



INSTRUCTIONS FOR
HOT SPLICING
OF ULTRA X BELTING

Version

2.5

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GENERAL INFORMATION FOR BUILDING AN ULTRA 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 1 mm or 2 mm noodles
Duncover:	Unvulcanised cover rubber	1, 2 or 2.5 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.



ULTRA X SPLICE SYSTEM

The Ultra X belts are 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%.

Alternative dimensions are possible for applications with a belt load below 60%. Table 2 shows the splice dimensions for belts with a load below 60%. When in doubt about the belt load, please use the splice dimensions in table 1 or contact our Application Engineering Department on +31 (0) 512 585 555.

ULTRAX

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 ULTRA X SPLICE

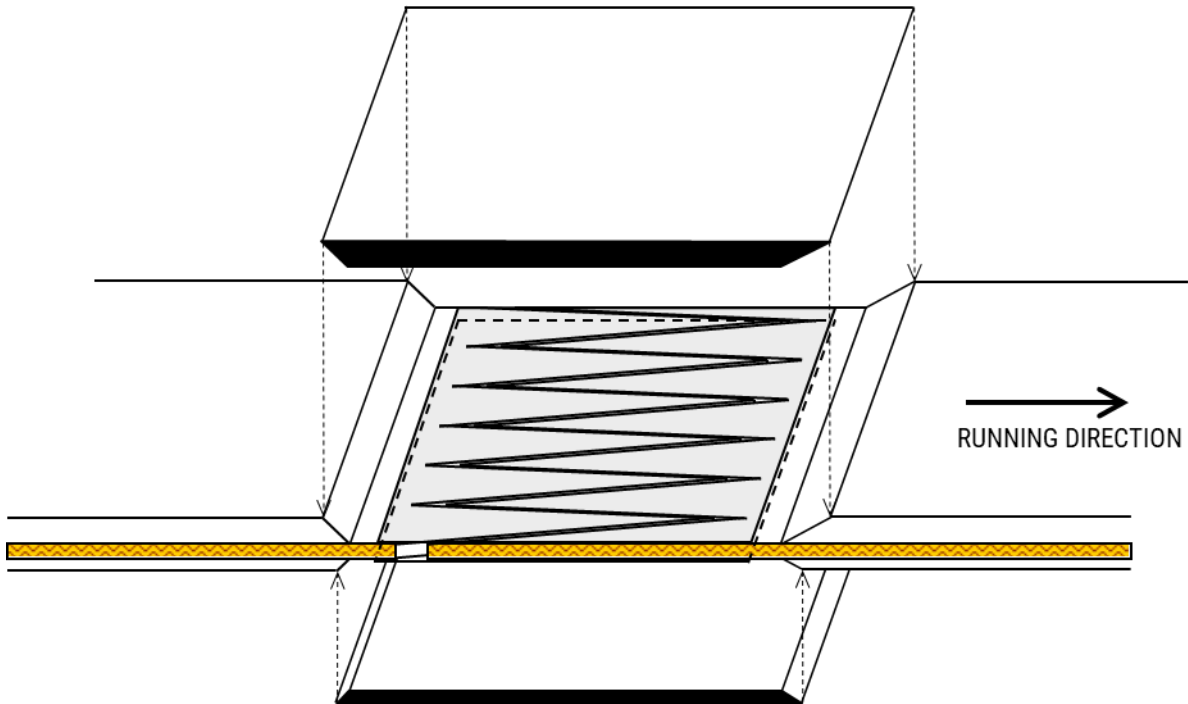


Figure 1. Schematic presentation of Ultra X splice

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)
Ultra X1	1	300	50	25	30	380
Ultra X3	1	500	50	30	60	620

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

Alternative splice dimensions for reduced tension operation:

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)
Ultra X1	1	250	40	25	30	330
Ultra X3	1	400	40	30	40	500

Table 2: Splice dimensions for belt loads up to 60% only

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 and 2.

5. PREPARATION OF THE SPLICE

The following photo session shows the preparation of a finger splice.
For the over length see chapter 4, for other dimensions see table 1 and 2.

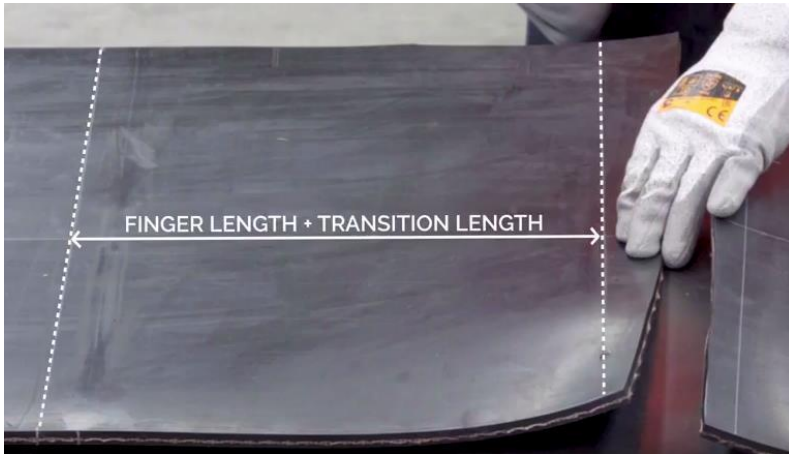


Photo 1: Marking the top cover

Mark 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 according to table 1 or 2 (for standard splicing 50 mm).

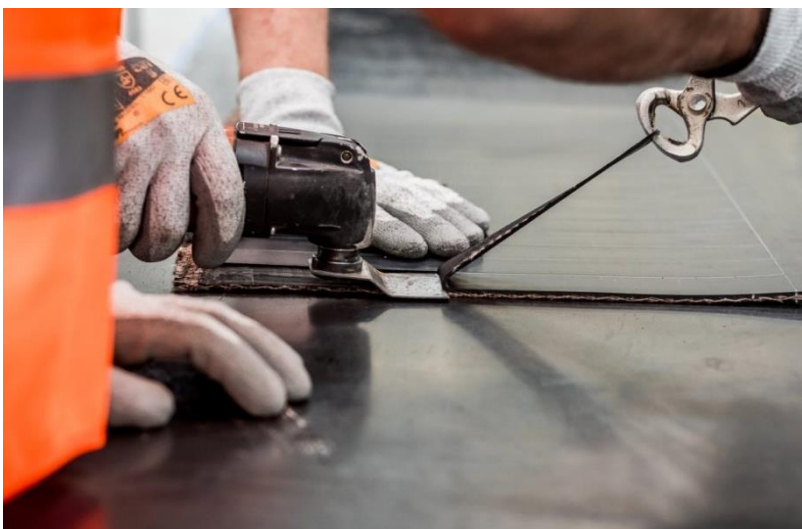
Photo 4: Drawing the finger widths



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



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 11.

Photo 7: Marking the finger tips



Draw the fingers.

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

(Note: for ease and speed of preparation, Dunlop developed a special template to quickly mark the finger pattern as alternative to the drawing procedure in this manual. Contact your Dunlop representative for more information.)

Photo 8: Draw the fingers



Cut the fingers along the lines.

Photo 9: Cutting the fingers



Photo 10: Buffing the covers

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!

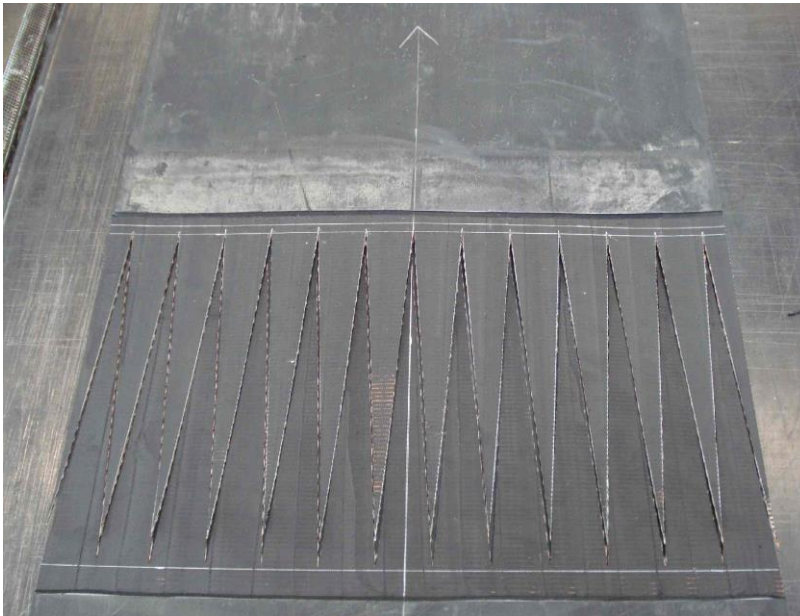


Photo 11: Belt alignment

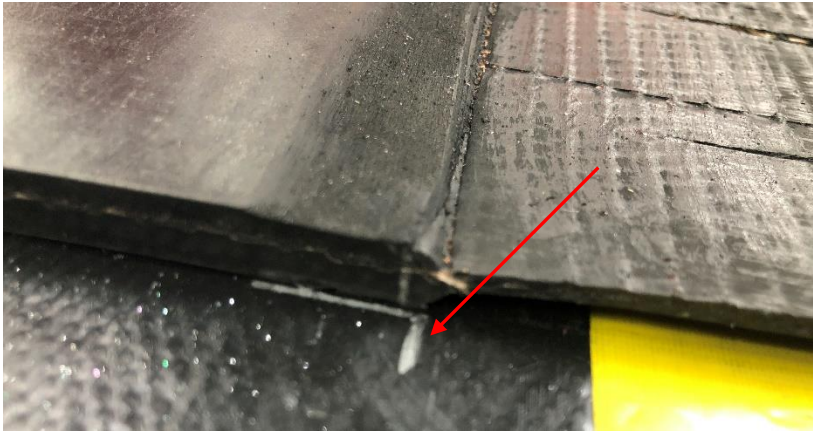
Accurately align the two belt ends creating a space of 2 mm between the fingers, resulting from the given pull back length in table 1 or 2.

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



Photo 12: Finger spacing

Space of 2 mm between fingers.



Mark the belt end position for later reference.

Photo 13: Marking belt position



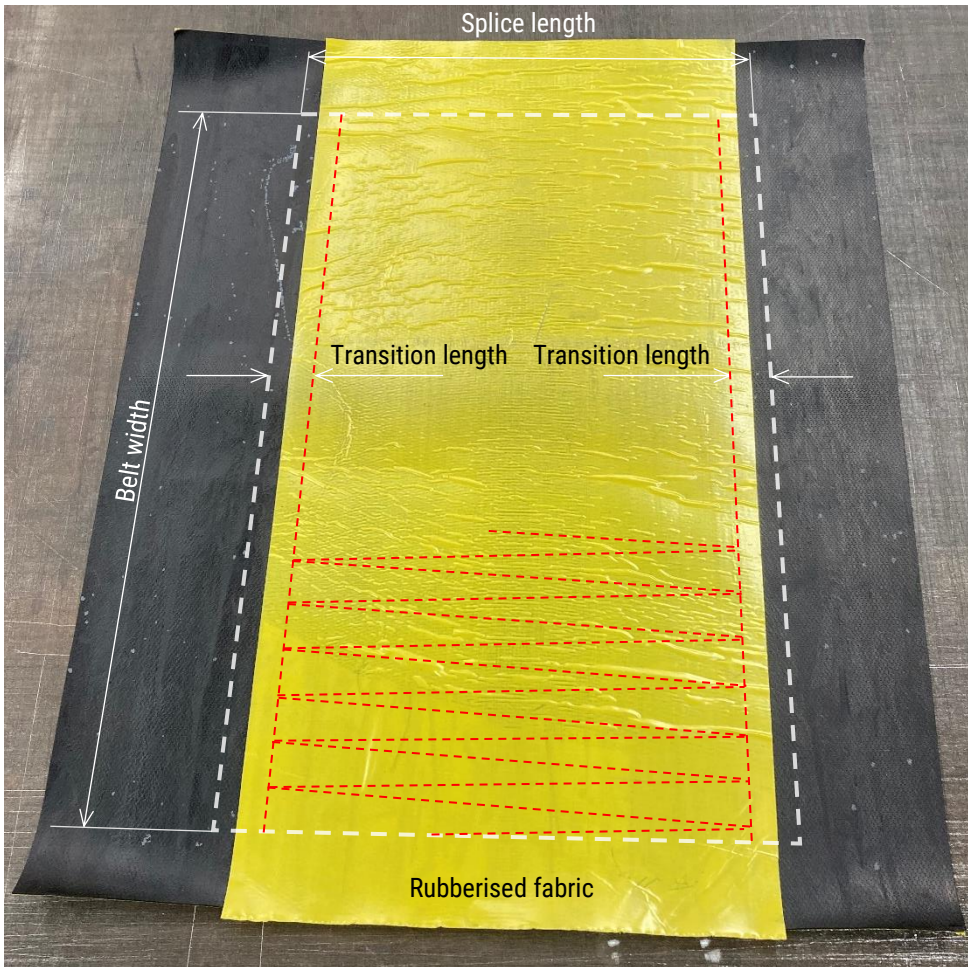
Start the preparation of the bottom cover by cutting the Duncover approximately 10 cm longer than the splice length and 10 cm larger than the belt width.

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

The rubberized fabric is approx. 1.2 mm thick.

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

Photo 14: Preparation of the bottom cover



Cut the rubberized fabric to the required length. It should end half-way along the transition length.

The longitudinal direction of the fabric is directed across the belt width.

Place the rubberized fabric on the bottom cover.

Roll bottom cover and rubberized fabric tightly together. Leave foil on the fabric for the moment to prevent it from sticking to the splice fingers during positioning. (see photo 19).

Photo 15: Placing rubberized fabric (longitudinal direction of fabric used across belt width)



Prepare 2 layers of skim rubber to fill out the space next to the fabric to reach equal thickness.

Photo 16: Prepare 2 layers of skim



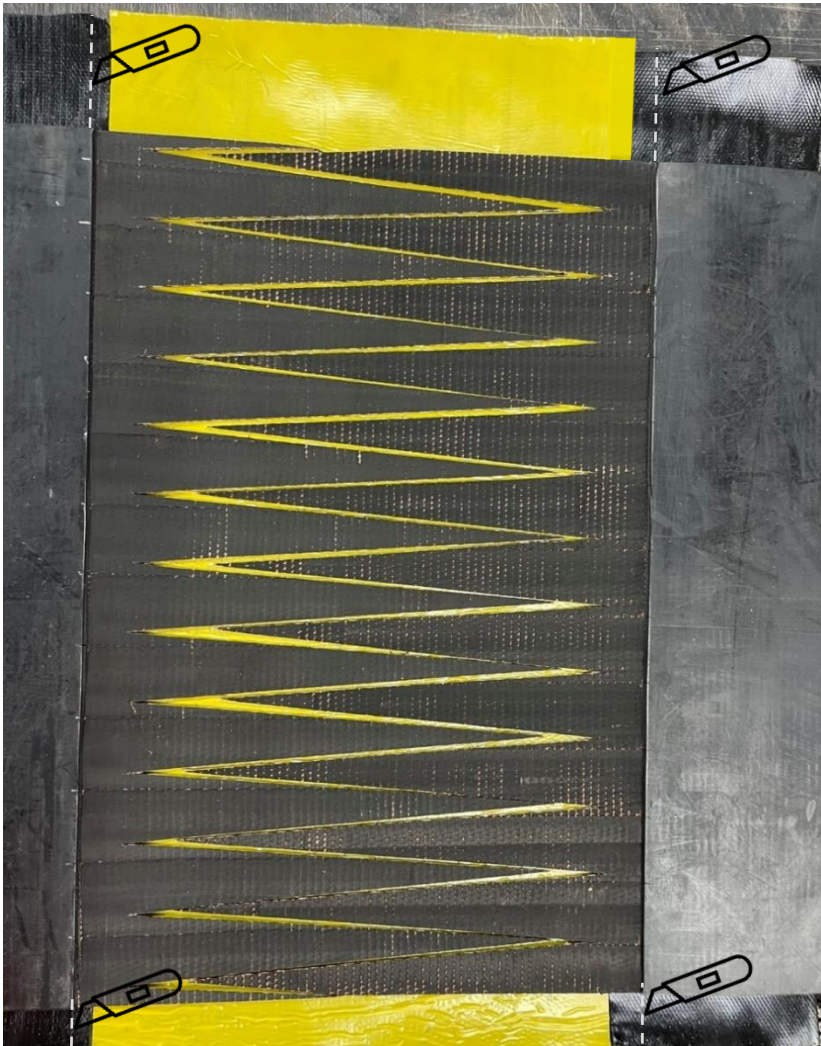
Place the double skim layers next to the rubberised fabric.

Photo 17: Applying two skim layers next to the fabric



Apply solution to the bottom side of the fingers of both belt ends.

Photo 18: Solution on bottom side of fingers



Position the prepared bottom cover below the fingers and mark the necessary size to fill the space completely.

Photo 19: Positioning and marking of the bottom cover



Cut the splice bottom cover to the desired size.

Photo 20: Cutting of bottom cover to size



Photo 21: Position both belt ends

Position the prepared bottom cover and remove the yellow foil. Bring both belt ends back in position and roll tightly.



Photo 22: Correct position of the bottom cover

Check the position of the bottom cover.



Photo 23: Solution on top of fingers

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

Do not fill the void between the fingers with an abundance 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 24: Noodle on fingers

When the solution has dried until tacky, apply skim noodles on/between the fingers.

Do not fully overlap the noodles at the tips!

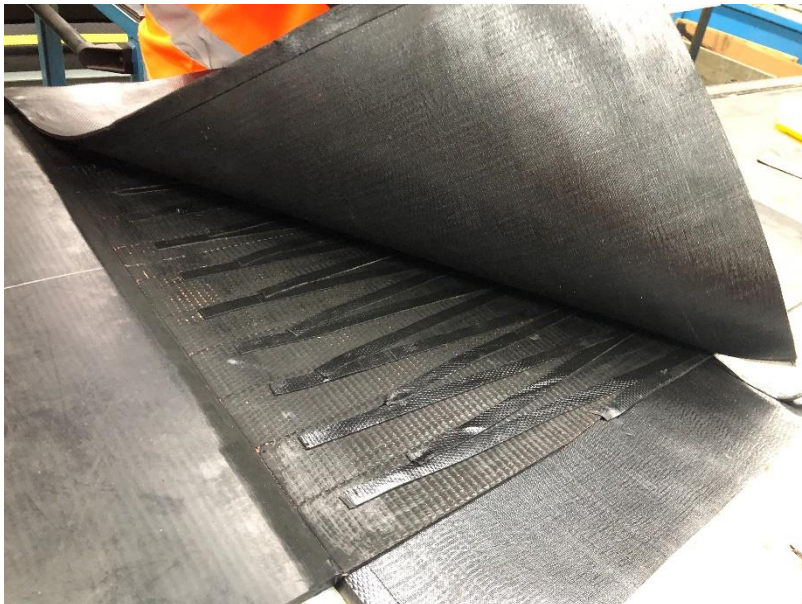


Photo 25: Positioning of prepared top cover

Prepare the top cover with rubberised fabric similar to the bottom cover.

The total thickness of the cover insert (Duncover + rubberized fabric) should have 0 to 0.5 mm over thickness to the cover. The rubberized fabric is approx. 1.2 mm thick.

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

Position the top cover on top of the fingers.

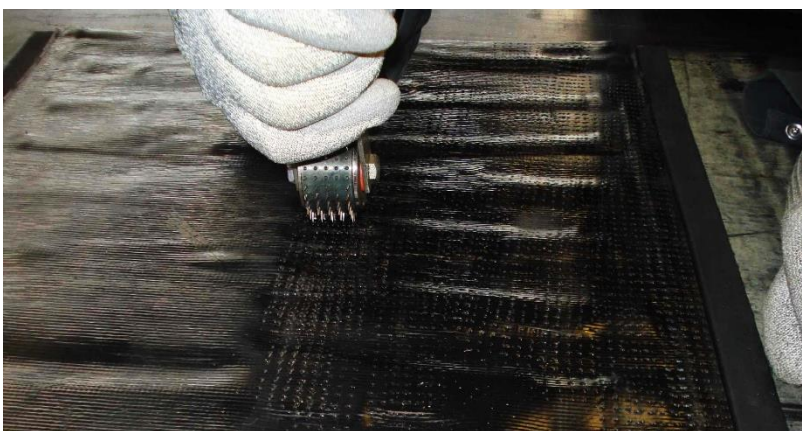


Photo 26: Stitching the top cover

Roll the top cover tightly with a stitch-roller and puncture it with a pair of sharp ended scissors to prevent air-bubbles (trapped air).



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

Photo 27: Marking the belt edges



Trim the belt edges.

Photo 28: 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.

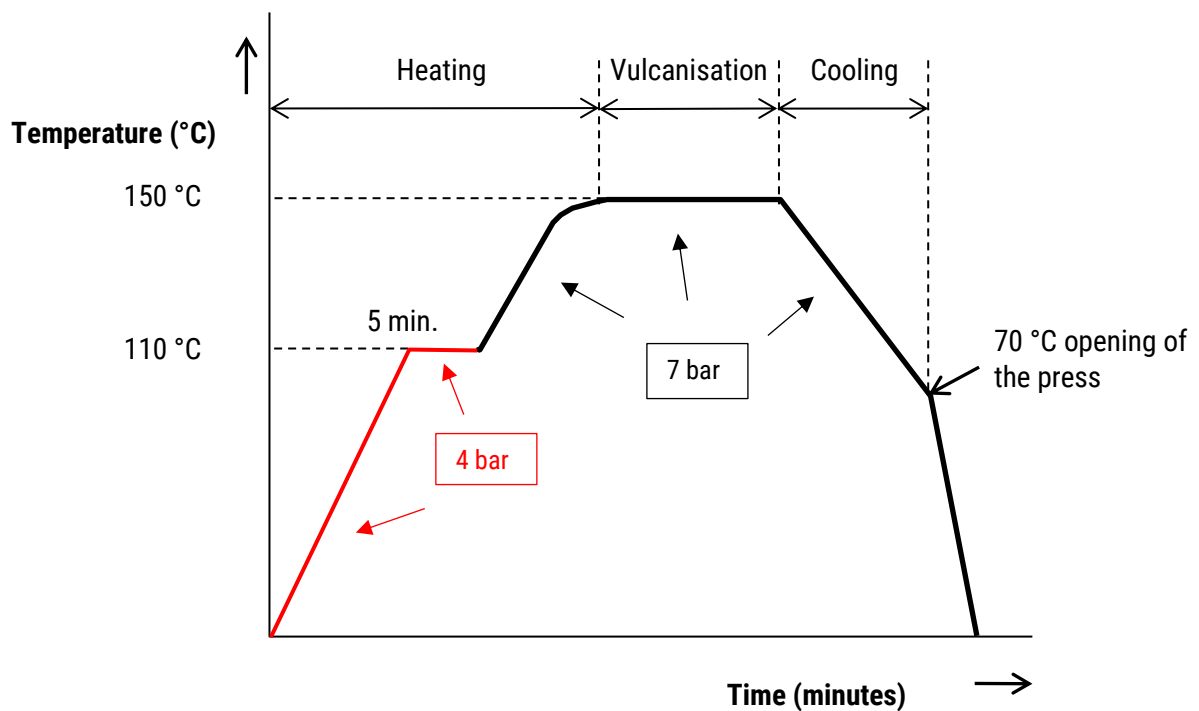


Figure 2: Temperature during vulcanisation

Qualities	Belt thickness (mm)			
	up to 10	10 - 15	15 - 20	20 - 30
AA	20	25	30	40

Table 3. Vulcanising time in minutes

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