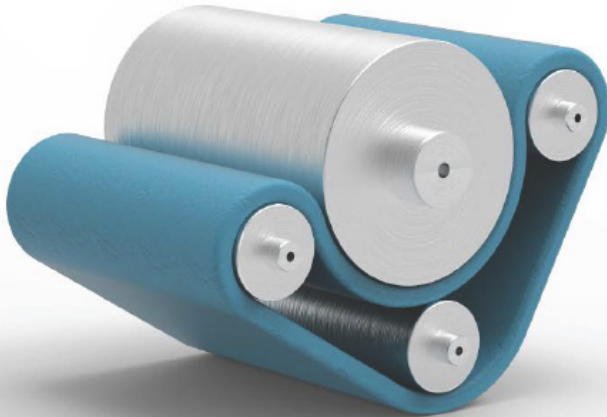


# HANNESH<sup>®</sup>SHRINK

*rubber belts*



## Hanneshrink<sup>®</sup> shrinking belts manual

- ▶ User instruction
- ▶ Maintenance advice



# Shrinking Belts

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# Characteristics

## ► Dimensional

- Inside circumference: 3962 mm.
- Usual thickness: 50 and 67 mm.
- Thickness tolerance: +2 mm / -1 mm (without tension on the belt).
- Width tolerance: +20 mm / -10 mm (without tension on the belt).

## ► Hardness

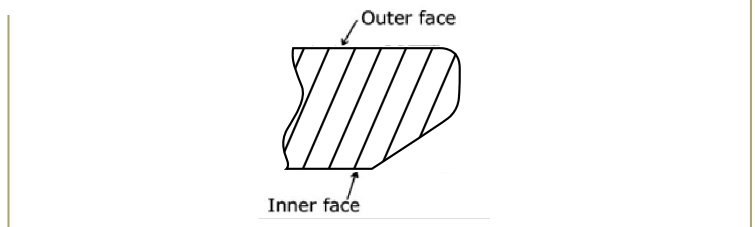
- Nominal hardness:  $38 \pm 3$  ShA

## ► Rubber belt tensioning marks

Each belt is marked on the 2 edges as below. The distance between the 2 marks is equivalent to 305 mm, initial position for the tensioning of the belt. Refer to chapter commissioning.

|      **305** → **312 mm**      |

## ► Edge profile



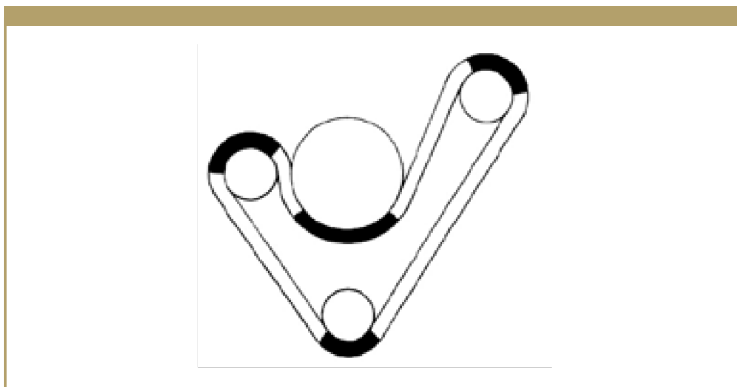
# Storage

Leave the belt in its original packing and store it in a ventilated and tempered area.

The storage period before fitting and use of the belt on the machine doesn't exceed 15 months after the manufacturing (or invoice) date of the belt.

If for any reason, the belt should remain on the machine during shutdown exceeding 8 to 10 days, it is recommended:

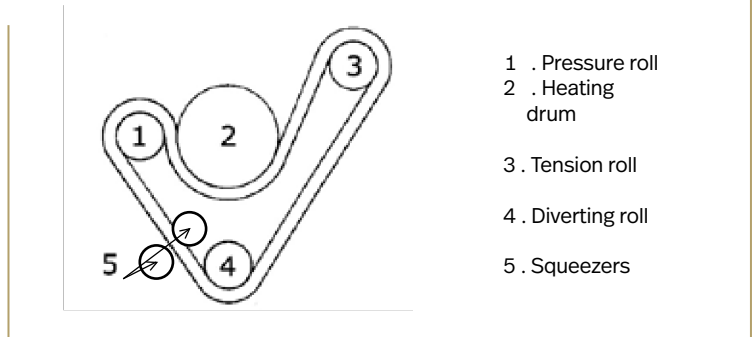
- ▶ To clean carefully the belt inside and outside.
- ▶ To remove the tension.
- ▶ o drain the eventual cooling device located under the belt.
- ▶ o remove aside the scraper blades under the cooling device.
- ▶ o cover the belt with a protective envelop (plastic films or fabric for example).
- ▶ To move manually the belt each 15 days in order to relieve the strain points as described below to avoid cracks appearance.



- ▶ To grind imperatively the belt before starting again the production.

# Installation

## ► Machine general design:



Remove the belt from its original packing and inspect it inside and outside.

Disassemble the rolls 1, 3, 4 and 5.

Inspect the surface conditions of these 4 rolls as well as the heating drum.

Install a handling and protective platform covered with several layers of fabric under the heating drum.

Place the belt on this platform and insert it under the heating drum.

### **Note:**

- Take preventive measures to protect the belt during these operations.
- Put some talc powder inside the belt in order to facilitate the rolls slipping on the belt inner face.
- Wrap the rolls 1,3 and 4 with several layers of fabric.

Insert the rolls 1, 3 and 4 in the belt.

Introduce these rolls into their respective bearing seats by successive manipulations and fix them in the following order: 4, 1 and 3.

Check and adjust the parallelism between all the rolls (1, 3, 4 and 5).

### **Note:**

- Reinstall the guiding rollers leaving a gap of 10 mm on both sides of the belt edges.
- Adjust the rollers orientation as a function of the contour of the belt edges, so that it is held flat.

# Commissioning

**Important: the operations described below must be carried out imperatively in the following chronological order.**

## ► Belt tensioning

---

Move the identification and tension mark, on both edges of the belt, from initial position (305 mm) to 312 mm representing an elongation of 2.3% of the belt development.

This operation must be carried out with the identification marks positioned between the rolls 3 and 4 as described below.

Let the belt run at 10 m/min for about 5 min.

Check the 312 mm value again and adjust if necessary.

The necessary belt tension can vary slightly from one belt to another but in any case don't exceed 315 mm.

Check carefully that the belt doesn't vibrate at the usual working speed.

In case of vibration, adjust slightly the tension.

**Note:**

After each grinding check the tension value and readjust if necessary.

## ► Belt compression

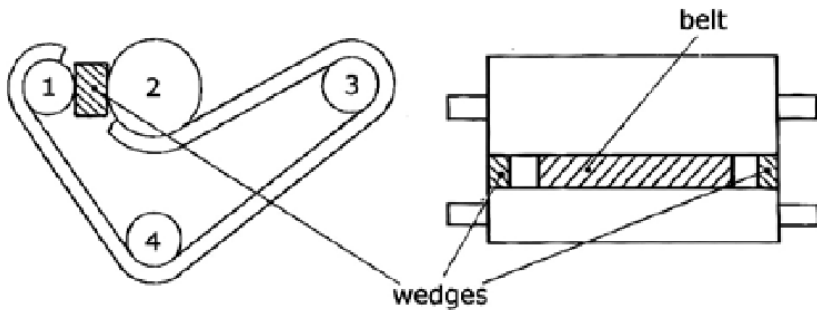
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Measure the belt thickness on the section between the rolls 3 (tension roll) and 4 (diverting roll) and at least 50 mm from the edges of the belt.

Determine the "zero point": it is obtained by adjusting the distance between the pressure roll 1 and the heating drum 2 to the belt thickness value measured under tension.

**The zero adjustment is made:**

- ▶ With a wedge adjusted to the belt thickness value under tension.
- ▶ On both sides of the belt in a reachable area between rolls 1 and 2 (pressure roll and heating drum).

**Note:**

these measurements ensure the parallelism between the rolls as well.

### ▶ Belt guiding and stabilization

Let run the belt at approximately 10 m/min and check its position with respect to the guiding rollers, cooling device inside and outside of the belt opened.

**Note:**

The belt usually moves from left to right and vice versa, or can even remain in slight contact with the roller on one side if this roller can be easily stop with hand. Heat the drum at working temperature (not exceeding 2.5 bars). The belt is stabilized and ready for use only if it doesn't vibrate.

### ▶ Grinding before start-up of the production

Refer to chapter "Maintenance recommendations" for the procedure.



## Working parameters

The working parameters strongly depend of the treated fabrics and the type of treatment desired.

## Temperature

### 1. Heating drum

The recommended temperature range of the heating drum is 120°C to 140°C corresponding to a maximum pressure of 2.5 bars (See the table below).

Steam pressure (bars)	Steam temperature (°C)
0.5	112
1.0	120
1.5	128
2.0	132
2.5	138
3.0	142
3.5	147

Recommended working temperature

### 2. Rubber belt

It is important that the temperature on the rubber belt itself, measured on the area directly in contact with the heating drum, doesn't exceed 90°C. To ensure a better protection of these areas against temperature, it is possible to use some wax sold by Hannecard. See the procedure in the chapter "Annexes".

## ► Compression

This parameter is adjusted from the “zero point”.

The compression on the rubber doesn't exceed 25% of the residual thickness of the belt (See the table below).

Residual belt thickness (mm)	Maximum recommended compression (mm)
71	18
69	17.5
67	17
65	16.5
63	16
61	15.5
59	15
57	14.5
55	14
53	13.5
51	13
49	12.5

## ► Speed

The working speed depends of the type of treatment desired (shrinkage, touch...).

## ► Cooling

---

The rubber belt cooling outside and inside is essential and must be sufficient to maintain, under all working conditions, a maximum rubber surface temperature of 90° C; the cooling device efficiency is directly depending from the water flow rate and temperature.

It must be homogeneous over the entire width of the belt, especially on the area directly in contact with the heating drum.

The inside cooling is also used for lubricate the inside face, this one should always be open and in correct operating function.

## ► Squeezing rollers

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The load applied on these rollers must be sufficient to prevent excessive rises of water.

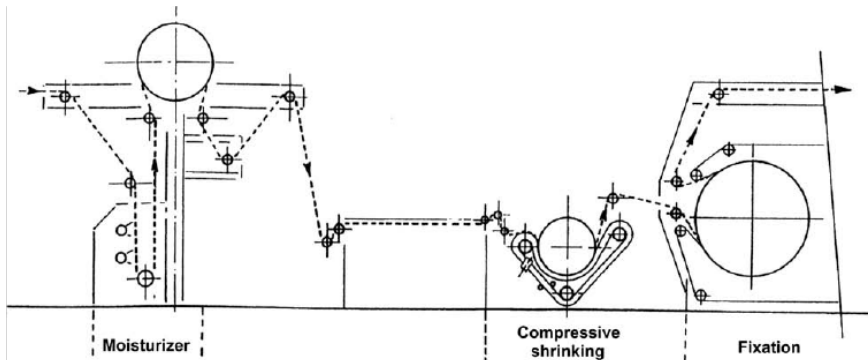
Check the cleanliness of the roller surface as well as the parallelism between the 2 rollers.

# recommendations

# Usage

Due to our long experience in the compressive shrinking market, we know that a right adjustment of the working parameters is essential for the process reliability.

## ► Describing of a compressive shrinkage line



## ► Different type of applications

### **Type of treatment**

- Shrinkage
- Shrinkage + touch
- Overdraw correction
- Shrinkage + visual aspect (brightness)

### **Type of treated fabrics**

- ▶ Type of base treated weft and warp fabrics, open or tubular knitted fabrics, non woven
- ▶ Fibers component  
cotton, cotton/PES, cotton/polyamide, viscose, linen, synthetics
- ▶ Fabrics weight  
from 50 to 600 g/m<sub>2</sub>
- ▶ Fabrics weave  
weft and warp: cloth, serge, satin...  
Knitted: jersey, interlock, cote...
- ▶ Finished products destination  
clothing  
household linen (belt sheets, napkins...)  
furnishing (curtains, wall covering...)  
technical fabrics (tents, tarpaulin...)

## **Parameters influencing the shrinkage rate**

---

- ▶ Fabrics preparation
- ▶ Fabrics entrance in the shrinking element
- ▶ Shrinking element adjustments
  - rubber belt tension
  - rubber belt compression
  - temperature
  - speed
  - rubber belt cooling efficiency
  - squeezing rollers load
- ▶ Fabrics output from the shrinking element

### **Fabrics preparation**

The fabric must be conditioned before its introduction into the shrinking element.

### Moisture

The fabric moisture rate before entering the shrinking element must be higher than the normal moisture rate recovered by the stored fabric, i.e. minimum 15% humidity.

### Preheating

It is recommended for fabrics containing a high percentage of synthetic fibers or highly finished to obtain a correct shrinkage rate.

### Fabric tension

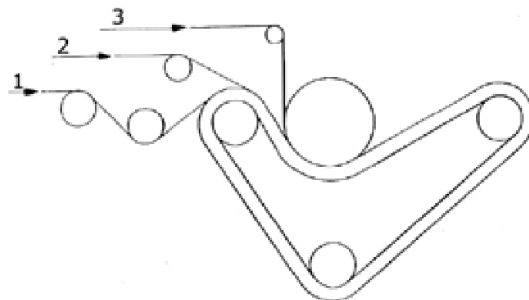
The introduction processes can be different according to the different machines but in any case:

- Introduce the fabric completely flat.
- Avoid any floating edges.
- Adjust the fabric tension to its characteristics (structure, composition).

### **Fabrics entrance in the shrinking element**

The shrinkage rate obtained is depending upon how the fabric makes contact with the belt before entering the shrinking element.

1. Maximum contact with the upper side of the belt
2. Limited contact with the upper side of the belt
3. Direct introduction at the compression point (no contact with the belt)



Unfortunately, there is no way to determine the ideal choice except trial on the machine.

### Shrinking element adjustments

For basic adjustments, refer to chapter “commissioning”.

For particular adjustments, refer to chapter “malfunctions – causes and corrective actions”.

The limit working parameters for the Hanneshrink® rubber belt can be summarized as below:

Tension: **2.3 % (305 mm to 312 mm)**

Heating drum temperature: **< 145°C**

**< 2.5 bars**

Compression: don't overpass **25% of the belt residual thickness**

Grinding frequency: **500 000 à 1 200 000 m depending of the type of fabrics (see instructions on grinding section)**

Grinding depth: **0,8 mm to xx mm depending the state of the surface**

### Fabrics output from the shrinking element

The fabric must be relaxed without tension. This relaxation allows:

- To keep the obtained shrinking rate, only finally fixed after passing through the dryer.
- To obtain the desired shrinking rate with a minimum of compression on the rubber belt, improving by the way its life time.

### Diverse

We strongly recommend providing an accumulator (J-Box) at the entry and issue of the line to avoid frequent stops of the machine causing an increase of temperature on the belt detrimental to its service life.

Pay attention to the synchronization of the different elements of the line.

Check regularly the obtained shrinking rate.

# Maintenance recommendations

## ► Preventive

---

Check regularly the following points:

### **Inner and upper side surface aspect:**

- Roughness (welts, orange peel, finishing or calcareous deposits...).
- Cracks, holes, bubbles.
- Deformation (corrugations, hollows, depressions, micro-tears, flats).
- Deterioration (discoloration, yellowing, darkening).
- Deposits.

### **Hardness**

- In and out the working width.

### **Geometry**

- Flatness.
- Surface profile.
- End profile on the edges.

## ► Curative

---

### **Products to be used**

For the belt

- Scouring powder type Ajax - Vim - Ata... (named Solution A).
- Soft cold water (pH 7) at room temperature.

For the mechanical components

- Pure acetic acid diluted at 50% with water at 20° C (named Solution B).
- Scotch Brite or Jex pad.
- Gasoline "F", ethyl acetate or toluene (named Solution C).



## Using procedures

### Solution A

To be used in case of sticky surface of the inner or outer side of the rubber belt.

- Bring the belt and the heating drum to a maximum temperature of 30°C.
- Close the inside and outside cooling devices.
- Spray evenly the scouring powder on the inner or/and outer face of the belt slightly humid.
- Let the belt run with a compression of about 4 mm at 15 to 20 m/min for minimum 15 min.
- Open the cooling devices to rinse the belt during minimum 5 min.
- If necessary, recommence the operation a second time.

### Solution B

To be used in case of calcareous deposit on the heating drum or squeezing rollers surface.

- Cool the heating drum at 20°C.
- Coat its surface with the acetic acid solution using a soaked cloth.
- Let the solution react for 5 min.
- Rinse thoroughly with water.
- Eliminate the deposit on the heating drum by slight rubbing with a Scotch Brite or Jex pad.

### Solution C

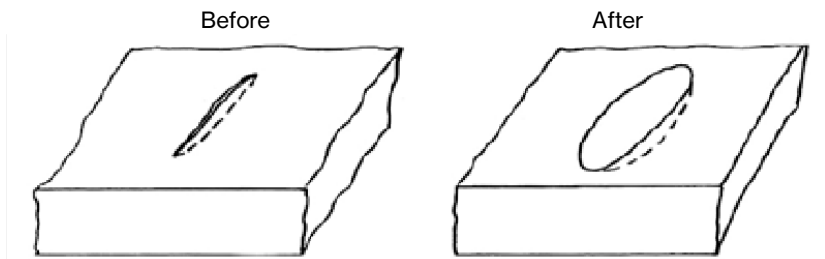
To be used in case of a deposit (rubber, finish or paraffin) on the pressure and expanding rolls or in case of important deposit or damage on the inner or outer side of the belt. Don't forget to clean the belt with solution A and rinse thoroughly.

- Soak a cloth with the solution C and rub the surface of the rolls or of the belt until complete elimination of the deposit. Repeat if necessary. The operation can last more than one hour in certain cases.
- Continue with a complete cleaning following procedure solution A.
- Note: if necessary, use an extension piece (e.g. a wooden broom handle) in order to reach all the parts of the belt to be treated.

### ► Ablation

(named **A** in the summary table at the end of this chapter)

This is done with a small-sized sander equipped with a cutter, taking great care to grind all the facets of the crack or injury beyond the beginnings.



### ► Cutting of the belt

(named **D**)

This is done with a fixed disc-shaped knife in a single pass, belt cold and running at 10 m/min, cooling devices opened.



The guide rollers should be in contact with the belt to prevent lateral displacement during cutting.

The pressure exerted on the knife is manual and continuous.

To avoid too much friction, it is recommended to lubricate the cut with water.

## ▶ Sealing

(named C)

### Useful equipment

- ▶ A sander equipped with either a milling cutter or a grinding wheel.  
Note: the milling cutter is preferable for 2 reasons: less heating of the belt and easier machining (flexibility).
- ▶ A vulcanizing unit including:
  - A heating shoe.
  - A temperature regulator.
  - A test thermometer graduated from 0 to 150°C attached to the sole of the vulcanizing shoe.
- ▶ A sander with abrasive disc (grade 120).
- ▶ A stainless steel or glass rod (diameter about 8 with a rounded end).
- ▶ A fine brush.
- ▶ Talc powder.
- ▶ A sheet of fine polyamide cloth slightly larger than the size of the repair.
- ▶ Ethyl acetate.
- ▶ A roll of calibrated abrasive tape:
  - Feldmühle Ref.47838/04 Type KX890.
  - Length: 50 m.
  - Width: 75 mm.
  - Grade: 80.
- ▶ Clean rags.

### Preparation

#### Preparation of the area to be repaired

Clean the area with Ethyl Acetate or Methyl Ethyl Cetone.

#### Preparation of the lesion

Wash hands carefully to avoid perspiration and greasy matter.

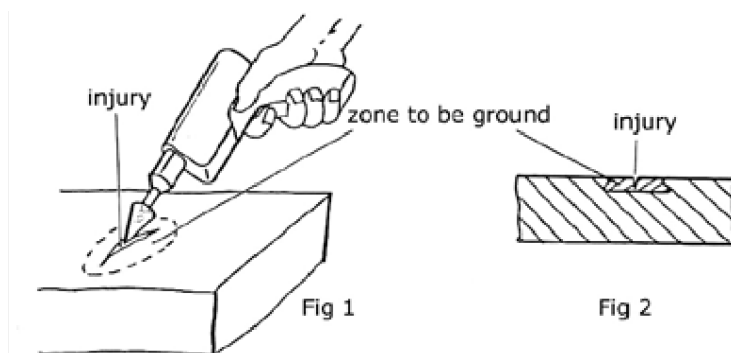
Reshape the lesion with a milling cutter (fig. 1 and 2).

Remove the dust with compressed air.

Use a small brush and solvent to clean the lesion and surrounding area over a radius of 200 mm.

Let the solvent completely evaporate (about 5 min).

**Note:** If a crack appears in the reshaped lesion due to the solvent penetration, continue to reshape until the crack disappears.



#### Preparation of the Reptop repair kit components

**Reptop – product A:** master compound in the form of a blue-colored, 5 mm thick, protected by 2 plastics sheets.

**Reptop – product B:** catalyst in the form of a cream-colored paste, protected in a small plastic box.

Break the heating set pellet. The reaction will release immediate heat.

Place product A on the set, removing the protective sheets.

After 15 to 20 seconds, blend the products A and B.

Bleeding is performed by manually kneading the products until an homogeneous colored paste is obtained.

Before going on, the paste must be temporarily protected in a flexible wrapping (aluminum sheet or silicone paper).

**SAFETY:** Use some goggles.

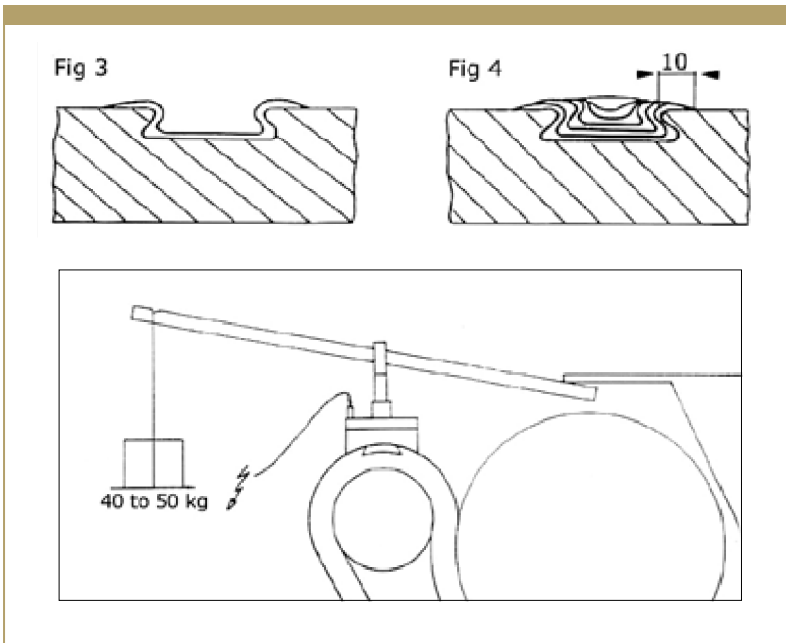
### Application

Fill the lesion with paste (fig.3).

Pencil in a mark running through the center of the lesion to enable the positioning of the vulcanizing shoe.

Place the sheet of polyamide fabric over the lesion area, dimensions being slightly larger than the shoe surface (fig.4).

**Note:** If an air bubble is trapped in the paste, burst it with a needle.



### Vulcanization

Position the vulcanizing shoe, centered on the mark.

Check that the shoe-heating surface moulds perfectly the belt.

Attach the shoe in position, pressurizing it to obtain a **minimum** pressure of 0,5 daN/m (in fact the surface of the shoe should be all in contact with the rubber belt).

Maintain this pressure at room temperature about 15 min in order to enable an eventual spreading and positioning of the paste.

Power up the vulcanizing shoe to heat it.

Adjust the vulcanizing cycle by means of the shoe control unit.

A cycle comprises different steps:

A slow temperature increasing (30 min to reach 120°C) interrupted by degassing at 80°C (release the pressure on the lesion for a few minutes before reapplying the pressure and continuing the heating).

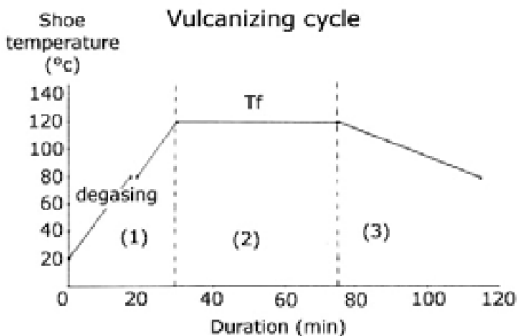
A level stage at constant temperature (Tf) depending on the lesion depth (fig. 5 and 6).

A slow temperature decreasing to 80°C initiated by the shoe power shut down.

**Note:** Respect the cycle to optimize the repair result.

Degazing is not necessary if the depth of the lesion is under or 5 mm

In case of power cut during the operation, begin the repair again from the beginning.



Lesion depth	Tf (min)
Up to 5mm	45
5 to 10 mm	90
10 to 15 mm	145
15 to 20 mm	240

Fig 6

### Sanding

Remove the vulcanizing shoe and pressurizing device.

Remove the polyamide fabric protecting the area.

Wait until the repair has a temperature of about 20°C.

Sand with a disk sander (avoid creating hollows).

Check with a magnifying glass that the repair is not porous.

Grind the belt after a minimum of 12 hours at rest if the repair is located in the working width.

**SAFETY:** Use some gloves during the operation.

## ▶ Grinding

(named R)

### **Frequencies are depending of the type and thickness of the fabrics**

#### Heavy fabrics

(300g/sqm to 600 sqm) - Every 500 000 to 700 000 m - around every 2 weeks

#### Medium fabrics

(200g/sqm to 300g/sqm) - Every 600 000 to 900 000 m - around every 3 weeks

#### Light fabrics

(Up to 200 g/sqm) - Every 800 000 to 1 200 000 m - around 4 to 6 weeks

### **Requirements**

- ▶ Make a frequency program to keep a fresh rubber with operational properties which will give good shrinkage.
- ▶ It is necessary to grind the belt in the following cases.
- ▶ Storage: grind the belt when you fit it on the machine regardless of the storage time.
- ▶ Prolonged shutdown: grind the belt if the machine has been stopped more than 2 weeks.
- ▶ Operating time: a normal use of the belt causes a slow degradation of the belt outer face rubber requiring regular and frequent grinding.
- ▶ Accidents: every accident causing a surface change (cracks, holes, orange peel...) requires a compulsory grinding of the belt.
- ▶ Repair: a grinding is recommended after each repair in the working width.

### **Equipment required**

- ▶ A grinding roll (delivered by the machine manufacturer with the machine).
- ▶ For the sand paper:
  - FLEXOVIT type KX 890
  - NORTON type R 445

Length 50 m and wide 75 mm  
Grain: 80 or 120 (depending of the treated fabrics, 120 will be used for finest fabrics).
- ▶ Cold water
- ▶ Talc
- ▶ Soap "cake"
- ▶ Anti-pollution filtering mask
- ▶ Vacuum and recovery box for the rubber dust during grinding
- ▶ Inspection tools: thickness gauge, parallelism gauge, durometer...

## Procedure

### 1. Dry grinding

#### Mounting of the abrasive tape on the grinding roll

Check the cleanliness of the grinding roll surface as well as its balancing.

Attach the pre-moistened tape to one end of the roll using the device provided for this purpose.

Wrap the grinding roll with the tape using a very small angle ( $10^\circ$  max).

Install the grinding roll on the machine following the machine manufacturer instructions.

#### **Note:**

The tape spirals must join together.

This operation can be carried out the day before grinding and provides a maximum tape tension at the moment of the mounting on the grinding roll.

#### Grinding roll adjustment

Check the parallelism between the compression roll and the heating drum.

Check the parallelism between the grinding roll and the compression roll using the adjustable gauge delivered by the manufacturer.

Mount the safety casings.

Mount the rubber dust suction box.

#### Belt preparation

Cool the belt to a temperature of 20 to 25°C.

Check that the inner and outer faces are completely dry.

During the grinding, the belt should be:

- Tightened according to the "installation" recommendations (305 to 312 mm equivalent to 2.3% elongation)
- Not compressed, adjusted to the "zero point"

#### **Note:**

Let the belt run previously at 5 m/min and check its stability for 5 min before beginning the grinding; make sure that the belt does not vibrate to prevent facets appearance during grinding.



### Starting of the grinding operation

Let the grinding roll rotate at about 1770 rpm or 1500 m/min for a diameter of 270 mm.

Adjust the compression roll until it touches the surface of the belt.

Keep the heating drum cooling device open during the entire operation.

### Grinding depth

Proceed in successive steps, closely monitoring the grinding roll motor ammeter, whose amperage should not exceed 12 to 15 A for a 380 V motor.

The grinding depth adjustment should be maintained at least for 6 revolutions of the belt, i.e. about 4min.

Wait about 4min before making a new pass, remembering to keep the amperage range between 12 and 15 A.

Make the required passes number until complete regeneration of the outer face of the belt.

Clean with solution A following the procedure (scouring powder).

## **2. Wet grinding**

See the chapter “dry grinding” for the mounting of the abrasive tape on the grinding roll as well as for the grinding roll adjustment.

### Belt preparation

Cool the belt to a temperature of 20 to 25° C.

Open the inside and outside cooling devices to lubricate both faces of the belt continuously, but not excessively, adding 5 to 10% of a non-detergent liquid soap.

During the grinding, the belt should be:

- Slightly overtensioned compared to the “installation” recommendations (305 to 313 or 314 mm) to avoid aquaplaning effect during the grinding.
- Slightly compressed (4mm) to avoid slipping.

### **Note:**

Let the belt run previously at 5 m/min and check its stability for 5 min before beginning the grinding; make sure that the belt does not vibrate to prevent facets appearance during grinding.

### Starting of the grinding operation

Let the grinding roll rotate at about 1770 rpm or 1500 m/min for a diameter of 270 mm.

Adjust the compression roll until it touches the surface of the belt.

Keep the heating drum cooling device open or maintain the drum wet during the entire operation.

### Grinding depth

Proceed in successive steps, closely monitoring the grinding roll motor ammeter, whose amperage should not exceed 12 to 15 A for a 380 V motor.

The grinding depth adjustment should be maintained at least for 6 revolutions of the belt, i.e. about 4 min.

Wait about 4min before making a new pass, remembering to keep the amperage range between 12 and 15 A.

Make the required passes number until complete regeneration of the outer face of the belt.

#### **Note:**

Make sure that the lubricating device covers all the surface of the belt.

In case of accidental interruption of the lubrication, remove immediately the grinding roll.

In order to improve the evacuation of the rubber deposit during grinding, increase the water flow rate periodically and temporarily.

Wet grinding can procure a finer surface than a dry grinding, provided you carry out a final polishing.

### Polishing

As the final pass starts, rub the outside face of the belt across its entire width from the top of the expanding roll using a bar of soap.

The soap has to be applied for 3 to 4 revolutions of the belt and will be followed by a quick removing of the grinding roll.

Clean the belt with solution A (scouring powder) following the procedure.

#### **Important:**

**Don't forget to rework the radius of the edge profile after each grinding in order to prevent cracks appearance.**

## Curative maintenance summary chart

Type of events	Location of events	Remedy Size	
		of events	
		Depth<2 mm	Depth<2 mm
Inclusions	Outer face Outside working width	R or A	(C+R) or D
	Outer face In the working width	R	(C+R)
	Side edges	A	(C+R) or A
Cracks	Outer face Outside working width Outer	R	(C+R) or D
	face In the working width	R	(C+R)
	Side edges	A	(C+R) or A or D
Diverse injuries	Outer face Outside working width Outer	R or A	(C+R) or D
	face In the working width Side edges	R	(C+R)
		A	(C+R) or A

Key:

- A = ablation (grinding)
- B = cutting of the belt
- C = sealing
- D = grinding

### Note:

No repair or intervention can be done on the inner face of the belt, except in case of sticking (see remedy in the annexes).

The choice between (C+R) or D and (C+R) or A is determined as a function of the residual thickness of the belt and the maximum fabric width treated on the belt.

# Malfunctions and Corrective Actions

## ► Rubber belt lateral stability

Effects	Causes/Origins	Corrective actions
<ul style="list-style-type: none"> <li>• Vibration • Inner face abrasion • Inner face cracks</li> <li>• Sticky inner face</li> </ul>	Non parallelism of the metallic rollers of the machine	Adjustment of the parallelism between the pressure roller and the heating drum
	Inadequate tension of the belt	Tension adjustment to avoid vibrations and ensure stability of the belt (fine and progressive adjustment)
	Heterogeneity of the metallic rollers surface, heterogeneous adherence between the belt and the rollers, heterogeneous pressure on the squeezing rollers	Powdering of the inner face with soap to facilitate the belt mobility. Perfect cleaning of the rollers in contact with the inner face. Perfect cleaning of the inner face itself (see annexes chapter)

## Shrinkage deficiency and heterogeneity

Effects	Causes/Origins	Corrective actions
<ul style="list-style-type: none"> <li>• Fabric aspect defect/orange peel</li> <li>• Heterogeneous shrinkage</li> <li>• Appearance of folds along the fabric edges</li> </ul>	Unsuitable condition of the belt outer face, sticky belt outer	Belt grinding, inner face cleaning (see annexes)
	Moisture rate in the fabric deficiency at the entry of the pressure roller	Moisture rate in the fabric increasing at the entry of the pressure roller
	Too high tension of the fabric at the issue of the rubber belt	Tension adjustment at the issue of the rubber belt Temperature and
	Unsuitable temperature and compression	compression adjustment

## ► Visual defect on the treated fabric

Effects	Causes/Origins	Corrective actions
<ul style="list-style-type: none"> <li>• Longitudinal ridges on the fabric</li> <li>• Over or under shrinkage in spots</li> <li>• Orange peel</li> <li>• Folds on the fabric</li> </ul>	Heterogeneity and deterioration of the belt inner face	Efficient inner face cleaning (see annexes)
	Deterioration of the outer face of the belt, abrasion, cracking, sticky surface	Cracks repairing, taking care to have the same hardness in the repaired area
	Chemical reaction with some finishing products	Grinding of the belt with grade 120 sand paper and thermal treatment (see annexes)
	Rubber belt vibrations	Adjustment of the belt compression and tension
	Unsuitable fabric tension	Adjustment of the fabric tension at the output

## Rubber belt degradation

Effects	Causes/Origins	Corrective actions
<ul style="list-style-type: none"> <li>• Splits, cracks, hardening of the outer face and edges</li> <li>• Abrasion of the inner face</li> <li>• Cracks on the inner face</li> <li>• Sticky inner or outer faces</li> <li>• Discoloration or yellowing of the belt</li> </ul>	Excessive compression, temperature and tension, unsuitable grinding frequency	Preventive maintenance and more frequent grindings, cracks elimination as soon as they appear
	Vibration and lateral instability of the belt	Inner face cleaning (see annexes), tension adjustment until the vibrations disappearance
	Chemical reaction with some finishing products	Immersion test to determine the faulty products and if possible, replacement of this product. More frequent grinding of the belt followed by a thermal treatment (see annexes) Deeper grinding at the
	Unsuitable or too long storage	fitting on the machine with correction of the rounded edges and sides of the belt

# Annexes

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## ► Use of a protection wax on the edges of the belt

The wax must be applied only on the rubber surface in direct contact with the heating drum, outside the working width.

The application frequency is around each 8 working hours.

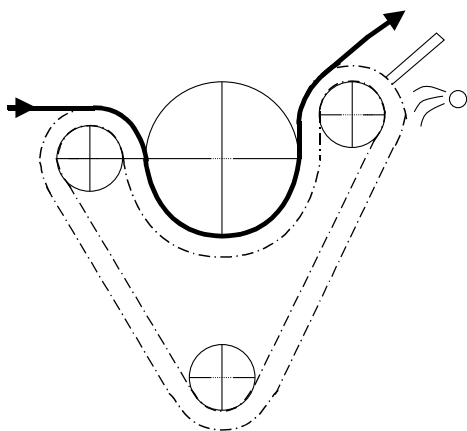
### HOW TO PROCEED

Let the rubber belt run with a speed of about 10 m/mn and a heating drum temperature around 1.5 to 2.5 bars.

Apply the wax on the rubber belt surface, on the tensioning roller before the cooling device at the issue of the heating drum.

You have to proceed progressively in order to cover both entire edges of the belt directly in contact with the heating drum.

Maintain the wax piece with a light hand pressure on the rubber surface; it will melt and let a fine layer protecting the rubber from the temperature effect.



## ► **Cleaning of the inner or outer face of the belt in case of sticking**

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Prepare a solution consisting in abrasive powder mixed with a small quantity of cold water in order to obtain a dense paste (2 to 5 kg powder are necessary).

The rubber belt and the heating drum have to be cooled (temperature lower than 30° C).

Stop the external and internal cooling devices.

Dispatch the paste in a homogeneous way on the belt internal face and run the machine with a 4 mm compression and a 15-20 m/min speed during about 15 min (the running time depends of the elastomer quantity to eliminate).

Open the cooling devices and rinse the internal and external faces of the belt.

If necessary, proceed again to the operation but adding some paraffin oil to the paste.

If the elastomer deposits are important, use a rounded spatula to remove them avoiding deteriorating the rubber belt.

Rinse again, stop the cooling devices and sprinkle paraffin oil on the internal face.

Let the machine running about 15 min in the same working conditions as described above.

Rinse abundantly by opening again the cooling devices.

## ► Grinding and thermal treatment

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In case of sticky surface and/or edges, or orange peel aspect on the edges on a rubber belt, it is recommended to grind consequently the rubber belt, removing minimum 2 mm of rubber or eliminating the defect plus 1 mm rubber in case of orange peel on the edges.

After that, proceed to a thermal treatment as explained below before going on again in production: let the belt run for about 60 to 90 min with a speed of 10 to 15 m/min, one bar temperature in the heating drum and the external cooling device shut down.

Go on with the production.

**Note:** the thermal treatment can also be used if longitudinal lines appear on the treated fabric; in that case, proceed to a grinding with a grade 120 sand paper and go on with the thermal treatment as explained above.

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