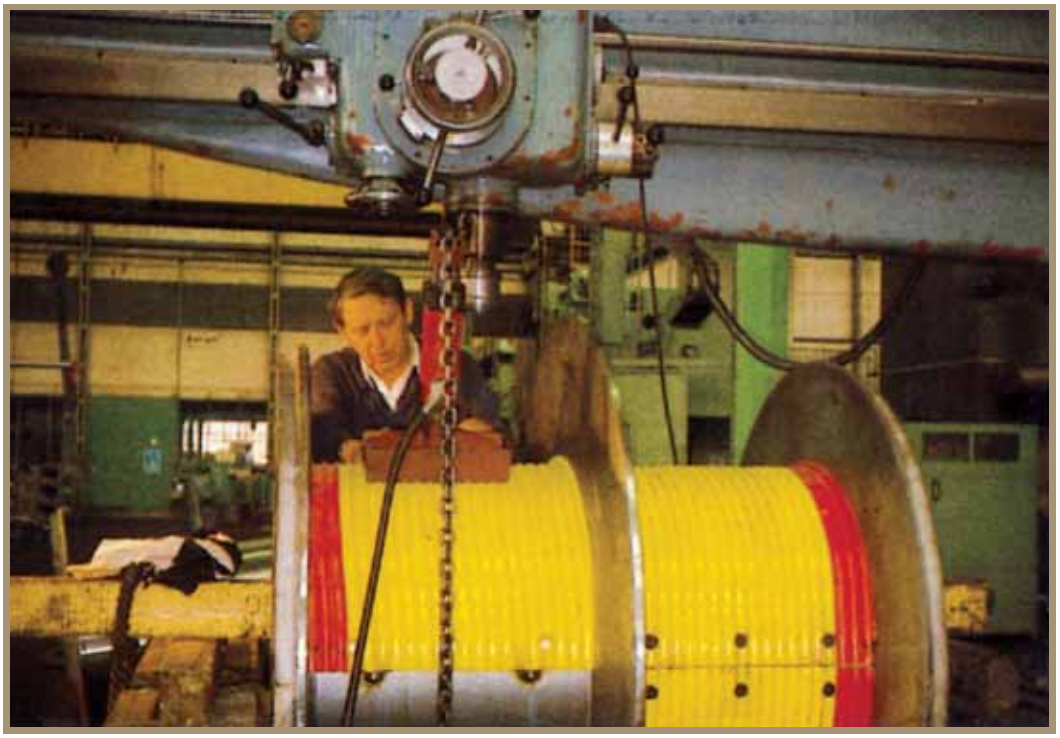
LEBUS germany INTERNATIONAL

THERE IS ONLY ONE ORIGINAL
THE LEBUS GROOVE
世界上唯一的原装篱笆式卷筒槽



LEBUS-GROOVE

Installation Instructions
安装指南





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动力技术是LEBUS®在中国业务销售及技术服务的合作伙伴。

若中文翻译有错漏，欢迎来电指正并以英文为准。

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目录

INSTALLATION OF WIRE ROPE ON ORIGINAL LEBUS® PARALLEL GROOVING

General Information

In order to fully achieve the service life potential of a wire rope for demanding lifting jobs, some step-by-step most important instructions should be followed. They are intended to prevent rope damage caused by kinks, untwisting, and loose strands, during handling and installation as well as later operation of the equipment.

Original LEBUS® grooving has been designed to give the best wire rope service for rope manufactured to maximum standard Federal Specifications for rope size and tolerance. It is understood and self explanatory that multilayer spooling does require intensive care and caution to avoid crushing of the bottom layers when applying high loads on the top layers.

1. Measuring the rope

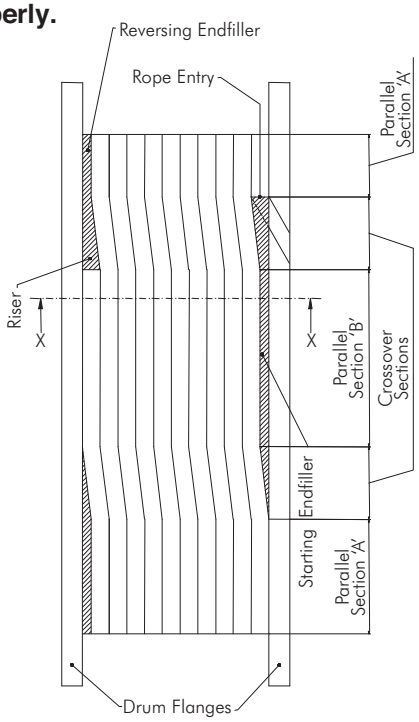
Before you start anything, make sure the diameter of the new rope you are about to install is the correct one and in accordance with the Lebus recommendation regarding the tolerances. It is the **customer's or rope manufacturer's responsibility** to provide a rope construction suitable for the specific application, for multilayer spooling, also suitable for the technical load data given in specification.

Keep a record of the new rope diameter for future references. You will be asked to determine how much the rope diameter has decreased in service and you must know the actual diameter of the rope after the run in period. When measuring the rope, don't measure the layer on the reel. Pull a couple of metres off the reel and measure the rope when straight. It is advisable to take 4 measurements of the rope round its axis and average the results.

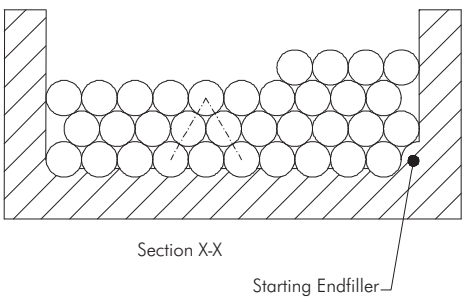
2. Winding the rope on the drum

2.1 About the Original LEBUS® Spooling System

Knowledge of how the LEBUS® Spooling System works is helpful in order to determine if the cable has spooled properly.



FIG,1



FIG,2

It will be seen from the development of the grooved drum (Figure 1) that the groove is continuous and parallel to the flanges except for the two crossover sections where the groove moves across the drum one-half pitch to give one full pitch of movement per revolution. Use of end fillers and risers of proper design to retain the pyramid pattern illustrated maintain control of the spooling at the flanges.

Original LEBUS® Grooving has been designed to give the best wire rope service for rope manufactured and calculated to withstand high load pressures avoiding deformations when multilayered spooled.

Note: Strictly follow the recommended wire rope Tolerances stated in our specification and drawings for each drum. The idea behind this strict rule is to guarantee a proper pyramidal build-up.

Once the cable has been strung up and anchored in the rope clamps situated on the flange, it is then ready to be spooled. Although spooling should be completely automatic due to the fixed pattern, it is of greatest importance to strictly fulfil the following procedures.

2.2 Tension required for Spooling

When spooling dead wraps (turns) onto the drum, it is very important that they be spooled tight on the drum, **every single wrap!** Take a mallet or a piece of wood and tap the wraps tightly into the bottom of the grooves.
If the dead turns are wound too loose, the next layer will wedge a gap into the dead turns.

The cable should be spooled onto the drum with a minimum tension of
a) 10% of the working load or
b) 2% of the breaking strength of the wire rope
where safety factor breaking load to working load **5 to 1** is involved. The higher value (a or b) must always be used.

The tension should be about 1/3rd of the maximum load where safety factors are **3 to 1** or less.

Above values are understood as average values and will depend on rope construction. Contact your rope manufacturer for more information.

2.3 Spooling 1st layer and subsequent layers

Many methods may be used to obtain the required tension for spooling a wire rope on a drum. The best system is one that will give the required tension and with the capability of spooling the line back onto the reel or drum should it become necessary, like for example adjusting the LEBUS® spooling device (LEBUS® levelwinder or LEBUS® fleet angle compensator). The use of another hoist is often advisable or a storage reel with a capstan to obtain the proper tension.

The method used to do this work often depends upon availability of equipment on hand. Therefore this operation should be planned in advance.

Hand Spooling the wire rope onto the drum is absolutely unsatisfactory due to lack of required tension unless a short length of wire rope is involved which can be respooled once the cable is on the drum.

In any case, the first layer, as well as all the subsequent layers, must be wound on the drum with sufficient pretension. If wound with no tension at all the rope is subjected to premature crushing and flattening caused by the 'under load' top layers.

Make sure the cable spools into each groove while winding. This is important because the cable must repeat the groove pattern for the rope to spool up on in the second and subsequent layers.

Check the cable for proper tension as previously mentioned.

Make sure the cable goes down into the last groove properly.

As the cable rises from one layer to the next, watch to see that the cable crosses one-half wrap after one half revolution of the drum.

Make sure there are no void wraps of cable when the load has been lowered and the rope has become completely slack.

Remember: A cross section of the cable in each parallel section should look like the section shown in figure 2.

Even if wound on properly during installation, the first layer will loosen somewhat during service. When the first layer becomes slack (the pretension is gone) this initial procedure MUST be repeated in regular intervals. Otherwise the tensioned hard wraps will severely crush the bottom layers.

3. Using Your Rope for the first time

3.1 Break in period

After installing a new rope it is necessary to run it through its operating cycle several times under light load and reduced speeds. This allows the rope to adjust itself to the working conditions and enables all strands and wires to become seated. Depending on the rope type and construction some rope stretch and a slight reduction in rope diameter will occur as the strands and core are compacted. The rope is less liable to be damaged when full load is applied.

3.2 Equipment testing

In many cases the equipment has to be tested prior to use. During the test, the equipment gets purposely overloaded to varying degrees. The magnitude of overloading depends on the type and capacity of the lifting equipment.

Under NO circumstances must the equipment be tested prior to the break in procedure of the wire rope. If you overload a rope that has not yet been broken in, you may inflict permanent damage to the rope. Multilayer spooling calls for most caution. As mentioned before, severe overloads of the top layers may damage the lower ones and/or may crush the rope.

Note: If possible test the winch with the rope spooled in the first drum layer only.

4. Misspooling check list

If misspooling should occur, check for the following items:

- Slack line may have worked its way down into the dead turn causing the rope to miss a wrap by one cable being high or misplaced, thus the spooling pattern has been lost.
- Misspooling sometimes occurs when a new cable has been installed due to the cable being slightly larger in diameter than the groove pitch, which is evident when the wire rope does not stay in the grooves in the first layer.
- Misspooling will also occur due to reduction in diameter of the cable due to wear. This is evident when the rope begins to lie low in the wraps adjacent to the drum flange and/or cutting in of the rope may also occur.
- The hook or hook- and load may have been set down, causing the rope to become completely slack. This usually causes a void wrap misspool. In either case, spool the cable off the drum to a point past the bad spooling or loosen cable and respool under tension.
- If the cable misspools at the drum flange by pulling away from the flange after rising to the next layer and thereby leaving a void wrap, check the LEBUS® spooling device, or if not a LEBUS®spooling device installed, check the first fixed sheave it may be out of alignment.
- If misspooling occurs at the drum flange by the line piling upon itself would be due also to misalignment of the first sheave, or in case if a LEBUS® fleet angle compensator is used, the adjustment collar could have slipped off.

LEFTHAND OR RIGHTHAND?

One distinguishes between a rope beeing left-hand lay and/or a right hand-lay rope and the direction of the grooving on a drum beeing right-hand or left-hand grooving.

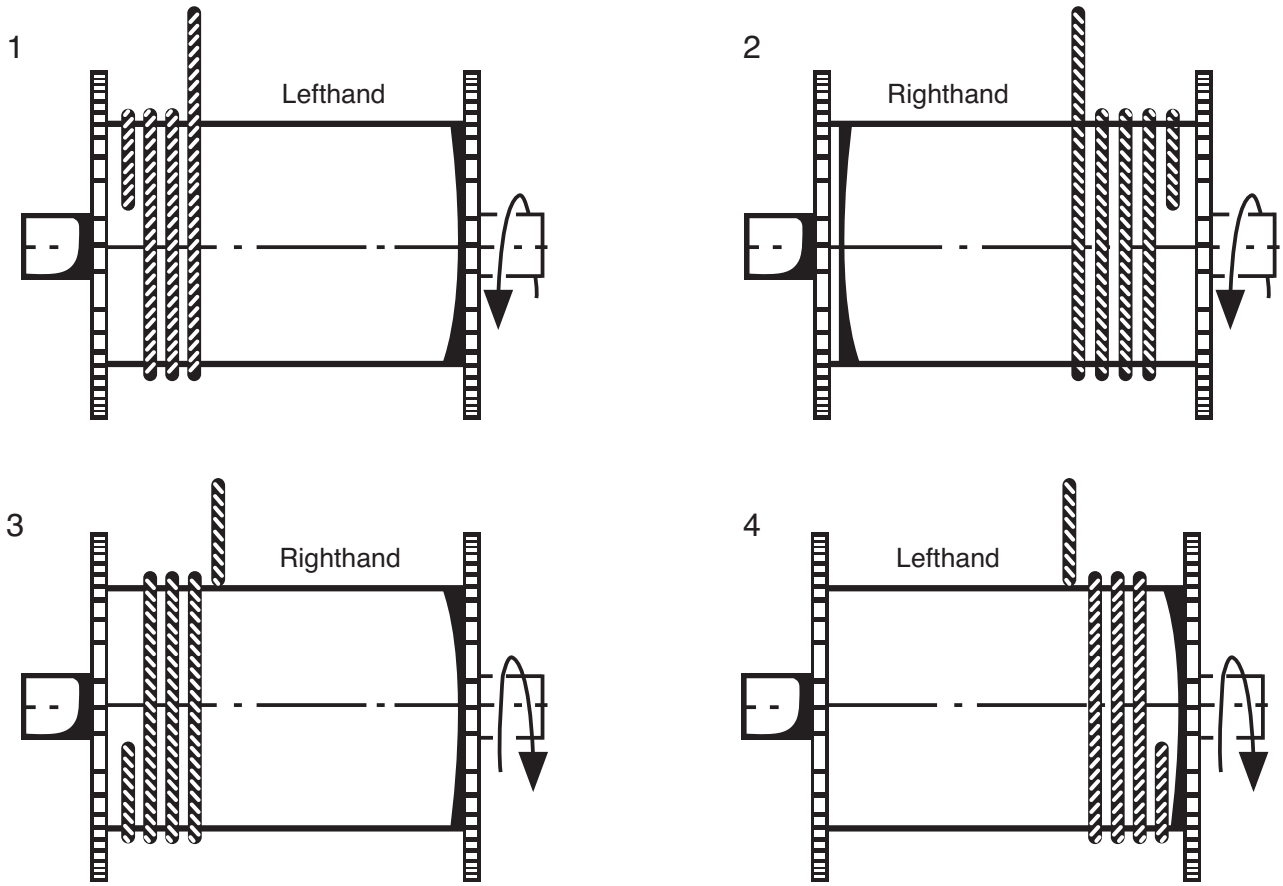
1. **Directions of rope lay. (DIN 3051)** The term "lay" describes the way the strands rotate in a rope In right hand lay, the strands in a rope rotate clockwise. In left hand lay, the strands in a rope rotate counterclockwise.

2. **Direction of machining grooves on drums:** Left and righthand. These terms describe the way and direction the drum and/or the LEBUS® sleeves are grooved. In right-hand, the groove is cut clockwise, comparable to the right-hand thread of a bolt. In left-hand, the groove is cut counterclockwise, comparable to the left-hand threads of a bolt.

On principle the following rule applies:

- Right-hand lay rope on left-hand grooved drum.
- Left-hand lay rope on right-hand grooved drum.

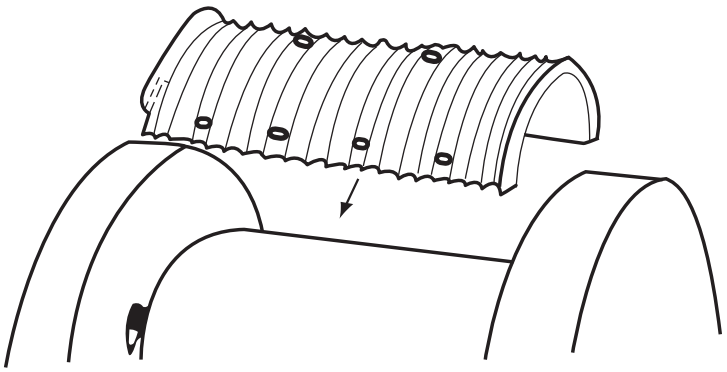
Circle or mark appropriate no.1,2,3 or 4 to note direction of grooving.



INSTRUCTIONS FOR INSTALLATIONS OF LEBUS GROOVED SLEEVES "WELD-ON-METHOD"

1). The procedure for installing LEBUS split sleeves by Weld-On-Method is illustrated by the step by step instruction as follows:

Figure 1



2). Shown in Figure 1 is the drum, grooved split sleeves having the rope entry and the basic tools required to do the installation. At this time check the material and tools to determine if everything needed for the job is on hand.

a) 10 Ton “Porto-Power” hydraulic Jack with fixtures and extensions to hold the sleeves in position for welding.

b) Oxygen-acetylene cutting and welding equipment.

c) If it is necessary to make a removable section in the sleeve due to the type of wire rope entry hole, or to provide access to a grease fitting, or other reason a drill and drill press may also be required.

d) Heavy duty grinder or disc sander 90° side wheel.

e) 5/15" or 3/8" Hi-Test chain with hook on end.

f) Hand tools such as crescent wrench, hammers.

3). Pictured below here is the first half sleeve in position with starting and end filler and the wire rope entry hole.

Figure 2

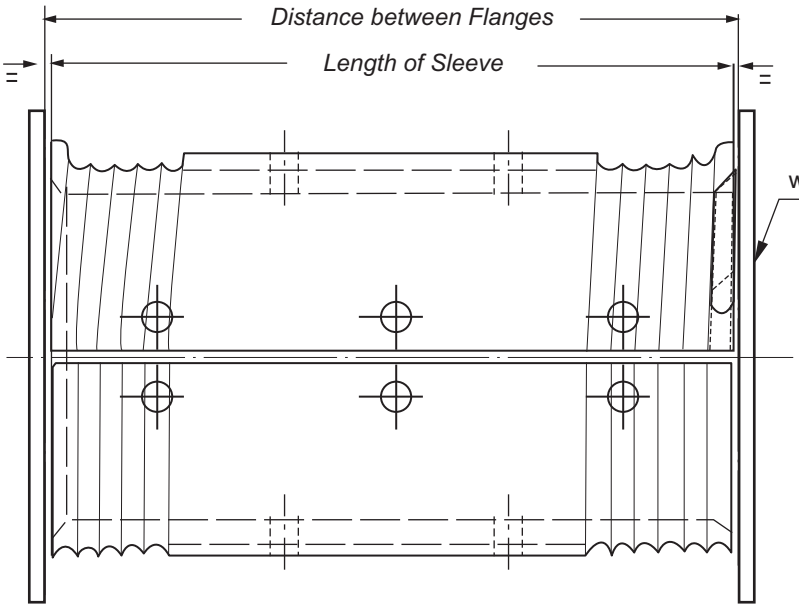


Figure 3

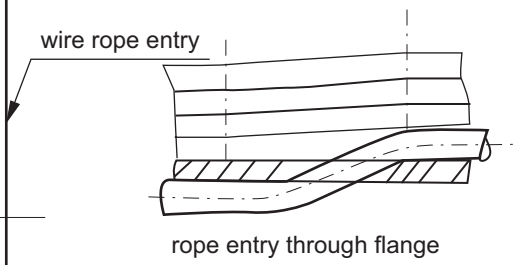
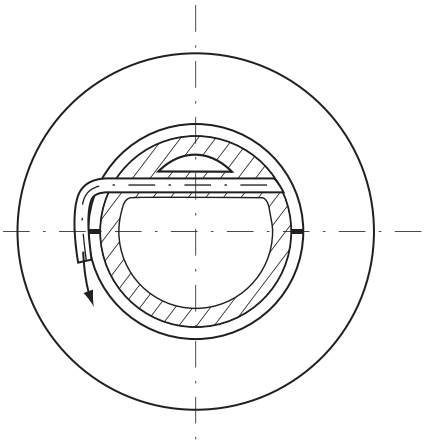


Figure 4



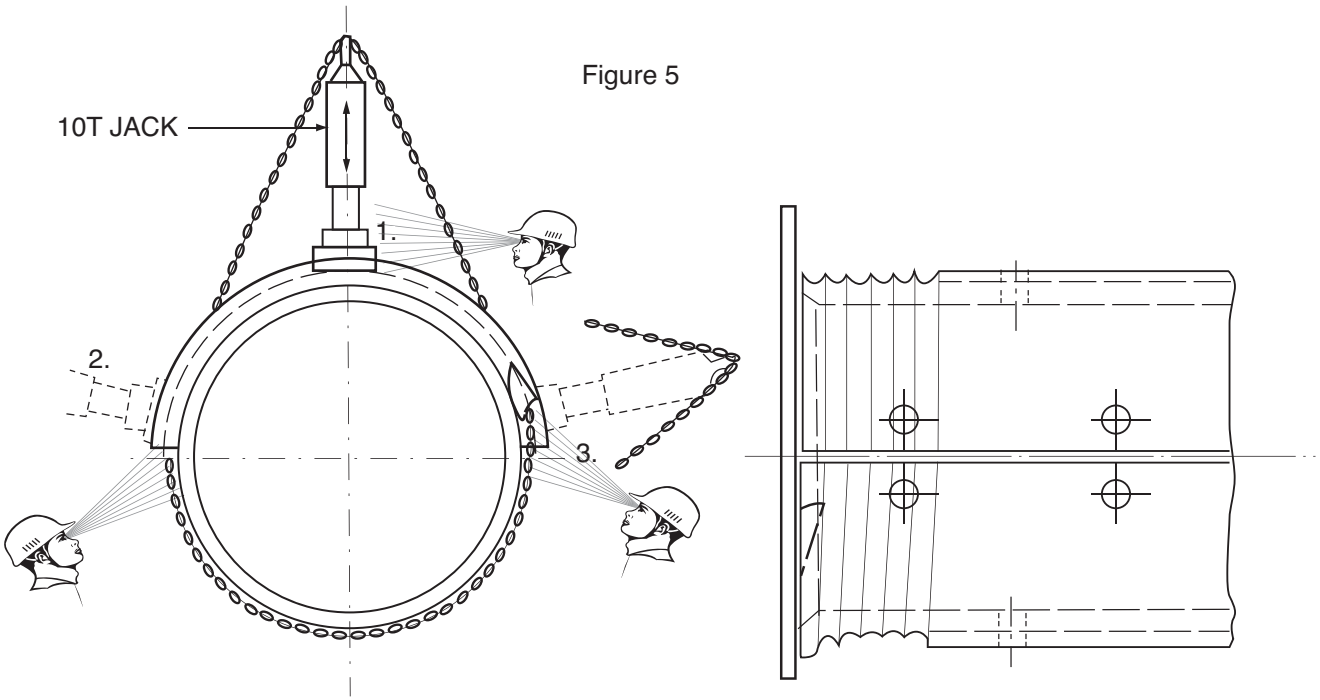
rope entry through drum core

Place the first half sleeve in position on the drum core (the first half sleeve that has the rope entry) and align perfectly with the wire line entry hole as illustrated in Figure 2, 3 and 4.

4) Space the sleeve properly between the flanges using shims if necessary.

Caution: Use the Porto-Power Jack to hold the sleeve tight on the drum.

Figure 5



5) Use low hydrogen welding rod and start welding row 1 through the holes provided for plus welding as shown on figure 5. For better penetration of the weld on the drum increase the amperage slightly for plus welds.

6) Rotate Porto Jack and chain 90° to row 2, check that sleeve is tight on drum and repeat operation 5. Fill the hole flush with bottom of groove. Excess weld here will necessitate grinding smooth before using.

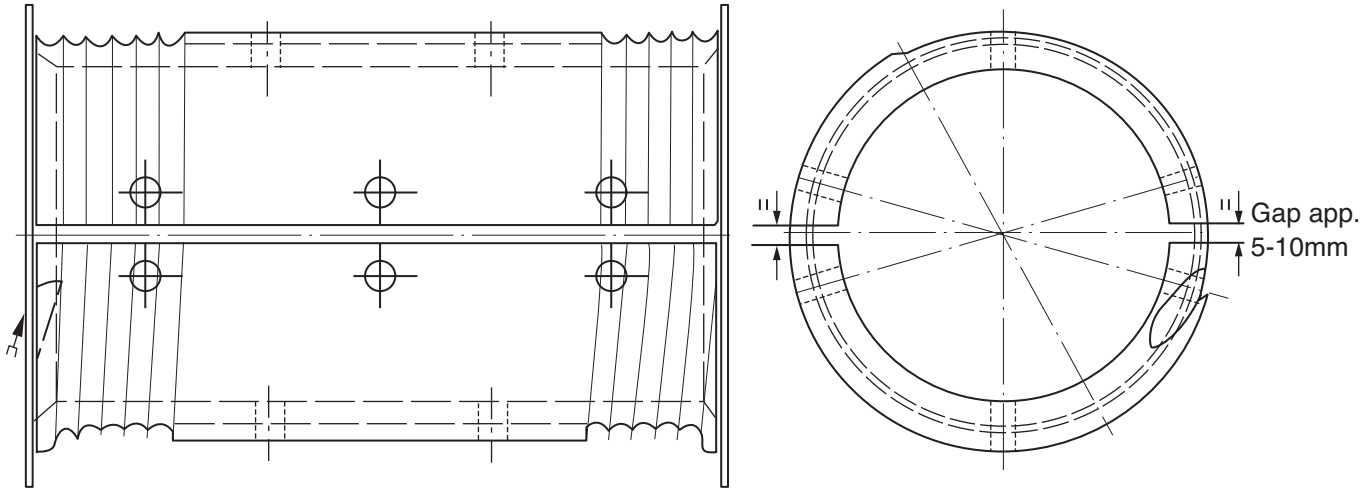
7) First half sleeve installation completed cleaned, and ready to receive the second half sleeve.

8) Place the second half sleeve in position making certain that it is spaced properly between flanges. Figure 5.

   a) To avoid placing the second half sleeve backwards, check to see that the crossover sections are 180° apart.

   b) Check also that clearance between the two sleeves is equal on each side at the split line. Gap should be approx. 5-10 mm on each side.

Figure 6



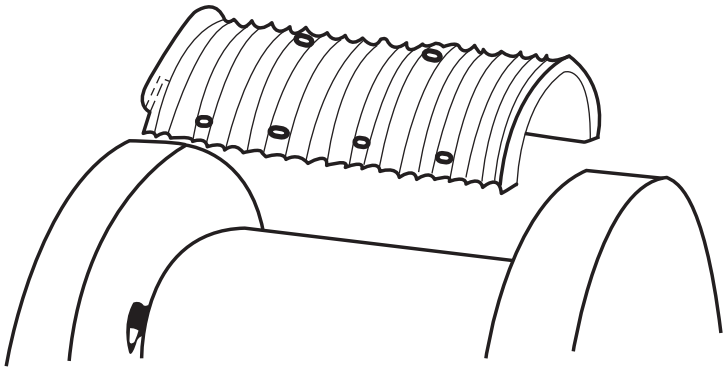
9) Using the hydraulic jack and extensions, position and weld second half sleeve. Weld up flush with bottom of groove. All excess welds must be grind off.

10) Now, that the welding has been completed, the installation is to be cleaned up by grinding and blending all joints into smooth grooved surface.
The installation is complete and the hoist drum after painting recevied is ready to be put into service using.
LEBUS counterbalance spooling.

INSTRUCTIONS FOR INSTALLATIONS OF LEBUS GROOVED SLEEVES "BOLT ON METHOD"

1) The procedure for installing LEBUS split sleeves by bolt on method is illustrated by the step-by-step instruction as follows:

Figure 1



2) Shown in Figure 1 is the drum, grooved sleeve, and the basic tools Required to do the installation. At this time check the material and tools to determine if everything needed for the job is on hand.

a) Portable electric Drill with reversing switch (for thread tapping).

b) Twist drills

c) Taps and sockets

d) Countersink usually not necessary as the grooved sleeves are shipped with the bolt holes drilled and countersunk at the factory, but will be necessary if any of the bolt holes are to be relocated, or where a removable section of the sleeve must be made at installation.

e) 10 ton "porto Jack" Hydraulic Jack

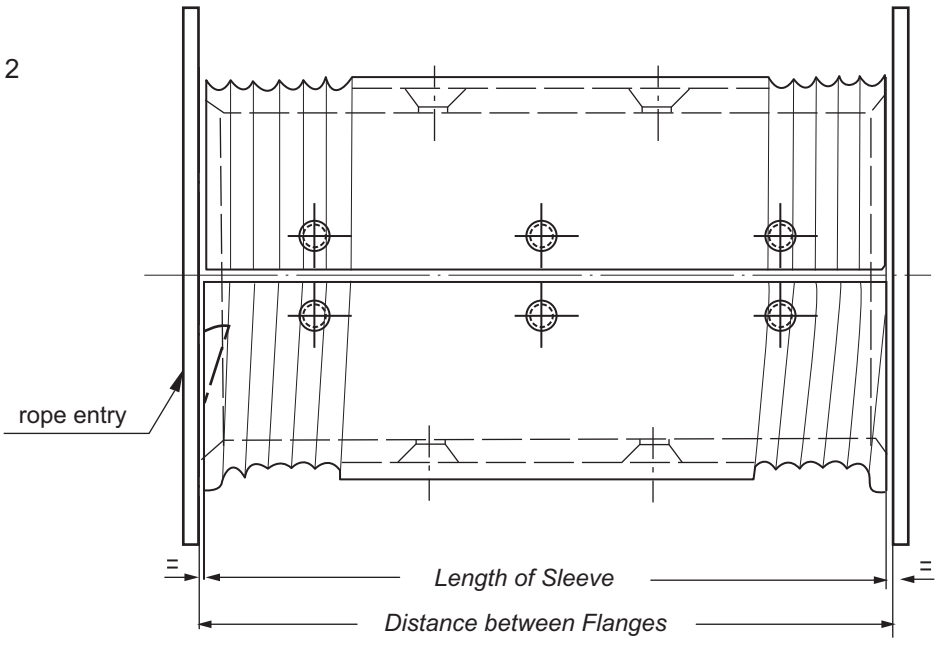
f) Brinder

g) 5/16" or 3/8" Hi-Testchain with hook and snd.

h) Hand tools such as crescent wranch, hammers.

i) Jigs and Fixtures, see enclosed drag.

Figure 2



3) Pictured-figure 2 is the first half sleeve in position with starting and filler at the wire rope entry hole.

Nots: space the sleeve equally between the flanges, using shims if necessary starting and filler with rope entry hole in flange or drum core according to figure 3 or 4.

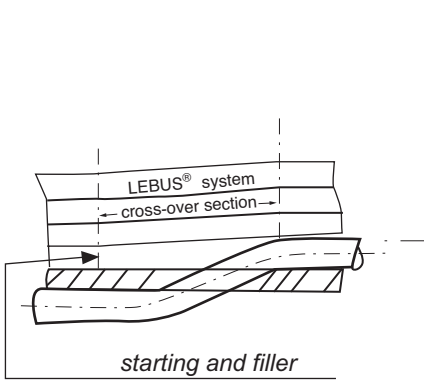


Figure 3

entry through flange

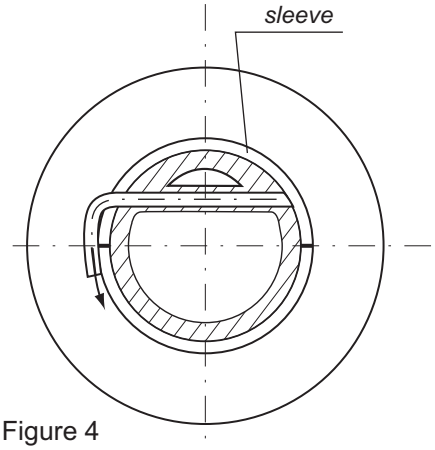


Figure 4

entry through drum core

4) Before starting to drill and tap (figure 5) the middle row check carefully to see taht the sleeve is fitting tight on the drum. Insert the bolts as you complate each hole to prevent cutting from getting under sleevs.

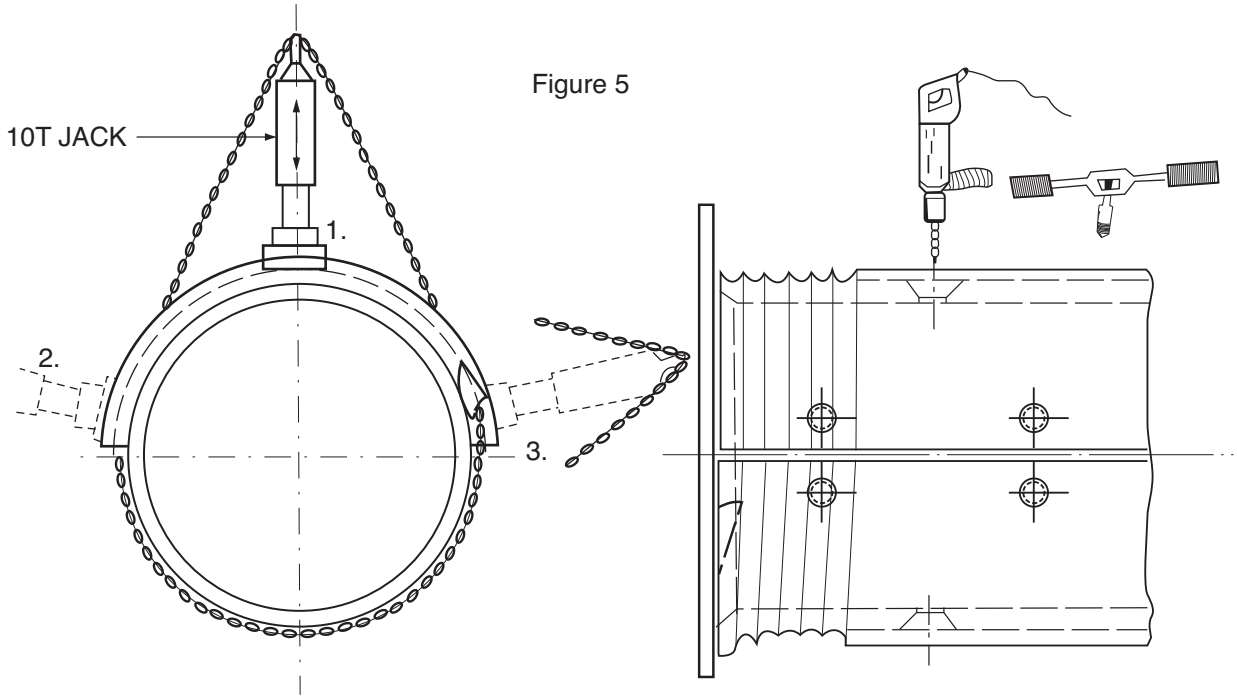


Figure 5

5) Potate the drum for the next row of bolt holes Tighten the drill-base fixturs; check the sleeve for beeing down on the drum.

Note: The use of the "porto power" jack to hold the sleeve down while drilling and tapping.

6) Turn the drum to the opposite side, reset drill base fixture and drill and tap the drum.
Drilling and tapping completed on the first half, the drum has been positioned and cleaned; ready to install the second half (figure 6)

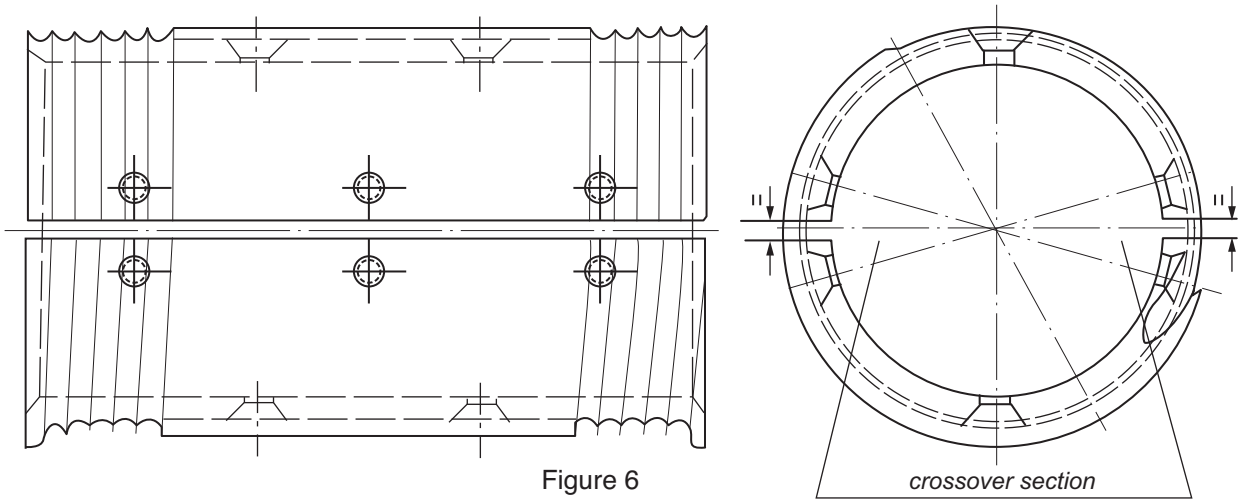


Figure 6

7) This sleeve is placed on the durm exercising caution to prevent this half from being put on backward. The crossover sections must be located 180° apart and the grooves must be in alignment at the split edges.

8) Repoat the drilling operation for the second half sleeve.

9) After completion of drilling and tapping, clean surface of the installed sleeves.

在独创的LEBUS®平行沟槽上安装钢丝绳

概 观

针对要求的提升作业，为了使钢丝绳完全达到预期使用寿命，应该遵从一些最重要的分步指导。其目的是，在搬运、安装以及其后的设备操作中，防止因扭结、反捻和松股而损坏钢丝绳。

设计独创的LEBUS®沟槽的目的是给予最好的钢丝绳养护，这些钢丝绳是按照针对钢丝绳尺寸和公差的联邦技术规格（最高标准）制造出来的。可以理解和不言自明的是，多层卷绕确实要求十二万分的谨慎和小心，以避免当上层施加很大的负载时，底层被压坏。

1. 测量钢丝绳

首先，确认您准备安装的新钢丝绳的直径是正确的，与LEBUS®关于公差的建议相符。
这是**用户或钢丝绳制造商的责任**，即提供的钢丝绳的结构应适合特定的应用场合，针对多层卷绕，也要适合技术规格中的技术负载数据。

为新的钢丝绳的直径保存一份记录，作为将来的参考。您将被要求确定钢丝绳的直径在运行中减少了多少，并且您必须知道，在运行一段时间后钢丝绳实际的直径。当测量钢丝绳时，不要测量在卷轴上的那一层。从卷轴上拉出几米钢丝绳，拽直后测量其直径。明智的作法是，沿钢丝绳轴线做四次测量，取其均值。

2. 在卷筒上卷绕钢丝绳

2.1 关于独创的LEBUS®卷绕系统

知道LEBUS®卷绕系统如何工作有助于确定钢丝绳是否在正确地卷绕。

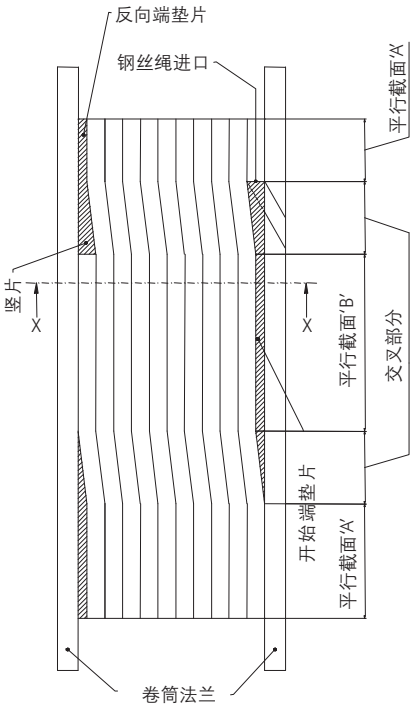


图1

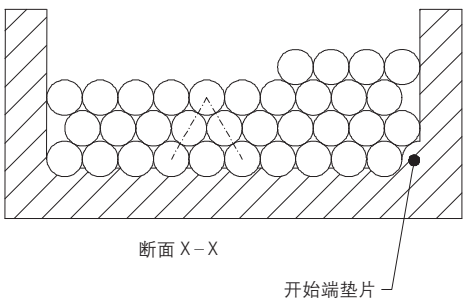


图2

可以从沟槽卷筒的展开图（图1）看出，沟槽对法兰是连续和平行的，除了两个交叉的部分。在这两个部分，沟槽移动越过卷筒半个螺距，而每圈中移动一个螺距。使用端垫片和正确设计的竖片来保持图示的金字塔型，保持在法兰处对卷绕的控制。

独创的LEBUS®沟槽设计给予钢丝绳最好的养护，这些经过计算制造出来的钢丝绳要承受很高的负载压力，当多层卷绕时，避免变形。

注意：严格遵循在我们的技术规格中和每一种卷筒的图纸上标明的钢丝绳推荐公差，这一严格规定的初衷是确保正确的金字塔型构造。

一旦钢丝绳被拉紧并被固定在位于法兰的绳索夹钳上，就可以准备卷绕了。虽然由于形式不变，卷绕应该完全自动，但是严格履行下列程序仍然是至关重要的。

2.2 卷绕要求的张力

当在卷筒上卷绕空匝时，重要的是在卷筒上的每一匝都要卷绕紧。用一根槌棒或木片，将其紧紧地敲打进沟槽的底部。
如果空匝卷绕得太松，下一层就会在其中楔入一个缝隙。

钢丝绳应该卷绕在卷筒上，其最低张力为:
a）10%的工作负载，或
b）2%的钢丝绳断裂强度
必须包括安全系数（断裂负载比工作负载）**5:1**，必须总是使用更高的值（a或b）。

在安全系数为**3:1**或更低时，张力应该为最大负载的三分之一。

上述数值应该理解为平均值，并将取决于钢丝绳的构造。
联系您的钢丝绳制造商，以获得更多信息。

2.3 卷绕第一层和接下来的层

许多方法可以用来获得在卷筒上卷绕钢丝绳所要求的张力，最好的系统可以给予所要求的张力，并且如果必要的话，能够卷绕钢丝绳返回到卷轴或卷筒上，例如就像调整LEBUS®卷绕装置（LEBUS®水平绕线机或LEBUS®偏角补偿器）的示例。经常建议使用另一台绞车或带绞盘的储存卷轴，以获得正确的张力。

用来做这项工作的方法通常依赖于手边可用的设备。因此，这种操作应该事先作出计划。

由于缺乏要求的张力，用人力将钢丝绳卷绕到卷筒上是绝对不能令人满意的，除非将一段已经在卷筒上的不长的钢丝绳重新卷绕回去。

在任何情况下，第一层以及接下来的绕层都必须具有足够的预张力后才卷绕的。假如在完全无张力的情况下卷绕，则所有的钢丝绳都会由于顶层'承受负载'而过早地压垮和压扁。

卷绕时要确保钢丝绳被卷绕进每个沟槽，这很重要，因为钢丝绳必须以重复的沟槽模式卷绕进第二层和其后各层。

检查钢丝绳必须具有正确的张力，如前所述。

确保钢丝绳正确地进入最近的沟槽。

当钢丝绳从一层升至另一层时，注意观察，卷筒转过半转后钢丝绳越过半匝。

必须确定，当负载降低和钢丝绳变得完全松弛时，钢丝绳没有空匝。

记住：在每一个平行部分，钢丝绳的横截面应该看起来就像图2所显示的一样。

即使在安装时卷绕得很合适，在运行时头一层还是会多少松弛一点。当头一层变得松弛（预张力消失）这个初始过程**必须**定期重新来过。否则，张力大的绳匝将严重压坏底层。

3. 第一次使用钢丝绳

3.1 定期停歇

安装好新钢丝绳后，在其整个工作周期内，有必要在负载小和减速下运行几次。这会让钢丝绳得以调整自身至工作状态，使所有的绳股就位。依照钢丝绳类型和构造，有些绳缆会伸长，导致直径轻微缩小，缆和芯都呈紧密状，这种钢丝绳在满负载时易于损坏。

3.2 设备试验

在很多情况下，设备在使用前必须试验。在试验期间，设备被适当地过载至不同的程度。过载的大小取决于提升设备的类型和能力。

在任何情况下，在中断钢丝绳的程序之前，设备必须不能进行试验。
如果您使尚未处于良好工作状态的绳缆过载，您可能会造成对绳缆的永久性损坏。多层卷绕更须注意，如前所述，顶层钢丝绳的严重过载可能会毁损下层并可能压坏绳缆。

注意：如果可能，试验绞机时，仅在卷筒上卷绕第一层。

4. 错误卷绕检查表

如果出现了错误卷绕，检查下列项目：

- 松弛的钢丝绳会卷绕进空匝，造成一根绳缆高出或卷错位置，使钢丝绳错过一匝，导致无法保持卷绕模式。
- 有时，安装了新的钢丝绳后，由于其直径比沟槽节距稍大，也会出现错误卷绕，当第一层钢丝绳没有处于沟槽内时，这种现象尤为明显。
- 由于磨损使钢丝绳的直径减小，也将发生错误卷绕。当钢丝绳在临近卷筒法兰处开始处于重叠时这种现象很明显，或者也可能出现钢丝绳的切入。
- 吊钩或者吊钩和负载可能已经卸载了，造成钢丝绳完全放松，这往往导致空绕。在这两种情况下，将钢丝绳拽离卷筒到越过错误卷绕之处，或者放松绳缆，带张力重绕。
- 如果在卷筒法兰处绳缆发生错误卷绕，即绳缆在上升至邻近的层之后离开法兰，从而留下了一个空匝。这时应该检查LEBUS®卷绕装置，或如果安装的不是LEBUS®卷绕装置，检查第一个定滑轮，它可能与卷筒没有对正。
- 如果错误卷绕发生在卷筒法兰，即绳缆堆绕在自身之上，其原因可能还是第一个滑轮没有对正，或者如果使用了LEBUS®绳索偏角补偿器，可能是调整环滑落。

左手或右手?

左手绞绳和/或右手绞绳之间的区别，以及右手方式或左手方式中卷筒上沟槽的方向。

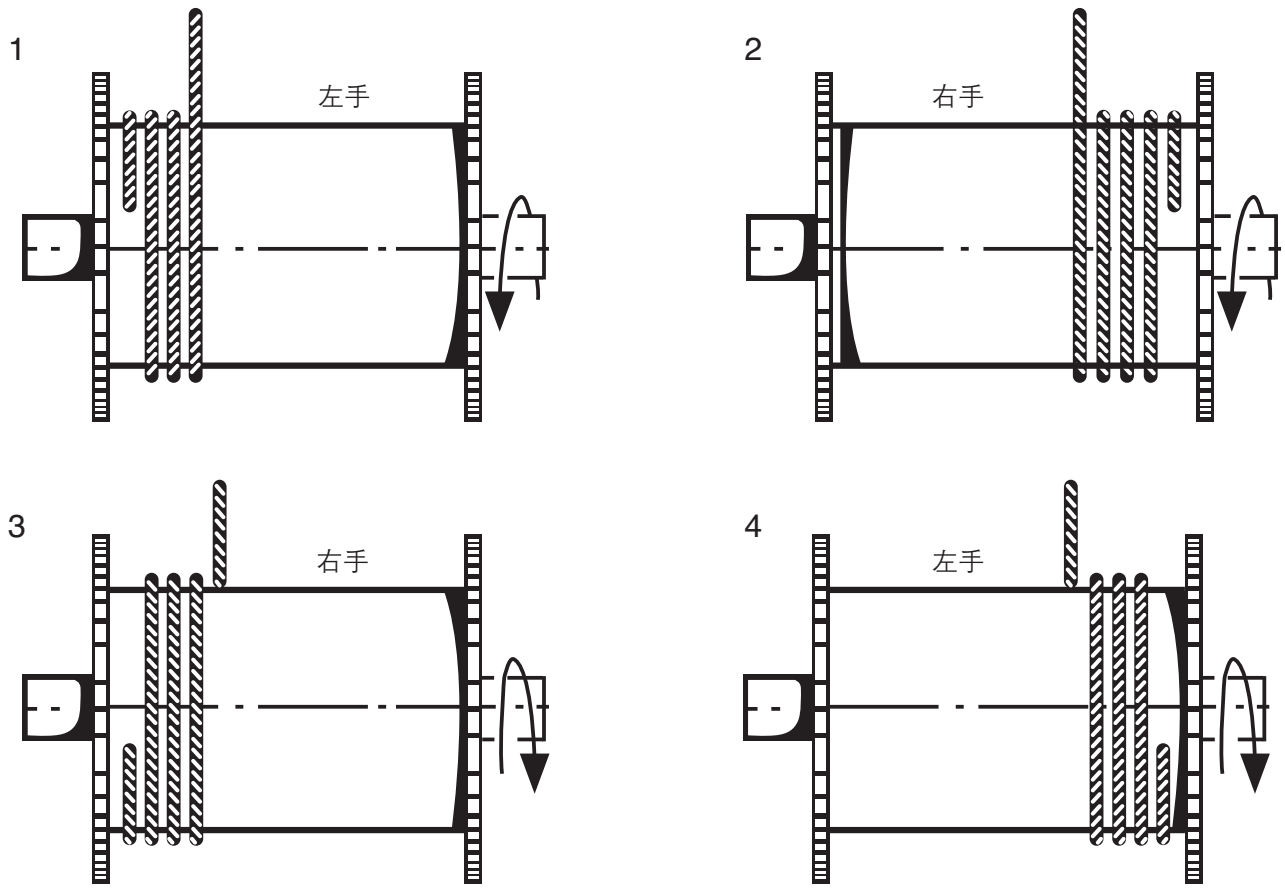
1. **绞绳的方向。(DIN 3051)** “绞” 一词形容了一根绳子的股旋转的方式。右手绞绳的股顺时针方向旋转，左手绞绳的股逆时针方向旋转。

2. **在卷筒上加工沟槽的方向：** 左手和右手。这些词说明了在卷筒和/或LEBUS®筒上开槽的方式和方向。在右手式中，沟槽是顺时针切削，与螺栓的右手螺纹类似；在左手式中，沟槽是逆时针切削，与螺栓的左手螺纹类似。

原则上，下列规则使用：

- 右手绞绳用于左手沟槽卷筒。
- 左手绞绳用于右手沟槽卷筒。

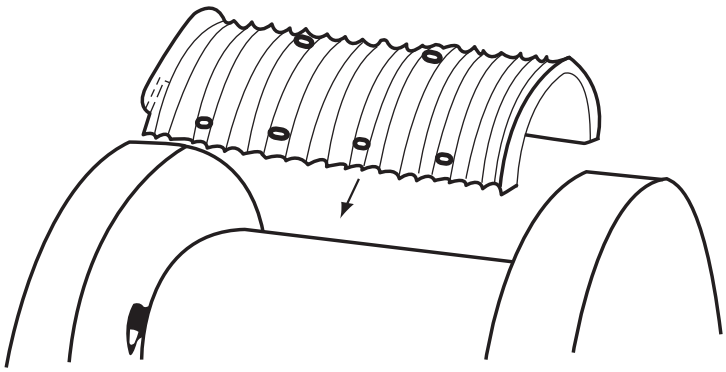
划圈或标注适当的数字1、2、3或4、来指明沟槽的方向。



安装LEBUS®沟槽卷筒皮的说明“焊接紧固法”

1). 用焊接法安装篱笆丝对分卷筒皮的步骤用图示分步说明如下:

图1



2). 图1所示是卷筒、带有绳缆进口的沟槽卷筒皮和安装工作所需的基本工具。这时，检查材料和工具，以确定是否工作需要的所有物品都在手边。

a) 带夹紧装置和扩展装置的10 t “Porto-Power” 液压千斤顶，用于固定卷筒皮在焊接位置。

b) 氧气-乙炔切割和焊接设备。

c) 如果由于钢丝绳进口孔的类型，必须在卷筒皮上制作一个可去除部分，或者为润滑脂接头提供通道，或者其他原因，也可能需要钻头和钻床。

d) 重型砂轮机或者圆盘打磨器90°侧轮。

e) 端部带钩的5/15"或3/8"的Hi-Test 链。

f) 手工工具，如活扳手、锤子。

3). 下图是第一半卷筒皮在具有开始端垫片和钢丝绳进口孔的位置。

图2

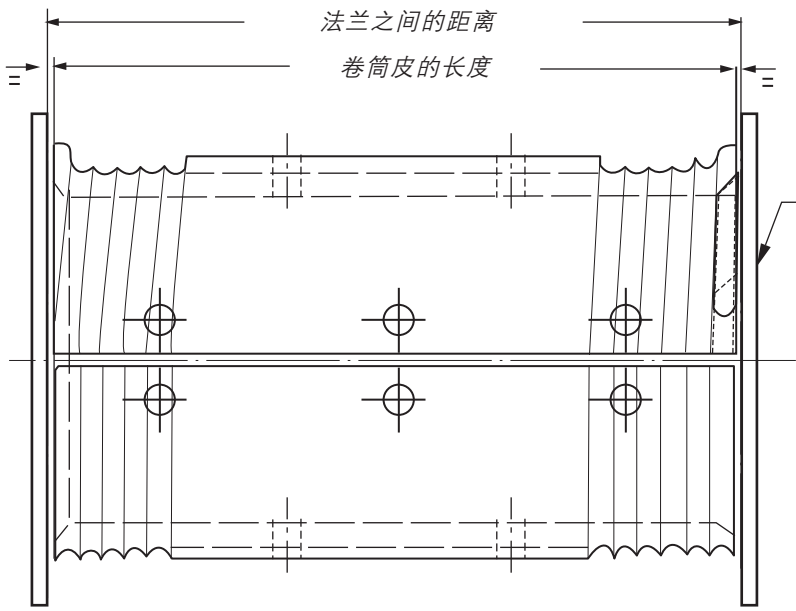


图3

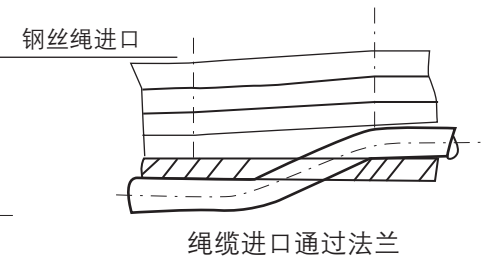
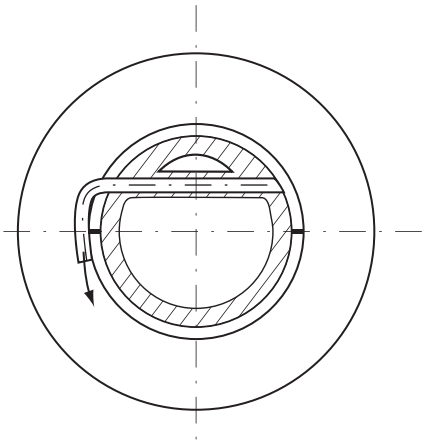


图4



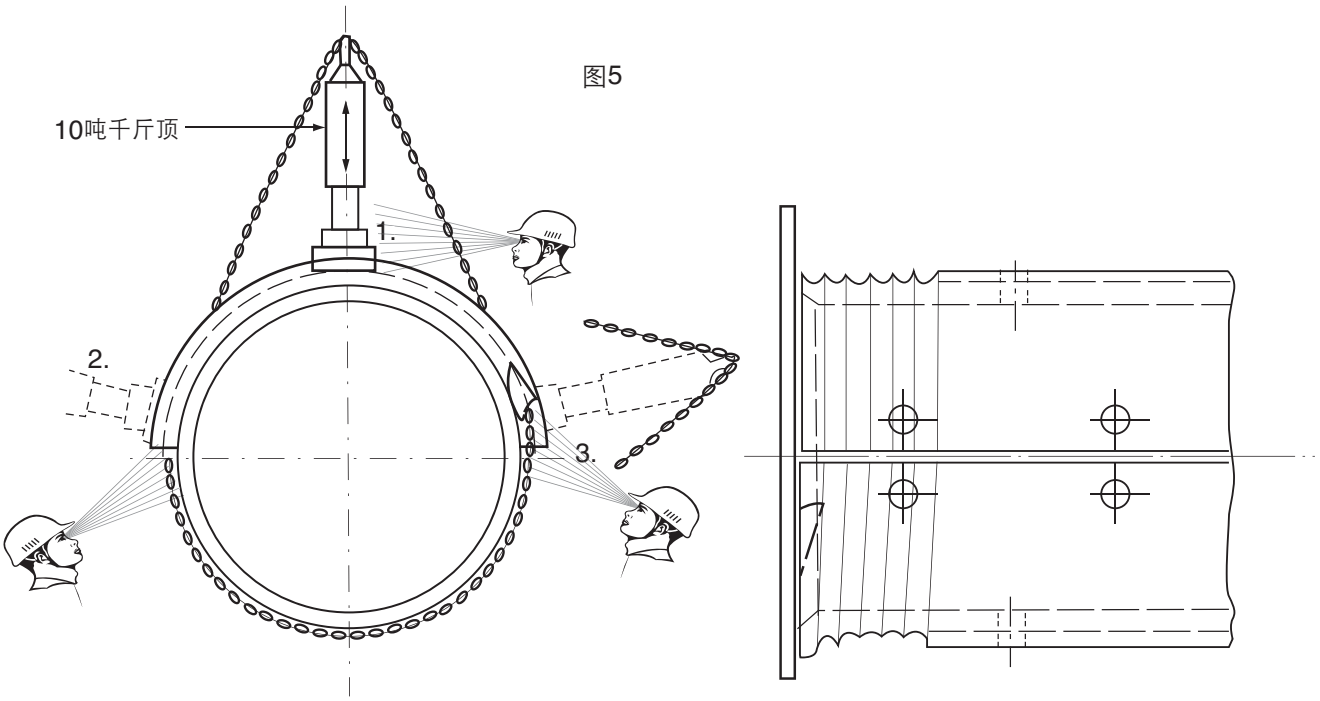
绳缆进口通过卷筒中心部分

把第一半卷筒皮放在卷筒中心部分的位置(第一半卷筒皮有绳缆进口)，并且如图2，3和4所示，与钢丝绳进口孔准确对准。

4) 把卷筒皮放在法兰的正中间,如有必要使用垫片。

注意：使用“ Porto-Power ”千斤顶把卷筒皮紧固在卷筒上。

图5



5) 使用低氢焊条，并且如图5所示开始焊接行1，通过孔提供加焊，为了更好地焊接在卷筒上，稍微加大电流，进行加焊。

6) 旋转Porto千斤顶和链条90°至行2，检查卷筒皮是否紧贴卷筒，并且重复步骤5，填充孔与沟槽底齐平。使用之前，此处多余的焊接将需要打磨光滑。

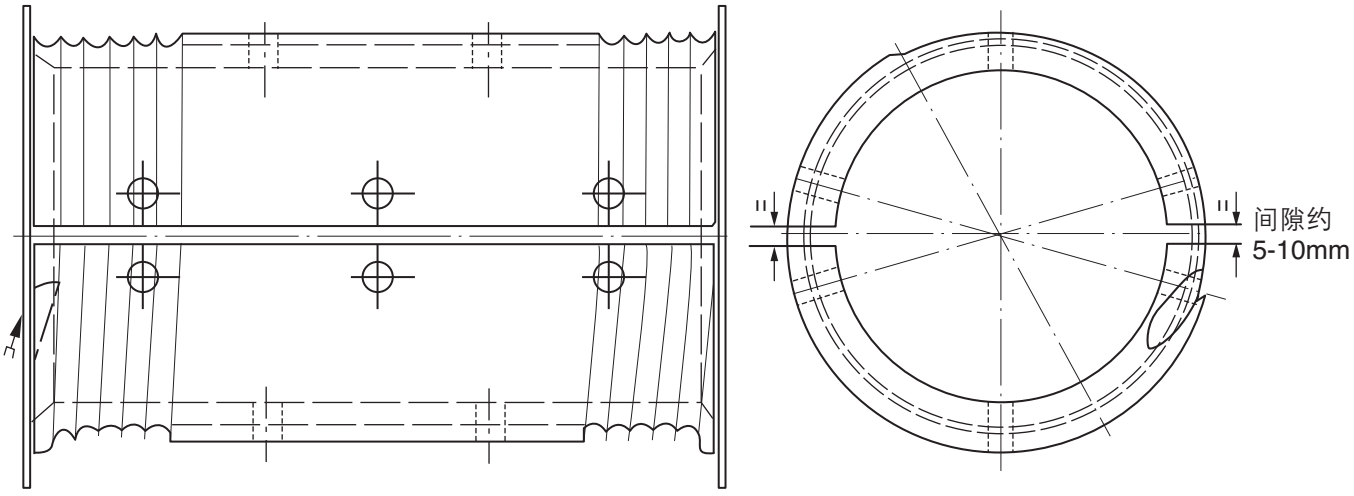
7) 第一半卷筒皮完全安装利索，准备接受第二半卷筒皮。

8) 把第二半卷筒皮放在法兰的正中间位置，图5。

a) 为了避免把第二半卷筒皮放反方向，查看交叉部分是否180°隔开。

b) 也要检查2个卷筒皮之间的间隙在对分线上的每一侧是否相等。在每一侧的间隙应当大约5-10 mm。

图6



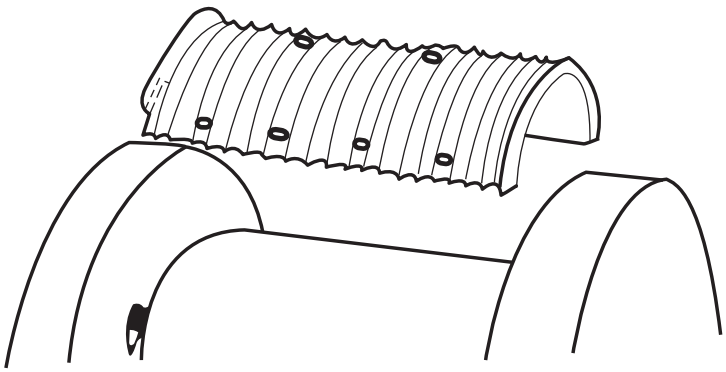
9) 使用液压千斤顶和扩展装置，定位和焊接第二半卷筒皮，焊接成与沟槽底齐平，所有多余的焊接必须打磨掉。

10) 现在焊接就已经完成了，把所有结合处打磨成光滑的沟槽表面后，安装就利索了。
安装完成，喷漆之后卷扬机卷筒就准备交付使用了。
篱笆丝平衡卷绕。

安装LEBUS®沟槽卷筒皮的说明“螺栓紧固法”

1) 用螺栓紧固法安装LEBUS®对分卷筒皮的步骤用图示分步说明如下:

图1



2) 图1所示是卷筒、沟槽卷筒皮和安装工作所需的基本工具。这时，检查材料和工具，以确定是否所有工作需要的物品都在手边。

a) 带反转开关的便携式电钻（用于攻丝）

b) 麻花钻头

c) 丝锥和管筒扳手

d) 通常情况下不需要埋头钻，因为沟槽卷筒皮是在工厂打孔和钻了埋头孔后发货的。但如果有螺栓孔需要改变位置，或者卷筒皮的可去除部分在安装时必须被去除，就将需要埋头钻了。

e) 10吨 “porto Jack” 液压千斤顶

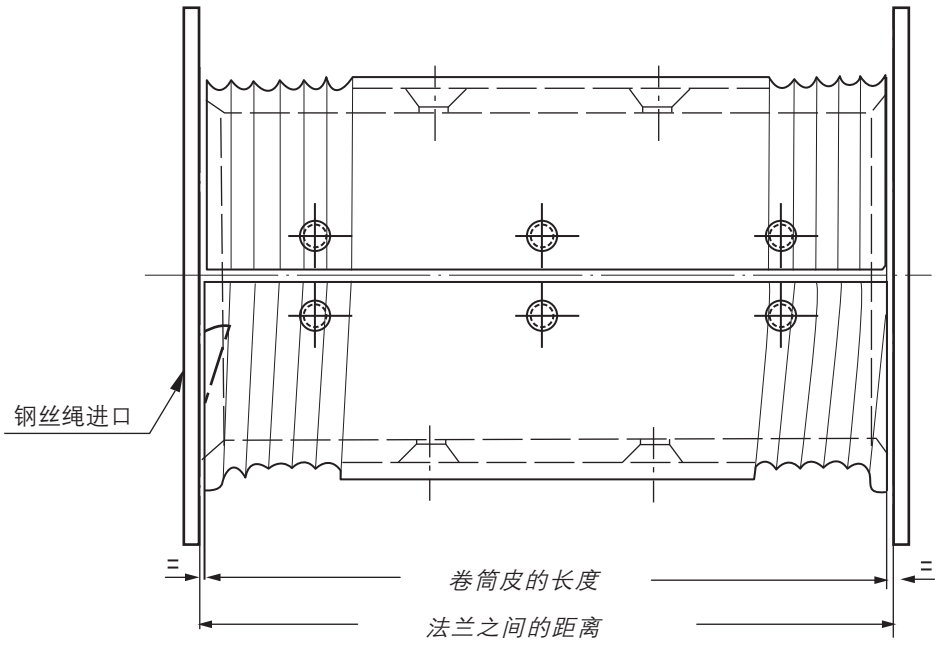
f) 砂轮机

g) 5/16"或3/8"带勾和梢的Hi-Testchain

h) 手工工具，如新月形扳手，锤子等

i) 夹具和卡具，参看附图

图2



3) 图2是第一半卷筒皮在钢丝绳进口孔处带有开始端垫片的位置。

注意: 卷筒皮正好在法兰的正中间，如有必要使用薄垫片，并且把开始端垫片连同钢丝绳进口孔置于法兰中或卷筒芯中，按图3或图4所示。

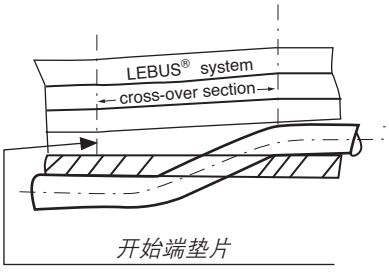
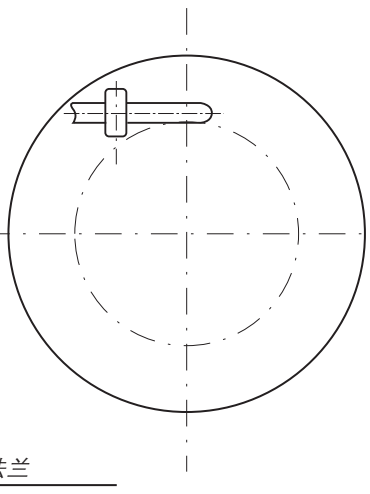


图 3



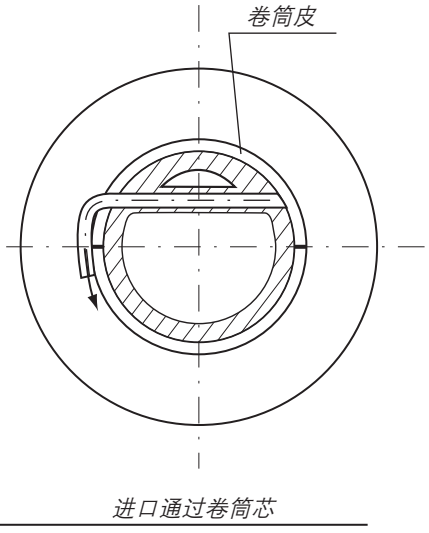


图 4

4) 在开始对中间一排进行钻孔和攻丝（图5）之前，仔细查看卷筒皮是否与卷筒紧紧配合。每完成一个螺孔即拧进螺栓，以避免切屑流入。

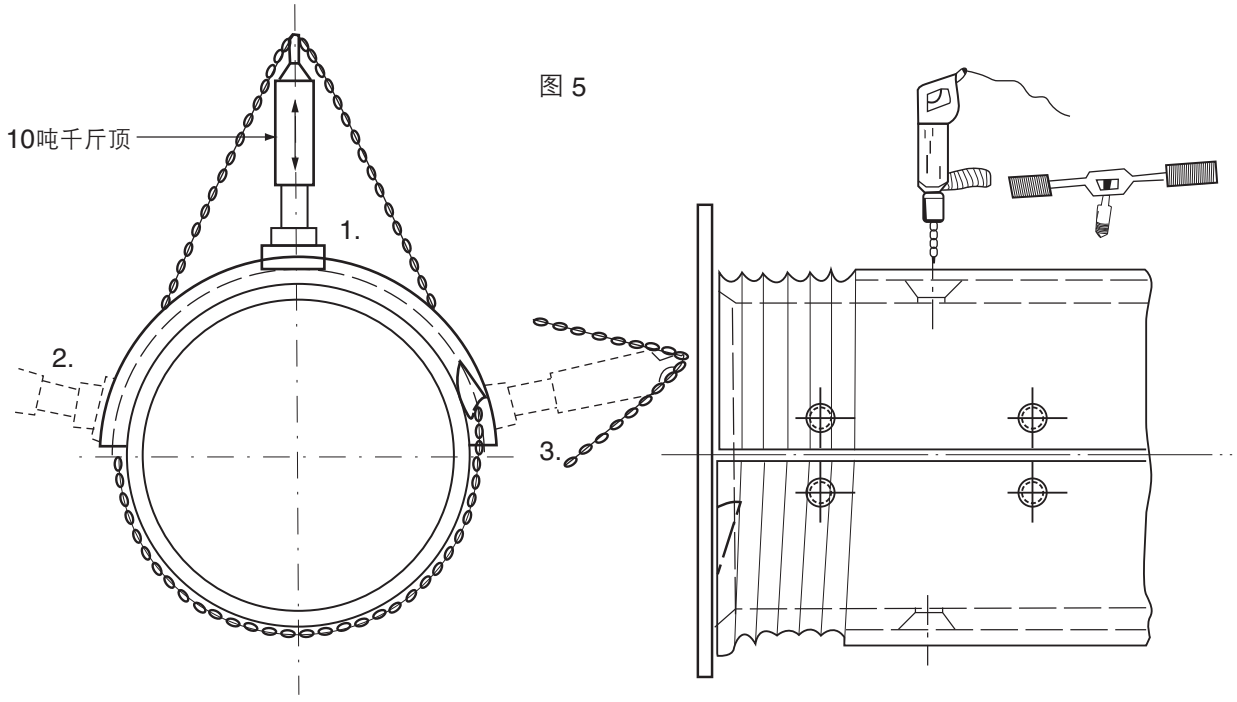


图 5

5) 旋转卷筒至下一排螺栓孔，固定钻基夹具；针对下面的卷筒检查卷筒皮。

注意：使用“porto power”千斤顶在钻孔和攻丝时支撑住卷筒皮。

6) 旋转卷筒至相反一侧，重设钻基夹具，并且钻孔和攻丝。
第一半卷筒皮完成钻孔和攻丝后，把卷筒定位并且清理，准备安装第二半卷筒皮（图6）。

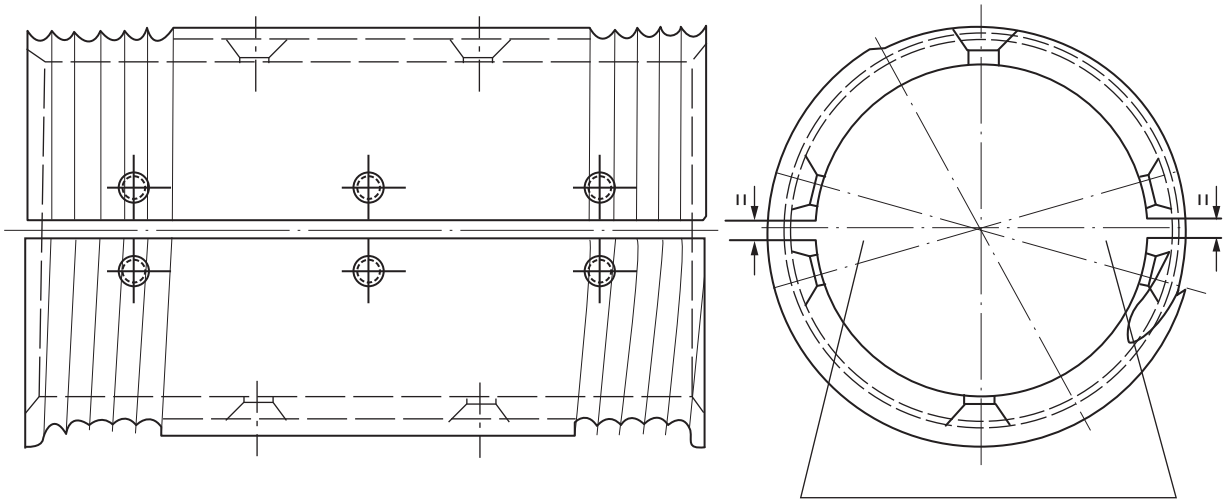


图 6

7) 小心翼翼地将这半卷筒皮放到卷筒上，以避免向后滑落。交叉部分必须180°分离。沟槽必须在对分边缘处对齐。

8) 对第二半卷筒皮重复进行钻孔操作。

9) 完成钻孔和攻丝后，清理安装好的卷筒皮的表面。

备记

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