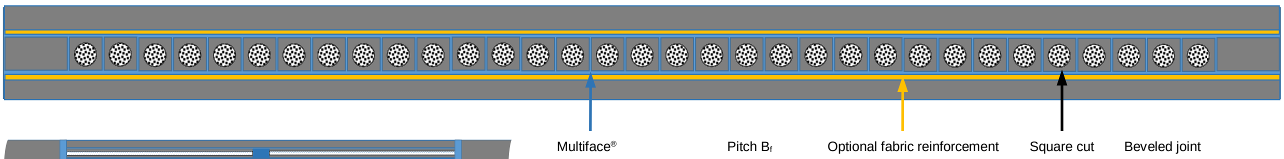
Steel cord belt splicing with Multiface®

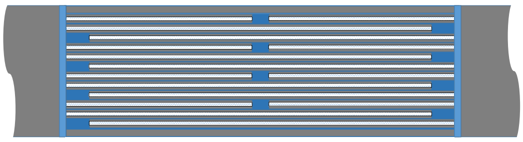
Multiface® achieves a very good adhesion with all components and material of usual conveyor belts made of rubber, PVC and PU. On the contact surface with rubber, it realizes additionally a unique chemical crosslinking, which corresponds to the process of hot vulcanizing, but at room temperature. **Multiface®** can therefore be used both in hot process as replacement for vulcanizing solution and raw rubber with a vulcanizing press or in cold process as replacement for contact glue or rubber cement. In both cases, a low pressure and temperature are sufficient to perform a complete vulcanizing. If necessary, the procedure and the adhesion should be tested before use.

The splicing of steel cord conveyor belts with **Multiface®** is generally made with regard to the Standard DIN 22 131 or ISO 15236 – Steel cord conveyor belts – Part 4: Vulcanized belt joints – and should be carried out by professionals who have the knowledge and the experience of splicing steel cord conveyor belts. Depending on the requirements and the dimension of the splice, various versions with shorter or longer reaction time are available, which can be combined together:

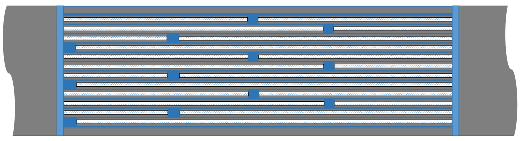
	Multiface 20	Multiface 40
Pot time at 23°C / 73°F (max. interruption time without the need to change the static mixer)	20 min.	40 min.
Max. time for spreading at 23°C / 73°F progressively in several steps	90 min.	120 min.
Max. time from first applying to assembly at 23°C / 73°F (≈ open time)	120 min.	240 min.
Curing time for full functional strength of a steel cord splice at 23°C / 73°F	8 h	24 h
Curing time for full functional strength of a steel cord splice by heating at 80°C / 176°F depending on the thickness	1 - 1½ h	1 ½ - 2 h
Material consumption under optimum conditions	1,000 – 2,500 g/m²	

Step length according to DIN 22131 and ISO 15236 - Part 4

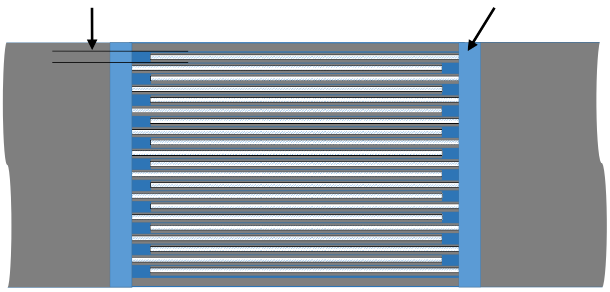




2 step splice

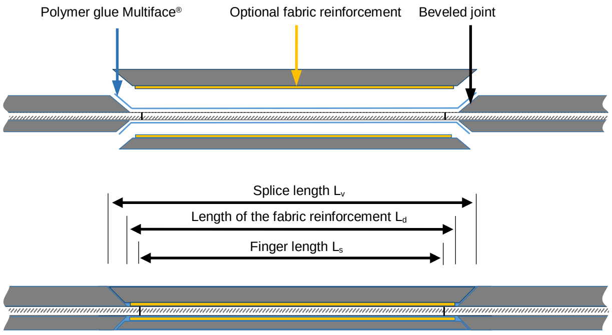


3 step splice



1 step splice

Belt type	Number of steps	Min. step length L_s	Transition	Splice length L_v
ST 800	1	300 mm	300 mm	600 mm
ST 1000	1	300 mm	300 mm	600 mm
ST 1250	1	350 mm	300 mm	650 mm
ST 1600	1	450 mm	300 mm	750 mm
ST 2000	2	400 mm	350 mm	1150 mm
ST 2500	2	500 mm	350 mm	1350 mm
ST 3150	2	650 mm	350 mm	1650 mm
ST 3500	3	650 mm	400 mm	2350 mm
ST 4000	3	750 mm	400 mm	2650 mm
ST 4500	3	800 mm	400 mm	2800 mm
ST 5000	4	900 mm	650 mm	4250 mm



(*) Step and splice length, splice angle, offset and transitions are illustrated in simplified manner. Follow DIN 22131 / ISO 15236-4 and the specifications of the belt manufacturer. Depending on the requirements and on the properties of the fabric reinforcement **Multiface®** allows shorter jointing length.

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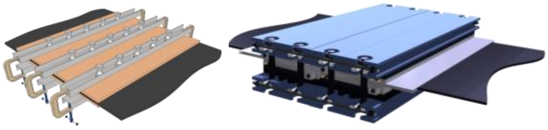
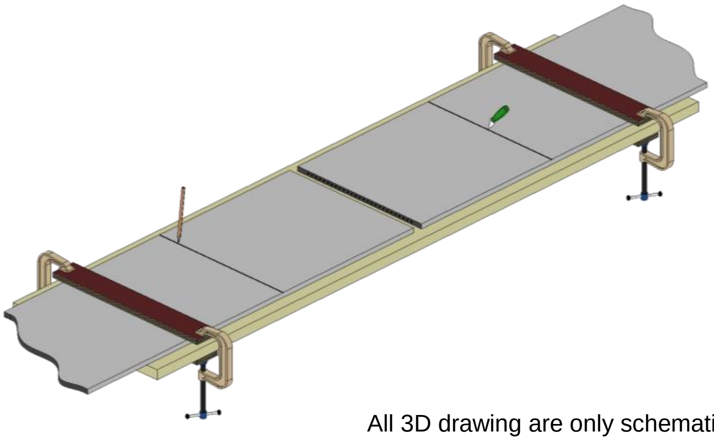
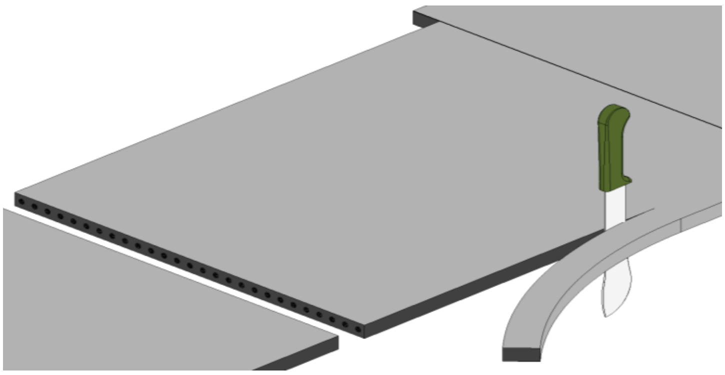
Equipment required:
- Plane workbench or fixing device with multiplex panels
- Equipment ensuring at least 2 bars / 28 psi pressure, preferably with a vulcanizing press or with the fixing device
- PTFE coated fabric or silicone paper to prevent sticking
- Set of weights and screw clamps or belt clamps to fix the belt
- Low square and cutter and eventually a belt stripper
- Steel cord shear or belt cutter
- Electric winch and belt pliers and electric belt skiver
- Spatula and round brush Ø 40 mm
- Angle grinder with abrasive disc grit 12 or grit 24
- Rotary carding brush or rotary metal brush
- Hand brush (clean and oil-free)
- Rubber mat with approx. 40 Shore(A) for pressure distribution
- Pair of disposable gloves
- Some sheet of cleaning paper



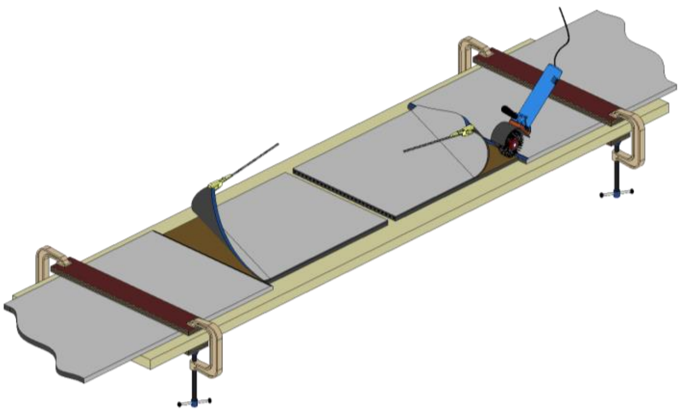


All 3D drawing are only schematic!

Secure the belt ends to the lower fixing device, or on the workbench, or on the vulcanizing press, using squared timbers or belt clamps with sufficient clearance to be able to fold both sides. Then cut off the belt with 90°. Mark the joint length and angle (90° or rhombic) on the belt cover and cut carefully the cover.

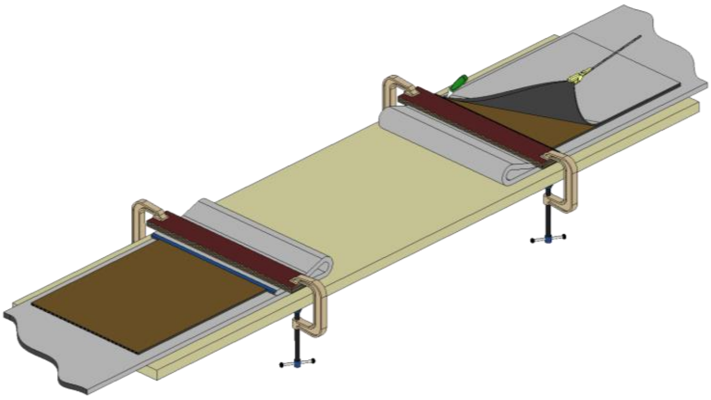


Cut the belt edges alongside the steel cord.

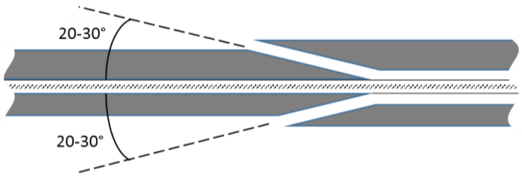


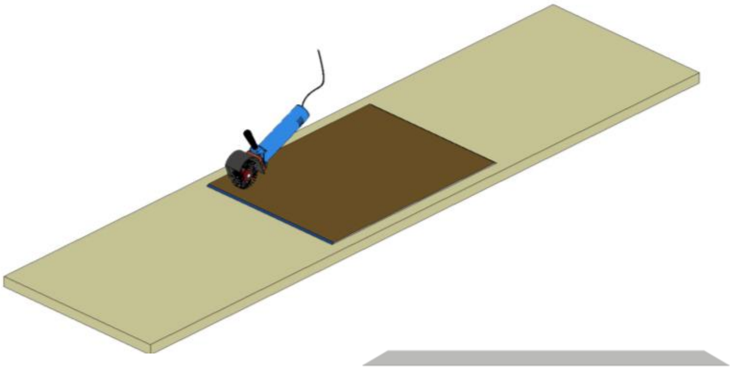
Remove the top cover on both belt ends. Now the edges should be beveled at a flat angle of 20-30° in order to achieve a progressive overlap of the intended cover plate.

Remark: we recommend the using of a winch together with a knife or an electrical skiver (Part #: WZ-SC-299) in normal conditions
or a pneumatically skiver (Part #: WZ-SC-265) in underground mining.



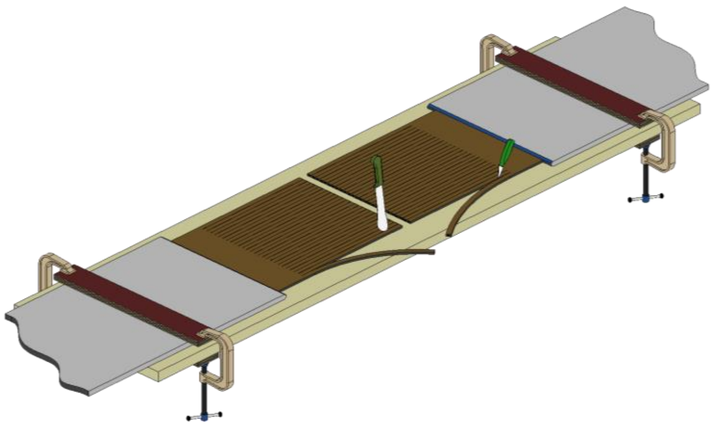
Turn over both belt sides to remove the cover plates on the bottom side.
Now the edges should be beveled at a flat angle of 20-30° in order to achieve an overlap of the intended cover plate.



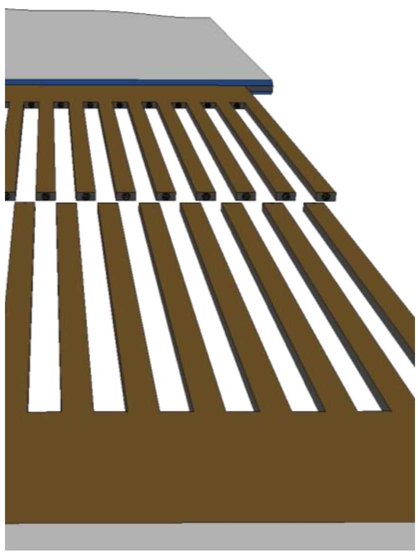


Prepare the bottom cover plates with chamfers for overlapping and grind the surface with grit 16 or grit 24 to roughen it.

Remark: we recommend using a cover plate with a layer fabric from another belt. The fabric should be so elastic that the min. drum diameter is maintained but elongate so slightly that an increase of the splice strength is achieved.

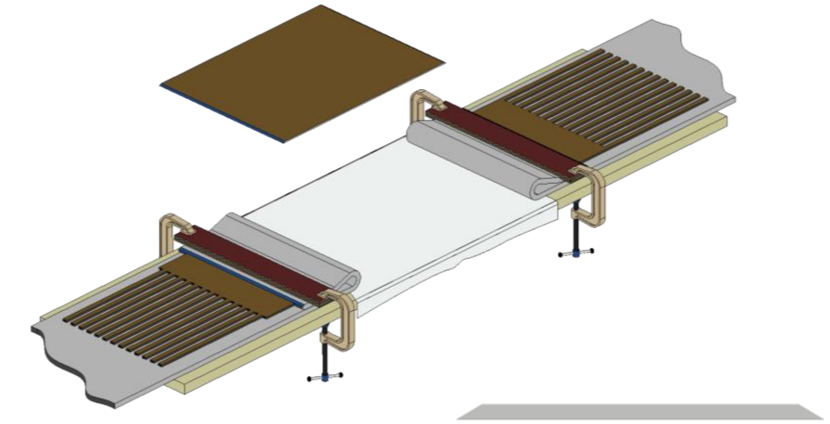


Separate the steel cords preferably with a square cut (finger-shaped) with rubber as to leave a small gap.

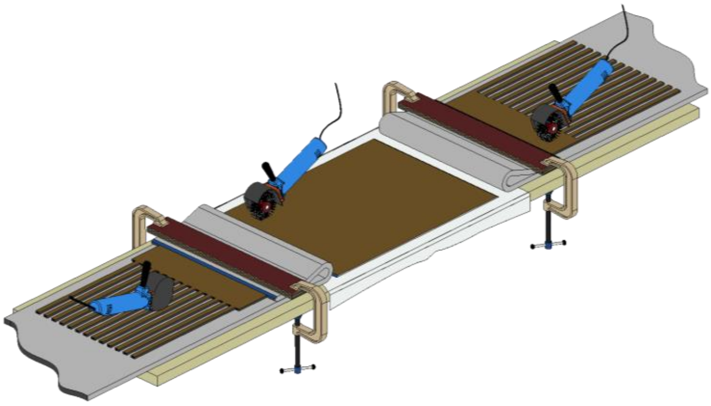


Standard hexagonal or octagonal cut

Recommended cut



Place a PTFE coated fabric or silicone paper on the lower plate of the fixing device or vulcanizing press. This PTFE coated fabric must be approx. 20 cm/8 inches wider as the belt width. Now place the bottom cover plate on the PTFE foil.



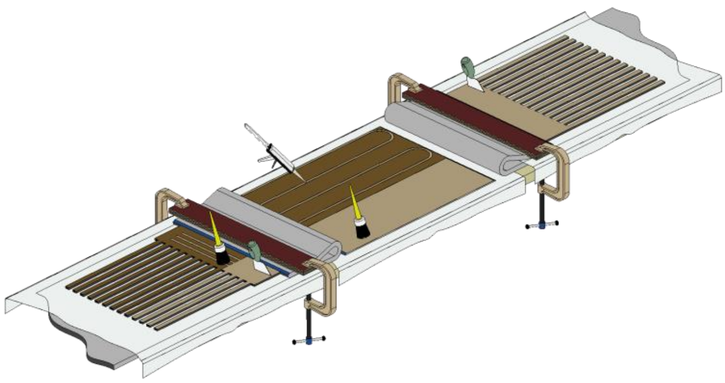
Then roughen all contact surfaces on all sides with rotating carding brush or a rotating metal brush. The optional fabric reinforcement of the cover plates should be slightly roughen too. Now clean all surface with an unsoiled brush. Do not use chemical cleaners and solvents!

Remarks: now all surfaces must be protected against some contamination.

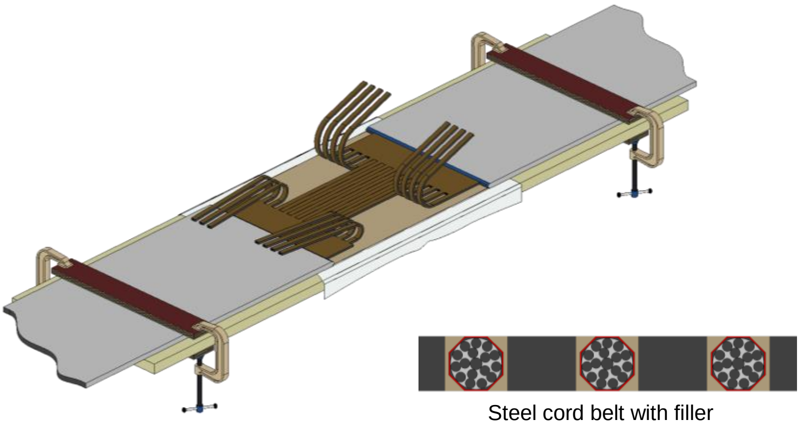
	Multiface 20	Multiface 40
Processing time for each step (= pot life time at 23°C/73°F)	20 min.	40 min.
Max. time to spread the Multiface® in several steps at 23°C/73°F	45 min.	120 min.
Curing time for full functional strength of a steel cord splice at 23°C/73°F	8 h	24 h
Curing time for full functional strength of a steel cord belt by heating at 80°C/176°F depending on the thickness	1 - 1½ h	1½ - 2 h

Apply quickly **Multiface®** on all bottom contact surfaces with a caulking gun, spread it quickly with a spatula, and rub the glue with a short bristle brush in the pores.

Caution: due to the relatively short application time, Multiface® starts to harden in the static mixer after an interruption exceeding 50 % of the pot time. After this time, do not try to push the product by force but rather change the static mixer!



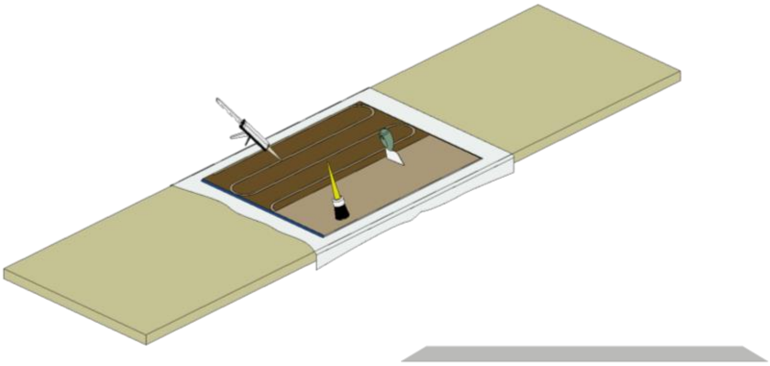
Remarks: from now on, the time must be recorded to prevent exceeding the maximum processing time!
The required quantity depends on the distance between the fingers and the remaining gaps. In this step, the consumption is usually more than 1,000 g/m².



Steel cord belt with filler

Unroll the fingers of both sides of the belt without waiting and join them together with the necessary offset to achieve the correct alignment. If enough Multiface® was dispensed the surplus penetrates between the finger, ensuring additionally optimal adhesion.

Remark: In case of hexagonal or octagonal cut, some filler must be inserted as usual between the ropes and the consumption of adhesive will significantly increase



Lightly roughen the top cover plate. Now clean the surface. Then apply quickly **Multiface®** on the contact surface, spread it quickly with a spatula and rub it with a short bristle brush in the pores.

Remark: in this step, the required quantity is approx. 300-500 g/m² depending on the weaving density of the optional fabric.

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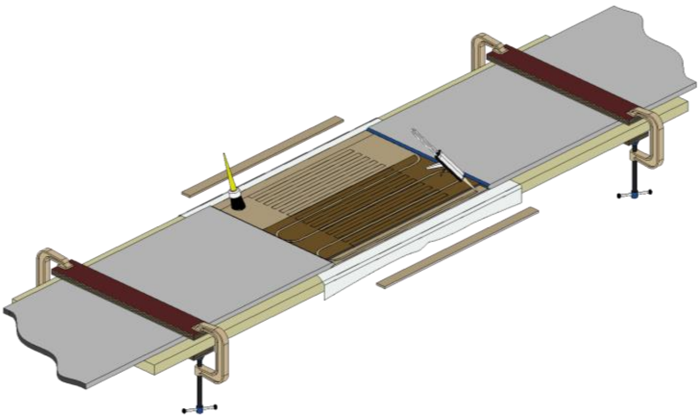
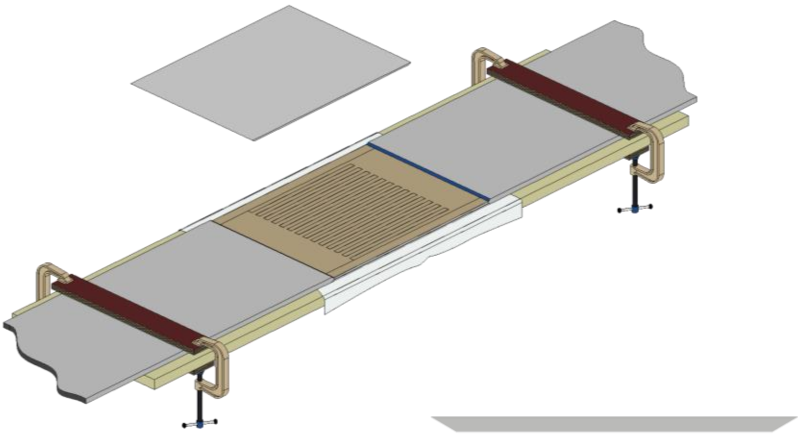
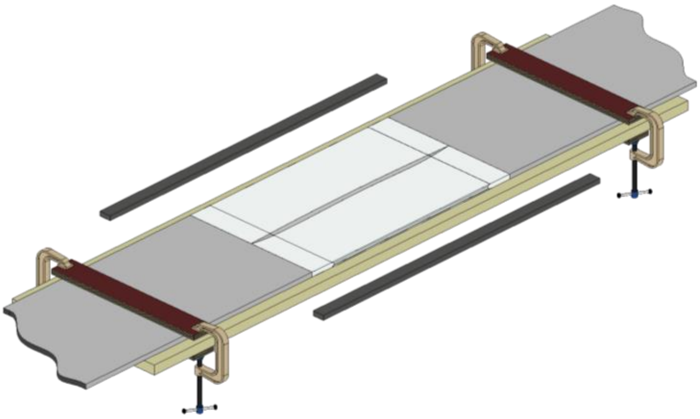


Apply quickly **Multiface ®** on all upper contact surfaces and in all gaps and spread it quickly with a spatula and rub the glue into the pores with a short bristle brush.
Make sure that the adhesive is applied in sufficient quantity with a slight excess between the fingers and the gaps to allow a uniform distribution under pressure.

Remark: the required quantity is here approx. 300-1,000 g/m² depending on the roughness and the gaps.

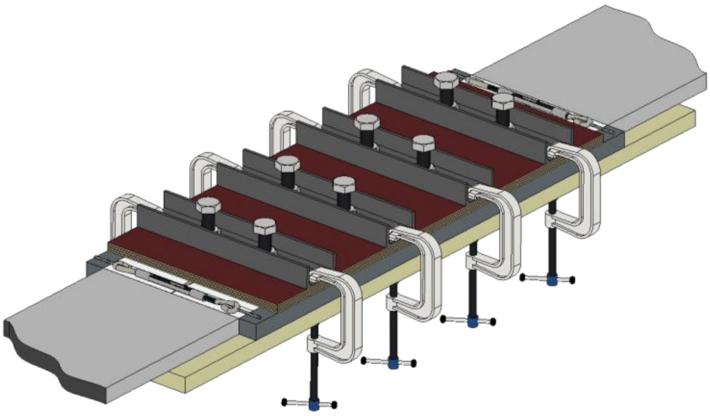


Insert rubber edges.
Place the top cover and apply some pressure by rolling the surface, to try to press out some of the air bubbles.

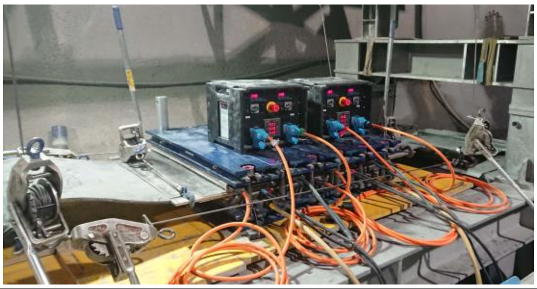


Close the PTFE coated fabric on the belt and add two edge irons. These should be about 1 mm thinner than the belt. Add further PTFE coated fabric on the top of the beveled edges to avoid sticking of the fixing device.

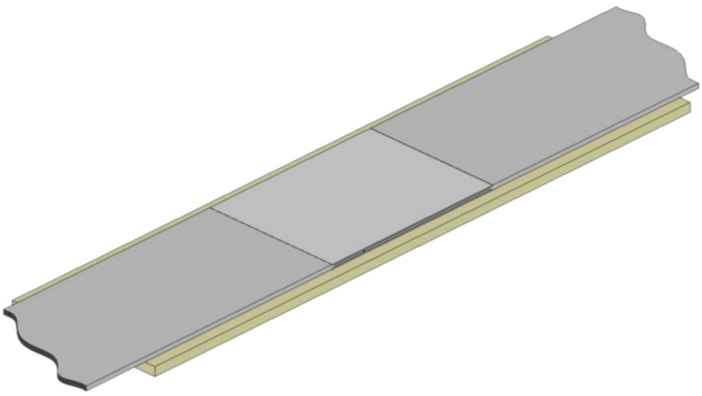
Remark: the edge irons should be minimum 50 mm/2" wide to keep laterally the pressure.



Fix the edge irons and close the fixing device or the vulcanizing press, while inserting a soft rubber mat with 40 Shore (A) and at least 5 mm thick, to ensure a good distribution of the pressure over the whole surface, and particularly over the biased overlaps. The fixing device should not only fix the belt but also apply sufficient pressure (minimum 28 psi or 2 Kg/cm^2), in order to press **Multiface®** between the steel cords and into the fabric reinforcement.



However, generally it is preferable to proceed with a vulcanizing press, ensuring a constant pressure, but also to accelerate the curing time by heating at 80°C / 176°F, in order to restart the belt quickly.

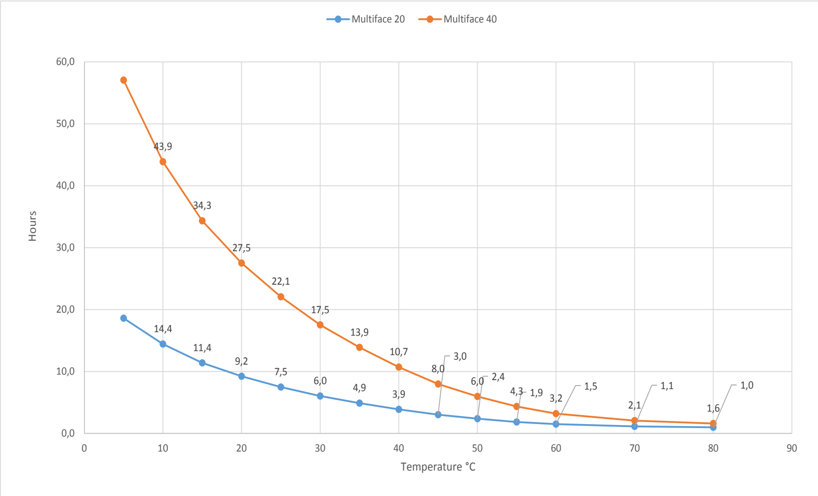


The fixing device or the vulcanizing press can be opened as soon as the safe hand strength is reached.
This time depends on the material and the temperature.
It takes at 23°C/73°F:

- **Multiface 20**: 4 hours
- **Multiface 40**: 8 hours

Check the splice, and if necessary add some **Multiface 1.5** to seal the joints and the edges. Cut or grind the protruding parts and clean the belt.

	Multiface 20	Multiface 40
Curing time for full functional strength of a steel cord splice at 23°C/73°F	8 h	24 h
Curing time for full functional strength of a steel cord splice by heating at 80°C/176°F depending on the thickness	1 - 1½ h	1½ - 2 h



Curing time depending on the temperature with thin belt thickness

Wait the full curing to functional strength before starting the belt. This time depends on the material and the temperature.
With 25 mm or 1 inch thick steel cord belts it takes at 23°C / 73°F:

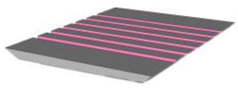
- with Multiface 20: 8 hours

- with Multiface 40: 24 hours

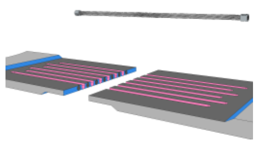
Important: depending on the belt thickness, the curing time can be reduced to less than 2 hours by using a heating source (up to 80°C/176°C). Avoid a higher temperature during curing to keep the maximum final strength and to prevent some burning of the belt cover.
At temperature below +5°C/41°F the use of a heating source is mandatory.

General remarks:

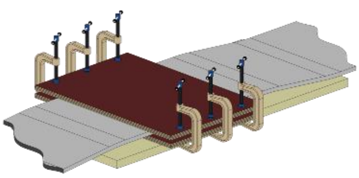
- The total consumption of **Multiface®** is expected to be between 1,000 g/cm2 and 2,500 g/m2, depending on the roughness, weaving density of the scrim fabric, gap between the steel cords etc. In case of wide gaps, the consumption can be much more.
- Instead of normal cover plates, we recommend using fabric reinforced cover plates with a ply of elastic fabric, preferably polyamide, allowing to increase the resistance of the splice, or to reduce the splice length. In this case, the upper cover and the lower cover should be installed offset in longitudinal direction in order to insure a smooth transmission. However, it must be checked that the splice will be not too stiff and remains compatible with the drums of the conveyor.
- As an alternative, it is also possible to use a cover plate made of rubber, or PU or PVC, with CNC milled grooves in U-shape, allowing the steel cords to be placed directly in the right position. In this case, it is possible to release the steel cords with a cable stripper according to the usual procedure. Since **Multiface®** obtains good direct adhesion to steel, and provides a very effective anticorrosive protection; it is possible to completely remove the rubber on the surface of the steel cords, to get the best possible tolerance between the external diameter of the cords, and the width of the U-shaped grooves. The application of Multiface and the installation of the steel cords becomes very easy and much faster.



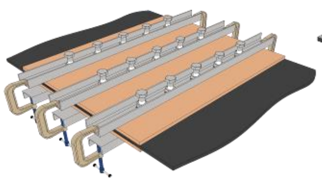
- Instead of folding the steel cords side to side, it is also possible to cut both sides of the belt with a slight angle (16° or 22°), to remove both rubber covers, to join belt edge to belt edge and insert tensile ropes between the steel cords, together with the fabric reinforcement of the covers plates to achieve the necessary strength.



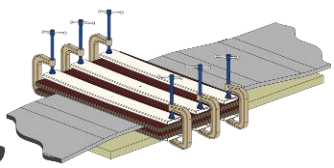
- Further information can be found on the DIN 22121 or ISO 15236 – Part 4 or in the instruction of the respective belt manufacturer.



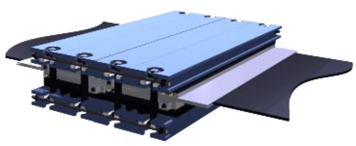
Fixing device with 2 wooden panels and clamps
for belt width up to 650 mm



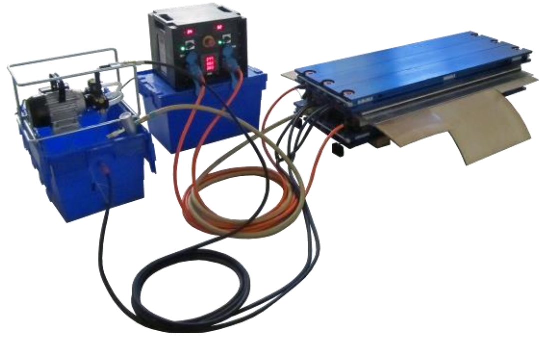
Fixing device with additional U profiles
for belt width up to 1,400 mm



Fixing device with bended hollow profiles
for belt width up to 1,200 mm



Vulcanizing press
for belt width up to 2,200 mm



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