

شركة صناعة الكابلات العمانية ش.م.ع.ع.  
Oman Cables Industry (SAOG)



# DRUM HANDLING GUIDE

THE TRUST ADVANTAGE



Oman Cables Industry (SAOG) develops, manufactures and markets a totally integrated variety of electrical products, which include medium voltage power cables, low voltage power and control cables, pilot cables, overhead power transmission line conductors and building wires.

OCI offers cables with special features suitable for different types of applications, environmental conditions or as per customer requirement.

- FLAME RETARDANT PROPERTIES
- LOW SMOKE AND FUME (LSF) PROPERTIES
- CABLES WITH ANTI-TERMITE SHEATHS
- UV RESISTANT OUTERSHEATH
- LEAD SHEATH

The manufacturing facilities are situated within the largest industrial complex in Muscat, The Sultanate of Oman, with its offices and factory presently occupying an area of 135000 sqm with future expansion plans in mind. OCI have equivalent facilities in Sohar, Oman at its Aluminum manufacturing facility and together has a capacity of copper and aluminum of more than 120,000 MT annually.

Oman Cables Industry (SAOG) has its offices in Oman, UAE, Qatar, and KSA and has an extensive network of distributors and agents throughout MENA, Asia and Europe.

## OMAN CABLES' MARKET SEGMENTS

- Oil & Gas
- Residential
- Commercial
- Transportation
- Utilities
- Construction

## OCI'S MARKET SEGMENTS



UTILITIES



OIL, GAS &  
PETROCHEMICAL



TRANSPORTATION

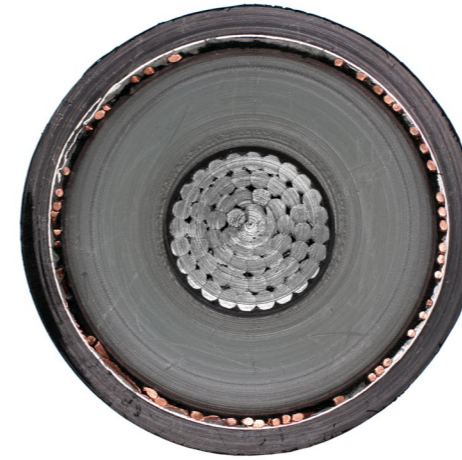


INDUSTRIAL &  
MANUFACTURING



HOUSING, BUILDING  
& CONSTRUCTION

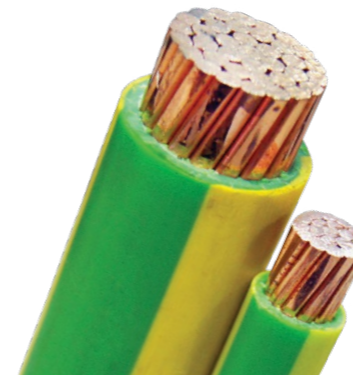
## OCI'S PRODUCT RANGE INCLUDES:



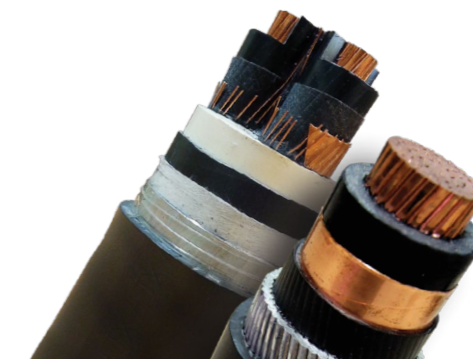
Aluminium



Copper



Building Wire



Medium Voltage Power Cables



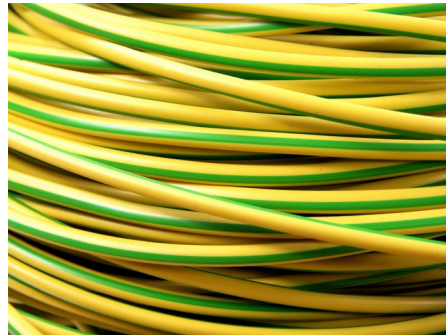
Low Voltage Power Cables

## CABLE DRUM HANDLING, STORING AND TRANSPORTATION

Cables are one of the most valuable assets and are used for many applications, such as wiring a house for electricity, street lighting, cabling a plant or used in transmission and distribution networks. It is therefore important that this medium which transports energy (wire and cable) is properly protected to ensure it is 100% suitable for the application.

Oman Cables Industry (SAOG) ensures using the most durable and practical reels and cable drums suitable for a specific cable size and the quantity to accommodate the weight. Prior to manufacturing all packaging equipment goes through an inspection stage before the product is packed and shipped.

There is adequate marking on the cables to identify the manufacturer and product information. Oman Cables coils, reels and drums are identified with their popular colours.



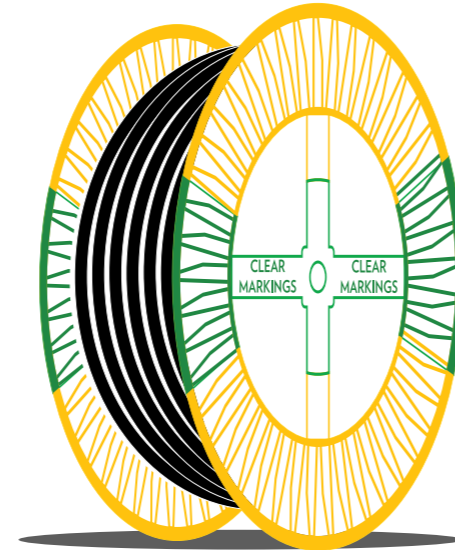
The purpose of this Drum Handling Guide is to create an awareness to all users to take precautions in drum handling, storing and transportation. This is to protect your most valuable asset.

# PROCEDURE FOR TRANSPORT, HANDLING AND INSTALLATION OF ELECTRIC CABLES

## CABLE DRUMS

- CABLE DRUMS CLEARLY MARKED OR LABELLED WITH THE FOLLOWING INFORMATION:

1. Manufacturer's name or trade mark.
2. Rated voltage, rated area, number of cores and specification.
3. Length of the cable in meters.
4. Year of manufacture.
5. Gross mass in kilograms.
6. The instruction "NOT TO BE LAID FLAT".
7. Serial number or other identification.
8. On each flange an arrow with the words "ROLL THIS WAY".
9. Mark of the Standards authority (if applicable).



- BOTH ENDS OF THE CABLE ON THE DRUM SHOULD BE SEALED AND THE INNER END FIXED TO THE FLANGE OF THE CABLE DRUM TO PREVENT LOOSE COILING. THE OUTER END IS FIXED TO THE FLANGE AS WELL, FOR THE SAME REASON.

- DRUM PROTECTIVE CLOSURE SHOULD BE MAINTAINED UNTIL CABLE IS UTILISED.

- CABLE DRUMS SHOULD STAND ON FIRM, WELL DRAINED SURFACES.

- IT IS RECOMMENDED THAT PERIODICALLY THE DRUM IS ROTATED.

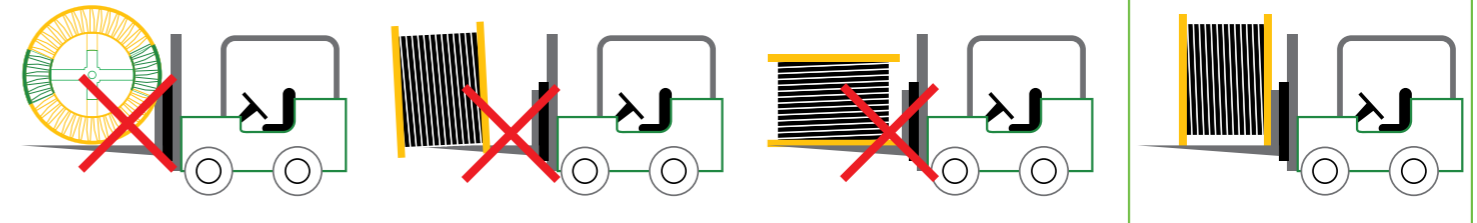
## CABLE TRANSPORTATION

- PREPARATION

- The truck must be suitable for the drum size and weight.
- Do not overload trucks
- Cable ends must be sealed, secured and protected.
- Use special cable trailers for depot to site transportation where possible. (See below). Cables should not be removed from the cable drum and transported independently to the installation site.

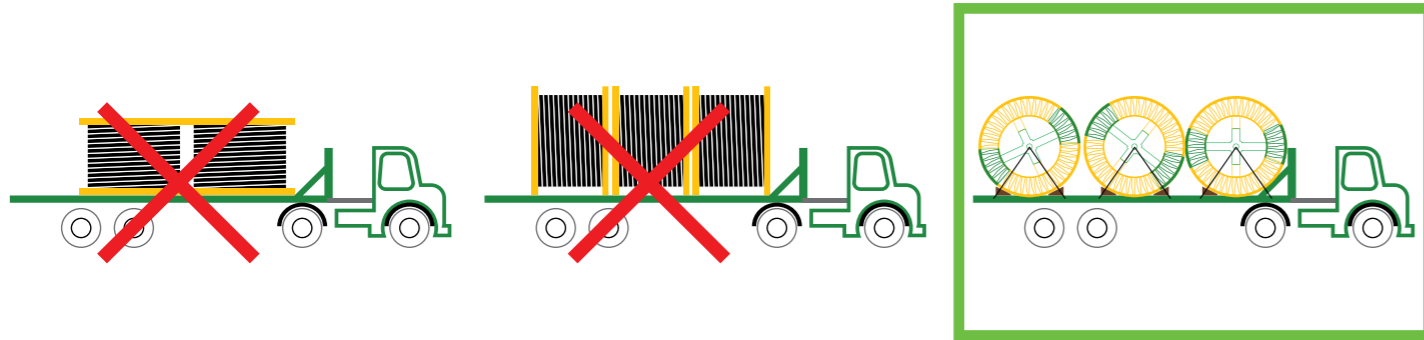
- LOADING

- Check drums for correct cable and size, serial number, mass and any form of possible damage.
- Select correct forklift or crane.
- Select correct slings and spindle and check their condition.
- If a crane is to be used, ensure that a spreader is incorporated to prevent damage to drum flanges.
- If the drum is to be rolled, observe correct rolling direction by referring to arrows on the drum flanges.
- Ensure the drum bolts are tight.
- Ensure that the truck surface is clear of obstructions, nails, etc.
- Do Not drop drums onto truck loading bed.



## • SECURING

- Secure drums to the truck bed to prevent sliding and rolling, using adequate steel chains and chocks.
- Always try and pack drums flange to flange, but with the flanges at least 50mm apart..
- Do not lay cable flat.
- Stop the vehicle at periods during transportation and check that the load is secure.



## • OFF LOADING

- Check the drums for any trace of damage. Damaged drums to be reported before off loading.
- Select correct spindle slings for the drum size and mass and ensure that they are in good order. Ensure that a spreader is used.
- Do not drop the drums. Lower gently onto a firm and relatively level surface.
- Off load drums in such a way that they are easily accessible.
- If using a forklift, ensure that it is of adequate size relative to the task at hand.
- Ensure the forklift forks lateral spacing is correct.
- Take care that the protruding forks do not damage other equipment or drums.
- There are two methods of rolling drums off loading beds if cranes are not available. (see below).



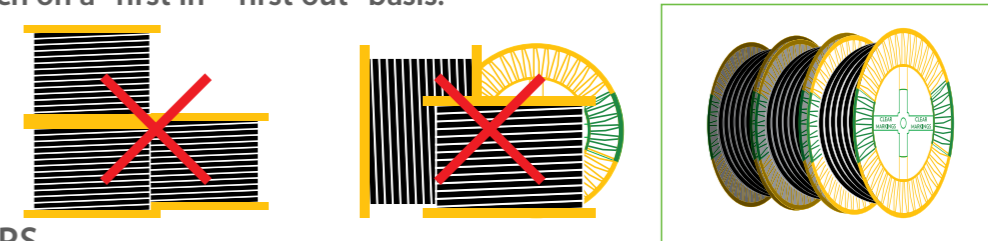
Method 1: Hole excavated (Maximum slope 1 in 10) to receive truck.

Method 2: Ramp construction (Maximum slope 1 in 4).

## CABLE STORAGE

### • INDOORS

- Stack flange to flange and preferably not one on top of the other. Do not lay the cable drum flat.
- Stack so that drums are easily accessible.
- Observe fire precaution rules.
- Cable ends must be sealed at all times.
- If drums are expected to be stored for a long time they should be specially treated, or, if applicable, use pesticides at regular intervals in the storage area to avoid termite and rodent attack on wooden drums.
- Despatch on a “first in – first out” basis.



### • OUTDOORS

- Drums should be stored on a hard surface at a slight angle and the area should have a drainage system.
- Drums should be released on a “first in – first out” basis.
- Cable ends must be sealed at all times.
- Stack flange to flange, but if this is not possible, limit vertical stacking practice to smaller drums only. Do not store the cable drum flat.
- Stack in such a way that drums are easily accessible.
- In areas having a “hot climate”, drums should be stored under a shade and should be protected from direct sunlight.
- Observe fire protection rules.
- Cables must be identifiable at all times.
- Cable racks are ideal for storage but take care not to overload.
- If drums are expected to be stored for a long time they should be specially treated, or, if applicable, use pesticides at regular intervals in the storage area to avoid termite and rodent attack on wooden drums.

## PREPARATION FOR CABLE LAYING

### • PLANNING

When planning a cable route there are several factors to be considered, amongst the most important are :-

- Ground Thermal resistivity (TR) tests.
- Position of joint bays
- Provision to indicate on the “as laid” drawings, the serial or drum number of the cable installed.
- Suitability of the cable type to the installation. e.g. LSF cables are not recommended for use in installations in direct sunlight\* (Cables with LSF properties are usually used in buildings or confined spaces where smoke and fumes in a fire situation could endanger human life), or, buried direct in soil (LSF properties serve no purpose in the ground, the additional cost is therefore wastage).
- \*LSF materials have lower mechanical strength than conventional materials, and therefore extreme caution must be exercised when installing this type of cable. Twisting or over bending the cable during installation could result in increased forces being exerted within the cable that could cause cracking or splitting of the outer sheath. This is particularly important when installing this type of cable in areas with hot climates.
- **Correct de-rating factors for cable current ratings for multiple circuits, differing soil or ambient temperatures, depth of burial, etc.** (Variation of installation conditions along a route - When the heat dissipation differs in one part of a route to another, the current carrying capacity shall be determined so as to be appropriate for the part of the route having the most adverse conditions).

### • DRUM HANDLING

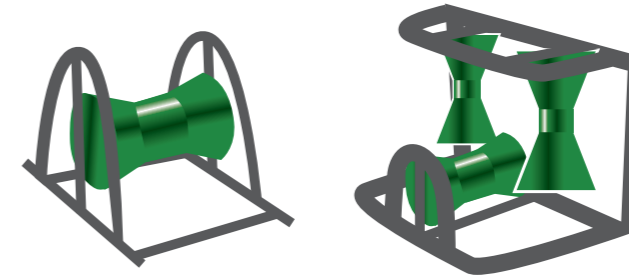
- Always use the best hoisting equipment available.
- Do not drop drums of cable onto the ground as this can damage the drum as well as the cable.
- It is most important that a minimum of rolling the drums on the ground be allowed and then only in the direction of the arrows indicated on the drum.
- When rolling a drum of cable, to change direction use 2 steel plates with grease between them, and by standing one flange on these plates the cable drum may then be swiveled in the desired direction.
- Position the drum prior to cable-pulling so that the cable is pulled from the top of the drum.
- Note that a drum of power cable can weigh in excess of 10 tons, so make sure that adequate cable

drum jacks are used, that the spindle is strong enough to hold the drum and that the jacks stand on firm ground and that they hold the spindle horizontal.

- Site the drum at the most convenient place for cable-pulling, usually at the start of a reasonably straight section near the commencement of the trench work.
- Allow for drum braking.

### • PREPARING FOR CABLE LAYING

The following “VITAL ACTIONS” must be observed prior to a cable pull.



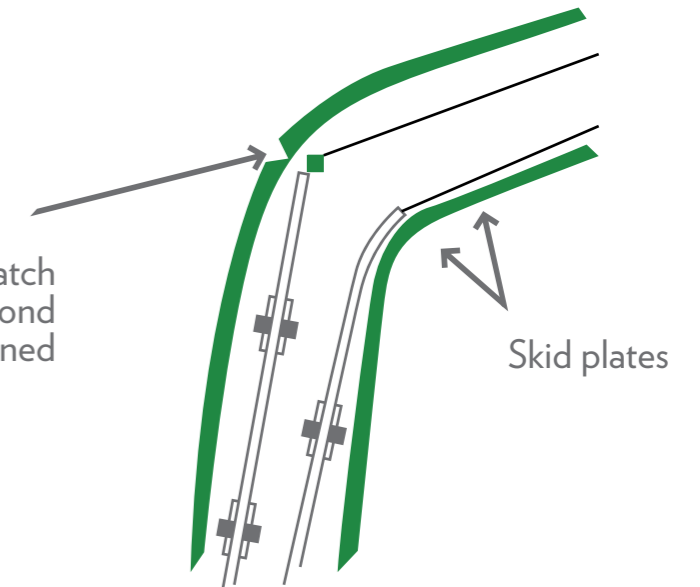
- Cable rollers must be placed between 2 and 4m apart in the trench (Depending on cable size).
- Ensure that rollers can rotate freely. Grease or apply graphite lubricants if required.
- Check that skid plates, or corner rollers, are secure and in position.
- Ensure that each member of the pulling gang knows exactly what he is to do and that communication signals between members are clear.
- The trench floor must be clear of stones and other obstructions and the cable bedding is correctly dispersed.
- Cable covers are available at convenient points.
- Any objects that may fall into the trench and damage the cable during the pull and prior to backfilling have been removed. Similarly for cables installed on cable ladders care should be taken that no sharp edges or protrusions are present that can damage the cable.
- If the ambient temperature is below 10°C, or has been for 24 hours, the cable on the drum will have to be covered with a tarpaulin and heated with suitable lamps or heaters for at least 24 hours under close supervision. Ensure that sufficient ventilation exists, and pay the cable off the drum slowly and carefully. Similarly, if the ambient temperature is above 45°C, the cable drum should be shielded from the sun prior to and during paying the cable off the drum.

- Place the drum at a convenient point, prior to the pull, on strong jacks and on sound footing (as mentioned earlier) with the arrow on the drum flanges **POINTING IN THE OPPOSITE DIRECTION** to the rotation when the cable is being pulled. The cable, on the jacks, should be at an angle of about 10 - 15° to the line of the trench.
- Before pulling, cut the inner end of the cable free. Failure to do this will cause buckling of the cable.
- The cable must be payed off from the top of the drum, but take care not to bend it too sharply.
- Cable pulling stockings should be examined and placed over the nose of the cable with care. The pulling rope or wire must be attached to the stocking in such a way that the cable cap will not be damaged during the pull. The use of swivels is recommended to prevent twisting of the stocking. The use of rope or slings attached directly to the cable for the pull-in is not recommended. Permissible mechanical forces are indicated in the section titled “Mechanical Forces on Cables during Installation”. A dynamometer should be attached in line with the pulling rope to indicate the pulling force exerted on the cable.
- Bending radius of cables should not be less than what the cable manufacturer recommends. Usually a minimum of 15 \* the cable overall diameter is used.
- One man should remain at the drum and “brake” the drum in order to maintain the correct tension on the cable during the pull. If the drum is allowed to continue turning when cable pulling has ceased, there is a danger of the cable kinking or twisting.
- Avoid twisting the cable, as it can result in “bird caging” of the armour wires and subsequent damage to the outer serving of the cable. This is particularly important if the cable is to be installed by the flaking (Figure of 8) method where twisting within the cable is more prevalent, especially in areas with hot climates, as the heat can soften the sheathing material resulting in lower tear resistance of the material. If the flaking method is used, the radius of bend should be as large as the available space allows, but never less than the supplier specified radius, and the number of layers at cross-over points must not be excessive.



- Cables should be pulled to their final position in a continuous manner.
- Cables should be “snaked” on either side of each joint position to relieve the joints of any thermo mechanical stresses.
- If a winch is being used to pull the cables and unavoidable sharp bends are encountered, a snatch block could be used to assist the pulling tension at the bend.

Cable pulled to a position as near snatch block as possible. Then cable and bond detached from block and positioned around skid plates as shown.



#### • SEALING OF CABLE END

- Once the cable pull is completed, the nose end of the cable is carefully lifted off the rollers and placed on the bottom of the trench, leaving enough slack to terminate the cable and observing the minimum bending radius. Immediately after cutting, the cable must be suitably sealed on both ends of the cut to prevent the ingress of moisture. Examine the nose cap, and if any damage has occurred to it during pulling, the seal should be replaced.

# INSTALLATION GUIDELINES FOR LOW SMOKE AND FUME SHEATHED CABLES

The sheaths of Low Smoke and Fume (LSF) cables, including Low Smoke Zero Halogen (LSZH, LSOH) cables, do not have the same mechanical strength as other sheathing materials, particularly at higher temperatures. It is therefore strongly recommended by OCI that LSF sheathed cables be used mainly indoors, and only where cables have been specified to have low smoke and toxic gas emission property.

## • INSTALLATION

We recommend the following special guidelines, in conjunction with the standard installation instructions.

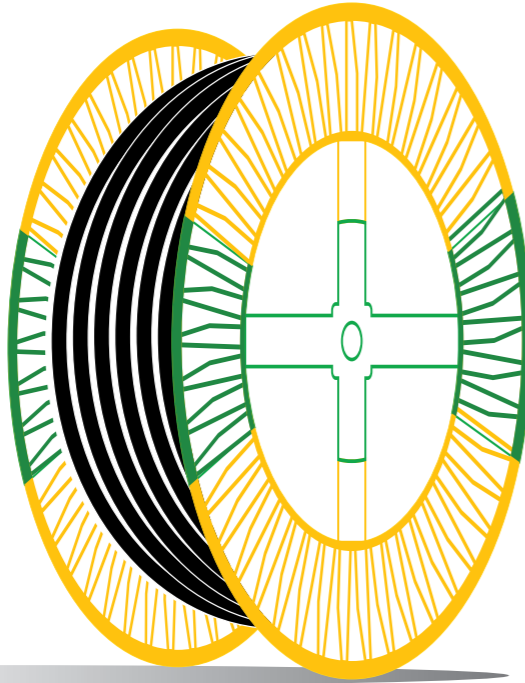
- The LSF cables must be stored in proper packed condition, in the shade. Direct exposure to sun must be avoided.
- As LSF sheaths have lower tear strength property when compared to PVC and PE sheaths, special care must be taken during installation to avoid any damage. Even a small cut on the LSF sheath could result in the sheath splitting.
- Use pay-in rollers and corner rollers of non-metallic material (Nylon or Teflon) at least every 4 meters when laying the cable.
- Where possible installation must be under cover or indoors. Where outdoor installation is unavoidable, direct exposure to sunlight must be avoided by using suitable cable trays with suitable covers.
- The cables must not come into contact with hot surfaces.
- The installation bending radius must not be less than that stated on the cable data sheet. (Care must be taken, particularly if cable is installed by the flaking (fig-8) method, that this minimum bending radius is not compromised.)
- Any clamping device must not be applied directly onto the outer sheath. There must be some form of cushion (for instance a rubber pad of approximately 3 mm thickness) between the cable's outer sheath and the clamps.
- The distance of unsupported length of cable for horizontal and vertical run must not exceed the figures given in the table below:

OVERALL DIAMETER OF CABLE (MM)	MAXIMUM SPACING BETWEEN THE SUPPORTS FOR HORIZONTAL RUN (MM)	MAXIMUM SPACING BETWEEN THE SUPPORTS FOR VERTICAL RUN (MM)
Up to 14,9	350	450
15 - 19,9	400	550
20 - 39,9	450	600
40 - 59,9	700	900
60 and above	1 100	1 300

## • RE-WINDING

Where re-winding is necessary, extreme caution must be taken during the process to avoid damage. The following must be adhered to:

- The winding must be done equally and uniformly with no over-riding of the coils or pinching on the sides of the drum.
- The pay-off drum must have an adequate breaking system to prevent the cable from becoming loose on the drum.



## WE TRUST THIS BASIC PROCEDURE WILL ASSIST YOU WITH YOUR CABLE INSTALLATIONS.

### References :-

“Power Cables and their applications” by Lothar Heinhold

“Electric Cables handbook” by Mc Alistair

BS 7671:2008 – Requirements for Electrical Installations.

IEC 60364 – Electrical Installations of buildings.

BS 8512:2008 – Code of practice for the storage, handling, installation and disposal of cables on wooden drums

SANS 0198 – “Code of practice for the selection, handling and installation of power cables”

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