



Cable drum handling

- transport, storage and installation recommendations
for halogen-free shipboard cables

HELKAMA

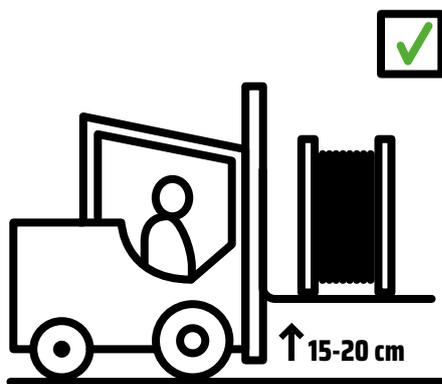
GENERAL

The purpose of this guide is to illustrate how damages can be avoided by correct handling and storage practices.

HANDLING

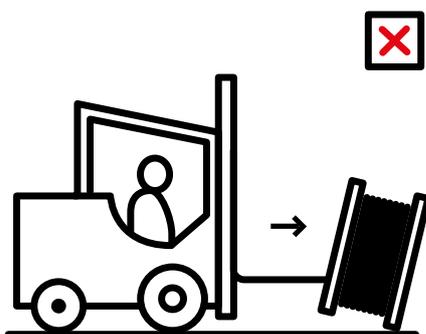
Drum flanges are marked to provide vital information to assist with the handling of the drums and the installation of the cable. This information includes drum weight, a mark on the flange indicating the end of the cable, and an arrow indicating the rotating direction of the drum for rolling or transportation.

If the handling is done correctly, the drum will protect the cable from damages. The forks of the forklift must be longer than the width of the drum, so that the lagging is not damaged. Raise the forks of the forklift sufficiently (15-20 cm) above the ground.



Insufficient lifting height may cause the drum to be dragged on the ground and eventually get damaged or dropped off the forks, especially if the ground surface is uneven. The drums may be placed and stacked on pallets to make it safer and easier to move them.

Don't push the drum with the forklift.

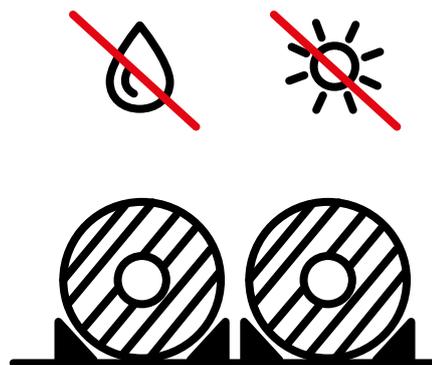


STORAGE

Cable drums shall be stored properly. Improper storage conditions can easily cause damage to cable drums or the actual cables. Cable ends shall be sealed with caps to prevent ingress of water. The caps must be protected to avoid any mechanical risk and exterior shocks. Always check drums before moving.

Drums shall be stored on a level and firm surface (e.g. timber baulks, flange edges) standing upright and strapped/wedged securely to place. Do not store the drum with the flange flat on the ground. Drums shall not be standing in water or be stored in continually damp conditions. Failure to provide these conditions is likely to result in timber rot and weakening of the flange with potential breaking or collapse of the drum to the point where the cable will end up resting on the ground. Any of these outcomes will make later installation of the cable more problematic or impossible.

Recommended cable storage temperature: -40 °C - 50 °C
Handling temperature: -15 °C - 45 °C



Cables with coloured outer sheaths shall not be stored in direct sunlight to prevent fading. Cables shall be protected against direct sunlight with suitable protective packaging, such as plastic sheeting.

If the cable is used progressively (partial lengths are cut and used), the exposed cable end must be immediately sealed with a new end cap. Heat shrinkable end caps are recommended.

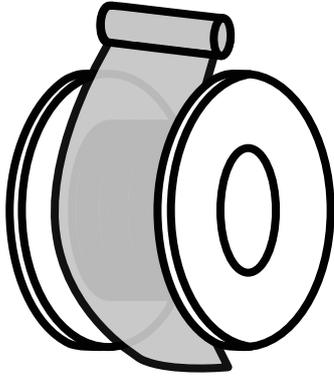
PACKING

Before shipping the cable drums shall be packed correctly for transportation. The packing consists of the following items:

- Plastic foil is wrapped over the cable layers and affixed with adhesive tape.

- The cladding boards are attached with a plastic or steel strap (optional). Do not tighten the strap too much to avoid damage to the cable.

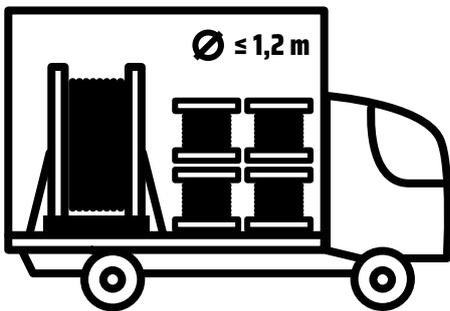
If the cladding boards need to be attached to the flanges of the drum with nails, the nailing shall be done making sure the nails hit the middle of the flanges, and don't damage the outer cable layers.



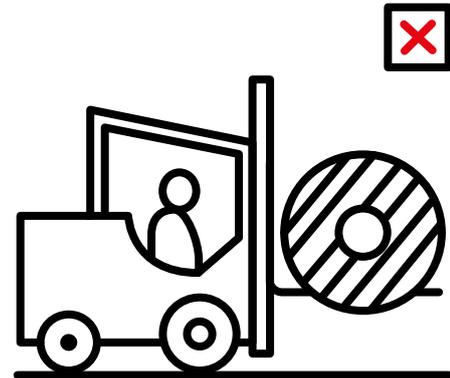
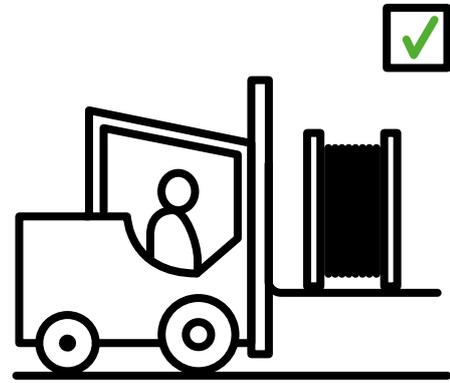
TRANSPORT

The bigger cable drums shall be loaded in the container or transportation vehicle in vertical position, i.e. standing up, so that they don't move during transportation. For cable drums with diameter $\leq 1,2$ m a horizontal position can also be used and the drums can be stacked.

Secure the drums firmly. The round shaped cable drum rolls easily. Make sure that each drum is secured in place with stoppers/wedges to prevent rolling during transportation and storage.



During transportation, the drum shall be fastened with a combination of wedges and transportation straps to tie down the front and rear of the drum, to prevent movement of drums.

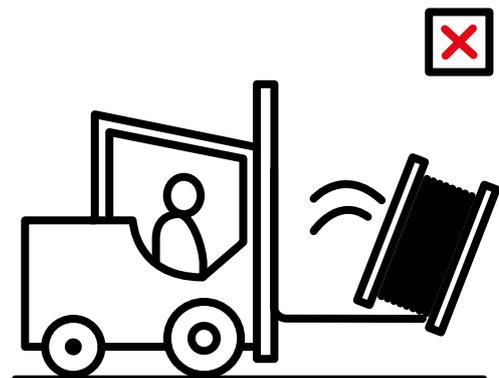


Lifting cable drums with a forklift is only allowed from the "flange side". To avoid damage, never touch the cable or its protective cover with the fork.

Main dangers are the invisible damages that lead to unusable cables. Therefore some basic guidelines need to be followed. The cable itself must always be protected. Cable or drum, damaged by handling etc., must be checked before use.

The unloading and handling shall be done carefully using correct lifting equipment. When handling the drum with a forklift truck, place the drum vertically on the forks.

Never let a drum fall during unloading.



Inspect the cables when they arrive on site. Check the condition of the end caps of the cables and the lagging (a break in the wooden lag could tear the outer sheath of the cable).

If the cable drums show signs of damage from handling and/or storage, any warranty obligation given for the cable drums and any subsequent problems resulting from it, are null and void.

INSPECTION

Drums, cables and delivery documents must be inspected when the products are first received at the storage area. The packing list and the product order have to match the received products. In case of document flaws it is necessary to contact the nearest Helkama representative to assess the situation and advise an appropriate solution.

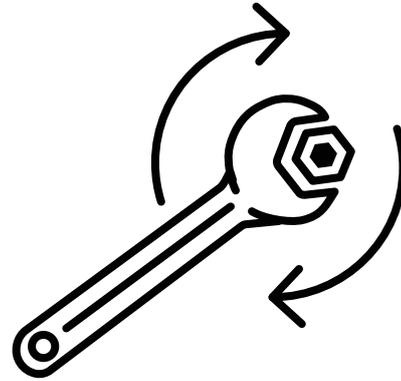
The received drums should be carefully inspected to ensure that no damage occurred during transportation. If any damage is discovered on the drum, it is advisable to also check the cable for damages. It is essential to inform Helkama representative if any cable damage or severe drum damage is found. The damage shall be documented before moving the drum in order to demonstrate the situation properly.



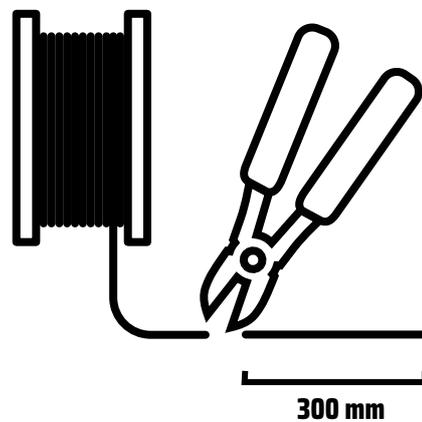
LONG-TERM CABLE STORAGE

Always inspect the drum before moving it from long-term storage. Transport vibrations and movement, weathering or environmental damage can cause changes in the drum and an assessment of the state of the drum is necessary. In changing dry and wet weather, or consistently dry and hot weather, the wooden sections of the drum can shrink and the whole drum could become unstable and cause damage to the cable when moving the drum. Therefore, the transverse bolts must be tightened with a torque

wrench before the drums are moved, to prevent the drums from collapsing. To ensure the bolts stay tight they must also be re-tightened during cable installation. Note that timbers of the drum flanges and barrels that have shrunk are also likely to have loose nails, but they are harder to fix than bolts. Apply caution and vigilance during the cable unwinding to identify loose nails and reduce possible damage to the cable.



If the cable ends are accessible, it is recommendable to inspect the condition of the end caps. The end cap is designed to prevent the ingress of water. If the cap or seal has been absent for a long time (more than one month); or the cable end faces up toward the sky; or the end cap has been absent during periods of rain; or any form of cable end deterioration / ageing / swelling / or soiling is observed; it is recommended that the cable end be cut back 300 mm and re-examined for presence of moisture. If moisture is found, cut back further, and apply a new end cap to the cable end, ensuring a tight seal to the cable outer layer.



INSTALLATION RECOMMENDATIONS FOR HALOGEN-FREE SHIPBOARD CABLES

GENERAL

This document presents the guidelines for installing Helkama halogen-free shipboard cables. The guidelines are based on the standard IEC 60092-352 1) and on the experience from users.

Because the requirements of classification societies may differ, it is strongly recommended to get installation procedures approved by the classification society involved in each project.

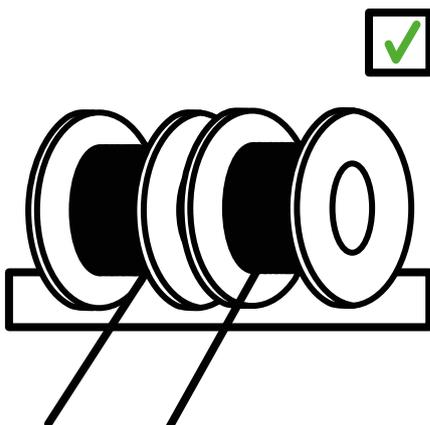
CABLE SELECTION

Helkama halogen-free cables can be installed outside on open deck. If the cable will be exposed to heavy direct sunlight, it is recommended to use cable with black colour on outer sheath. Power and control cables with rated voltage 0,6/1 kV are black. Other cables are available in black on request. Another option is to paint the cables with water solvent paint.

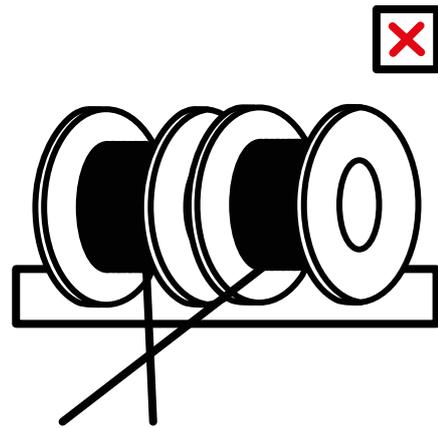
CABLE PULLING

Only same size cables should be pulled at the same time. If different size cables (i.e. big difference in cable diameters) are pulled at the same time, the small cables may get damaged.

When pulling big cables, it is recommended to use rollers, especially if the cables are pulled with the help of winches.



Cables should not be pulled crossing each other to avoid abrasion of the sheath at the crossing point.



The number of cables to be pulled at the same time is determined by the installation conditions at site: distance to be pulled, open space available for looping the cable at intermediary drawing stations and the routing of cables (number of bends and number of corners).

PROTECTION OF CABLES DURING BUILDING OR REPAIR

Against welding sparks:

- When welding close to cable drums or already installed cables:
- The drum and cable should be protected against the welding sparks e.g. with a fire blanket or with a protection plate. A fire blanket is found to be very practical and easy to use.
- Same methods can be used for the protection of installed cables.

Against abrasions on outer sheath:

- Temporary cables used at the site (e.g. for welding and lighting) should not be pulled crossing already installed cables to avoid abrasion of the sheath at the crossing point.

MINIMUM CABLE BENDING RADIUS

The minimum bending radius during installation and for fixed installation shall be according to the following table.

UNARMoured AND UNSHIELDed CABLE TYPES (LKM-HF AND LKMM-HF)

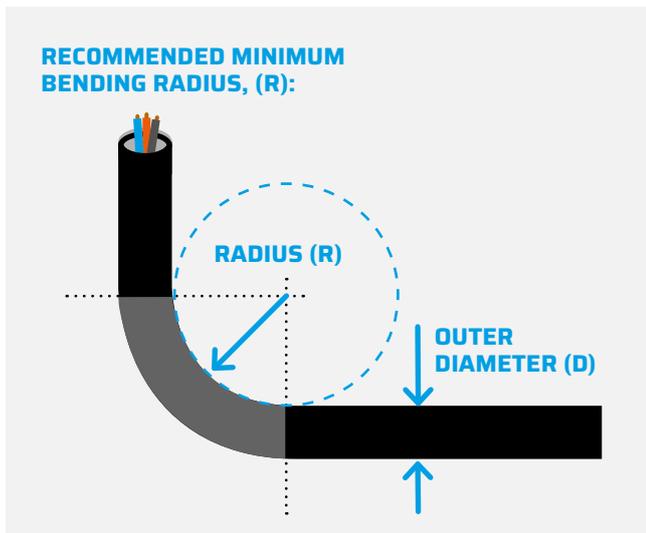
Diameter range	During installation	Fixed installation
≤ 25 mm	6 x D	4 x D

UNARMoured AND UNSHIELDed CABLE TYPES (LKM-HF, LKMM-HF AND LKM-FRHF)

Diameter range	During installation	Fixed installation
> 25 mm	9 x D	6 x D

ALL OTHER TYPES

Diameter range	During installation	Fixed installation
All sizes	9 x D	6 x D



MINIMUM INSTALLATION AND OPERATION TEMPERATURE

Minimum installation temperature for all cable types is -15 °C. Lowest operation temperature for all cable types is -40 °C.

CABLE FIXING

Cables shall be fixed by means of clips, saddles or straps of suitable material, which if ignited, will not contribute to any spread of flame along the cables or insulated wire. The material shall have a surface area sufficiently large and shaped so that the cables remain tight without their coverings being damaged. (IEC 60092-352 Clause 3.19)

As a guideline, the following recommendations can be given for straps (partly from Panduit web-site):

Length of the strap (mm)	Width of the strap (mm)	Max. diameter of the cable bunch (mm)
102	2.5	22
142	3.5	35
188	4.8	48
292	4.8	75
371	7.6	102
510	12.7	130
718	12.7	200

The distances between supports shall be chosen according to the type of cable and the probability of vibration. It shall not exceed 400 mm for a horizontal cable run where the cables are laid on cable supports in the form of tray plates, separate support brackets or hanger ladders. The spacing between the fixing points may be up to 900 mm, provided that there are supports with maximum spacing as specified above. This exemption shall not apply to cable runs along weather decks, when the cable run is arranged so that the cables can be subjected to forces by water washing over the deck. (IEC 60092-352 Clause 3.19)

When designing a cable support system for single core cables, consideration shall also be given to the effects of electrodynamic forces developing in the occurrence of a short circuit. The distances between cable supports given above are not necessarily adequate for these forces.

Cables with class 5 conductors may require additional support to prevent sagging. (IEC 60092-352 Clause 3.19)

The requirement above can be fulfilled by fixing the cables to each step of the cable tray or at maximum 400 mm intervals.

Fixed installation must be used when the cable is protected with a heat shrinkable sleeve. If there is a possibility that the cable outside the heat shrinkable sleeve may vibrate or

move, the heat shrinkable sleeve must be long enough to be fixed on both ends.

REPAIR INSTRUCTIONS FOR HELKAMA HALOGEN-FREE SHIPBOARD CABLE OUTER SHEATH

If the cable has a damaged outer sheath, screen and insulation:

- The whole cable has to be replaced.

If the cable has damages only (a hole or similar) on outer sheath, it can be repaired according to following instructions:

- Clean the damaged cable surface with a suitable cleaning agent.
- Grind the cable surface with sandpaper.
- Clean the grinded cable surface from sliver.
- Wind tape (Scotch 70) around the cable with a little extension. Ensure the winding has 20-50 % overlap.
- Set a shrink-on sleeve of flame retardant material over the taped length with 10 % overlap. Ensure that the diameter of the shrunk sleeve is correct.
- Heat up with a hot-air blower, not with a fire blower. Start heating from the middle and work towards the ends.

If the cable has a deformation but the outer sheath of the cable is undamaged:

- It may be difficult to determine if there is damage inside the cable.
- It is difficult to know if the screen wires have deformed the cable insulation. The screen wires may have damaged the cable insulation and the insulation wall thickness may have decreased.
- The characteristics will not be the same as for an undamaged cable.

If unsure, please contact the local representative of the classification society.



SPECIAL INSTRUCTIONS FOR LIGHT CABLES

Light cables include cable types LKM-HF L, LKSM-HF L, RFE-HF L, LKSM-FRHF L that are designed for applications where low weight and small size are required. Compared to standard cables, these cables are manufactured using smaller insulation and outer sheath wall thickness.

All the instructions in this document are also applicable to Light cables. In addition, using special caution is recommended in handling Light cables during cable pulling due to smaller outer wall thickness.

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