MULTIPLY BELTING – STEP SPLICING

INSTRUCTIONS FOR

HOT SPLICING

OF MULTIPLY BELTING

Version

5.2

Contents

GENERAL INFORMATION FOR BUILDING A MULTIPLY 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
Duncover:	Unvulcanised cover rubber	1, 2, 3 or 4 mm thick sheet

For splicing multiply belts in Deltahete quality see also the additional instructions on pages 18 and 19.

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

DUNLOP STEP SPLICE SYSTEM

Dunlop Multiply belts are typically spliced with a hot vulcanised step splice. The splice strength depends on the number of fabric reinforcement layers. Table 1 shows the required step dimensions. The splice efficiency of a step splice is calculated in percentage as (N-1)/N x 100, with N being the amount of layers in the belt.
Alternative step dimensions may be possible for applications with reduced belt loads, but Dunlop cannot provide warrantee on reduced step lengths. 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.

1. NECESSARY TOOLS

- press:
  length: splice length + 200 mm
  width: belt width + 100 mm to accommodate belt and edge bars
  pressure: 6 - 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
- 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. METHODS FOR SPLICING MULTIPLY BELTS

For different types of Multiply belting there are different types of splicing:

- Standard Superfort splice
- Overlap splice for 2 ply Superfort, Dunloflex and Trioflex
- Superfort Rigitra splice
- Slider belt/Sawmill splice
- Chevron splice

2.1 SCHEMATIC PRESENTATION OF A STANDARD STEP SPLICE (MULTIPLY)

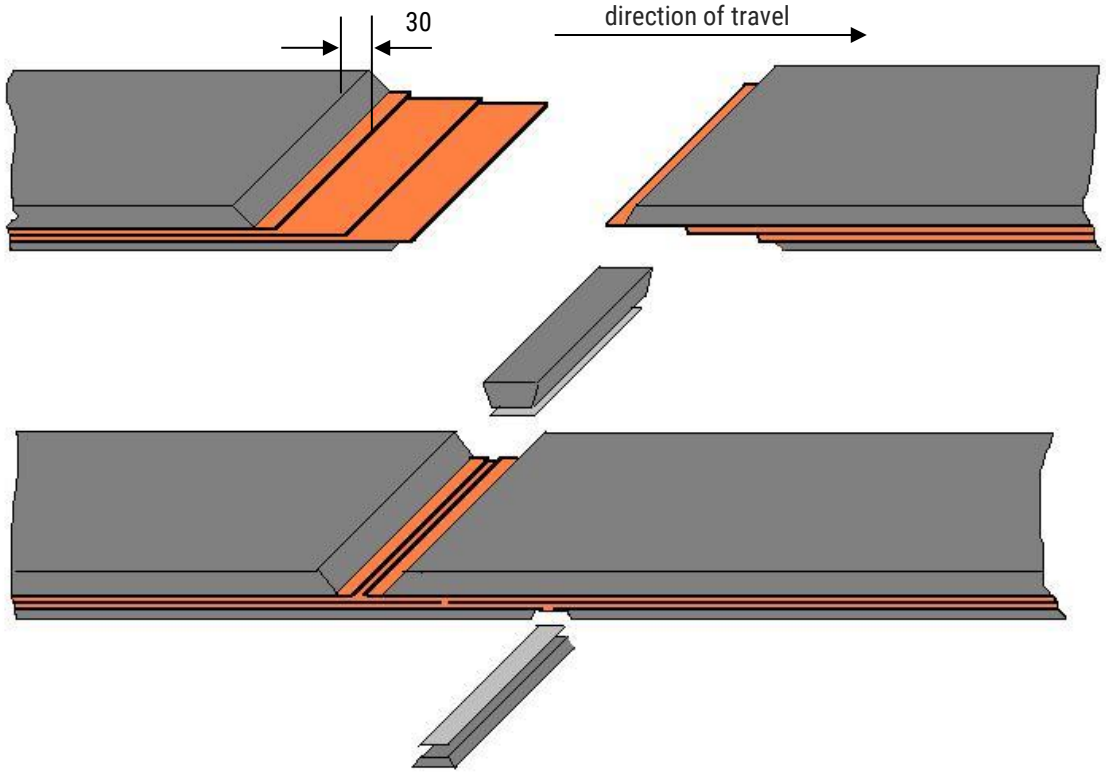


Figure 1. Schematic presentation of splice

2.2 SCHEMATIC PRESENTATION OF A CROSS-RIGID BELT SPLICE (RIGITRA)

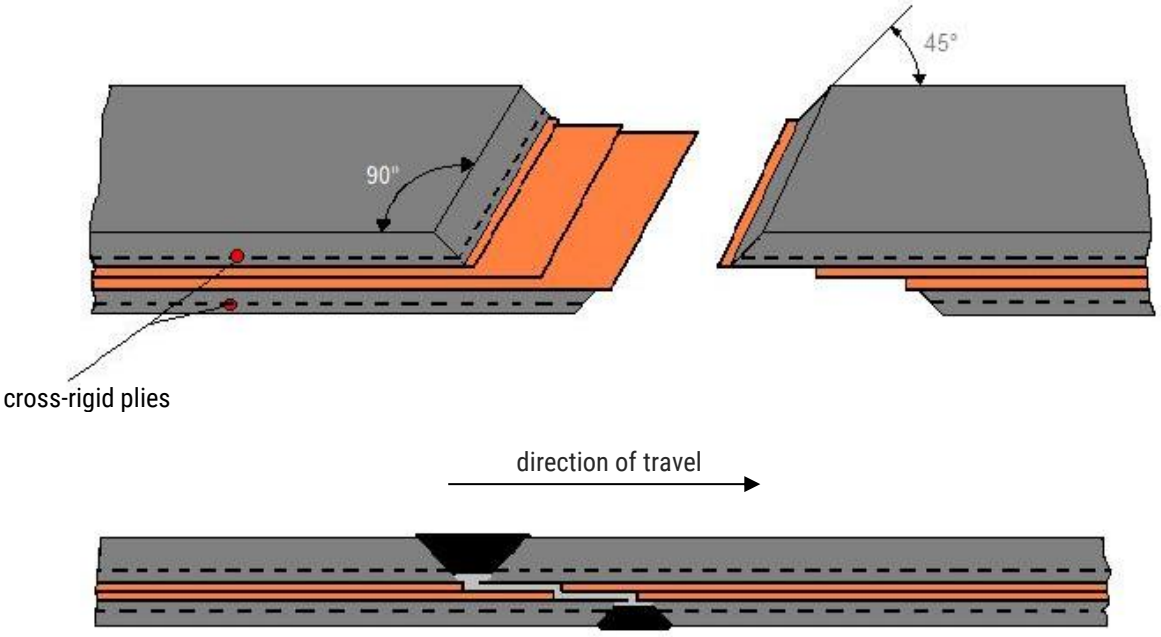


Figure 2. Schematic presentation of splice

2.3 SCHEMATIC PRESENTATION OF A SLIDERBELT SPLICE (SLIDER/SAWMILL)

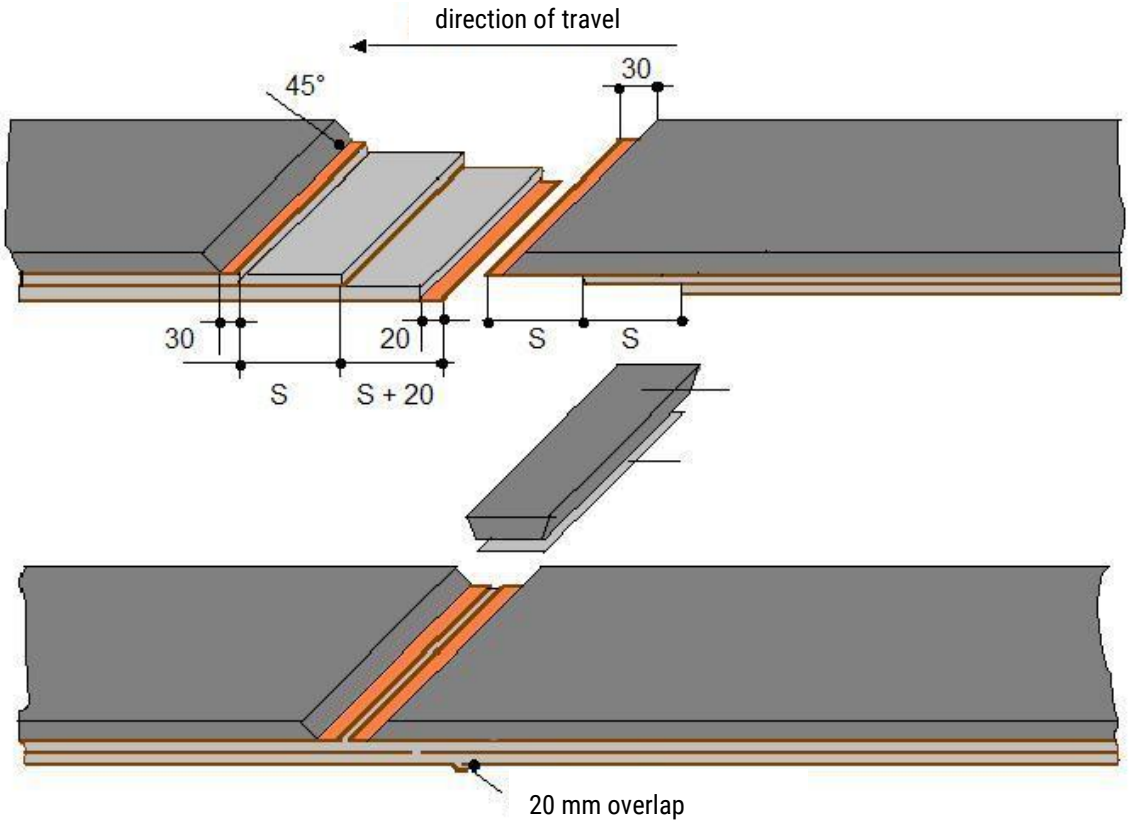


Figure 3a. Schematic presentation of splice

As detailed in figure 3a, a standard sliderbelt splice will have a small fabric overlap at the trailing edge of the bottom, to ensure a complete slider surface on the whole splice area of the bottom. In case of reversible conveyors, or other constraints during execution of the splice, the overlap cannot be made. In these cases, a small ca. 5mm wide gap must remain when closing the splice, which must then be filled up with a small strip of unvulcanised Dunlofol. Ensure to fill the void, but be aware not to overfill either. See figure 3b for a schematic view.

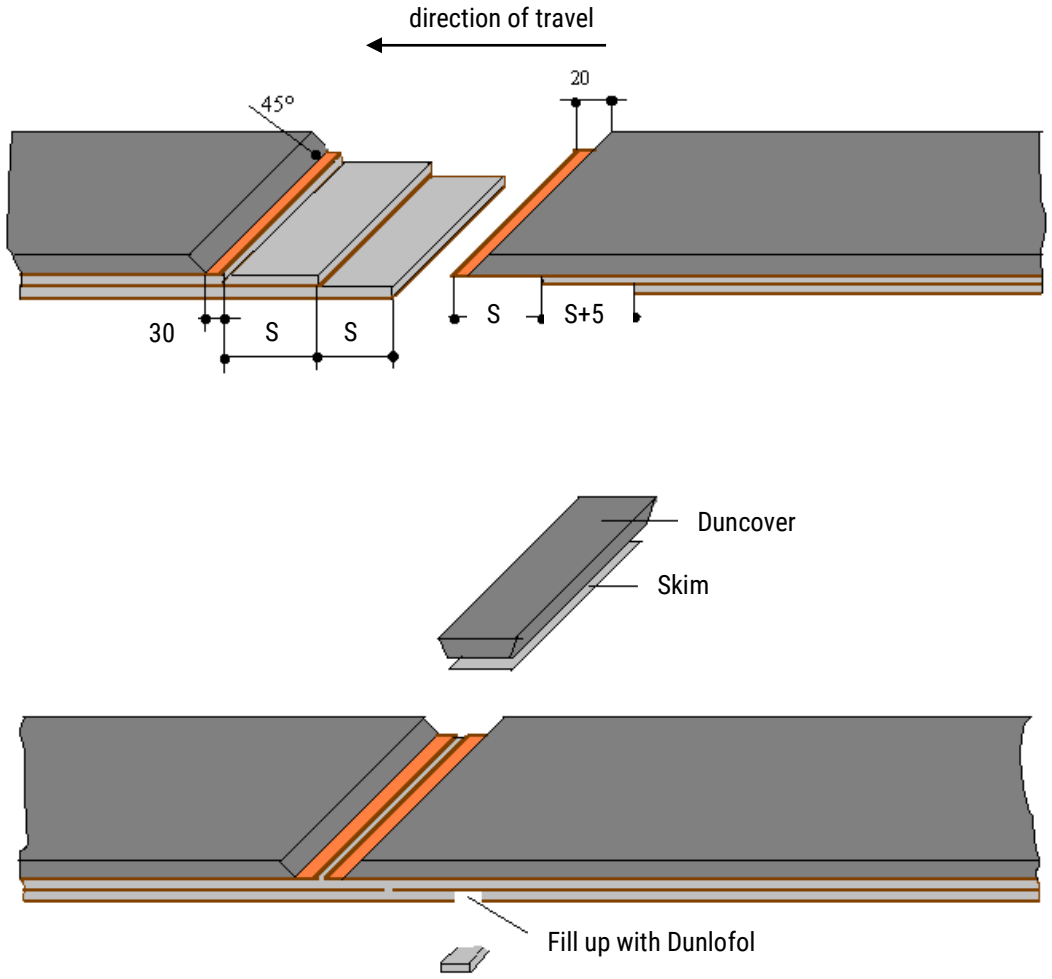


Figure 3b. Schematic presentation of splice

2.4 SCHEMATIC PRESENTATION OF A PROFILED BELT SPLICE (CHEVRON)

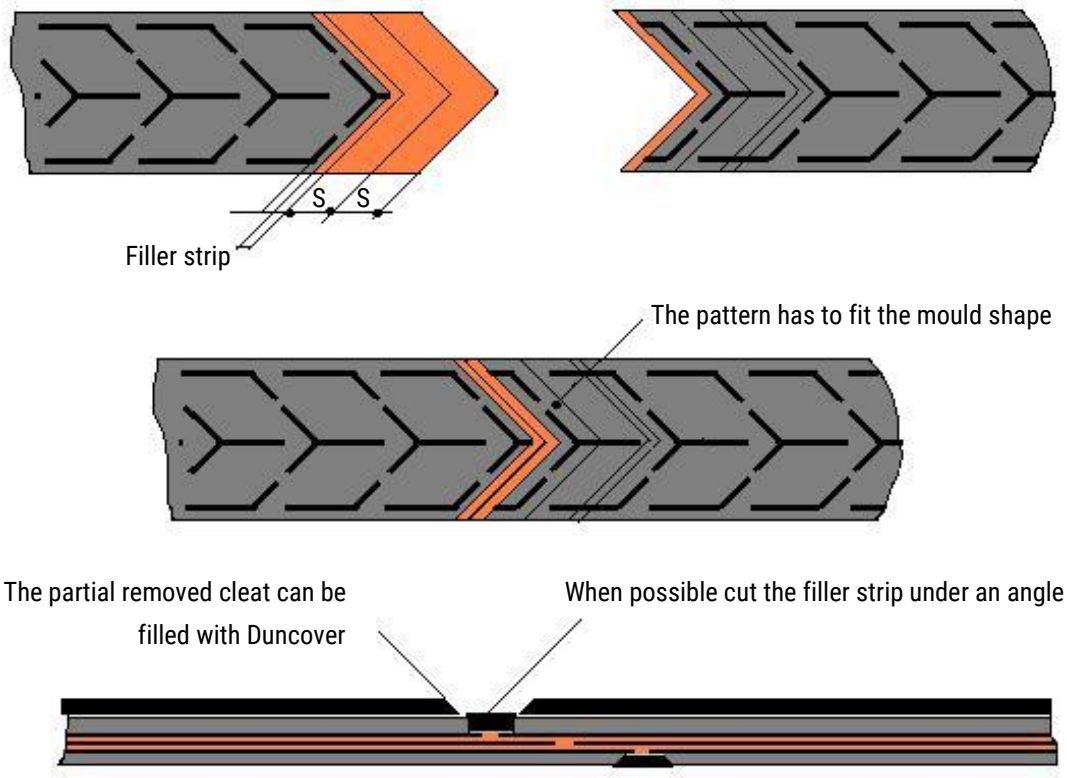
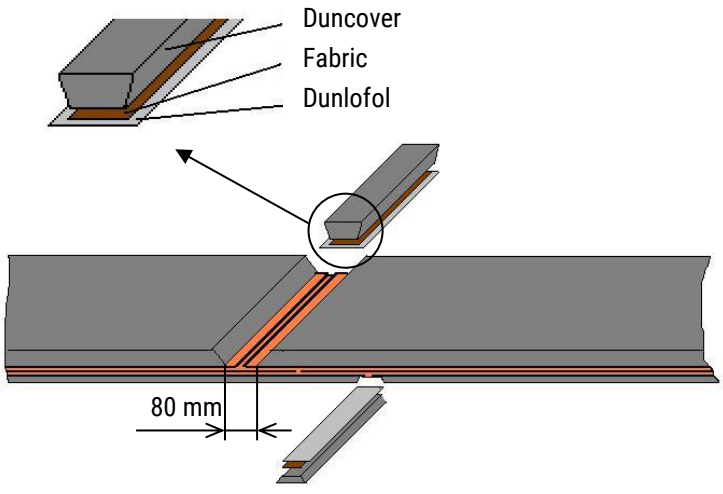


Figure 4. Schematic presentation of splice

2.5 ADDITIONAL INSTRUCTIONS FOR HIGH TENSION RATINGS

Special high tension rating splice kits are available on request. The following additional instructions are to be followed for the belt types of 2000 N/mm and higher. These instructions can also be used in other cases, for more information please consult our Application Engineering Department.

- After the preparation of the steps in the splice, apply Dundisol as normal
- The splice kit contains special high adhesion Dunlofol.
- This should be applied in one or two layers, depending on the amount of skim that remained on the fabric after preparation. The splice should be build-up with a thickness equal to the belt.
- The filler strips must be made with a special 60 mm wide fabric issued with the special kit, see the drawing. This is a special tacky fabric, which can be used without Dundisol.



2.6 STEP LENGTHS

The step dimension for multiply splices is depending on the strength of the individual fabric ply. Below table indicates the appropriate step length based on belt type specification (strength/plies).

Belt type	Step length S (mm)	Belt type	Step length S (mm)	Belt type	Step length S (mm)
S 250/2	160	S 800/5	200	S 1600/5	315
S 315/2	200	S 1000/3	315	S 1600/6	250
S 400/3	160	S 1000/4	250	S 2000/4	350
S 500/3	200	S 1000/5	250	S 2000/5	315
S 500/4	160	S 1000/6	200	S 2000/6	315
S 630/3	250	S 1250/3	315	S 2500/5	350
S 630/4	200	S 1250/4	315	S 2500/6	315
S 630/5	160	S 1250/5	250	S 3150/5	350
S 800/3	250	S 1250/6	250	S 3150/6	350
S 800/4	250	S 1600/4	315	S 3150/7	315

Table 1: Superfort step dimensions for belt loads up to 100%

Belt type	Step length S (mm)	Belt type	Step length S (mm)
D 200	160	T 400	160
D 250	160	T 500	200
D 315	200	T 630	250
D 400	250	T 800	250
D 500	250	T 1000	315
D 630	315	T 1250	315
D 800	315		

Table 2: Dunloflex and Trioflex step dimensions for belt loads up to 100%

3. DETERMINATION OF THE OVER LENGTH

The necessary over-length is determined by the step length, number of steps and the splice angle. The typical angle of a step splice is 17 degrees, or 0.3 x belt width (B).
This over-length needs to be taken into account when determining the endless belt length.

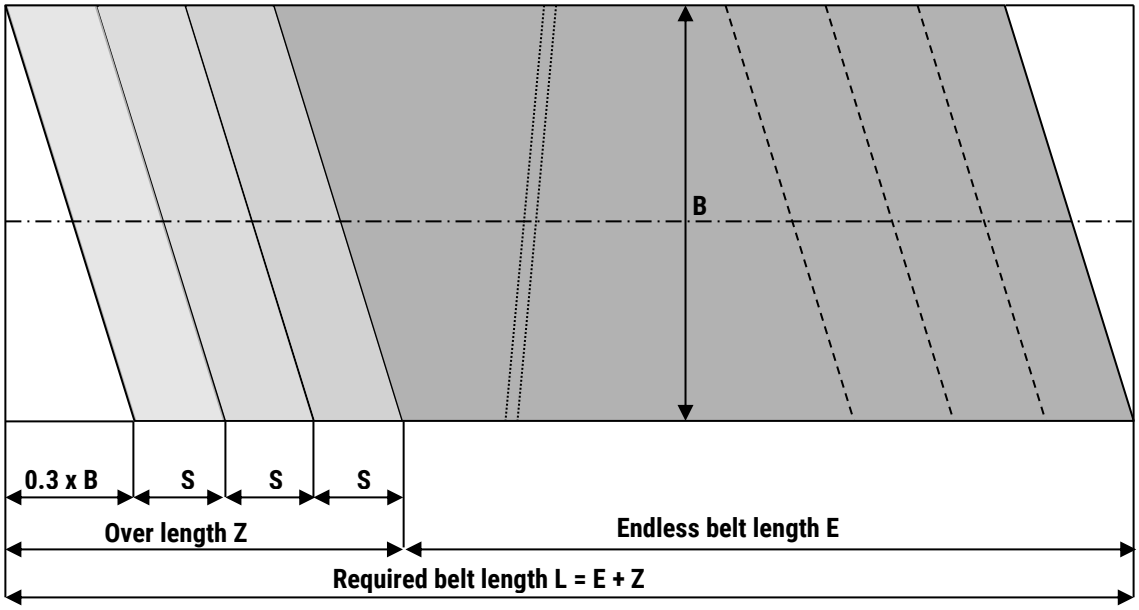


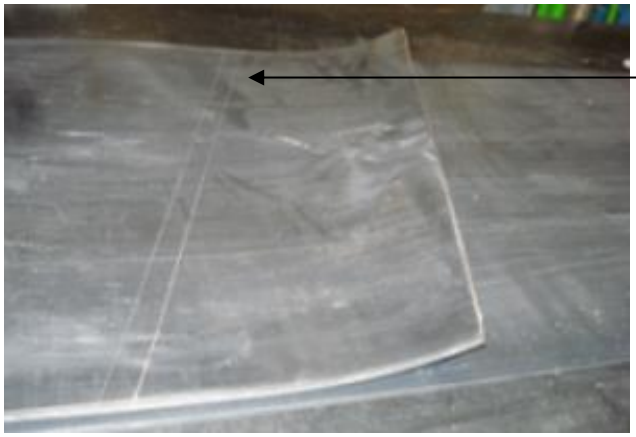
Figure 4: Schematic presentation of the required over length

The over-length $Z = 0{,}3 \times B + (n-1) \times S$ (For normal step splice)
$Z = 0{,}3 \times B + n \times S$ (For overlap splices)

Z = Over length (mm)
B = Belt width (mm)
n = Number of plies
S = Step length (mm)

4. PREPARATION OF THE SPLICE

The following photo session shows the preparation of a step splice.



Mark the belt with:
- The step length(s) + (0.3 x B)
- Filler-strip

The amount of steps depends on the amount of fabric plies.

Follow the same procedure for the bottom cover of the other belt-end.

Photo 1. Marking the belt

Cut the top cover until the first fabric ply.

Follow the same procedure for the bottom cover of the other belt-end.

Photo 2. Cutting the filler strip

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

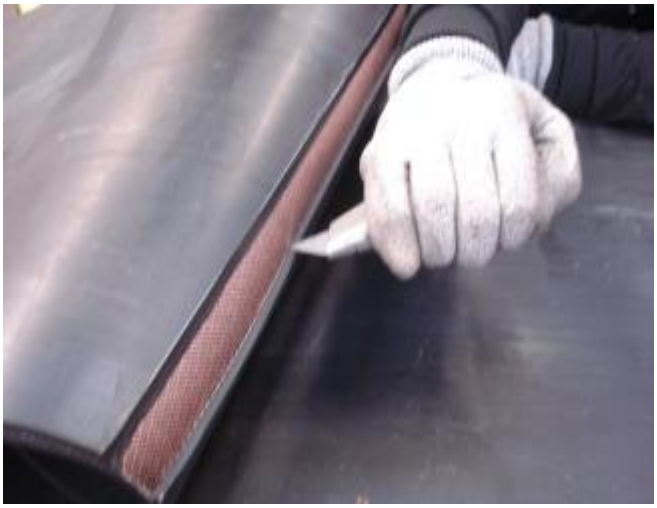
Follow the same procedure for the bottom cover of the other belt-end.

Photo 3. Cutting at an angle of 45°

Peel off the existing cover- rubber.

Follow the same procedure for the bottom cover of the other belt-end.

Photo 4. Peeling of the cover rubber



Cut through the first fabric ply up to the second fabric ply.

Note:
Do not touch the under laying (second) fabric layer!

This has to be repeated when more steps are needed.

Follow the same procedure for the bottom side of the other belt-end.

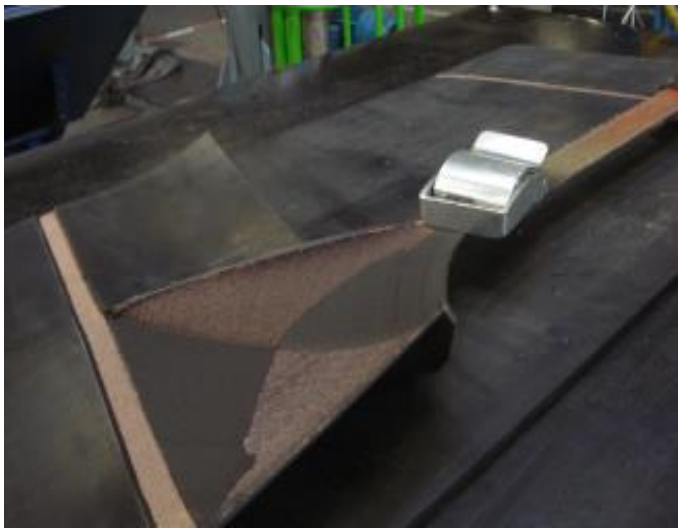
Photo 5. Cutting the fabric plies

Peel off the fabric sufficient far to fit in the frog clamp.

When the frog clamp is not available, peel off the fabric in small strips by hand in the longitudinal direction.

Follow the same procedure for the bottom side of the other belt-end.

Photo 6. Peel of the fabric (1)



Peel off the steps

Follow the same procedure for the bottom side of the other belt-end.

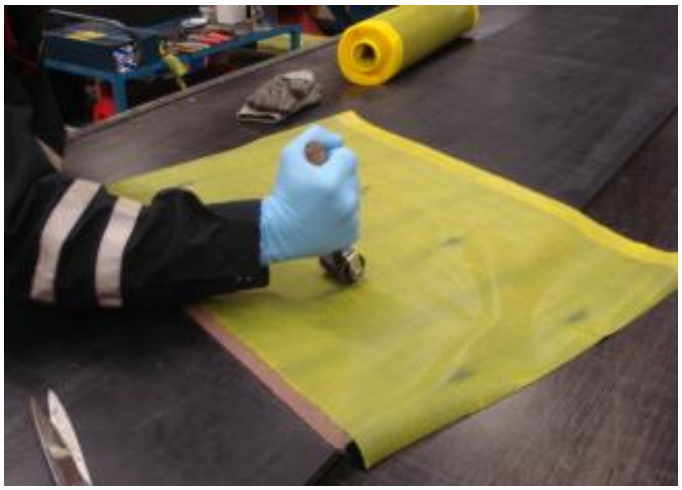
Photo 7. Peel of the fabric (2)

Apply Dundisol to the steps.

Follow the same procedure for the bottom side of the other belt-end.

Wait until the solution is dry, but still sticky to apply the Dunlofol.

Photo 8. Apply Dundisol

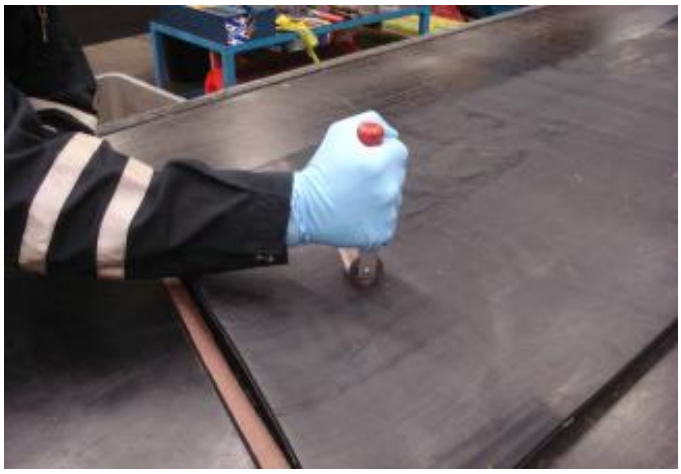


Apply a layer of Dunlofol to one belt end. Roll the Dunlofol tight onto the splice area to prevent air-traps between the carcass and the Dunlofol. Leave the area of the filler-strip free.

Photo 9. Apply Dunlofol

Align the belt-ends and match them together. The belt-ends have to fit exactly.

Photo 10. Aligning and matching the belt-ends



To prevent air-traps, roll the belt-ends together from the center to the outside of the belt, to enable the air to come out.

Photo 11. Roll the belt-ends together

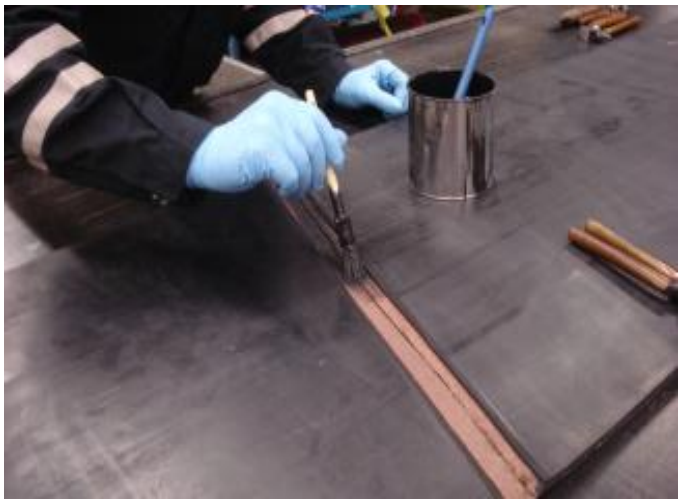
Peel off the filler strip of the other belt end.

Photo 12. Remove the filler strip

Buff the existing cover-rubber, over a width of approx. 3 cm directly aside the filler-strip, this allows a higher adhesion.

Follow the same procedure for the bottom cover of the other belt-end.

Photo 13. Buffing the existing cover-rubber

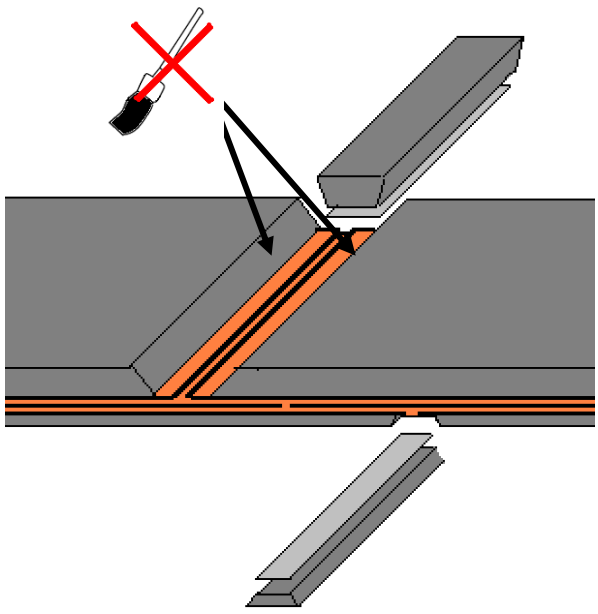


Apply Dundisol to the area of the filler-strips.

Wait until the solution is dry, but still sticky to apply the Dunlofol.

Photo 14. Apply Dundisol

IMPORTANT:
Additional Instruction for **ROS**, **BVGT**, **BV ROM**, **BV-VT** and **VT** quality:
Do not apply Dundisol to the chamfer and top of the existing cover rubber.
In case Dundisol is applied by mistake, the chamfer and the top cover needs to be cleaned and buffed to remove the Dundisol.

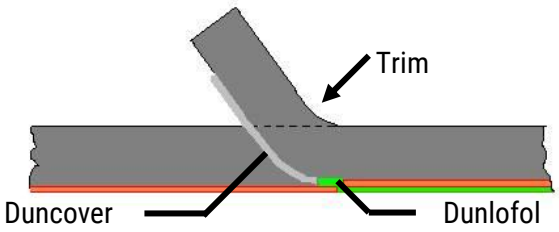


Insert one layer of Dunlofol and the needed amount of Duncover and roll it tightly to prevent air-traps.

The thickness should be approx. 0.5 mm thicker than the cover thickness.

Photo 15. Insert the filler strip

Another method of making a filler strip is by chamfering the existing cover to nicely fit against the opposite belt end chamfer. Make sure that a 1-2mm thick Duncover layer is added between the adjacent sides.



Wrap the splice with an anti-adhesive paper or cloth.
Apply the edge bars.
If multiple press plates are used, use a steel or aluminium (sole)plate on each side of the belt, equal or larger than the press size.
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.

5. VULCANISATION

The pressure during vulcanisation must be minimal 6 bar. See the temperature/time diagram for the exact press cycle. To improve flow of the splice materials and reduce air pockets, the heating of the press may be paused for 5 minutes when both plates have reached 110°C. Then continue the heating 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 5). When the cure is completed, water cool to 70°C (160°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.

Note: this does not apply for Deltahete quality (see the additional instructions on page 18 and 19)!

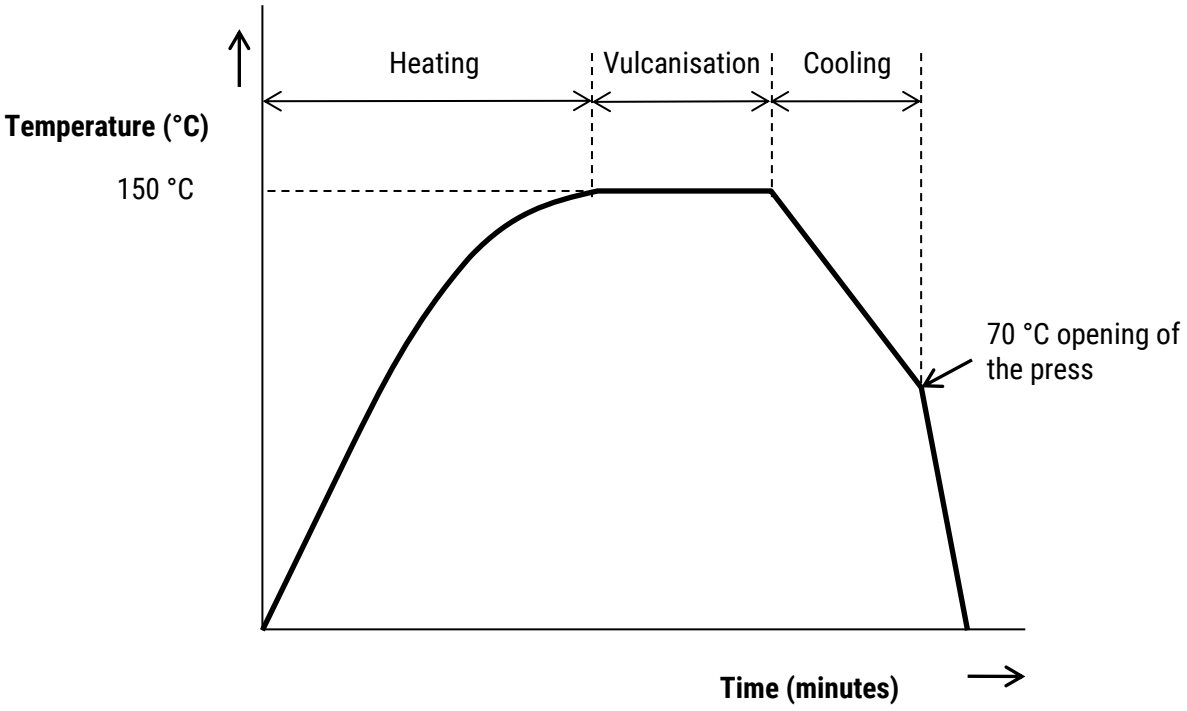


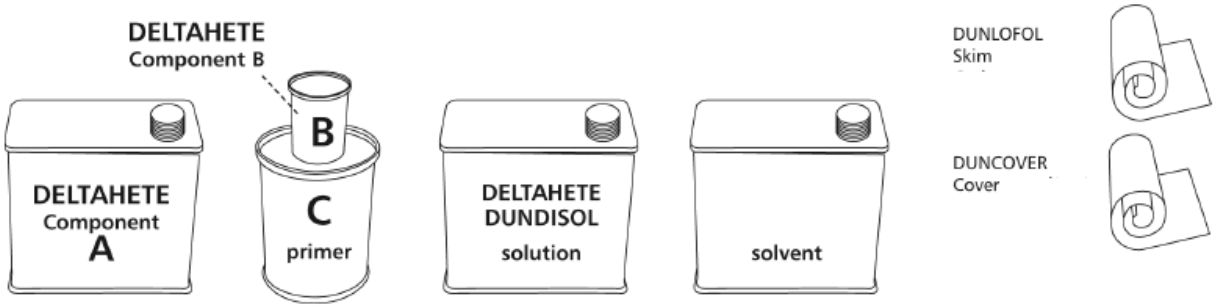
Figure 5: Temperature during vulcanisation

Qualities	Belt thickness (mm)			
	up to 10	10 – 15	15 – 20	20 – 30
AA, RA, RS, RSW, RE, RES, RAS	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
BVGT, VT, BVVT	25	30	35	45

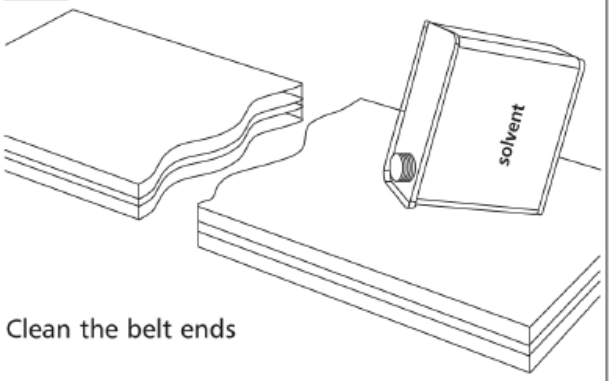
Table 3. Vulcanising time in minutes

6. ADDITIONAL INSTRUCTIONS FOR DELTAHETE SPLICING

CONTENTS OF SPLICING KIT DELTAHETE

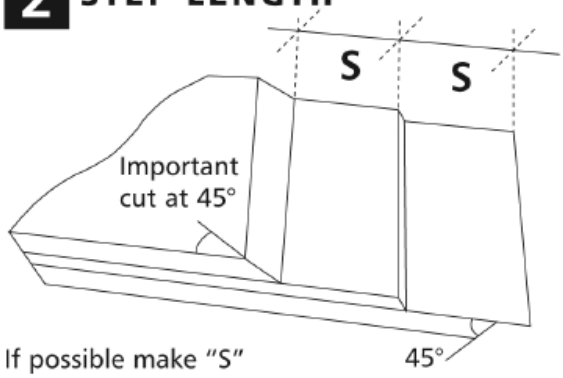


1 PREPARATION



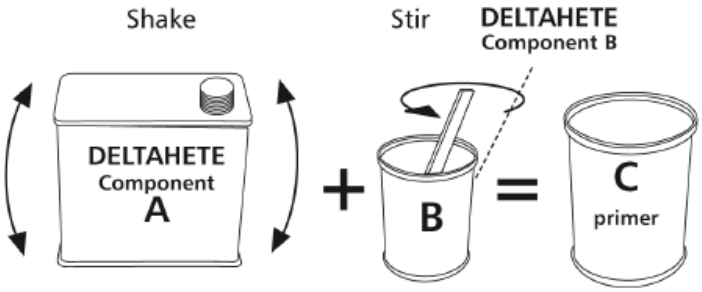
Clean the belt ends

2 STEP LENGTH

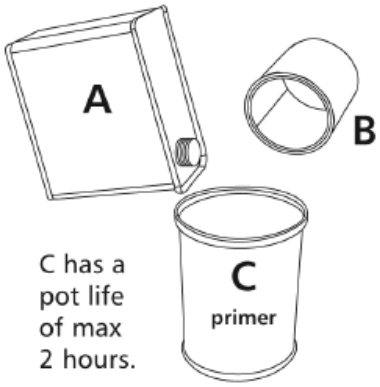


If possible make "S"
50-100% longer.

3 PRIMER

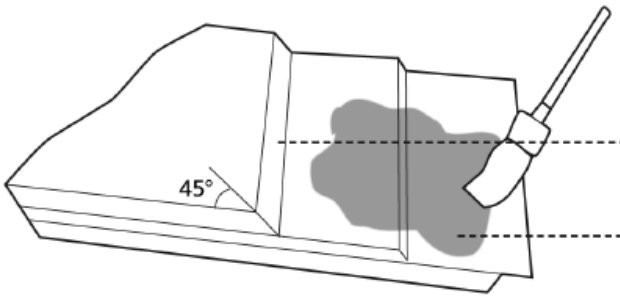


The components A and B should be mixed thoroughly.



C has a
pot life
of max
2 hours.

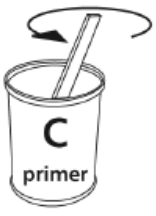
4 APPLYING PRIMER



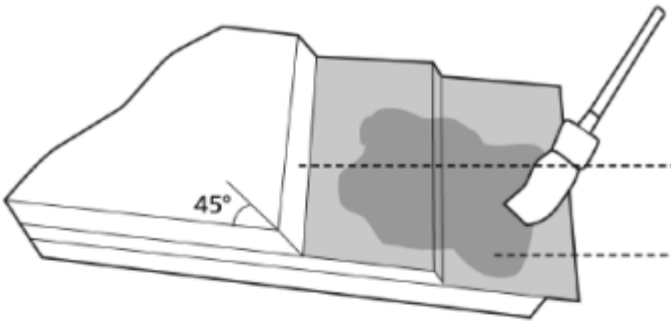
The fabric of both belt ends has to be covered with primer C once.

Attention!
No primer
on the cover!

Wait untill completely dry



5 APPLYING SOLUTION

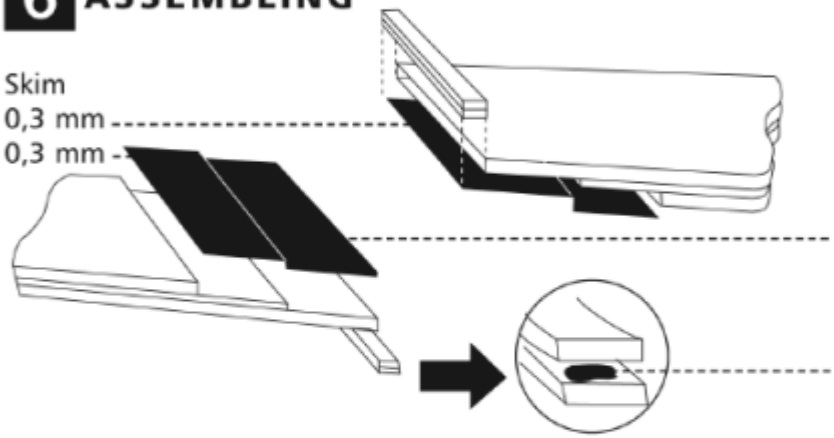


The fabric of both belt ends has to be covered with Dundisol once or twice.

Attention!
No Dundisol on the cover!

Wait untill tacky.

6 ASSEMBLING



Both belts ends have to be covered with skim rubber, which have to be covered with Dundisol once or twice. Wait untill tacky before assembling both belt ends.

Filler strip
When building up,
use solution between rubber layers.

Attention!
No skim on the cover!

To avoid the splice to stick to the pressplates, both the fillerstrips should be covered using the fabric supplied.

7 VULCANIZING

Temperature	155°-160°C		
Belt thickness (mm)	10	10-15	15-20
Vulcanizing time (min.)	40	45	50

HOW TO CONTACT US

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