

# General information on the mounting of cable support systems

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# 1 About these instructions

## 1.1 Target group



These general instructions for mounting cable support systems are intended for specialists and/or instructed technical personnel (e.g. engineers, installation engineers and maintenance personal). They are used to assist in the mounting and maintenance of cable support systems and make no claims as to completeness.

## 1.2 Relevance of these instructions

Please read the information carefully before starting mounting. We will not accept any warranty claims for damage and liability caused through non-observance of this information.

Any images are intended merely as examples. Mounting results may look different.

All the documents supplied with the product must be stored in an easily accessible location, so as to be available when information is required. (Only for printed instructions)

In these instructions, cables and lines are referred to simply as cables.

## 1.3 Types of warning information



**CAUTION**

### Type of risk!

Shows a risky situation. If the warning information is not observed, then medium or minor injuries may occur.

**ATTENTION**

### Type of risk!

Shows a risky situation. If the warning information is not observed, then damage to the product or the surroundings may occur.

**Note!** *Indicates important information or assistance.*

### 1.4 Basic standards and regulations

The basic principles of OBO cable systems are ensured by IEC/EN 61537. It describes all the relevant parameters – from the area of application, through test conditions, up to corrosion resistance and temperature classification.

You can read individual proofs for OBO cable support systems on the OBO website:

<http://www.obo-bettermann.com/de/>

### 1.5 Applicable documents

The mounting instructions listed below must be observed for the mounting of the appropriate systems.

#### Mounting instructions for different tray and ladder systems:

- Screw-on cable trays with fittings for screwing and snapping on [https://www.obo.de/out/media/04-100\\_TD%20KTS%20MA%20Screw-on%20cable%20tray%20systems%20with%20fittings%20for%20screwing%20and%20clamping\\_EN.pdf](https://www.obo.de/out/media/04-100_TD%20KTS%20MA%20Screw-on%20cable%20tray%20systems%20with%20fittings%20for%20screwing%20and%20clamping_EN.pdf)
- Latchable Magic cable tray systems, see [www.obo.de/out/media/04-100\\_TD\\_KTS\\_MA\\_Latchable%20Magic%20cable%20tray%20systems\\_EN.pdf](http://www.obo.de/out/media/04-100_TD_KTS_MA_Latchable%20Magic%20cable%20tray%20systems_EN.pdf)
- Cable ladder systems, see [www.obo.de/out/media/04-300\\_MA\\_Cable\\_ladder\\_systems\\_EN.pdf](http://www.obo.de/out/media/04-300_MA_Cable_ladder_systems_EN.pdf)
- Wide span cable tray systems, see [www.obo.de/out/media/04-320\\_MA\\_Wide\\_span\\_cable\\_trays\\_EN.pdf](http://www.obo.de/out/media/04-320_MA_Wide_span_cable_trays_EN.pdf)
- Wide span cable ladder systems [www.obo.de/out/media/04-320\\_MA\\_Wide\\_span\\_cable\\_ladders\\_EN.pdf](http://www.obo.de/out/media/04-320_MA_Wide_span_cable_ladders_EN.pdf)
- Mesh cable tray systems [www.obo.de/out/media/04-250\\_MA\\_Mesh\\_cable\\_tray\\_systems\\_EN.pdf](http://www.obo.de/out/media/04-250_MA_Mesh_cable_tray_systems_EN.pdf)

#### Mounting instructions for different support structures:

- U support systems, see [www.obo.global/out/media/04-150\\_MA\\_U\\_support\\_systems.pdf](http://www.obo.global/out/media/04-150_MA_U_support_systems.pdf)
- I support systems, see [www.obo.global/out/media/04-150\\_MA\\_I\\_support\\_systems.pdf](http://www.obo.global/out/media/04-150_MA_I_support_systems.pdf)
- Universal systems, see [www.obo.global/out/media/04-150\\_MA\\_Universal\\_systems.pdf](http://www.obo.global/out/media/04-150_MA_Universal_systems.pdf)
- Trapezoidal systems, see [www.obo.global/out/media/04-150\\_MA\\_TP\\_support\\_systems.pdf](http://www.obo.global/out/media/04-150_MA_TP_support_systems.pdf)
- Clamp fastenings, see [www.obo.global/out/media/04-150\\_MA\\_Clamp\\_fastening\\_systems.pdf](http://www.obo.global/out/media/04-150_MA_Clamp_fastening_systems.pdf)

## 1.6 Declarations of conformity

All the OBO cable support systems are CE-conformant according to the appropriate EC guidelines. This also applies to standard parts such as bolts, washers and nuts that are components of various product systems. The appropriate EC declaration of conformity certifies agreement with the named directives or standards, but does not guarantee properties. The safety instructions in the supplied product information and the general safety regulations must be complied with during installation and use.

The declarations of conformity are linked to the products at [www.obo-bettermann.com](http://www.obo-bettermann.com).

## 2 Intended use

Cable support systems are manufactured according to the standard and may only be used for routing cables. Improper mounting or mounting deviating from the manufacturer's specifications may cause the cable support system to collapse, causing damage to people and property.

During mounting, the generally valid and recognised rules of technology must be taken into account along with the standards and regulations applicable at the mounting location. Refer to the mounting instructions in Chapter „1.5 Applicable documents“ on page 6 for information on the detailed mounting of the different OBO cable support system components.

The cable support system is designed for use at ambient temperatures of between  $-20\text{ °C}$  and  $+120\text{ °C}$ . At temperatures below  $-20\text{ °C}$ , the metal will become brittle and may not be processed further.

The cable support systems are not designed for any other purpose than the one described here. If the cable support systems are used for another purpose, then this shall render all liability, warranty and replacement claims null and void.

### 3 Safety

#### 3.1 General safety information

Observe the following general safety information:

The work may only be carried out by qualified specialists, who have been trained for the following work:

- Creation of electrical standard structures
- Handling electrical resources
- Creation of safe electrical switching circuits

When erecting systems for maintaining electrical functionality, take the necessary fire protection regulations into account! These instructions do not mention any fire protection standards which are to be complied with.

Cable support systems may collapse if they are used as a footpath, a ladder for people or as a bridge. Human weights are not taken into account in the manufacturer's load data and the standard. Serious injury will result from such a fall.

Do not put your body weight on a cable support system unless the whole construction has been approved for walking on by a structural engineer.

Dangerous voltages when handling electrical resources can lead to serious physical injury or death. Never work on parts through which power is flowing. Wear suitable protective clothing and comply with all the required safety guidelines.

If cable support systems are touched or carried with bare hands, then cutting could result. Wear suitable protective gloves.

If the maximum load capacity is exceeded, the cable support system may collapse. Comply with the load limits!

Additional loads from snow and wind are not taken into account in the load data for the load capacity of the cable support system. Major wind and snow loads may lead to overloading and damage of the cable support system. Carry out structural calculations and take any additional loads into account during planning.

Seismic loads are not taken into account in the load data for the load capacity of the cable support system. Seismic loads may lead to damage of the cable support system. Take seismic forces into account during planning or obtain the appropriate advice.



### 3.2 Personal protective equipment

List of personal protective equipment to be used:



Use hand protection



Wear safety shoes



Wear hearing protection



Wear eye protection



Wear a harness

## 4 Corrosion protection

In compliance with the KTS standard, all the supplied cable support systems and fastening systems have corrosion protection applied at the factory. This corrosion protection is guaranteed through various galvanisation methods and the use of specific rustproof materials.

Corrosion protection	Icon	Optimum	use (optional)
Electrogalvanisation		Indoor areas	DIN EN 12329
Strip galvanisation	G	Indoor areas	DIN EN 10346
Hot-dip galvanisation	FT	Outdoors	DIN EN ISO 1461
Double-dip galvanisation	DD	Outdoors	DIN EN 10346
Stainless steel	VA	Tunnel construction Food industry Chemical industry	V2A, V4A or V5A
Aluminium	Alu	Special applications, e.g. offshore	

## 5 Transportation and storage



CAUTION

### Danger of cuts!

If cable support systems are carried with bare hands, then cutting could result.

Wear suitable protective gloves.

### 5.1 Transportation

- At the factory, the articles are packaged so that they will not be damaged during transport.
- For overseas transport, we recommend the use of suitable containers.

### 5.2 Unloading

ATTENTION

### Damage to the cable routes through improper unloading!

If material is unloaded improperly, then it may become damaged. Take special care during unloading with a forklift truck, in particular if the ground is uneven.

- Never move a stack of cable sections out of a container by pulling at the lowest element.
- Try to unload individual bundles, preferably using a crane or by hand.

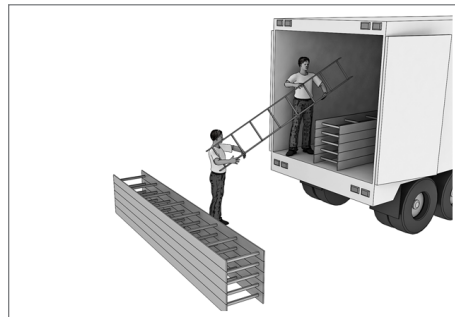


Fig. 1: Unloading the cable sections

ATTENTION

### Damage possible from direct contact with the forks of the forklift truck!

Material not transported on pallets may be damaged through direct contact with the forks of the forklift truck. The surface, and thus the corrosion protection, are at particular risk.

Unload material not transported on pallets by hand or by crane to avoid damage!

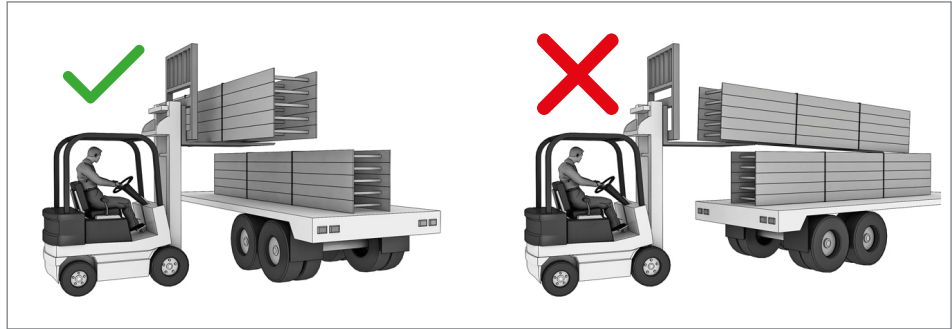


Fig. 2: Unloading with a forklift

### 5.3 Storage

**Note!** *Store all the system elements in a dry place! White rust may form on freshly galvanised surfaces in damp environments or outdoors.*

**The following measures can help prevent white rust:**

- Ensure all system components are stored in a dry place.
- Ensure sufficient ventilation of all areas.
- Use layers of wood between the stacks.
- If storing the products outside, avoid the use of plastic films or tarpaulins.

According to DIN ISO 1461, formation of white rust is not grounds for complaint. A small amount of white rust (loose, porous zinc hydroxide) is not linked to an early reduction of zinc thickness and does not affect the effectiveness and lifespan of the corrosion protection.

## 6 Preparations for mounting

### 6.1 Unpacking, sorting and transportation to the mounting area

**Note!** *After unpacking, check the supplied material for completeness and damage using the shipping note.*

*Inform the appropriate office or construction manager of any differences or problems immediately.*

**Procedure:**

1. Divide the supply into sections according to the mounting operation.
2. Label the sections.
3. Unpack the container.
4. Check the supplied materials using the delivery note or the packing list.

- Sort the materials according to the mounting sections and the list of material requirements.
- Visit the mounting locations.
- Define temporary storage locations and transport routes.
- Transport the materials with suitable means of transport to the mounting area or the temporary storage location.

### 6.2 Marking the route and the fastening holes

To specify the course of the route and the fastening holes, use existing cable route plans and mounting drawings.

With tray heights of 60 mm, the standard spacing between the suspended supports and between the brackets is 150 cm, if no other specifications were made in the mounting drawings.

#### Procedure:

- Mark the course of the route.
- Mark fastening holes for support, mounting angle and bracket mounting.

## 7 Fastening the retaining structure

### 7.1 Anchoring in the mounting substrate with heavy-duty anchors

The fastening systems must be suitable and approved to guarantee the necessary load capacity on the existing mounting substrate.

If the maintenance of electrical function is required, then the fastening systems and the cable support system must have the appropriate fire protection approval.

#### 7.1.1 Drilling anchor holes

#### ATTENTION

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#### **Destroyed anchors through incorrect drill hole size and depth!**

If the anchor is placed in a drill hole which is too small, excessive hammering will make the thread unusable. If the drill hole is too big, then the anchors cannot be tightened when inserted.

Ensure the right drill hole size and depth!

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## 7.1.2 Mounting anchors

**ATTENTION****Unstable anchor due to incorrectly selected torque.**

Tighten all the anchors with a torque wrench. Exceeding the maximum torques for the selected anchors will damage the anchor. In this case, the load capacity of the anchor is no longer guaranteed.

When mounting the anchors, use the product-specific mounting instructions of the anchor manufacturer. Comply with the specified torque data.

## 7.2 Welding to an existing retaining structure

**Note!** *Comply with the valid safety requirements and directives during welding.*

## 7.3 Beam clamp to an existing building steel construction

The retaining structure can be fastened to an existing steel structure with standard clamping technology. Observe the mounting images for information on the different fastening options.

It is the responsibility of the planner of the cable support system to ensure that the torsion stiffness and statics of the existing steel building structure are suitable. Additional loads of other structures on or along our routes are not taken into account.

**Note!** *Observe the following basic rules:*

- It is not required to use load distributing supports.
- Clamp fastenings on horizontal steel structures need not be protected against slippage, as the construction is intrinsically supportive.
- Clamp fastenings on vertical steel structures must always be protected against slippage using construction measures.
- In cases of doubt, we recommend calling in a structural engineer.

### 7.4 Applying cold galvanisation

Mechanical processing (e.g. drilling, cutting, sawing, welding) will damage or remove the zinc layer, which protects the surface against corrosion.

Cutting edges and new drill holes must be protected against corrosion with a reapplication of the cold galvanisation.

#### Procedure:

1. Clean the areas to be treated to remove dirt, grease and other impurities.
2. Apply the cold galvanisation according to the manufacturer's specifications.

## 8 Mounting cable routes

### 8.1 Calculating thermal length expansion

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#### ATTENTION

#### Damage from thermal length expansion!

Cable support systems are subject to length expansion (length expansion coefficient) and can be damaged by it. To prevent damage to the cable support system, expansion distances must be complied with.

---

**Note!** *If expansion joints exist in the structure of the building, then we recommend separating the cable support system at these points.*

If there are major temperature variations, the thermal expansion of a cable support system may be considerable, especially if mounted outside. Therefore, expansion distances must be complied with at specific intervals, in order to avoid damage to the cable support system.

In addition, cable support systems must have sufficient conductivity to guarantee the equipotential bonding and the connection to the earth potential. Attach movable bearings and equipotential bonding conductors in such a way that they function safely, even in the case of thermal expansion.

#### Necessary work steps:

1. Determining the distance between movable bearings.
2. Determining expansion distances.

### 8.1.1 Determining the distance between movable bearings.

**Procedure:**

1. Determine the maximum expected metal temperature difference to which the cable support system could be exposed at the mounting location (highest expected minus, lowest expected metal temperature).
2. In Table 1, choose the appropriate line in the “Metal temperature difference” column.
3. Select the distance given in the column “Distance between movable bearings”.

Metal temperature difference	Maximum distance between the movable bearings
10 °C	70 metres
25 °C	47 metres
40 °C	35 metres
50 °C	28 metres
65 °C	23 metres
80 °C	20 metres

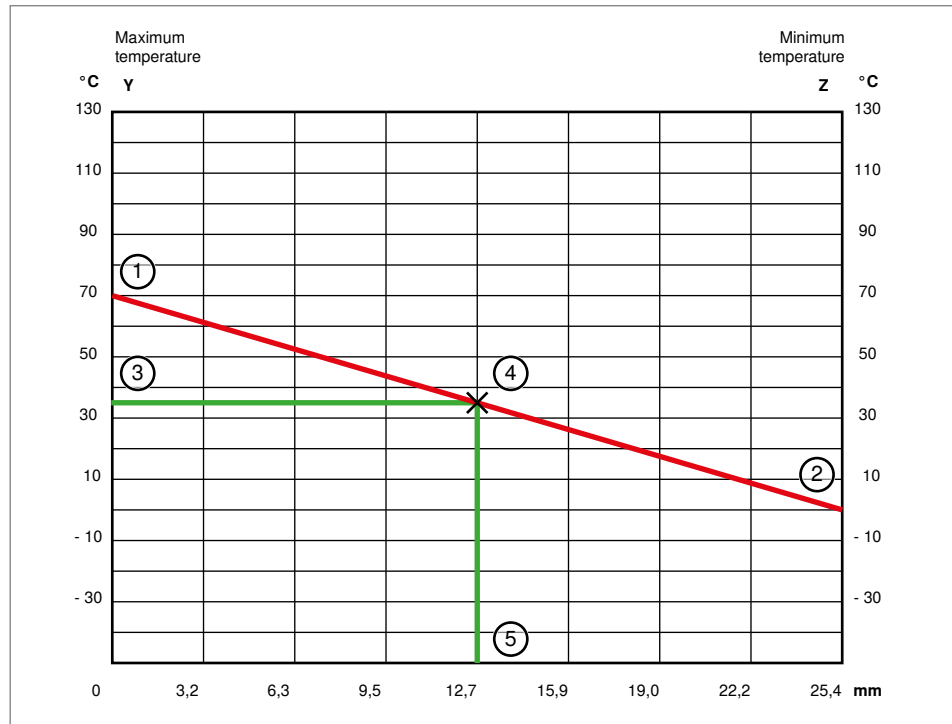
**Tab. 1:** Maximum permitted spacing between movable bearings

### 8.1.2 Determining the expansion distance

The required expansion distance is dependent on the expected metal temperature difference and the temperature at the time of installation. To determine it, use the diagram (Fig. 3) shown below.

**Procedure:**

1. Mark the highest expected metal temperature on the Y axis (Point 1).
2. Mark the lowest expected metal temperature on the Z axis (Point 2).
3. Draw a line between Points 1 and 2.
4. Enter the temperature at the time of installation on the Y axis (Point 3).
5. From Point 3, draw a horizontal line to the line which connected Points 1 and 2 (Point 4).
6. Draw a vertical line from Point 4 to the X axis (Point 5).
7. Use the value displayed by Point 5 for the necessary expansion distance.



**Fig. 3:** Determine sample expansion gap

## 8.2 Adapting and shortening cable routes

Cable routes can be shortened with hand coping saws or electrical angle grinders.

### Procedure:

1. Mark the cutting area.
2. Saw the profile along the marking.
3. Deburr cut edges.
4. Fasten the edge protection strip or floor end plates at the cut edges.
5. If perforations are required, then draw on the appropriate perforations (e.g. for straight connectors).
6. Drill the appropriate holes in the profile.
7. Deburr the drill holes.



### 8.3 Mounting cable routes

**Note!** *If expansion joints exist in the structure of the building, then separate the cable support system at these points. After separation, set up the electrical connection again using an equipotential bonding conductor.*

*Use edge protection to prevent the cables from being damaged by the cut edges.*

**Procedure:**

1. Refer to the materials lists or the mounting drawings for details on the material required.
2. Mount the cable routes using the mounting diagrams.
3. Refer to Table 2 and Table 3 for the torques to be maintained.
4. Tighten all bolts and anchors with a torque wrench.

The following tables show the required torques for a selection of nuts and bolts. Refer to the OBO Industrial installations fastening material catalogue for the resistance grades of the supplied bolts.

Thread	Tightness class 5.6	Tightness class 8.8
	Friction coefficient 0.14	Friction coefficient 0.14
M6	4.8 Nm	11.3 Nm
M8	11.6 Nm	27.3 Nm
M10	23.1 Nm	54.0 Nm
M12	40.4 Nm	93.0 Nm
M14	64.7 Nm	148.0 Nm
M16	100.7 Nm	230.0 Nm

**Tab. 2:** Tightening torques of bolts with metric thread

Thread	Resistance class 70	Resistance class 80
	Friction coefficient 0.14	Friction coefficient 0.14
M6	4.8 Nm	11.3 Nm
M8	11.6 Nm	27.3 Nm
M10	23.1 Nm	54.0 Nm
M12	40.4 Nm	93.0 Nm
M14	64.7 Nm	148.0 Nm
M16	100.7 Nm	230.0 Nm

**Tab. 3:** Tightening torques of bolts with metric thread made of stainless steel

## 8.4 Mounting movable bearings

In contrast to fixed bearings, movable bearings create connections between bodies which can accept movement or heat-related length changes within a certain range, without any damage occurring.

### ATTENTION

#### Damage in the area of the movable bearing!

If movable bearings are tightened too much, then they may not be able to follow movements due to thermal expansion. As a result, damage to the cable support system and the retaining structure may occur.

Do not use a spanner for movable bearings! Instead, tighten the nuts to hand tightness and use bolt locks, such as bolt locking agents or self-locking nuts, to permanently connect the bolts and nuts.

#### Procedure:

1. Determine the expansion distance as described in Chapter „8.1.2 Determining the expansion distance“ on page 15 (see  $\Delta L$  in Fig. 4).
2. Fasten the connectors tightly to one of the cable sections to be connected, see Fig. 4 No. 1.
3. Only hand fasten the connector with the other cable section (No. 2) with the determined expansion distance. In so doing, secure the hand-tightened bolts with a bolt lock to secure the bolts, e.g. with bolt locking agent (No. 3).
4. To guarantee equipotential bonding, create an electrical connection between the two cable sections (No. 4), as this is not sufficient in the area of the movable bearing (see „8.5 Earthing the cable support system“ on page 18).

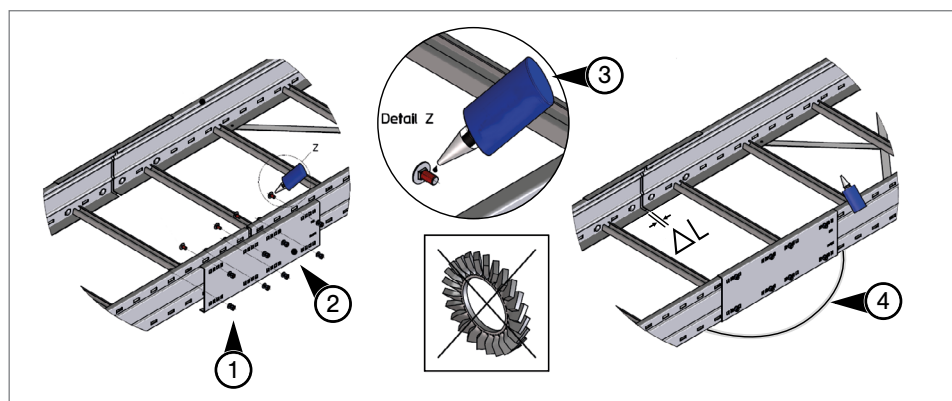


Fig. 4: Mounting connectors as movable bearings

## 8.5 Earthing the cable support system

It might be necessary to mount additional connection cables along the joints under certain conditions, and according to the specifications of the client/system operator. The regulations and specifications, which generally apply to the mounting location, must be complied with.

**Note!** *Observe the following basic rules:*

- Ensure that electrical conductivity is guaranteed by additionally fitting all the movable bearings with an equipotential bonding conductor.
- If the support system is interrupted at wall or ceiling penetrations, then connect the separated systems using connection cables.
- For safety and EMC reasons, the entire support system should be connected to the local equipotential bonding system multiple times.
- Position the ends of the equipotential bonding conductor at least 50 mm from the edge of the connector. The equipotential bonding conductor must be sufficiently long to function safely, even at maximum length expansion.

## 8.6 Labelling the cable support system

Label the sections of the cable support system according to the cable route network plan or the cable section plan.

**Procedure:**

1. Clean the areas to be treated to remove dirt, grease and impurities.
2. Label the cable routes with a suitable, non-washable or self-dissolving labelling system.

## 8.7 Completing the report

After the mounting work has been completed, have the client accept the cable support system.

**Procedure:**

1. Together with the client, check the cable support system.
2. Note down any problems immediately and inform the relevant people.
3. Create an appropriate report for the acceptance, in which you note down everything in writing.
4. Have the report signed by both sides.

### 9 Routing cables

The chapter deals with the insertion of cables. In cases where insertion is not possible, recommendations will be given of how cables can be drawn in with the minimum of risk.

#### ATTENTION

#### **Damage to the cable support system when drawing in cables**

Cables with larger cross-sections pose a particular threat to the cable support system on drawing in.

Lay the cable in the cable support system, instead of drawing it in!

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According to some national and international standards, cables must be laid in the cable support system and not drawn in. Therefore, we recommend laying the cables and not drawing them in.

**Note!** *If it is not possible to lay the cables, then you should observe the following information to avoid damage:*

- Use a suitable pulling apparatus to pull the cables inside in a straight direction. Use an appropriate aid at the start of the cable (e.g. cable hose, drawbar eye).
- Use suitable steering rollers to pull the cables around bends and T branch pieces, in order to avoid damage to the cable support system and cable insulation.
- Never pull cables over sharp edges to exclude the danger of insulation errors.
- Comply with the tensile forces and bend radii specified by the cable manufacturer.

## 10 Maintaining and cleaning cable support systems

The chapter deals with the maintaining and cleaning of cable support systems.

Maintenance and cleaning are in the sphere of responsibility of the future system operator, therefore we can only provide recommendations.

### 10.1 Maintaining cable support systems

Cable support systems do not need maintenance in the case of static loads.

**Note!** *Observe the following basic rules:*

- *If the cable support system is mounted directly on machine parts, conveyor systems or similar, then dynamic loads from shaking motions may loosen the mounting elements used.*
- *In this case, check the screw connections and the stability of the cable support system.*

### 10.2 Cleaning cable support systems

**Note!** *Cable support systems must be cleaned if the weight of extreme sand or snow loads could lead to an overload of the cable support system. Depending on the load, it might be necessary to clean the trays to avoid overloads.*

**Procedure:**

1. You can use a vacuum to remove sand or other impurities (except snow). If necessary, wipe the area with a moist cloth after this.
2. Snow, sand and other impurities can also be carefully swept away.
3. If a high-pressure cleaner is used, then the trays must be dried soon after cleaning and well ventilated.
4. We recommend that the cable support system then be lightly oiled with a saturated cleaning cloth (e.g. with drawing compound).

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**Building Connections**

