



Tigar®

"TIGAR CHEMICAL PRODUCTS" Ltd.

INSTRUCTIONS MANUAL FOR
PREPARATION AND STICKING
CONVEYER BELT BY ADHESIVE
TIGROSTIK SC – 021 AND TIGROSTIK
SC - 022



CONTENTS

- 1.Splicing conveyer belt
- 2.Cold splicing conveyer belt
- 3.Splicing types
 - 3.1.Oblique splicing
 - 3.2.Sagittal splicing
 - 3.3.Double sagittal splicing
- 4.Calculation of the length of splicing
- 5.Conveyer belt preparation for splicing
- 6.Equipment and tools for splicing
- 7.Splice making
 - 7.1.Lower part conveyer belt marking
 - 7.2.Upper part conveyer belt marking
 - 7.3.Conveyer belt opening
 - 7.4.Conveyer belt grinding
 - 7.5.Marking control
 - 7.6. Conveyer belt drying
 - 7.7. Conveyer belt cleaning before slicing
 - 7.8.Adhesive preparation
 - 7.9.Adhesive applying
 - 7.10. Conveyer belt centering
 - 7.11.Splicing the lower and the upper part of conveyer belt
 - 7.12.Conveyer belt splicing – using double rollers
 - 7.13.Final treatment of the conveyer belt

1. Splicing conveyer belt

Rubber conveyer belt is the basic element of transportation system. One of the most important conditions for transportation by the conveyer belts is splicing conveyer belts. The correct splicing of the conveyer belt is described in the illustration 1.

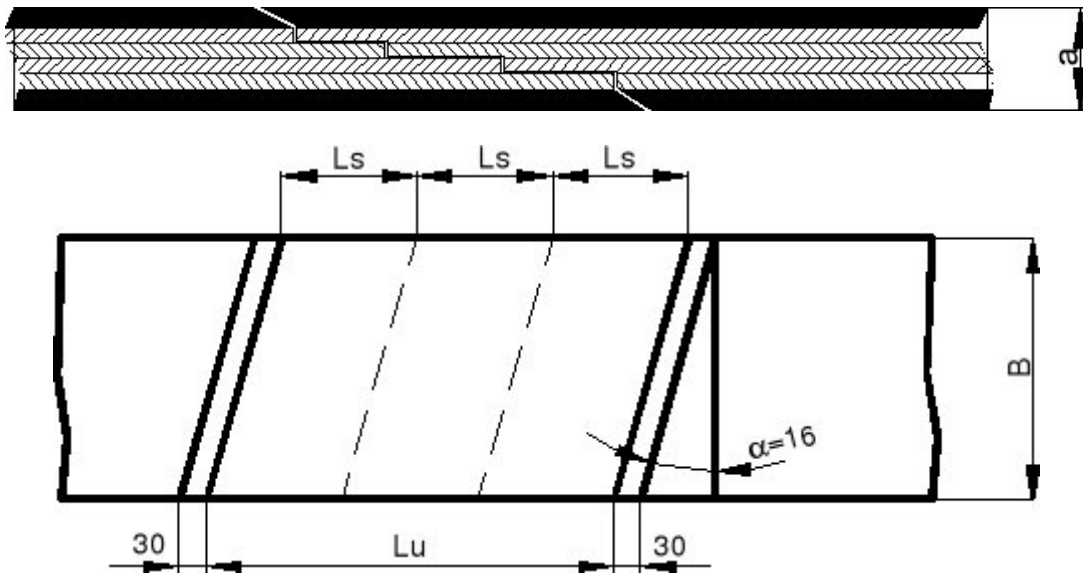


Illustration 1

Conveyer belt is exposed to complex tensions (shearing, extension, bending) during exploitation. Correct preparation and splicing are the most important conditions for conveyer belt durability.

2. Cold splicing conveyer belt

It is possible to splice conveyer belt by using “cold” and “hot” bonding. The advantages of “cold” over “hot” bonding are as follow:

- Shorter time for preparation and splicing conveyer belt
- Easier preparation conveyer belt
- Weaker electric power source
- Smaller weight of the equipment and tools
- Possibility of splicing conveyer belt with the damages

It is necessary to do the following operations in order to make the correct splicing of the conveyer belt :

- Correct conveyer belt marking
- Textile inserts in the conveyer belt should not be damaged during the preparation
- It is necessary to make control of the upper and lower part of the conveyer belt
- The upper and the lower part of the conveyer belt have to be dry and clean
- Preparation, applying and drying of the adhesive have to be made under recommendations of the adhesive manufacturer

3.Splicing types

There are the three types of splicing :

- oblique splicing
- saggital splicing
- double saggital splicing

3.1.Oblique splicing

B – width of the conveyer belt

L – additional length for slope

S – length of stair

Ls – length of splicing

$L = 0,3 B$

$$\operatorname{tg} \alpha = \frac{L}{B}$$

$$\text{angle } \alpha = 16^{\circ}42'$$

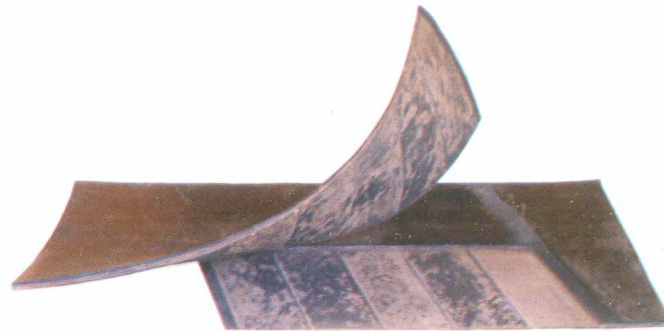
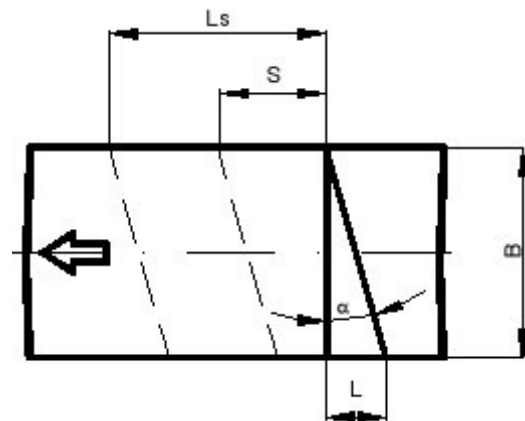


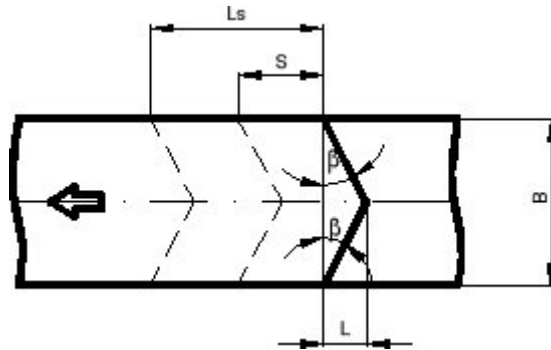
Illustration 2

Oblique splicing is used for conveyer belt which has the length of several hundred meters. The damages and openings of conveyer belt caused by rubber wipers can be avoided by splicing under angle of $16^{\circ}42'$. Rubber wipers are used for cleaning internal part of the conveyer belt and they determine the direction of slope.

3.2.Sagittal splicing

Sagittal splicing is used for conveyer belt which has length of several tens meters (illustration 3).

B – width of the conveyer belt
L – additional length for slope
S – length of stair
Ls – length of splicing
 $L = 0,3 B$



$$\operatorname{tg} \beta = 2L/B, \quad L = 0,3 \cdot B, \quad \text{angle } \beta = 30^{\circ}57'$$

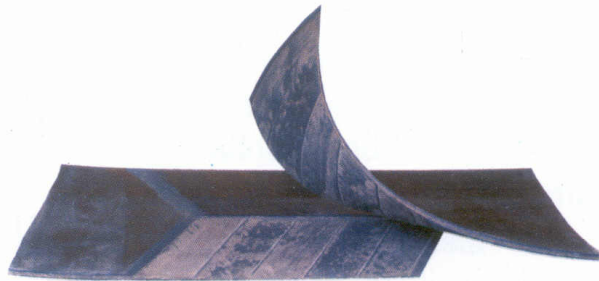
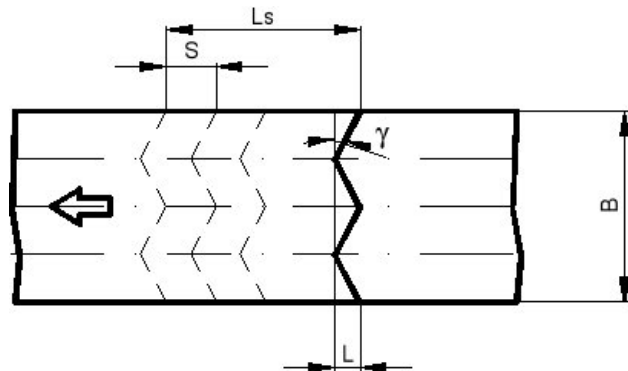


Illustration 3

3.3.Double sagittal splicing

Double sagittal splicing is used for reversible conveyer belt which has length of several tens meters (illustration 4).

B – width of the conveyer belt
L – additional length for slope
S – length of stair
Ls – length of splicing
 $L = 0,3 B$



$$\operatorname{tg} \gamma = 4L/B, \quad L = 0,3 \cdot B, \quad \text{angle } \gamma = 50^{\circ}62'$$

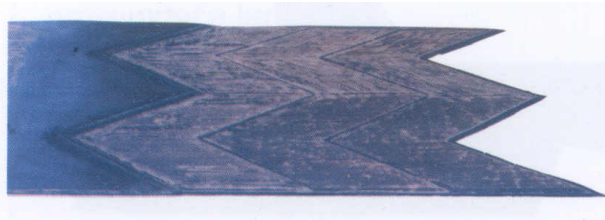


Illustration 4



4. Calculation of the length of splicing

Total splicing length is determined and it depends on tensile strength of textile inserts as well as the number of textile inserts in conveyor belt. The length of the stair and tensile strength of the textile inserts are shown in the table 1.

Number	Tensile strength of conveyor belt N/mm	Tensile strength of One insert N/mm	The length of stair mm
1	315/3	100	125
2	400/4	100	125
3	400/3	125	150
4	500/4	125	150
5	630/5	125	150
6	500/3	160	175
7	630/4	160	175
8	800/5	160	175
9	630/3	200	200
10	800/4	200	200
11	1000/5	200	200
12	1000/4	250	250
13	1250/5	250	250
14	1250/4	315	300
15	1600/5	315	300
16	1600/4	400	350
17	2000/5	400	350
18	2000/4	500	400
19	2500/5	500	400
20	2500/4	630	500
21	3150/5	630	500
22	3150/4	800	550
23	4000/5	800	550

Table 1

The number of stairs is determined by using the following formula :

$$N = n - 1$$

N – number of stairs
n – number of inserts

Total length for splicing conveyor belt is determined by using the following formula :

$$L = 0,3 B + N L_s + L_k$$

0,3 B – additional length for slope
N - number of stairs
L_s – the length of stair
L_k – the width of final slope



5. Conveyor belt preparation for splicing

It is necessary to make following preparations before splicing conveyor belt :

- provide sufficient length of the conveyor belt for splicing
- fix the ends of the conveyor belt on the conveyor belt construction on the distance of 6-7m from working place
- put the ends of the conveyor belt on the left and right from the working place
- put the working tables (25 mm thickness)
- put the tent construction over the working place
- put the ends of the conveyor belt on the working tables and cover the ends for the length of splicing
- provide electrical power sources (220 and 380 V)
- put electrical device for the conveyor belt opening on the distance of 6 m from the working place
- put the upper part of the conveyor belt in the direction of the conveyor belt moving
- mark the upper and lower part of the conveyor belt

6. Equipment and tools for splicing

It is necessary to provide the following equipment for splice making:

	pieces
1. Small wooden beam (cross section 10 x 10 mm, the length depends on the width of the conveyor belt)	5
2. Wooden working tables (thickness 25mm)	4
3. Tent construction (dimension 6 x 3 x 2,5 m)	1
4. Plasticized cloth for the tent (dimension 10 x 10 m)	1
5. Wooden board (1500 x 100 x 20 mm) for edges and slopes treatment	2
6. The tubes coated with zink (12 mm diameter the length depends on the width of the conveyor belt)	6
7. Wooden device for fixing the ends of the conveyor belt	3
8. Cables for fixing wooden devices on conveyor belt construction :	
- diameter 18-20 mm, length 30 m	2
- diameter 14-16 mm, length 10 m	1
9. Electrical power sources :	
- 4 x 220 V	1
- 3 x 380 V	1
10. Electrical heaters	1



It is necessary to provide the following tools for splice making :

	pieces
1.Steely meter (length 2m)	4
2.Knife for cutting and cutting off the conveyer belt – Skalpel	4
3.Big knife (length 150 mm)	2
4.Bent knife for slopes treatment	1
5.Knife for cutting textile inserts	2
6.Carpenter pliers 9length 200 mm)	4
7.Grindstone	2
8.Scissors for rubber (length 200 mm)	1
9.String for making the conveyer belt	2
10.Brush for cleaning	2
11.White chalk	4
12.Frog pliers	1
13.Grinding machine with round steely brush (Ø 100 mm)	2
14.Industrial dryer	2
15.Special electrical heaters for conveyer belt drying	4
16.Electrical device for the conveyer belt opening	1
17.Roller (width 40 mm)	2
18.Double rollers	2
19.Cable width the bulbs	2
20.Tools bag	1
21.Round brush for the adhesive applying	4

Note

The appearance and the specification of tools are offered in The tools and materials catalogues.

7.Splice making

The upper part of the conveyer belt always moves in the direction of the power station.

7.1.Lower part conveyer belt marking

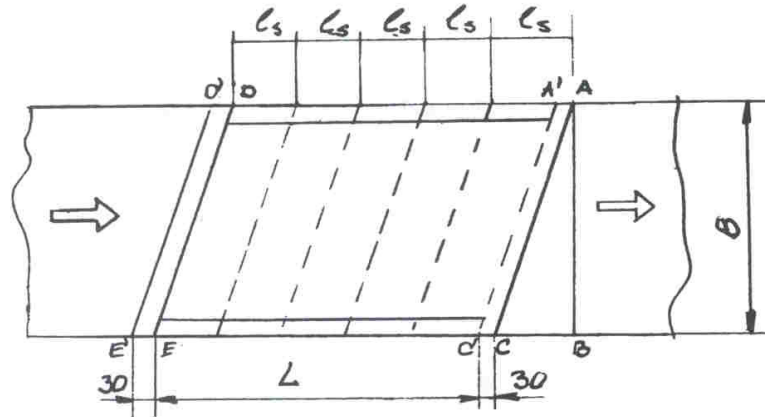


Illustration 5

Mark the points A, B and C at the end of the conveyer belt. The length is $0,3 B$ (B is the width of the conveyer belt). Connect the points A and C and then cut off the conveyer belt (line AC).

Mark total length of splicing (points D and E). Mark the width of slopes (points A', C', D' and E'). After that it is necessary to mark all the stairs and cut all the points at the edge of the conveyer belt. In the end, it is necessary to mark the middle of the conveyer belt on the length of 4-5 m because the width of the lower and upper part of the conveyer belt is different (illustration 5).

7.2.Upper part conveyer belt marking

Cover the upper over the lower part of the conveyer belt and mark middle of the upper part (illustration 6).

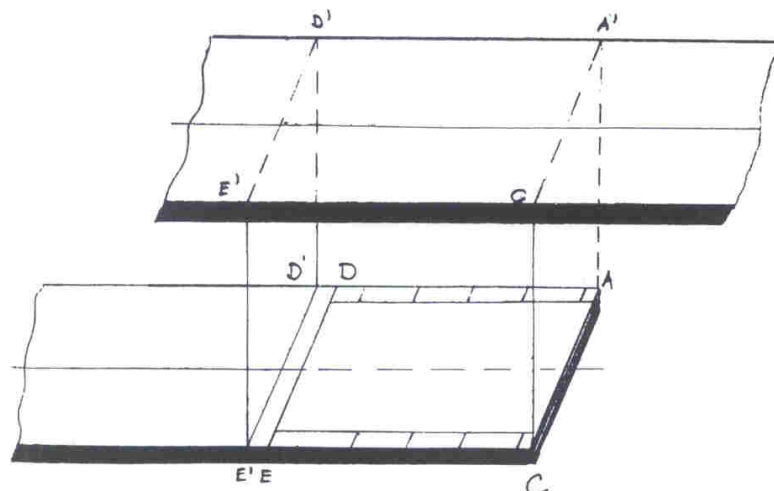


Illustration 6

Mark all the points from the lower part of the conveyer belt on the upper part.



7.3. Conveyer belt opening

Mark the line near the edges of the conveyer belt on the both side for the with of the protective rubber edges. Cut the rubber and one textile insert along the market line. The knifer has to be under angles of 45° during the cutting. The opening of the conveyer belt starts from the points D and E. It is necessary to take off the rubber and one textile insert for the first stair preparation by using carpenter pliers, a knife, a frog pliers and an electrical device for the conveyer belt opening. It is necessary to take off only textile insert for every next stair preparation. It is necessary to cut off the textile insert very carefully (without cutting the textile insert off wich is on the conveyer belt). Final treatement of the protective rubber edges should be made after preparation of all the stairs by using a knife of 150 mm length. All the operations are the same for the lower and upper part of the conveyer belt.

7.4. Conveyer belt grinding

Conveyer belt becomes rough by using grinding machine with a round stelly brush. During this operation the rubber takes off from the textile insert, but the textile insert should not be damaged or overheated. It is also necessary to grind protective rubber edges as well as both rubber slopes. After this operation the rest of the rubber should be removed by using a cleaning brush.

7.5. Marking control

It is necessary for marking control to cover the upper over the lower part of the conveyer belt and check the positions af all the stairs. The middle of the conveyer belt for both lower and upper part have to be in the right positions. If the conveyer belt is in the right poposition it is necessary to mark four control points at the beginning and the end of the splicing as well as two control points for slopes.

7.6. Conveyer belt drying

It is necessary to use electical heaters in order to dry and remove the moisture from textile inserts.

The moisture content in textile inserte should not be bigger than 20%.

The temperature of the textile inserts should not be higher than 110°C.

7.7. Conveyer belt cleaning before splicing

It is necessary to clean the rest of the rubber by using the cleaning brush and the cleaning agent TIGROSOL NL before applying the adhesive. The cleaning sholuld be done from the middle in the direction of the ends of the conveyer belt.

7.8. Adhesive preparation

The preparation of adhesive should be done by mixing with 5% of HARDNER SC. The mixing time is about 5 min. Arledy for use, the adhesive is useful within 2 hours.



7.9. Adhesive applying

Apply by using the round brush three coats of prepared adhesive to the textile and rubber. The time for drying the first coat on the rubber and textile is about 40min for TIGROSTIK-SC 021 and 10min for TIGROSTIK-SC 022. The second coat is dried for 30min. The third coat should be dried up to “tack free” state (from 15 to 20min). If the third coat is overdried it is necessary to apply the fourth coat.

7.10. Conveyer belt centering

It is necessary to make the conveyer belt centering before splicing by using the tubes coated with zink (12 mm diameter). The tubes have to be longer than the width of the conveyer belt. The tubes prevent splicing before checking of all the control points. Marking control should be done by covering the upper over the lower part of the conveyer belt and checking the control points. All the control points must have the right positions.

7.11. Splicing the lower and the upper part of the conveyer belt

The first operation is splicing the upper slope by using a hand roller. The second operation is splicing of the stairs. Splicing should be done from the middle of the conveyer belt in the direction of the edges (in this case there is not any air between the upper and the lower part of the conveyer belt). It is also necessary to check all the control points during the splicing. The last operation is splicing the lower slope.

7.12. Conveyer belt splicing – using double rollers

Splicing surfaces should be exposed to pressure four times by using a double roller (from the middle of the conveyer belt in the direction of the edges). The edges and slopes should be prepared very carefully. Initial pressure should not be high. The second and the third exposure are higher. The last exposure has to be 70 – 80 kp/cm².

7.13. Final treatment of the conveyer belt

The final treatment of the edges is cutting the excess conveyer belt off. The final treatment of the upper slope is cutting excess rubber covering off (the surface of the upper slope and the surface of the rubber covering have to be in the same plane). The conveyer belt can be put into operation one hour after splicing.

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