FENNER DUNLOP
CONVEYOR BELTING

NOVA X BELTING
FINGER SPLICING

INSTRUCTIONS FOR
HOT SPLICING
OF NOVA X BELTING

Version

10.6

Contents

GENERAL INFORMATION FOR BUILDING A NOVA X SPLICE

Because the splice is the weakest spot in a conveyor belt, it is essential to make the splice with greatest possible accuracy. This can be best achieved by making the splice using the correct materials and by following the step by step procedures as described in this document.

The following names are used for the splicing materials:

Dundisol:	Solution	black liquid to enhance tack
Dunlofol:	Unvulcanised adhesion (skim) rubber	0.7 mm thickness sheet 10 x 2 mm noodles
Duncover:	Unvulcanised cover rubber	1, 2 or 3 mm thick sheet
Rubberised fabric:	Rubberised reinforcement fabric	1.2 mm thick unvulcanised rubberised reinforcement fabric

All materials are marked with an expiry date. Never use materials that have exceeded the expiry date.

NOVA X SPLICE SYSTEM

The Nova X belts are typically spliced with a hot vulcanised finger splice. The splice strength depends on the finger dimensions. Table 1 shows the splice dimensions for a splice efficiency of 90%.

1. NECESSARY TOOLS

- rectangular press:
  length: splice length + 200 mm
  width: belt width + 100 mm to accommodate belt and edge bars
  pressure: minimum 7 bar
  temperature: minimum 150°C, preferably with forced cooling
- three wooden work boards, of at least 2 m long and width adjusted to belt width
- 4 U-clamps to fix the belt to the boards
- chalk cord for aligning purposes
- 2 edge bars: length: splice length +1m, width: 50 mm, thickness: 1 mm below belt thickness
- 2 clamps to tension the edge bars firmly to the belt edges
- oscillating knife (Fein or similar) to remove the cover
- sharpening tool for knives
- Stanley knives
- flat roller and stitch roller
- grinding tool with variable speed
- pinchers to remove cover
- thickness gauge
- two thermometers with gauges to insert between belt and heating plate
- two thermometers to measure temperature inside heating plates

2. SCHEMATIC PRESENTATION OF NOVA X FINGER SPLICE

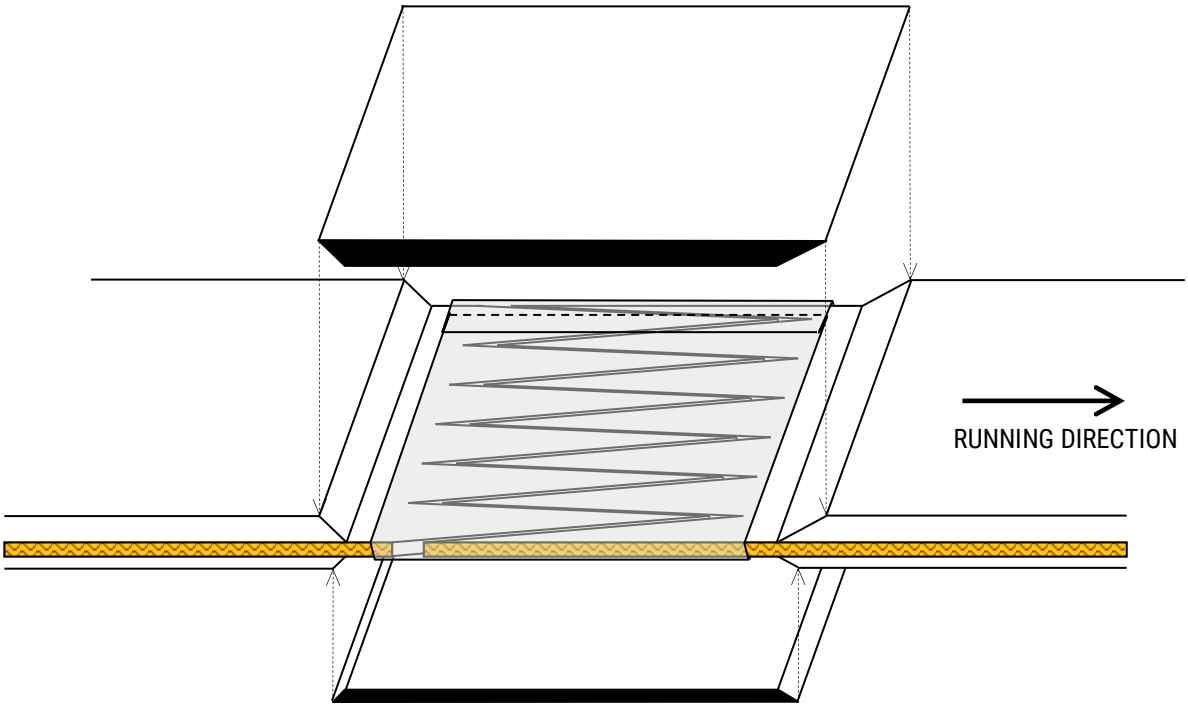


Figure 1. Schematic presentation of Nova X finger splice

3. SPLICE DIMENSIONS

Splice dimensions for standard splices:

Belt type	No. of plies	Finger length (mm)	Finger base (mm)	Trans. length at each end (mm)	Pull back one end (mm)	Total splice length (mm)
Nova X4	1	500	50	30	60	620
Nova X6	1	710	50	50	60	870

Table 1: Splice dimensions for belt loads up to 100%

4. DETERMINATION OF THE OVER LENGTH

The necessary over length is determined by the finger length and the pull back length. The pull back length gives extra length, created by shifting the two belt ends away from each other. This length needs to be adjusted for when determining the endless belt length.

So the necessary over-length for a finger splice is:

OVER LENGTH = FINGER LENGTH – PULL BACK LENGTH

For finger length and pull back length: see table 1.

5. PREPARATION OF THE SPLICE

The following photo session shows the preparation of a finger splice.
For the over length see Chapter A4, for other dimensions see table 1.

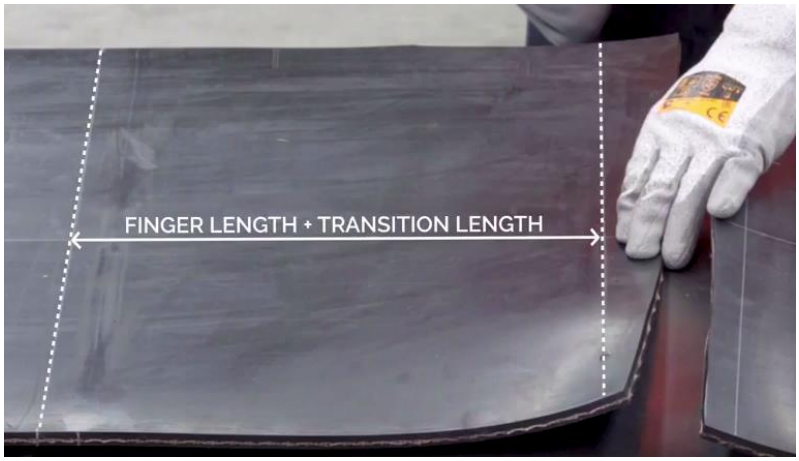


Photo 1: Marking the top cover

Mark the top cover of the belt with:

- Finger length + transition length
- Extra belt length

Make sure these marks are perpendicular to the belt axis.

Leave some extra belt length for ease of working.

Photo 2: Cutting at an angle of at least 45°

Cut the cover at an angle of at least 45°.

Ensure that the underlying fabric is not damaged!

Photo 3: Cutting and removal of the cover

Remove the cover near the end of the belt.

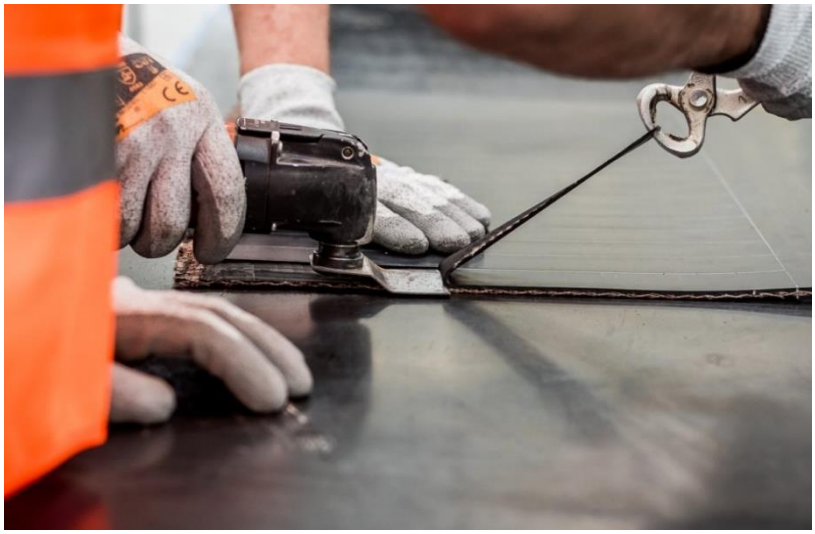
Divide the cover in finger widths of 50 mm.

Photo 4: Drawing the finger widths

Cut the cover on the lines.

Follow the same procedure for the bottom cover.

Photo 5: Cutting the covers



Cut off the cover just above the fabric, leaving a thin layer of rubber on the fabric.

For ease of working, preparing the bottom cover first is advised. Follow the same procedure for the top cover.

Photo 6: Cut off the cover

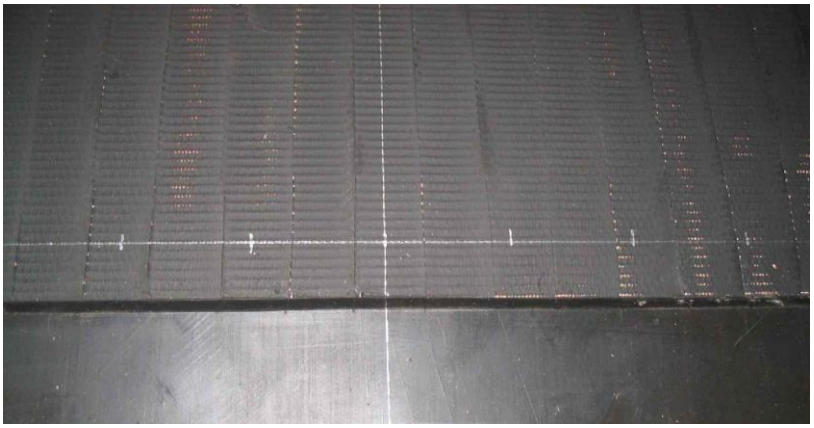


Photo 7: Marking the finger tips

Redraw the centre line and transition line. Mark the fingertips with the aid of the centre line.

The outer fingers need to be on the leading belt end if possible.

See also photo 12.

Photo 8: Draw the fingers

Draw the fingers.

The other belt-end needs to be prepared in mirror!

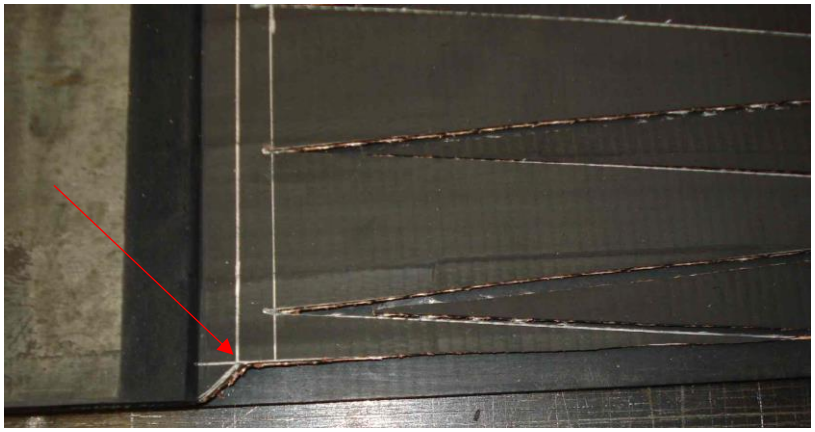
Photo 9: Cutting the fingers

Cut the fingers along the lines

Buff the 45° chamfer and the covers over a width of at least 30 mm on top and bottom.

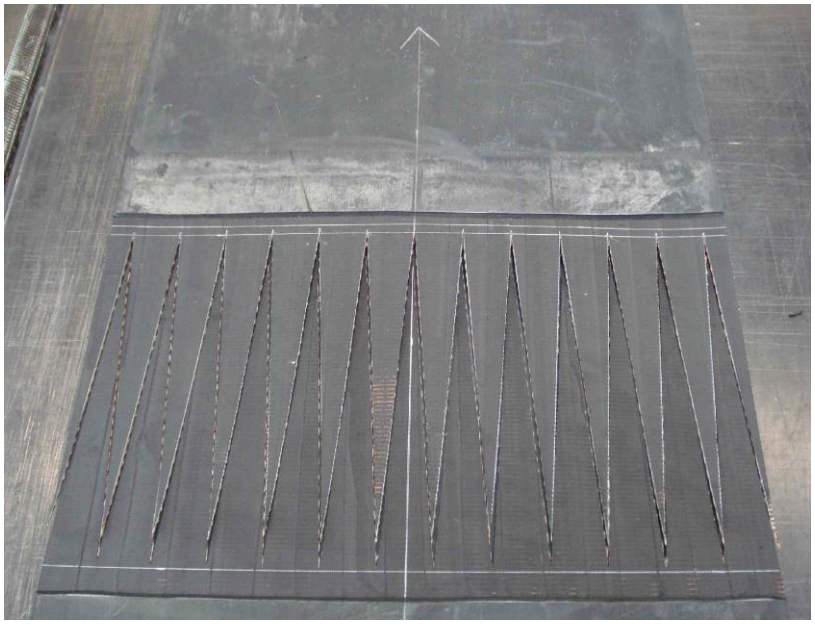
Do not damage the fabric whilst buffing the chamfer!

Photo 10: Buffing the covers



Cut out a 10 mm edge from the centre of the transition length at 45°.

Photo 11: Edge cut-out



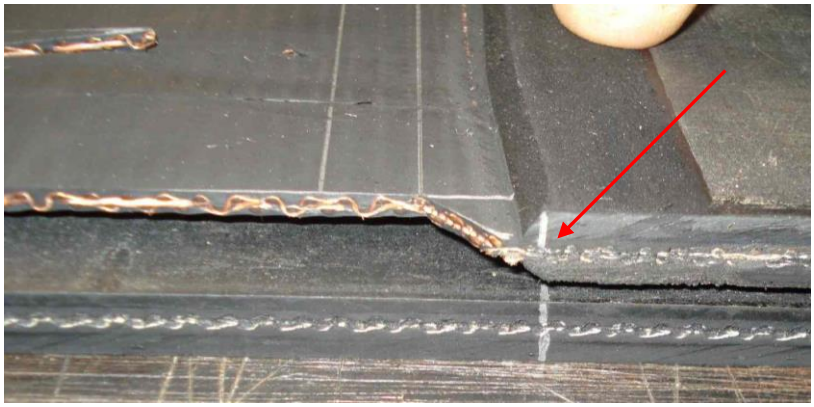
Accurately align the two belt ends creating a space of 2 mm between the fingers, resulting from the given pull back length in table 1.

Fix both belt ends to a solid structure, ideally a metal plate that can also go into the press.

Photo 12: Belt alignment

Space of 2 mm between fingers.

Photo 13: Finger spacing



Mark the belt end position for later reference.

Photo 14: Marking belt position

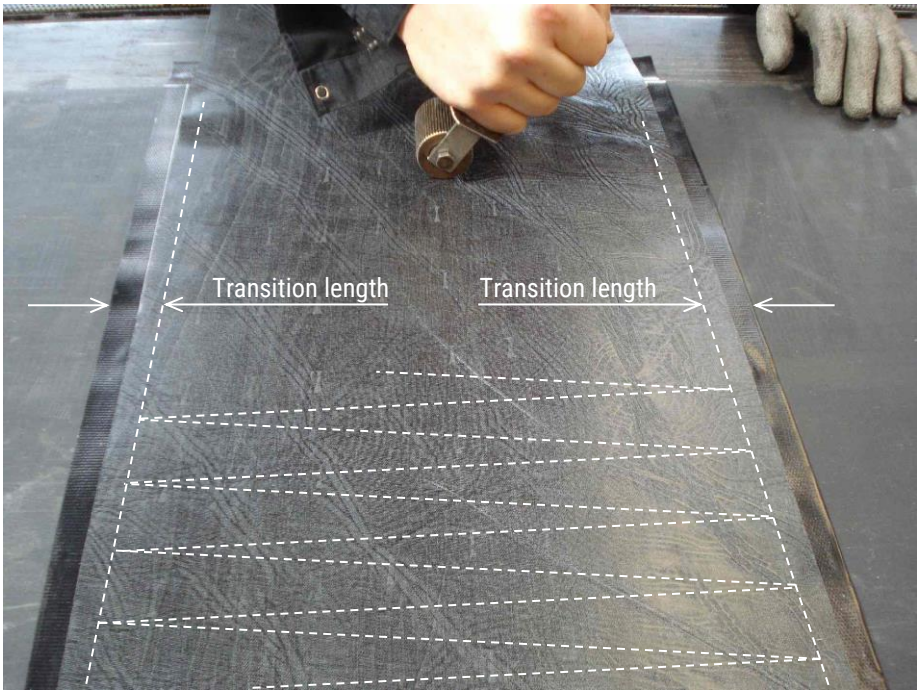
Prepare the bottom cover (Duncover) to fit the space.

The total thickness of the cover insert (Duncover + rubberized fabric) should have 0 to 0.5 mm over thickness to the cover.

Too much over thickness will lead to risk of belt-ends sliding out of press during vulcanization.

The rubberized fabric is approx. 1.2 mm thick.

Photo 15: Placing bottom cover



Cut the rubberized fabric to the required size. Position the rubberized fabric on the bottom cover. It should end half-way along the transition length.

The fabric should be prepared in one piece to go around the fingers in both the top and bottom cover.

Roll bottom cover and rubberized fabric tightly together. Leave foil on the fabric in the belt edge zone to prevent it from sticking to the bottom cover before wrapping (see photo 24/25).

Photo 16: Placing rubberized fabric (longitudinal direction of fabric used across belt width)

Fill out the space next to the fabric with skim to reach equal thickness.

Photo 17: Fill out space next to fabric

Two skim layers will be necessary to match the thickness of the fabric.

Photo 18: Applying second skim layer next to fabric

Apply solution to the fingers of both belt ends on the prepared bottom cover section.

Photo 19: Solution on bottom side

Bring both belt ends back in position and roll tightly.

Photo 20: Position both belt ends

Apply a thin layer of solution on top of the fingers.

Do not fill the void between the fingers with an abundance of solution!

Photo 21: Solution on top of fingers

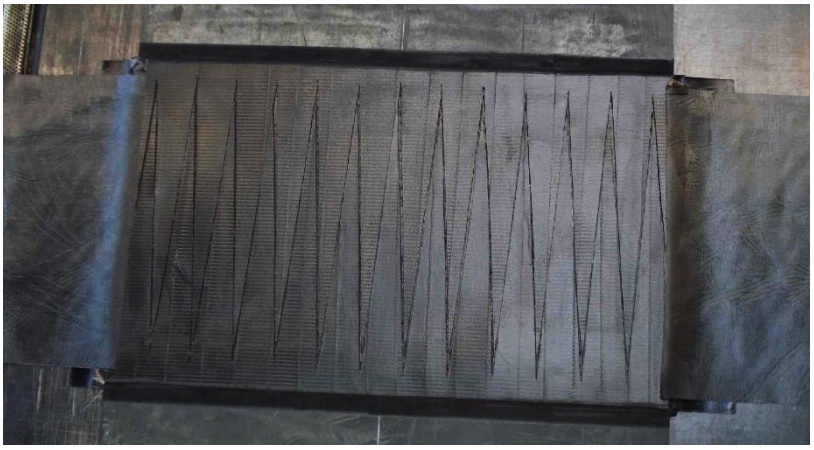


Photo 22: Drying of solution

Allow the solution to dry until tacky.

Specially pay attention to the solution between the fingers. There should be no accumulation of wet solution present.

Photo 23: Noodle on fingers

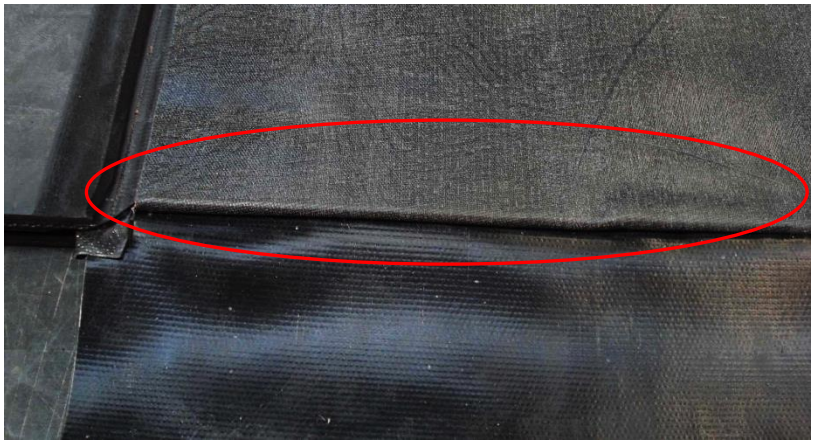
Apply skim noodles on/between the fingers.

Do not fully overlap the noodles at the tips!

Photo 24: Wrap fabric around the carcass

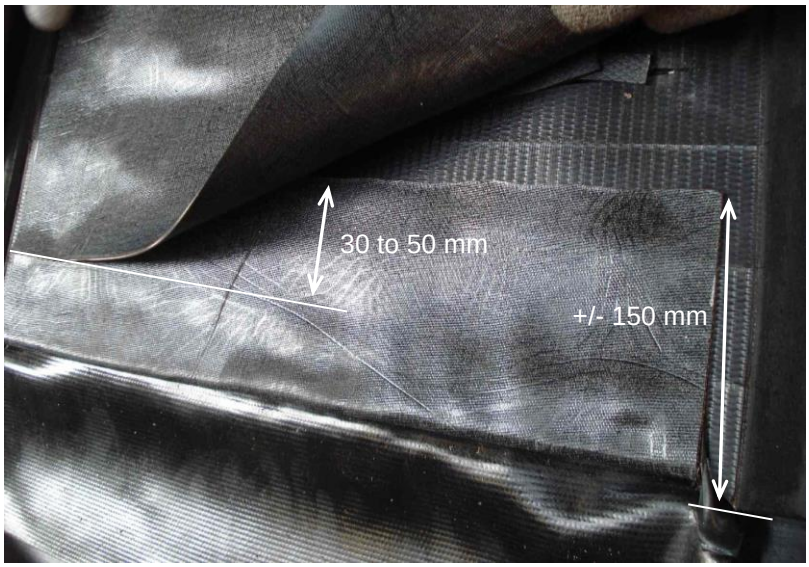
Wrap the fabric tightly around the carcass edge.

The overlap of 30 to 50 mm should reach approximately 150 mm inside from the belt edge, or adjusted suitably for narrower belt widths.



Tighten the wrap of rubberized fabric.

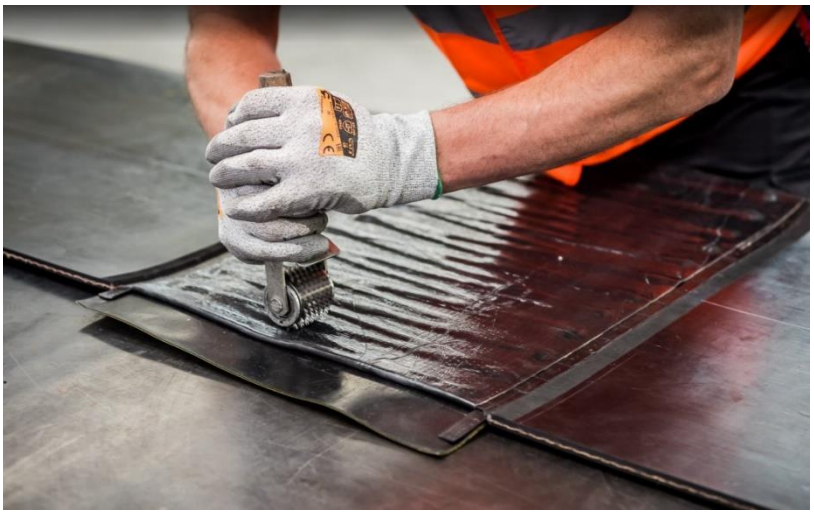
Photo 25: Tighten wrap of fabric



Overlap the rubberized fabric near the edge.

The overlap should reach approximately 150 mm inside from the belt edge, or adjusted suitably for narrower belt widths.

Photo 26: Rubberized fabric overlap



Roll and stitch the rubberized fabric to prevent air bubbles.

Photo 27: Rolling of rubberized fabric

Apply two layers of skim to fill the space between the rubberized fabric and the top cover.

Photo 28: Skim next to rubberized fabric

Apply Duncover for the belt edges. Thickness equal to: carcass thickness + 3 mm

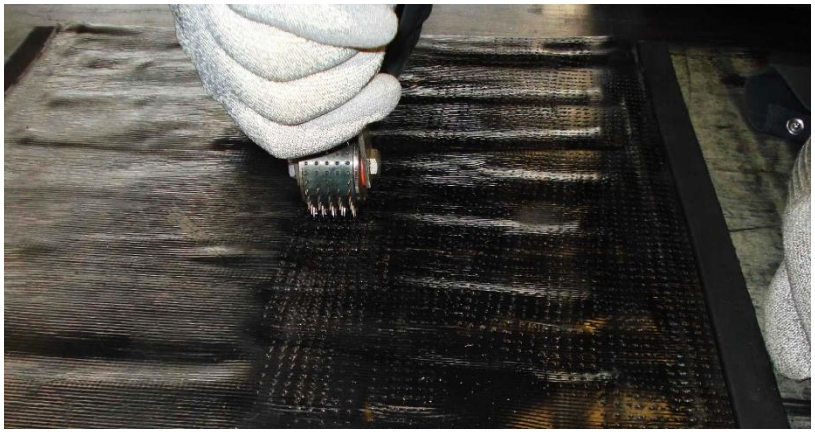
Photo 29: Applying rubber edges

Apply Duncover for the top cover.

The total thickness of the cover insert (Duncover + rubberized fabric) should have 0 to 0.5 mm over thickness to the top cover. Too much thickness will lead to the belt-ends possibly sliding out of press during vulcanization.

The rubberized fabric is approx. 1.2 mm thick.

Photo 30: Applying the top cover



Roll the top cover tightly with a stitch-roller to prevent air-bubbles (trapped air).

Photo 31: Stitching the top cover

Mark the belt edges on the top cover and trim the edges

Photo 32: Marking the belt edges

Trim the belt edges

Photo 33: Trimming of the edges

Cover the splice with an anti-adhesive paper or cloth. Apply the edge bars. If multiple press plates are used, use a steel or aluminium plate on each side of the belt. Build up the press. Fix the edge bars well against the belt edges. Mark the press-ends on the belt to check for any sliding of the belt out of the press.
Don't heat the platens before the pressure is applied.

6. VULCANISATION

The pressure during vulcanisation must be minimal 7 bar. Start with a pressure of 4 bar. To improve flow of the splice materials and reduce air pockets, stop heating the press for 5 minutes when both plates have reached 110°C. Then increase the pressure to 7 bar and continue the heating cycle. See the pressure/temperature/time diagram for the exact pressure cycle.

The vulcanisation temperature is between 150°C and 155°C.

The vulcanising time starts when a temperature of 150°C is reached (see figure 2). When the cure is completed, water cool to 70°C (150°F) and hold for 15 min before releasing the pressure. If no water cooling is available, allow to cool to 70°C before releasing pressure.

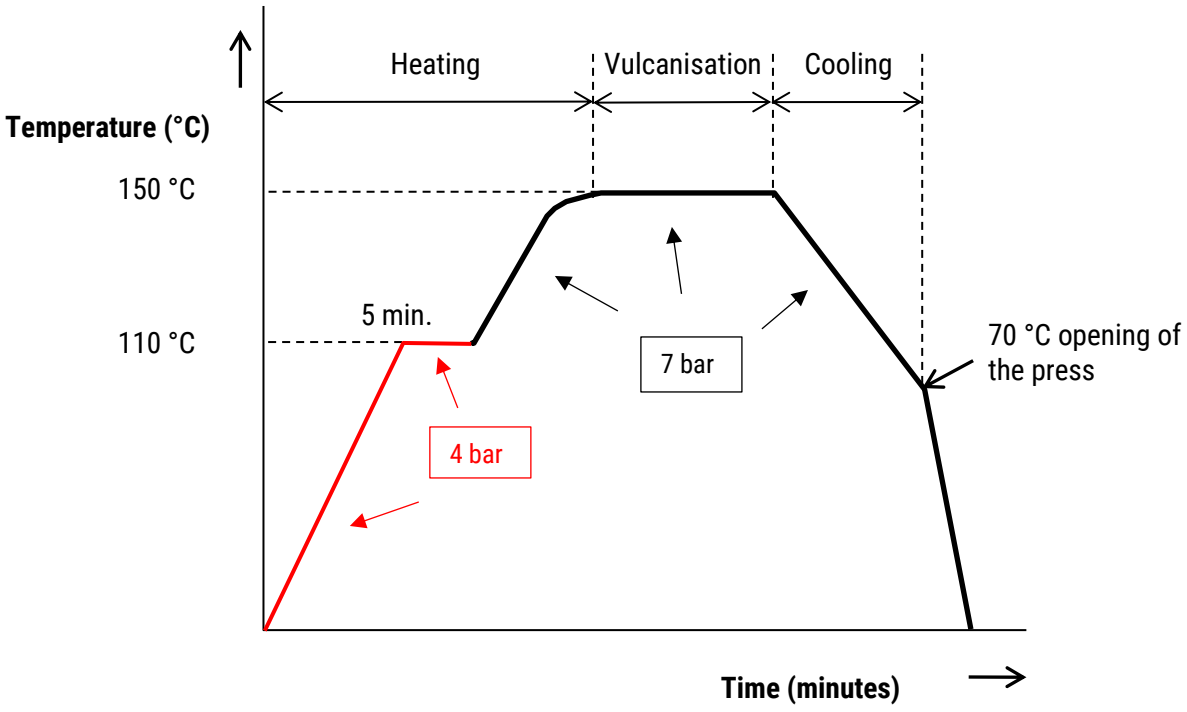


Figure 2: Temperature during vulcanisation

Qualities	Belt thickness (mm)			
	up to 10	10 – 15	15 – 20	20 – 30
AA, RA, RS, RSW, RE, RES	20	25	30	40
Betahete	20	25	30	40
ROM, ROS	20	25	30	40
BV K/S, BV ROM K/S, BV ROS K/S	25	30	35	45

Table 2. Vulcanising time in minutes

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