SPLICING MANUAL
Cold Splicing of Rubber Conveyor Belts with Fabric Plies
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## General Recommendations

### Storage of splicing products
Splicing products should be stored in a dry and dark place at a temperature between 59°F and 79°F (DIN 7716).

Please observe expiry date on box!

### Precautions
Observe safety instructions on the containers!

### Application Range of Cold Splices

#### Standard and "V"-quality conveyor belts
Cold endless splicing of mono- and multi-ply conveyor belts with textile carcass (DIN 22102) and covers made of the following polymers:

- Natural rubber (*NR*)
- Styrene butadiene rubber (*SBR*)
- Isoprene rubber (*IR*)
- Butadiene rubber (*BR*)
- Chloroprene rubber (*CR*)

- or a mixture of above polymers, e.g. *NR/SBR*

In case of doubt consult belt manufacturer about rubber quality.

For splicing of other belt types please contact your local REMA TIP TOP specialist.

### Splicing methods
- rectangular or
- bias (0.3 x belt width)

### Place / Site
- in a vulcanizing shop or
- on site

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Note:
Our recommendations are the result of field tests and long experience.

In view of different materials and working conditions beyond our control it is generally recommended to make tests locally.

A liability or responsibility can be extracted in no case from these recommendations.
Conditions for Cold Splicing

**Working place**
In order to ensure quality and durability of a cold splice a clean working place and proper usage of the splicing products are essential.

**Conveyor belt**
The conveyor belt must be clean and dry.

If necessary clean the belt as follows:
- Scrape off water-soluble contamination (e.g. salt, fertilizer) and rinse with water.
- Remove oil and grease with REMA TIP TOP Cleaning Fluid.

Dry the belt with REMA TIP TOP Drying Hood or Air Dryer.*

**Ambient conditions**
The ambient temperature and the temperature of the splicing products should be between +50°F and +113°F.

Humidity influences such as condensation water (below dew point) must be absolutely avoided.

If necessary
- erect a tent to protect working area from strong sunlight, rain and wind;
- warm up splice area with a drying hood or a hot air dryer.*

* Note:
Electrical appliances must not be left unattended (risk of fire!) or exposed to humidity.

**Tools and Equipment**
- Belt tensioners
- Chain or cable winch
- Screw clamps
- Measuring tape
- Metal ruler
- Flat angle
- Marking crayon (white)
- Plumb line
- 6" knife
- Don Carlos knife
- Off-set knife
- Ply knife
- Ply lifter
- Whetstone
- Scissors
- Pincers
- Grip tongs
- Hand brush
- Cement brush
- Stitcher
- Double acting roller
- Cable drum
- Safety goggles
- Drying hood
- Buffing motor (with flexible shaft and wire brushes)

Products for Cold Splicing of Standard and "V"-Quality Conveyor Belts

**SC 2000 Black**

<table>
<thead>
<tr>
<th>U.S. Part #: 101 000 041</th>
<th>Product #: SC2000B</th>
<th>Size: Pint/1/2 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>101 000 042</td>
<td>SC2000B 1KG</td>
<td>Quart/1 kg</td>
</tr>
<tr>
<td>101 000 043</td>
<td>SC2000B6</td>
<td>Gallon/5 kg</td>
</tr>
<tr>
<td>101 000 053</td>
<td>SC2000B-DRUM</td>
<td>Drum/290 kg</td>
</tr>
</tbody>
</table>

**UT-R 20 HARDENER (Non-Flammable)**
Use with SC 2000 Black Cement Only

<table>
<thead>
<tr>
<th>U.S. Part #:</th>
<th>Product #: S25 103</th>
<th>Size: 20 g</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTR20/20G</td>
<td>S25 1046</td>
<td>40 g</td>
</tr>
</tbody>
</table>

**#13 Cleaning Solvent (Non-Flammable)**
Use with SC 2000 Black Cement Only

<table>
<thead>
<tr>
<th>U.S. Part #:</th>
<th>Product #:</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>101 000 059</td>
<td>13-QT</td>
<td>Quart/32 fl. oz.</td>
</tr>
<tr>
<td>101 000 060</td>
<td>13-G</td>
<td>Gallon/1 US gal.</td>
</tr>
<tr>
<td>101 000 058</td>
<td>13-DRUM</td>
<td>Drum/54 U.S. gal.</td>
</tr>
</tbody>
</table>

**SC 4000 Black**

<table>
<thead>
<tr>
<th>U.S. Part #:</th>
<th>Product #: SC4000B-PINT</th>
<th>Size: Pint/0.33 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>101 000 045</td>
<td>SC4000Q</td>
<td>Quart/0.33 kg</td>
</tr>
<tr>
<td>101 000 046</td>
<td>SC4000Q</td>
<td>Quart/660 g</td>
</tr>
<tr>
<td>101 000 047</td>
<td>SC4000G</td>
<td>Gallon/3.3 kg</td>
</tr>
<tr>
<td>101 000 052</td>
<td>SC4000-DRUM</td>
<td>Drum/540 kg</td>
</tr>
</tbody>
</table>

**E-40 HARDENER (Flammable)**
Use with Standard Conveyor Belts and SC 4000 Black Cement Only

<table>
<thead>
<tr>
<th>U.S. Part #:</th>
<th>Product #: S25 114</th>
<th>Size: 15 g</th>
</tr>
</thead>
<tbody>
<tr>
<td>E40/15G</td>
<td>S25 1146</td>
<td>30 g</td>
</tr>
</tbody>
</table>

**R-50 CLEANING SOLVENT (Flammable)**
Use with SC 4000 Black Cement Only

<table>
<thead>
<tr>
<th>U.S. Part #:</th>
<th>Product #:</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>101 000 061</td>
<td>R-50-QT</td>
<td>Quart/32 fl. oz.</td>
</tr>
<tr>
<td>101 000 062</td>
<td>R-50-GAL</td>
<td>Gallon/1 gal.</td>
</tr>
<tr>
<td>101 000 050</td>
<td>R-50-DRUM</td>
<td>Drum/54 US gal.</td>
</tr>
</tbody>
</table>

**Filler Rubber with CN Bonding Layer on Both Sides (TT440)**

<table>
<thead>
<tr>
<th>U.S. Part #:</th>
<th>Product #:</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>303 (1.5mm)</td>
<td>S285363</td>
<td>1/16&quot; x 20&quot; x 33'</td>
</tr>
<tr>
<td>305 (3mm)</td>
<td>S285899</td>
<td>1/8&quot; x 29&quot; x 33'</td>
</tr>
<tr>
<td>306 (3mm)</td>
<td>S285428</td>
<td>1/8&quot; x 58&quot; x 33'</td>
</tr>
<tr>
<td>309 (6mm)</td>
<td>S285916</td>
<td>1/4&quot; x 29&quot; x 33'</td>
</tr>
<tr>
<td>310 (6mm)</td>
<td>S285882</td>
<td>1/4&quot; x 58&quot; x 33'</td>
</tr>
</tbody>
</table>

**Belt Repair and Cover Strip**

| U.S. Part #: | Product #: S316800 | Size: 4" x 33' |

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SPLICING MANUAL
Cold Splicing of Rubber Conveyor Belts with Fabric Plies
Systems and Dimensions of Cold Splices

Splicing methods
- Overlap splice (mono- and two-ply belts)
- Step splice (multi-ply belts)

A bias cut (0.3 x belt width) positively influences the durability of a splice.

Selection of step direction

*Splice runs against conveying direction*

This method is recommended because it is favorable even in case of aggressive scrapers.

*Splice runs in conveying direction*

Alternative method for slider bed conveyors.
Systems and Dimensions of Cold Splices

Selection of step length

*Mono-ply belts – up to 1/500*

Overlap splice

<table>
<thead>
<tr>
<th>Belt type</th>
<th>Step length $l_s$ in inches</th>
<th>Splice length $l_v$ in inches</th>
<th>Number of steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/200</td>
<td>9-7/8</td>
<td>9-7/8</td>
<td></td>
</tr>
<tr>
<td>1/250</td>
<td>9-7/8</td>
<td>9-7/8</td>
<td></td>
</tr>
<tr>
<td>1/315</td>
<td>11-3/4</td>
<td>11-3/4</td>
<td>1</td>
</tr>
<tr>
<td>1/400</td>
<td>11-3/4</td>
<td>11-3/4</td>
<td></td>
</tr>
<tr>
<td>1/500</td>
<td>13-3/4</td>
<td>13-3/4</td>
<td></td>
</tr>
</tbody>
</table>
Systems and Dimensions of Cold Splices

Selection of step length

*Two-ply and multi-ply belts*

<table>
<thead>
<tr>
<th>Belt type</th>
<th>Step length $l_s$ in inches</th>
<th>Splice length $l_v$ in inches</th>
<th>Number of steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/220*</td>
<td>8</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>2/250*</td>
<td>10</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>2/300*</td>
<td>8</td>
<td>20</td>
<td>1 or 2</td>
</tr>
<tr>
<td>2/400*</td>
<td>15</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>2/500*</td>
<td>18</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>3/330</td>
<td>8</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>3/375</td>
<td>10</td>
<td>24</td>
<td>2</td>
</tr>
<tr>
<td>3/600</td>
<td>15</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>4/400</td>
<td>8</td>
<td>28</td>
<td>3</td>
</tr>
<tr>
<td>4/800</td>
<td>15</td>
<td>49</td>
<td></td>
</tr>
<tr>
<td>5/750</td>
<td>12</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>5/1000</td>
<td>15</td>
<td>64</td>
<td>4</td>
</tr>
<tr>
<td>5/1250</td>
<td>18</td>
<td>76</td>
<td></td>
</tr>
<tr>
<td>5/1500</td>
<td>20</td>
<td>84</td>
<td></td>
</tr>
</tbody>
</table>

* These belt types can be spliced with both one step and / or two steps.
Systems and Dimensions of Cold Splices

\[ n_{st} = \text{Number of steps} = \text{Number of plies} - 1 \]

\[ l_z = n_{st} \cdot l_s + l_a \]

\[ l_z = \text{Belt length required for a functional splice} \]

\[ B = \text{Belt width} \]

\[ l_s = \text{Step length} \]

\[ l_v = \text{Splice length} \]

\[ l_a = \text{Bias cut } 0.3 \times B \]

In specific cases the splice can be made rectangular: \( l_a = 0 \)

### Step Splices

- **Conveyor belt with two plies;**
  - One step splice

- **Conveyor belt with two plies;**
  - Two step splice (overlapping)

- **Conveyor belt with three plies;**
  - Two step splice

- **Conveyor belt with four plies;**
  - Three step splice

Where:
- \( l_s = \text{Step length} \)
- \( l_v = \text{Splice length} \)
- \( l_a = \text{Bias cut } 0.3 \times B \)
Splicing Process

Overlap and step splice

General preparation

Provide tools, equipment and splicing products.

If a new belt is installed place a working table / platform on head or tail of the conveyor or in the conveyor construction (remove carrying idlers if necessary) in such a way that the belt lies on it even and straight without tension.

The working table / platform should be made of even and straight wooden boards, planks or beams.
Splicing Process

The free belt ends (heads) should be secured with belt tensioners.

The belt ends must be pulled together until the belt is tensioned.

Furthermore, the belt ends must be exactly aligned and positioned so that they overlap minimum by splice length plus bias (lz).

The belt should be fixed / secured in this position.

Preparation of the lower part of the belt

1. Fold back upper belt part and make a bias cut on the lower part.

2. Fold back lower part and draw a line parallel to the bias cut on the pulley side, at 1-1/8” from the belt end.
   Also mark rubber edges which should be preserved.
   Cut belt cover along the line with a Don Carlos knife held at an angle of approx. 45°.
   Cut belt cover along the marked rubber edges with the Don Carlos knife held vertically without damaging the top ply.

3. Strip rubber cover with pincers.
   Cut rubber edges even with the upper fabric ply.
Splicing Process

4. Bevel rubber cover 1-⅛” parallel to the removed strip using a 6” knife.

5. Fold back lower part again and mark splice length (lv acc. to chart), step length (ls) and rubber edges. Draw another line 1-⅛” parallel to the splice length line. Cut rubber cover along this line with a Don Carlos knife held at an angle of approx. 45°. Also cut rubber edges with the Don Carlos knife held vertically without damaging the fabric plies.

6. Cut rubber cover in narrow strips (approx. ¾” – 1-⅛” wide) and pull off with pincers or grip tongs. Cut rubber edges of the belt flush with off-set knife.

7. Bevel belt cover 1-1/8” wide with a 6” knife.
8. Cut upper fabric ply 1-1/8" from the rubber cover with a ply knife and pull off with pincers.

9. Mark the subsequent fabric plies according to the step length (lσ), cut and pull off. The last fabric ply must be retained.

10. Cut the rubber edges of the belt flush with each fabric ply.
Splicing Process

Preparation of the upper part of the belt
1. Superimpose the belt ends ensuring correct alignment. Secure both parts to avoid dislocation (e.g. with clamps).
   Transfer the edge of the top fabric ply of the lower part to the upper part – for the bias cut.
   Exactly transfer fabric steps of lower part to upper part. Marking should be made with a marking crayon or by cutting small notches at both edges of the belt.

2. Carry out bias cut on upper part.

3. Draw a line on the carrying side 1-1/8" from bias cut.
   Mark rubber edges also.
   Cut the rubber cover along the 1-1/8" line with a Don Carlos knife held at an angle of approx. 45°.
   Do not damage top fabric ply!
   Also cut the marked rubber edges with the Don Carlos knife held vertically.
   Pull off rubber cover with pincers and cut rubber edges flush.
   Bevel rubber cover 1-1/8" parallel to the removed strip using a 6" knife.

4. Proceed on the pulley side as instructed for the carrying side of the lower part of the belt (step down fabric plies, cut rubber edges flush, bevel rubber cover).

5. Control:
   Join both belt ends and check if the joints and the fabric steps are matching exactly to each other.
   Rectify if necessary.
   Moreover, it must be ensured that the edges of both belt ends are correctly aligned.
Splicing Process

Joining of the splice

1. Carefully buff bevelled edges of the rubber covers and the surface of the rubber edges with a buffing tool (e.g. rotating wire brush).
   Buff intermediate rubber and buff even any high spots.
   When buffing avoid shiny spots and scorching of the rubber.
   Break edge of fabric steps without damaging the fabric ply (e.g. protect with a thin tin plate).
   Remove buffing dust with a clean, dry brush.

2. Thoroughly mix cement with hardener.
   Important:
   This mixture must be used within 2 hours (potlife).
   Observe working and safety instructions!

3. Coat the whole splicing area and the joint gaps of both belt ends with cement / hardener mixture (use a brush with short bristles).
   Allow first coat to dry completely (min. 30 minutes).
   The second coat must be allowed to dry only until it is still slightly tacky (check with back of finger).
   In case of overdrying apply another coat.

   For fabric with coarse surface structure see below.

Fabric plies with coarse surface texture:

In such cases 3 coats of cement / hardener mixture have to be applied.
Alternatively and in order to increase the initial bonding strength, it is recommended to use the CN Bonding Rubber 0.5 mm (528 5208) as follows:

- Apply a coat of cement / hardener mixture to the whole splice area and the joint gaps of both belt ends and allow to dry completely (min. 30 minutes).
- Then apply another coat of cement / hardener mixture to the lower belt end and one coat to the exposed side of the CN bonding rubber and allow to dry until these coats are still slightly tacky (check with back of finger).
- Apply the CN bonding rubber with the coated side onto the lower belt end and stitch on from the centre outwards without trapping air. Remove protective foil from the CN bonding rubber.
- Apply another coat of cement / hardener mixture to the upper belt end and one coat to the CN bonding rubber and allow to dry until these coats are still slightly tacky (check with back of finger).
- In case of overdrying apply another coat of cement / hardener mixture,
Splicing Process

4. Align and superimpose lower part and upper part of the belt without trapping air.
   Splice areas must match to each other exactly.
   Never overlap fabric ply edges.
   Stitch on or press on complete splice area from center outwards.
   Stitch on the edges and joint gaps with a narrow stitcher (1/8”).

5. Then stitch on the splice area using the double acting roller with its pressure screw tightened lightly at first.
   Repeat this operation several times with the pressure screw fully tightened.
Splicing Process

Filling and covering the joint gaps

1. Coat once the joint gaps with cement / hardener mixture and allow to dry completely (min. 30 minutes).

2. If necessary fill any gaps in the joint area with CN filler rubber.
   Cut to size suitable pieces of filler rubber and coat joint gaps and filler rubber with cement / hardener mixture.
   Allow this coat to dry until it is still slightly tacky (check with back of finger).
   Apply filler rubber and stitch on.
   In case of thick rubber covers laminate filler rubber until max. 2 mm below belt surface to ensure that the cover strip (1.5 mm thick) is approx. 0.5 mm below belt surface.

3. Coat the joint gap with cement / hardener mixture.
   Remove protective foil on cover strip.
   Coat the bonding layer of the cover strip with cement / hardener mixture.
   Allow these coats to dry until they are still slightly tacky (check with back of finger).
   Apply cover strip without trapping air.
   First stitch on lightly with the wide stitcher and then firmly with the narrow stitcher from the centre outwards.

4. Repeat above operation for second splice gap.
## REMA TIP TOP Product & Solutions

### CONVEYING SOLUTIONS

#### Pulley Lagging
- PERFORMANCE GRIP 70
- REMAGRIP
- REMAGRIP Ceramic Lagging
- UNIGRIP
- UNILAG
- T-REX

#### Belt Cleaners
- REMACLEAN - T-Bar Scrapers
- REMACLEAN - Green Combi
- REMACLEAN - Grey Combi
- REMACLEAN - Cleaning Brush

#### Skirtings
- REMASKIRT
- Combi-Skirt
- T-REX
- UNISKIRT

#### Repair Products
- Repair Patches
- Repair Strips
- REMA GOO
- RG 7000
- T-2 Repair System

#### Other
- Conveyor Belting
- REMACLEAT
- Edge Wall
- Impact Slider Bed Bars
- REMAMILL
- REMASCREEN

#### Rollers & Pulleys
- REMASLEEVE
- REMAROLL
- REMATRACK

### WEAR & CORROSION PROTECTION

#### Wear Protection Lining
- REMA Preformance Line
- REMALINE
- REMASTAR
- UNILINE
- REMATHAN
- T-REX

#### Heavy Wear Protection
- REMALOX
- REMALOX HD
- KG Bars
- ZP Profile Bars
- REMA WEAR Repair

#### Corrosion Coatings & Linings
- COROFLAKE
- COROGARD
- COROFLOOR
- TOPLINE
- RCC LININGS
- COROFLEX

#### Material Handling Hose
- Fixed Flange
- Split or Swivel Flange
- Cut End Hose

### ADHESIVES & SOLUTIONS

#### Cements & Adhesives
- SC 2000 Black / White
- SC 4000 Black / White
- BC 3004 Blue Cement
- PC-4 Plastic Cement

#### Solutions
- PR 200 Metal Primer
- #13 Cleaning Solvent
- R50 Cleaning Solvent
- TIP TOP Hand Cleaner
- A&B Vulc Compound

#### Splice Kits
- Hot Splice Kits
- MSHA Splice Kits
- WK Press and Splice Material
- Filler Rubber
- CN Bonding Rubber

### TOOLS & REPAIR

#### Tools
- Rubber Cut Saw
- Extruder Gun
- Vulcanizing Presses
- Combi Stripper
- Grooving Tool

#### Other
- REMAWRAP Pipe Repair
- OTR Tire Patches