

General guidelines for transport, storage and installation of RF coaxial cables and jumpers

General

RF coaxial cables are very sensitive to all kinds of physical damage during transportation, storage and installation. Proper handling guarantees the perfect functioning of these cables, hence it is essential to know the right way to handle and install RF cables.

In most cases physical damage will cause problems to the electrical properties of cables, which will be found in the verifying measurement after installation. If any physical damage is found on the cable during the installation, the cable should be changed immediately or at least checked to ensure that it still fulfils the electrical and mechanical requirements on the specification. Installation instructions of cables and accessories (incl. connectors) shall always be followed carefully.

Please read this document to learn the basic principles to handle these high quality products correctly; if you have any questions related to our cables or need detailed information on these topics, please contact Draka Cableteq | Mobile Network Cable.

Storage of RF cables

1. The cable drums can be stored outdoors or indoors. Indoor storage is recommended.
2. If the drums' location needs to change during the storage, please follow the instruction in paragraph "Transportation".
3. During a long storage period, storage conditions like ventilation, room temperature or humidity should be monitored.
4. Cable ends must be sealed by heat shrinkable end caps or equivalent during storage, transportation and lying to prevent water access into the cable.
5. The circular cable drum rolls easily. It is in a very unstable state because its center section is empty and the whole weight rests on its peripheral section. Make sure to use wedges to prevent drums from rolling during storage. Large drums should be lifted from the base onto triangular or square wedges. The wedges should be positioned by the flanges or the full width of the drum. Sideways movement is eliminated by planks attached to the side of the drum.
6. For more detailed information about the drum handling, please read the booklet "*The right way to transport and move drum*".

Transportation of RF cable drums

1. The cable shall be handled with the appropriate equipment.
2. When lifting the drum, use a shaft through the centre of the drum and a wire spreader or fork-lift truck. If those are not available, lift with as long a wire as possible, so that the sides of the drum are not damaged.
3. When lifting by fork-lift truck
 - The forks of the truck must be longer than the width of the drum, so that the forks of the truck shall take contact to both flanges of drum. Lagging boards must not be used as a lifting base.
 - Be careful that the forks of the truck do not pierce the drum and damage the cable.
 - Do not push the drum with the fork-lift.
 - Do not move the fork-lift before the drum is lifted up to avoid the drum being dragged on the ground and breaking of the drum or lagging boards.
 - Remove and replace loose or broken lagging board immediately as it may damage cable during transportation or storing.
 - Leave sufficient room between each drum so that the fork does not damage the drum.
4. Avoid all kinds of impacts with the cable drum.
 - Do not drop or drag drums.
 - Stacking of drums should be avoided.
5. Always store and move the drum in an upright position.
6. Always roll the drum in the direction of the arrow on the flange to avoid loosening the cable on the drum. Loose cables are easily damaged.
7. Fasten the drums firmly to prevent damage to cables and for safety reasons during the transportation. Do not hit any nails on the drums to fix them as the nail can pierce the cable and damage it. Use fixing belts, wires or ropes.
8. The drums should be protected against dust and dirt during the transportation.
9. For more detailed information about the drum handling, please read the booklet *"The right way to transport and move the drum"*.
10. For more detailed information about loading/unloading the trucks and containers, please see the DVD *"Loading instructions for truck and container"*.

General instructions when installing a RF coaxial cable

1. Please read the most important installation characteristics below for detailed information.
2. The cable shall be unwound from the delivery drum by slowly and steadily rolling the drum along the cable route. Then the cable shall be laid into the fixing clamps avoiding any damage to the protective sheath. If the jacket is damaged, the cable shall be changed.

The sheath of the indoor cable is usually Low-smoke Halogen-free Fire-retardant thermoplastic (e.g. BHF, GHF), which is more sensitive to abrasion compared to the PE jacket of the standard feeder cable.

3. The tensile stress of the cable shall be limited to the maximum pulling force according to each cable's specification. The maximum pulling force depends on cable size and design.

The maximum pulling force for the cable with a suspension wire is determined by the strength of the suspension wire. To keep maximum protection on the cable, it is not recommended to remove the jacket of the suspension wire.

4. The number of bends should be limited to the minimum possible and specified minimum bending radius shall be followed.
5. The recommended clamp distance for large diameter cables such as 1 1/4", 1 5/8" and 2 1/4" cables is 1.5 m (4.9 ft), for smaller cables 1 m (3.3 ft) and for the cables with a suspension wire, 2.5 m (8.2 ft).

However, the local conditions and structures have to be taken into account.

6. The feeder is usually attached directly to the wall or ceiling, or it is laid on the cable ladder. The feeder can also be attached to the existing building structures with cable ties.

Multiple fixing methods are available because metallic clamps can also be used when installing the feeder cable and the location of the installation is not restricted by the environment.

7. Only the connectors approved by Draka Cableteq | Mobile Network Cable and the corresponding tools shall be used when installing our coaxial cables.
8. When installing the connectors, follow the installation instructions carefully and, finally, protect the connector and the cable interface with appropriate taping.
9. All connections must be tightened properly according to the connector installation instructions.
10. If necessary, please contact Draka Cableteq | Mobile Network Cable concerning the connector compatibilities and other possible technical questions.
11. For the jumpers, please read the paragraph "*NKJ Jumper cables*".

Special instructions when installing Coaxial antennas

1. The coaxial antennas shall be installed at least 10 cm (4 in) away from walls, ceilings and metallic structures to maintain good transmission characteristics, especially low longitudinal attenuation.
2. For the optimum performance the slots in the cable should be directed away from walls or ceilings.
3. The coaxial antennas are usually installed with special plastic hangers, which guarantee the minimum distance of 10 cm from the building/tunnel structures. In special cases the hanger can also be installed with simple plastic cable ties.
4. It is also recommended that every tenth plastic hanger has a metallic locking or there is a metallic hanger in order to prevent the cable coming down e.g. in a fire situation.
5. In buildings the coaxial antennas are usually installed above the false ceiling.
6. In tunnels the best location is at the top in the middle of the tunnel, but the cable can be also installed to either wall of the tunnel.
7. The coaxial antennas should be kept clean from metallic dirt, because it may affect the functioning of the cable.

NKJ Jumper cables

1. Jumpers shall be stored in a dry warehouse.
2. Protective caps shall be mounted during the transportation and storing.
3. Remove the protection caps just before connecting the jumper cable to the mating connectors (the dust and the dirt can spoil the electrical performance considerably)
4. Remove the cable tie using side-cutting pliers; do not damage the outer jacket of the cable.
5. Please note the minimum installation temperatures of NKJ Jumper cables as given in the table below.

Jacketing material	Temperature
LD Polyethylene	-40°C
Fire retardant	-20°C

6. Please note that the minimum bending radius is 30 mm.
7. Notice that the installed Jumper cable must not stay in tension or torsion.
8. Use the torque wrench to tighten the connector as given in the table below

Connector	Wrench	Torque
DIN 7/16	32 mm	25...30 Nm
N	19 mm	6 Nm

9. Appropriate taping is recommended in the connector interface to ensure the watertightness and protect the connectors against air pollution.

All the values in specifications shall be followed to ensure the best possible performance from these high quality products.

The most important installation characteristics

- minimum single and repeated bending radius
- minimum installation temperatures
- maximum pulling force
- crush resistance
- connector compatibilities

Minimum bending radius

There are typically two different values for minimum bending radius; single and repeated bending radius. Repeated bending radius is the limit during the installation (pulling) and single bending means the final bending in installation. It is very important to follow these values to avoid damage to the outer conductor and jacket. All kinds of mechanical changes will affect the electrical performance.

Minimum installation temperature

In lower temperatures the plastic materials in cables become stiffer, so the cables are more sensitive to bending and impacts. Minimum installation temperature means the temperature of the cable, not the temperature of the environment. If the cable has been stored in a cold warehouse, it shall be moved to a warm place long before the installation. When the temperature of the cable is warmer than minimum installation temperature, you may start installation.

Maximum pulling force (Tensile strength)

Maximum pulling force is determined by the construction of the cable and the specification values are verified by the real measurements. For the cables with messenger wire (e.g. RFXK), the pulling force is fully determined by the strength of the messenger wire. Thus, when pulling the cables with messenger wire, the pulling force shall be concentrated on the messenger wire.

Crush resistance (Flat plate crush strength)

All kind of impacts and compressions that may cause permanent changes to the cable construction are forbidden. Dents and depressions cause signal reflections and may block required frequency bands.

Connectors

It is always very important to use connectors that are fully compatible with Draka Cableteq | Mobile Network Cable's RF coaxial cables to be sure that the antenna line is working optimally.

- When installing the connectors, follow the installation instructions carefully.
- All connections must be tightened properly according to the connector installation instructions.
- Protect the connector and the cable interface with appropriate taping.
- Oxidation from all contact surfaces shall be removed before installation.
- For cables with aluminium outer conductor, only the connectors which are approved for aluminium cable shall be used to avoid further corrosion.

If necessary, please contact Draka Cableteq | Mobile Network Cable concerning the technical issues of RF coaxial cables.

These instructions are written for qualified and experienced personnel. Any liability or responsibility for the results of improper practices is disclaimed.