



Installation guideline

Installation recommendations for cables in
drag chains

Mechanical selection parameters

A durable, failure-free system depends to a large extent on the selection of the right components. Therefore, when selecting the components of the system, consider the parameters given by the application.

1.1 Minimum bending radius

The minimum bending radius of cables defines the smallest possible radius by which the cable can be bent.

In order to ensure the durability and reliability of the cables, the correct selection of the bending radius of the cable tray, i.e. the drag chain, must be taken into account when planning a drag chain system. In order to maintain the service life statement of our cables, it is important that the radius of the drag chain is not less than the minimum bending radius of the cable. If there are several cables in your system, the bending radius of the drag chain should not be smaller than the largest minimum bending radius in your system.

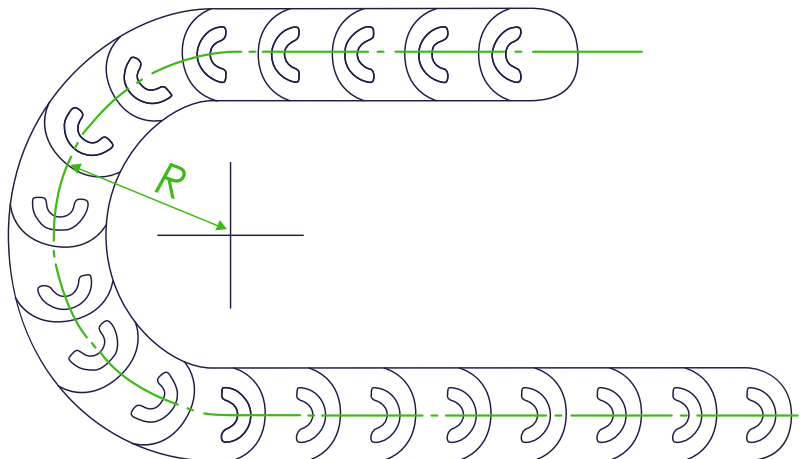
The minimum bending radius of cables is usually specified with a bending radius factor which is multiplied by the outer radius of the cable.

Example:

BR-factor = $10 \times d$; $d = 6,0\text{mm}$

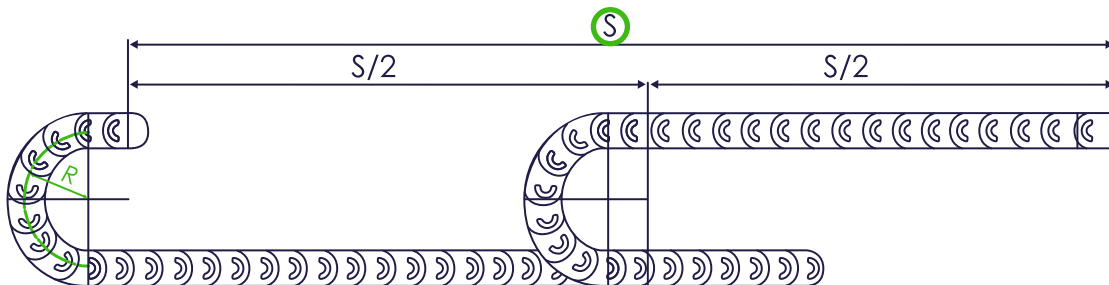
Min. BR = $10 \times 6,0 = 60\text{mm}$

R = Bending radius of the drag chain



1.2 Traverse length & bending radius

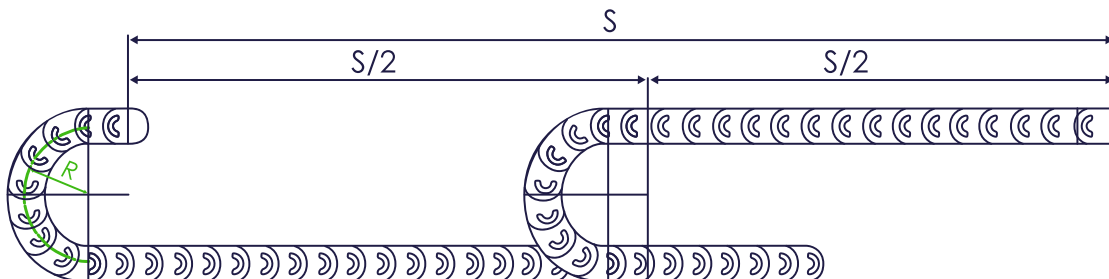
The traverse length is the distance covered by the chain from the starting point to the maximum end or turning point. This is marked as “S”.



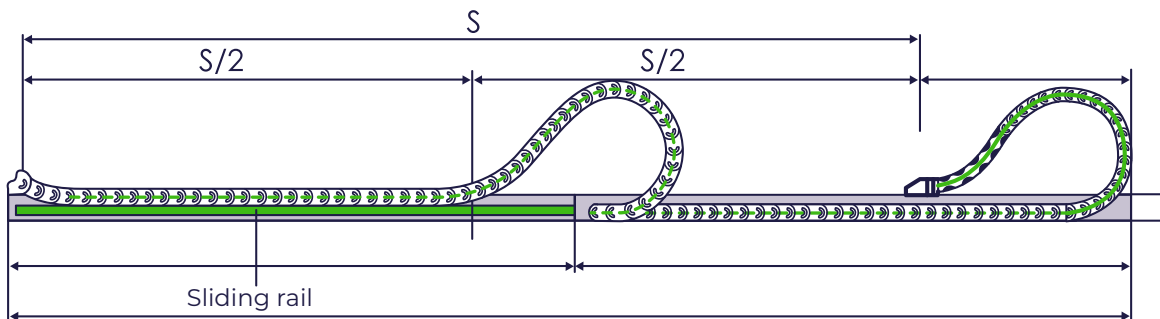
An important factor in fulfilling the expected lifetime of a cable is maintaining the maximum travel distance of the application. Information on the maximum travel distance can be found on the respective data sheet of the cable.

Depending on the application, the travel distance is described as “free carrying” or “sliding”. Exceeding the travel distance has a significant effect on the expected lifetime of the cable.

Free carrying:



Sliding:

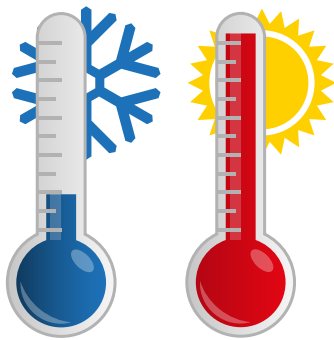


A bending cycle is usually a completed travel of the application from the start to the end position, i.e. back and forth. The lifetime is described by the number of bending cycles.

Consideration of environmental conditions

In addition to the application parameters, the environmental conditions must also be taken into account. A suitable selection increases the lifetime of the component and thus ensures a reliable process.

2.1 Thermal environmental conditions



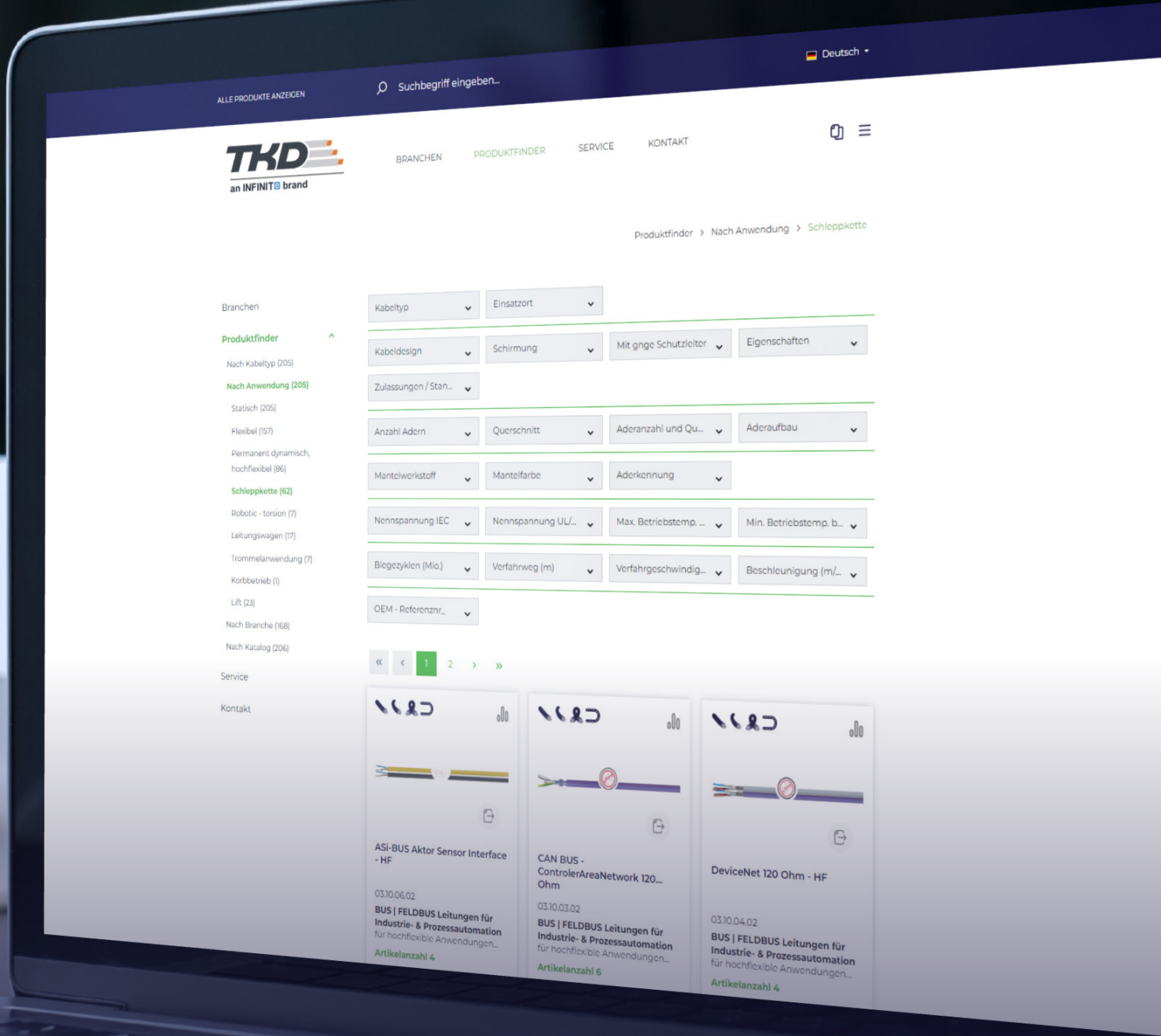
The ambient temperature plays a major role in the selection of your system. Cold as well as heat can significantly affect the properties of polymers. When selecting your cables, pay attention to the appropriate temperature specifications in order to maintain operational reliability. Our cable materials are designed for a wide range of temperatures.

2.2 Media: Chemical influences and oils



Are there direct or indirect chemical influences? Depending on the materials used, the lifetime of the cables and thus the entire system can be influenced. Therefore, check which influences can affect the system. You will find a first overview of the resistance of different media in the data sheet of the respective cable.

Our KAWEFLEX®-SK cable portfolio provides for three outer jacket materials for drag chain cables. These are PVC, PUR, and TPE sheathing material, whereby the highest media resistance is given by the TPE material.



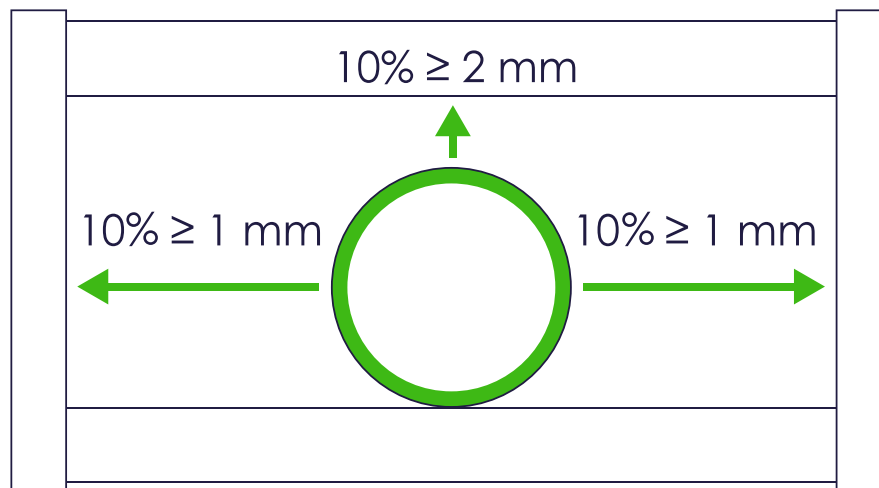
Our product finder will help you to choose the right cable:



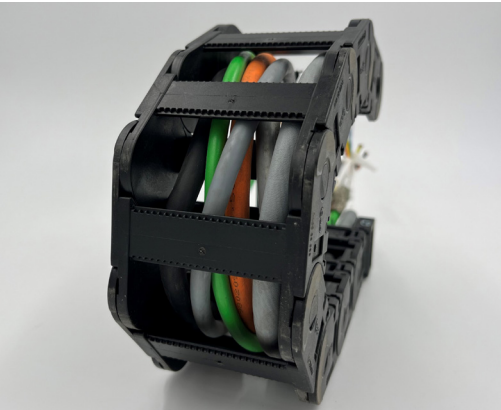
In addition to the correct choice of cable, the way in which the cables are installed in the drag chain also has a major influence on the lifetime of cables. Unplanned downtimes can occur due to improper installation, which is why compliance with the installation and assembly guidelines is very important.

3.1 Maximum cable diameter

The maximum cable diameter is defined by the inner height of the drag chain minus a space reserve for cables and tubes. For electrical round cables, this minimum reserve is 10% of the cable diameter, for pneumatic tubes at least 15% and for hydraulic tubes 20% all around.



3.2 Interior separation

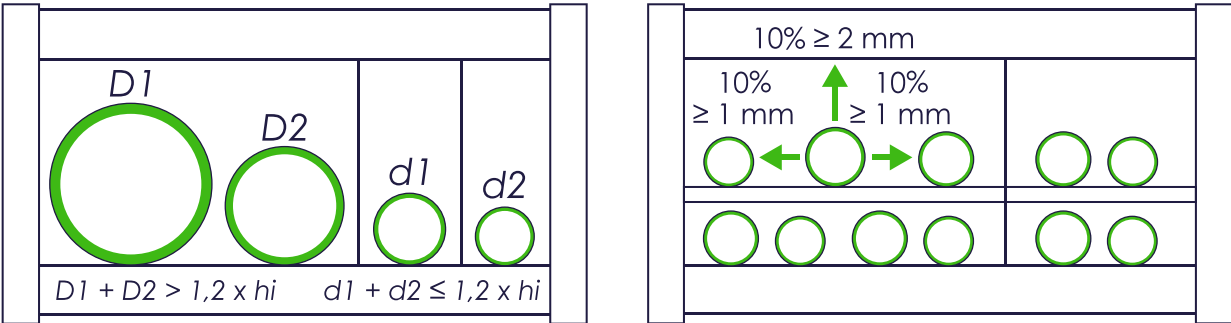


When filling a drag chain, it must be avoided that cables and tubes can overturn or exert tensile force on the energy supply chain in the inner radius.

To prevent cables and tubes from overturning, the following rule must be observed:

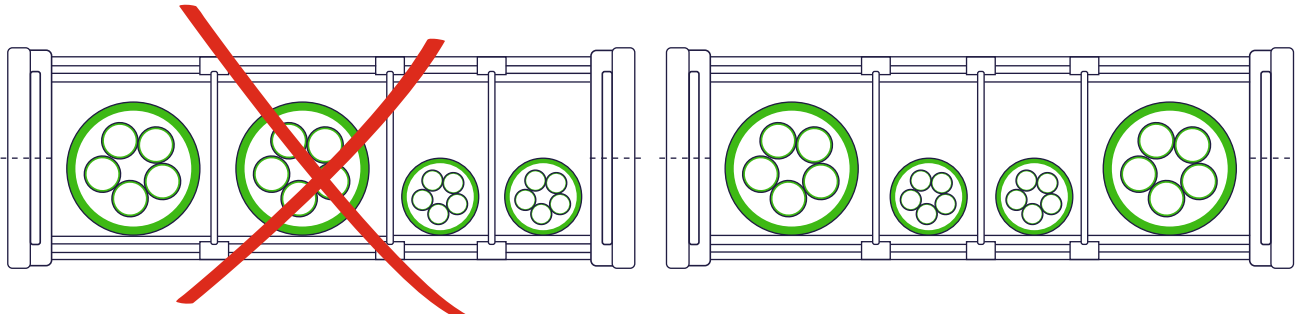
$d1 + d2 > 1,2 \times \text{Interior height}$

If this is not the case, a separator or shelf must be used to separate the cables.



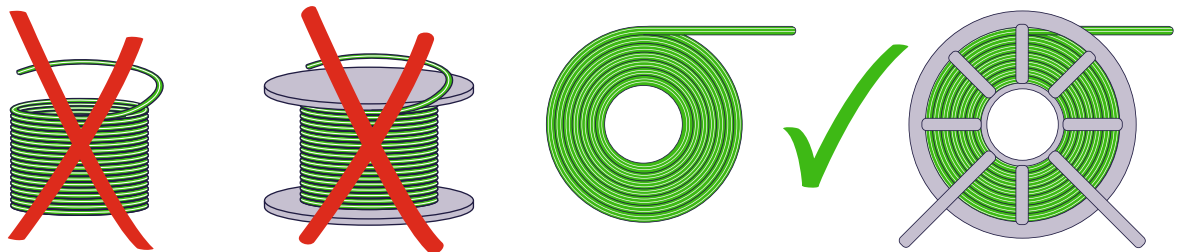
For cables with different outer sheath materials, we also recommend separating them to prevent the different cables from sticking together.

When assigning cables, ensure a symmetrical weight structure in the cable drag chain to avoid one-sided abrasion.

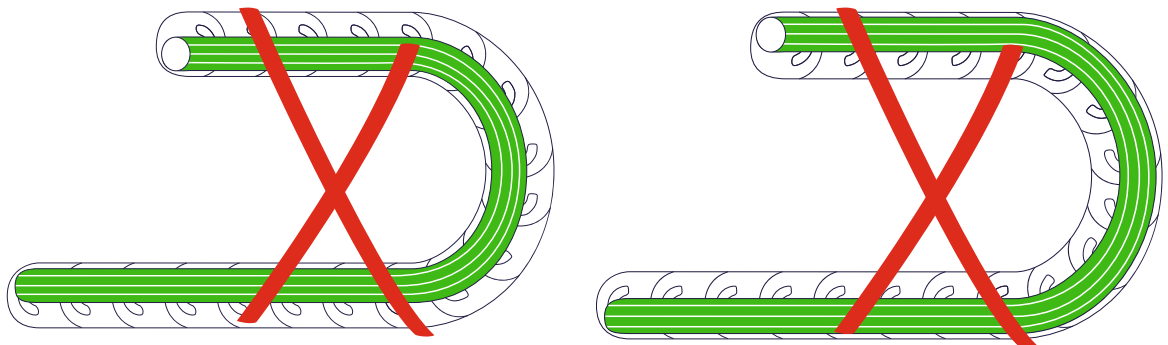


3.3 Installation and tension relief

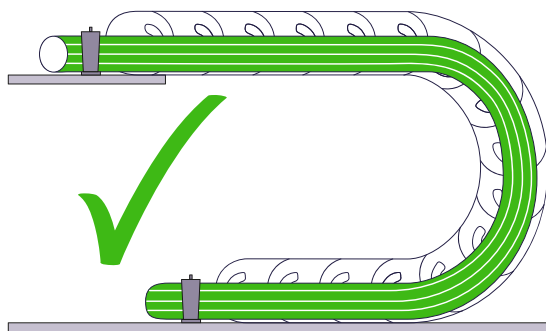
Make sure that the cables are routed without twists. Depending on requirements, cables must be suspended or laid out. Drums or rings must not be unwound overhead.



In the drag chain, cables must be laid in such a way that they can move freely in the lengthwise direction and do not touch the inner or outer radius.



In the case of linear as well as horizontal traverse, round electrical conductors and pneumatic tubes must be fastened on both sides immediately following the drag chain in such a way as to relieve tension.



3.4 Electrical installation guidelines

In addition to the installation guidelines mentioned above, also observe the applicable electrical installation guidelines for cables and lines, which are described for example by the VDE. The selection of the correct cable should always be made by a qualified electrician.

3.5 System weight

When filling your drag chain system, observe the permissible total weight. Your filling should not exceed the maximum load of the cable drag chain; for the media carrier, also observe the weight of the respective filling medium.

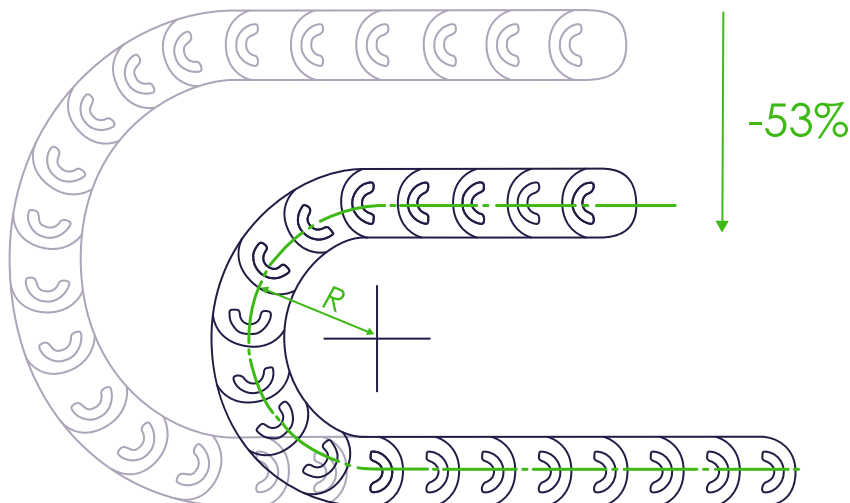
3.6 Cables with large cross sections

Do you have an application that requires high electrical power? For high cable cross-sections, we recommend the use of special single-core cables instead of a multi-core cable. Thus, smaller bending radii can be realized and a significantly longer lifetime of the system can be achieved.

Example:

Kaweflex Allround 7420 SK-C-TPE UL/CSA -> 4G10 -> min BR= 150mm

Kaweflex Allround 7610 SK-C-TPE UL/CSA -> 1x10 -> min BR= 63mm



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Control and readjustment

Check the installation after approx. 24h runtime and after the test operation. Set the parameters again if required.

4.1 Foreign objects

Make sure that there are no foreign objects in the energy chain. Protruding objects such as tools, cable remnants or cable ties can impair the running of the energy chain and lead to failures.

5

Error patterns and possible causes

5.1 Corkscrew



The term corkscrew in this context has nothing to do with opening a wine bottle, but with a permanent deformation of a cable. The deformation very quickly leads to the breakage of the cores. The corkscrew is usually caused by the insufficient bending radii.

5.2 Shield wire breakage



Shield wire breakage occurs when there is a mechanical overload. This can be a shortfall of the bending radius or a torsional movement in standard cables. Especially in case of a movement in the drag chain the shield of a cable is strongly stressed. The consequences of a shield break can have a reduced shielding effect or also generate short circuits, because the broken wires can press into the cores. Our KAWEFLEX®-SK cables have a shield structure specially optimized for movement in the energy chain.

5.3 Sheath abrasion / sheath breakage



The sheath of a cable is the first protection against external influences. Defects can be quickly detected with the naked eye. High abrasion can usually be caused by incorrectly adjusted tension relief. The breakage of the outer sheath can be caused by several influencing factors. Among other things, this can be caused by the influence of media or also by extreme cold as well as heat. Therefore, always pay attention to the temperature and media resistance of the cables, as well as the proper tension relief of the cable with appropriate space reserve in the drag chain.





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