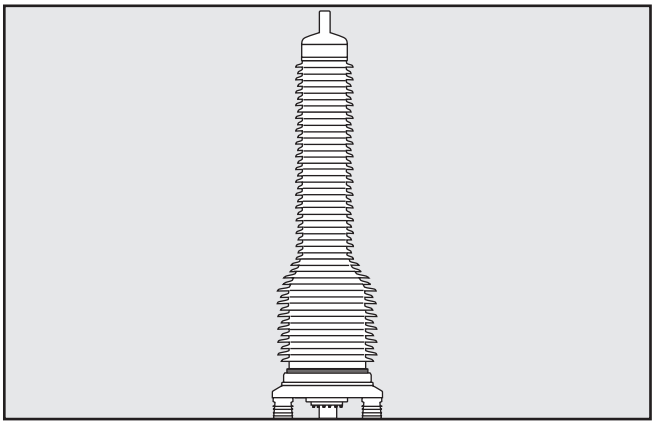
INSTALLATION INSTRUCTIONS

EPP-2469-4/24

OHVT-145D

Dry Outdoor Termination for Polymeric Cables with Wire Shield 145 kV



TE's Raychem Cable Accessories

Please dispose of all waste according to environmental regulations.

For more information: te.com/energy

Tyco Electronics Raychem GmbH
a TE Connectivity Ltd. Company
Finsinger Feld 1
85521 Ottobrunn/Munich, Germany
Tel: +49-89-6089-0
Fax: +49-89-6096-345

General Instructions

Before Starting

- Check the kit label and the title of the installation instructions to prove that the cable accessory you are going to use matches the cable.
- Make sure the cable is properly sealed.
- Make sure the cable is in the final installation position.
- Make sure the cable is straight at the jointing position.
- Check the position of the cables to be in alignment to the final position of the accessories.
- Make sure the joint bay/installation area provides adequate space for the cable components to be parked on either cable for later use during the installation.
- The joint bay/Installation area must be kept clean and dry during installation. For outdoor installation use tent or other appropriate shelter.
- Carefully read and follow the steps in the installation instructions. Components or working steps may have been changed/improved since you last installed this product.
- All tools, PPE and apparatus used must be kept clean during the installation.
- Obey relevant and local security and safety rules during the installation.

Shrinking Heat-Shrink Tubing

- Use a propane (preferred) or butane gas torch.
- Ensure the torch is always used in a well-ventilated environment.
- Adjust the torch to obtain a soft blue flame with a yellow tip. Pencil-like blue flames should be avoided.
- Keep the torch aimed in the shrink direction to preheat the material.
- Keep the flame moving continuously to avoid scorching the material.
- Clean and degrease all parts that will come into contact with adhesives.
- If a solvent is used follow the manufacturer’s handling instructions.
- Start shrinking the tubing at the position recommended in the instructions.
- Ensure that the tubing is shrunk smoothly all around before continuing along the cable.
- Tubing should be smooth and wrinkle free with inner components clearly defined.

Stripping the Cable

Use appropriate stripping tools for smooth and even insulation diameter.
Adjust the stripping tool to the thickness of the semi-conductive layer. Avoid removing too much of the insulation. Polish the stripped surface by hand using the supplied abrasive paper beginning with the lowest grid size, or by an appropriate sanding machine and abrasive paper and grades. The surface of the insulation must be even and free of all traces of conductive material.

Cables with Segmented Conductors

All cut back dimensions and information given in this instructions document refer to cables with non-segmented conductors only. In case of cables with segmented conductors, all insulation or conductive materials have to be removed from the conductor. If the removal of these materials require a longer cut back of the cable insulation, this length needs to be added to the cable cut back dimensions mentioned in the instructions.

NOTE

Special instructions for segmented conductors are available on request.

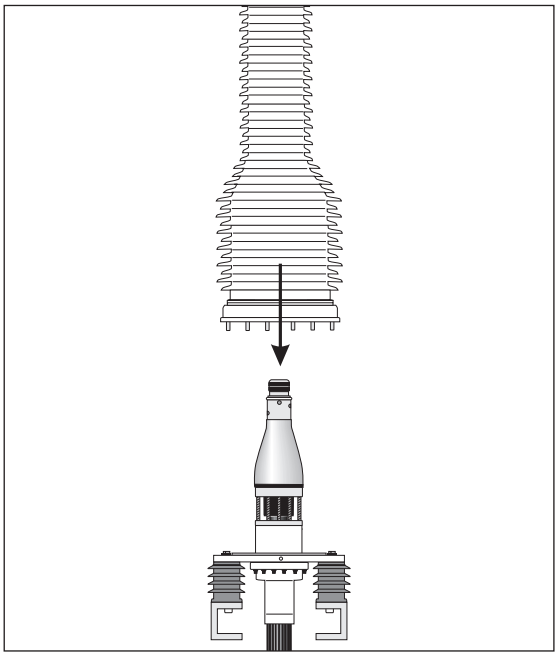
Overview

Insulator Installation from the Top

The cable is prepared before installing the insulator housing.

Method:

- Mount the base plate on the support insulator as shown in picture **I**.
- Prepare the cable according to steps **B1** to **H2** (including steps **A1** and **A2** on page 4).
- Install the insulator housing from the top.



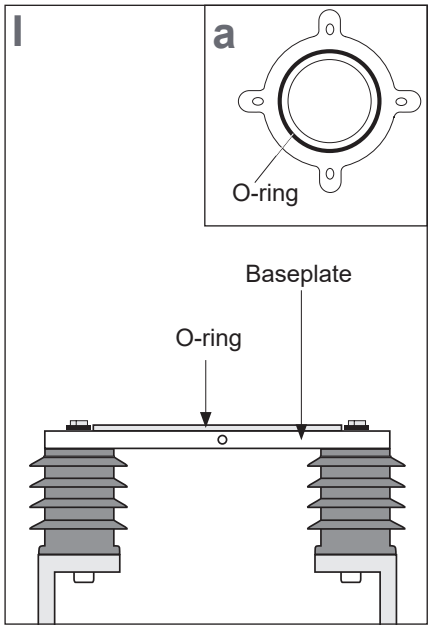
Mounting the Insulator Housing

Temporarily fix the base plate and the support insulators.

NOTE

If necessary, check and adjust the bores on the support rack.

Fasten the screws of the support insulators to the rack with a maximum force of 35 Nm.



A. Straightening and Heating of the Cable

Before starting the cable preparation, train the cable end in the straight installation position and fix it.

The cable needs to be heated and straighted for the length of complete Installation.

In case of graphite coating cover the cable with one layer of crepe paper.

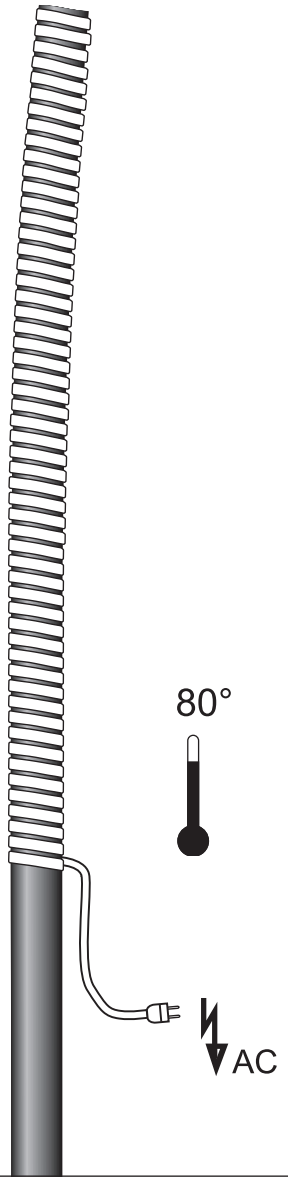
Degrease and clean the oversheath.

Heat the cable by applying a heating device to the oversheath as shown in the TABLE BELOW.

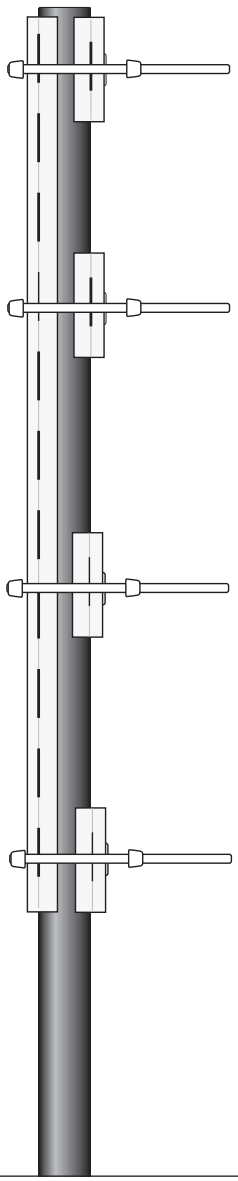
Before stripping to the required dimensions, the cable needs to be cooled down to ambient temperature using slide rails.

Cable Cross Section	Heating Time/ Temperature
up to 400 mm²	4 h / 80 °C
up to 1200 mm²	5 h / 80 °C
up to 2500 mm²	6 h / 80 °C

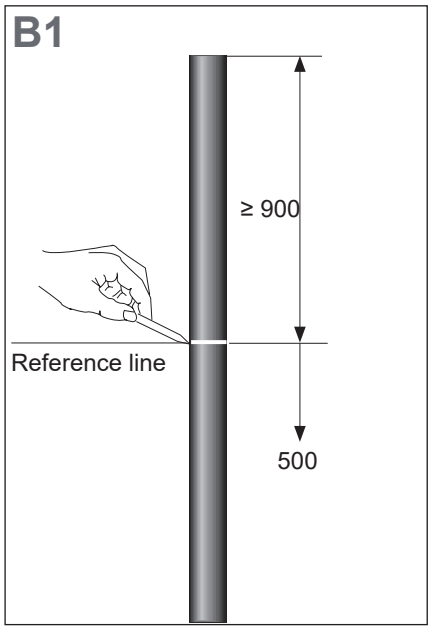
A1



A2



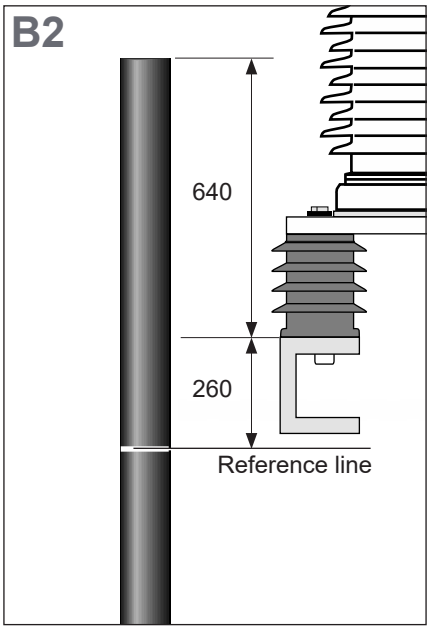
B Marking Reference Line



Mark a reference line on the oversheath. The cable has to be ≥ 900 mm above the reference line.

Remove the graphite coating or the extruded conductive coating up to 500 mm below the upper edge of the support rack.

This is the reference line for all further installation procedures.



Measure and cut the cable 640 mm above the upper edge of the support rack. The cut must be right angled.

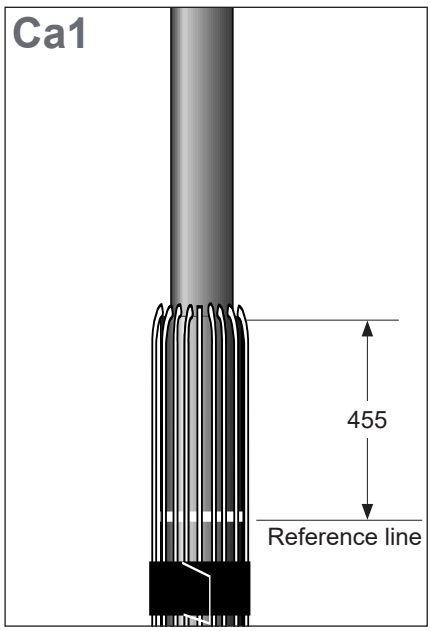
C Removing the Outer Jacket

a. Cable without Metal Foil

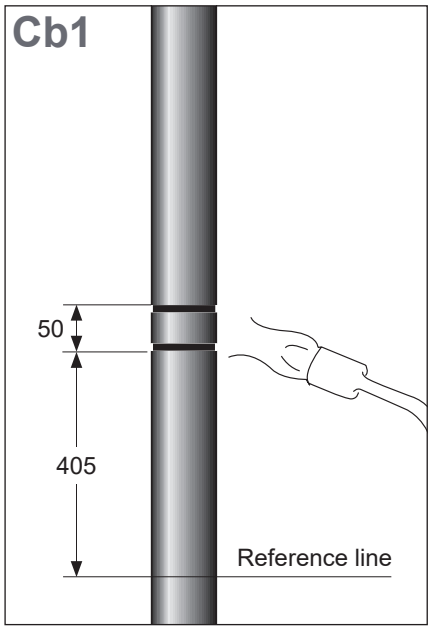
Starting out 455 mm above the reference line, remove the outer jacket of the cable as shown.

Bend back the shield wires and fix them.

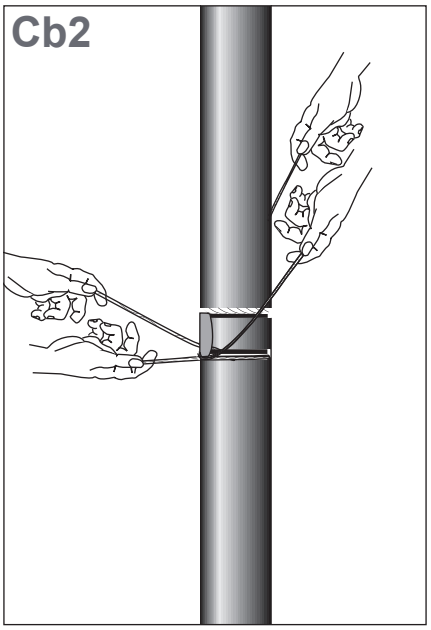
Continue with chapter D.



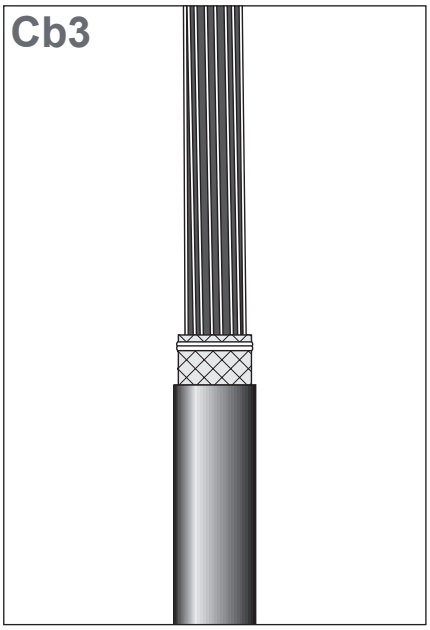
b. Cable with Metal Foil



Heat the cable outer jacket 405 mm above the reference line. Soften approx. 50 mm of the surface.

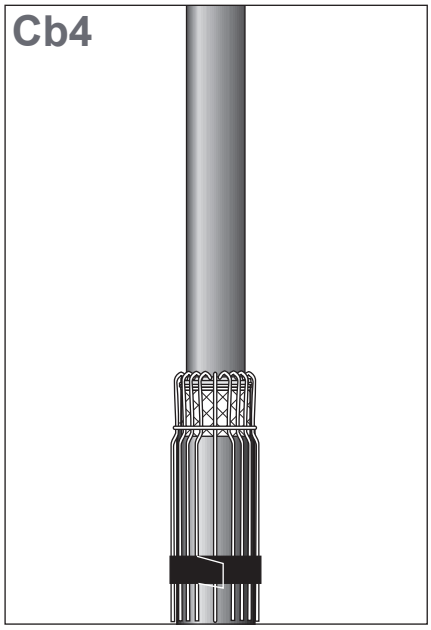


Cut through the outer jacket with the supplied string. Remove the outer jacket from the Al-foil by slicing segments away with the string as shown in the picture.



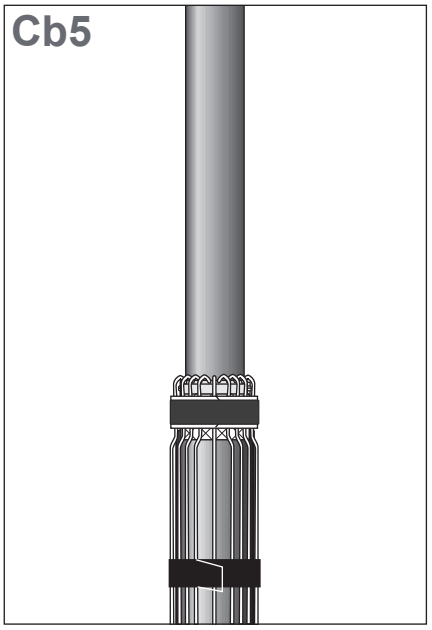
Clean the Al-foil from traces of the outer jacket (if any). Apply the copper mesh on the Al-foil with a CU wire binder. Remove the outer jacket, foil and bedding from the remaining cable end.

Bend the shield wires back onto the outer jacket and fix them temporarily in place with PVC tape. Fix the shield wires with a wire binder close to the outer jacket cut.

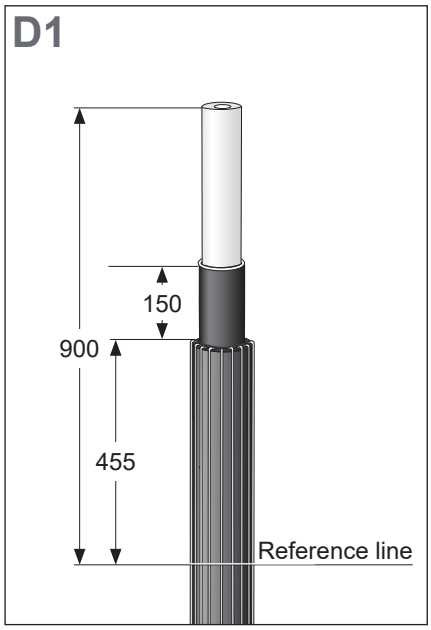


Place a roll spring over the shield wires. Fix the roll spring by twisting.

Protect the roll spring with PVC tape.



D Stripping the Outer Semicon Layer



Thoroughly remove the core screen to within 150 mm from the cable outer jacket cut. Make sure the cutting depth of the stripping tool is adjusted accurately so it removes the core screen entirely but does not cut into the insulation.

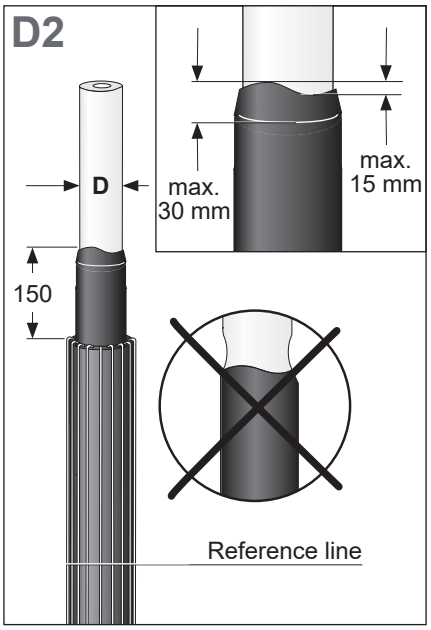
The surface of the insulation must be free from all traces of conductive material.

Polish the insulation up to 300 mm above the screen cut. Check dimension **D** as in **Table 1. D** must be within the given tolerances.

Check again the reference line is inline with the top of the support rack. If not rework the cable that all measurement fit.

NOTE

Do not damage the insulation.



Chamfer the outer semicon layer on the cut between 20 - 30 mm.

Abrade and smooth the insulation from the screen cut towards the end.

NOTE

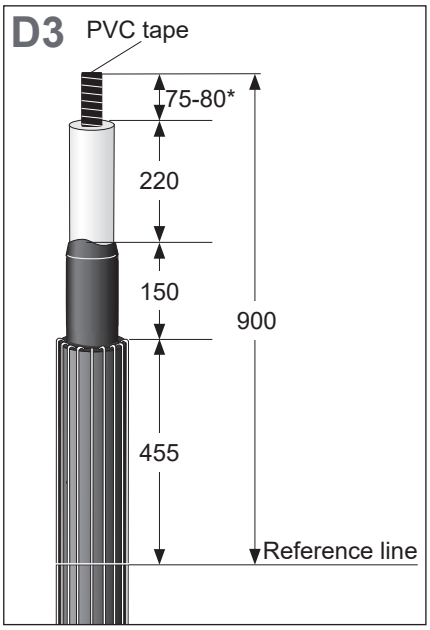
Do not nick the insulation.

For dimension D see table 1. The tolerances given must be kept.

Make sure the semicon transition wave shape is in accordance with the values and shape shown in the drawing above.

Make sure that the transition from the outer semicon layer to the insulation

Clean and degrease the insulation with the supplied cleanser in direction of the semicon to prevent contamination.



Remove the insulation as shown in the drawing. Slightly smooth the insulation edge.

Check the dimension 220 mm again.

NOTE

Adhere to the dimensions in the drawing.

Cover the cable conductor with PVC tape.

* The insulation may shrink back. Therefore the legth of the exposed conductor may vary from 75-78 mm.

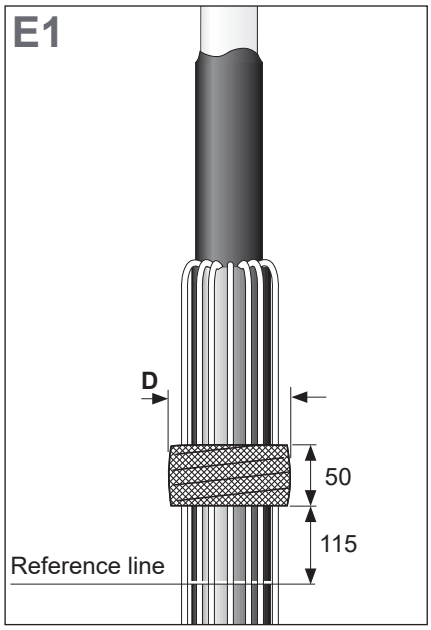
Table 1

Application range of the stress cone sizes

Stress Cone ref. #	Application range D (mm)
HVCA-PHVX145-SCONE-42/47	42 … 47
HVCA-PHVX145-SCONE-46/51	46 … 51
HVCA-PHVX145-SCONE-50/57	50 … 57
HVCA-PHVX145-SCONE-56/61	56 … 61
HVCA-PHVX145-SCONE-60/66	60 … 66
HVCA-PHVX145-SCONE-65/71	65 … 71
HVCA-PHVX145-SCONE-70/74	70 … 74
HVCA-PHVX145-SCONE-73/78	73 … 78

*The limit values are valid for the finally prepared cable (after peeling and grinding). For peeling it must be considered that subsequent grinding will reduce the diameter by 0.5 - 1 mm.

E Preparation for the Cable Gland



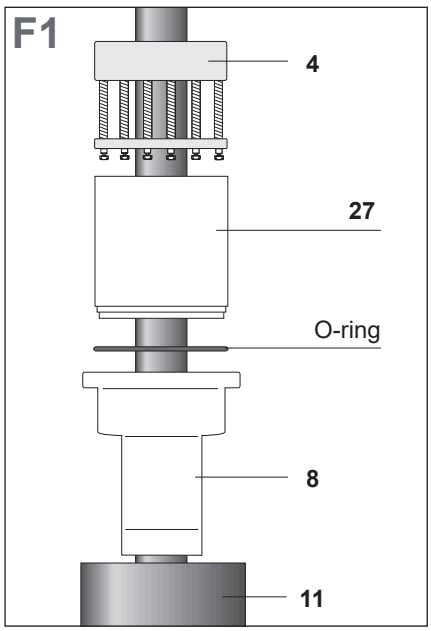
Starting 115 mm above the reference line, apply a 50 mm wide packing of cotton cloth tape.

D = Inner diameter of the gland.

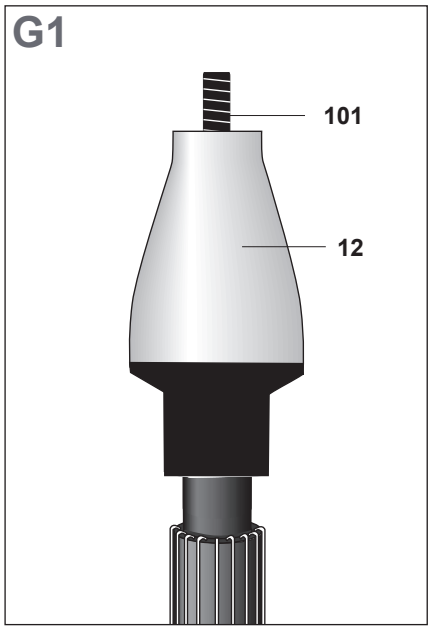
F Assembling the Base Plate

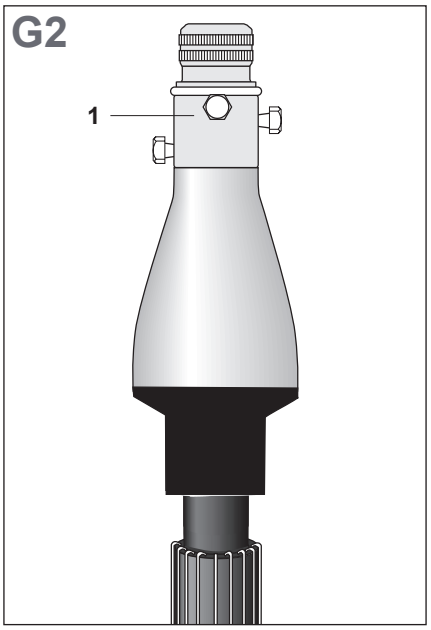
Move the heat shrinkable thick wall tubing (11), cable gland (8), O-ring, socket (27) and compression device (4) down the cable jacket as shown in the drawing.

Make sure enough room is left for the installation of the plug-in unit.



G Installing the Stress Cone and Connector





Installing the silicone stress cone.

Check the silicone stress cone (12) before installation of damages, failure or defects.

Clean the stress cone and protect it against any contaminations or damages.

If any, remove the PVC protection tape.

Clean the cable insulation (103) and the silicone stress cone bore with alcohol.

Thoroughly lubricate the cable insulation and the inner part of silicone stress cone with silicon grease.

Push the silicone stress cone onto the cable core until the insulation levels with the stress cone top.

Clean all parts installed.

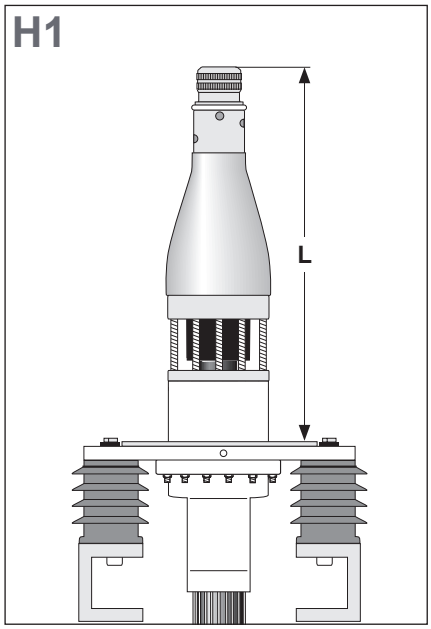
Remove the PVC tape from the conductor (101).

Place the connector (1) onto the conductor and butt it to the insulation cut.

Start tighting up the bolts beginning with the closes to the cable insulation.

Tight up the bolts in the same sequence each with a 1/2 turn until the bolt shearing of.

H Insulator Installation



Mount the base plate with maximum torque force of 35 Nm.
Feed the compression device (4) and the socket (27) through the base plate from the bottom side.
Bolt the cable gland to the base plate housing. Fasten the screws loosely by hand.

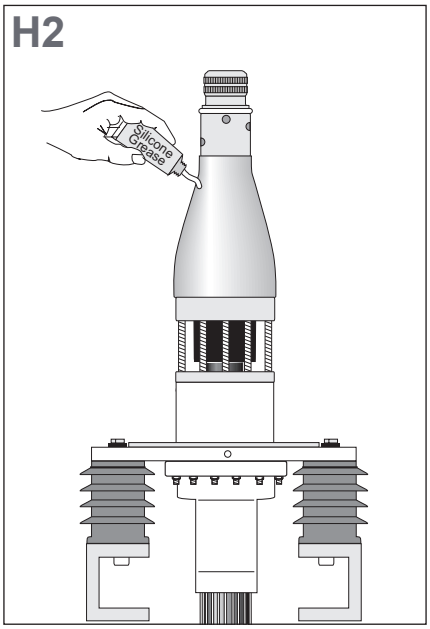
NOTE

Make sure the O-Ring is placed into the notch of the cable gland (8).
Measure the dimension L = 525 mm.
L is measured from the top of the base plate to the top of the bolt.

Install the insulator carefully from the top using a crane.
Avoid contact of the Cable lug to the inner part of the insulator. The gap should not be bigger then 40 mm.

NOTE

Tighten the bolts carefully!
A gap will be left between the base plate and insulator flange. The gap will disappear while tightening the bolts.

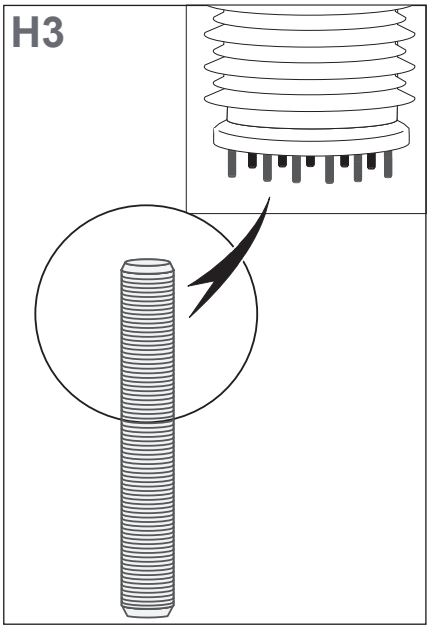


Make sure the O-ring (grey) is applied to the connector stud and into the notch of the base plate. Clean and degrease the gray cover part of the stress cone with alcohol.

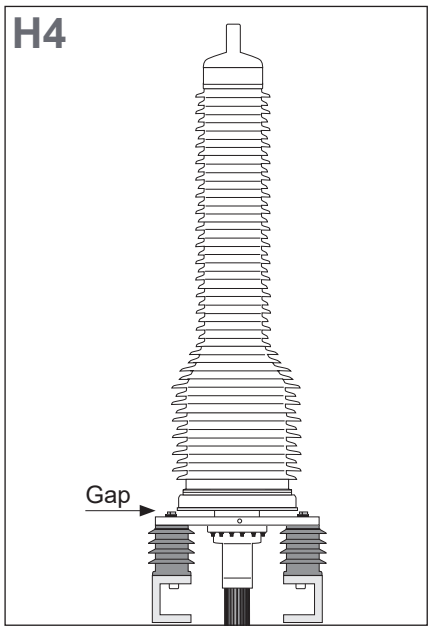
NOTE

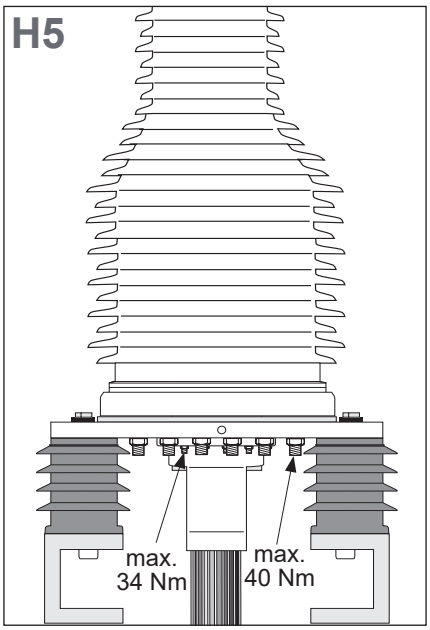
Do not touch the conductive part of the stress cone with any solvent.
Clean the insulator housing inside with Shell-Sol D60 or equivalent means.
Grease the stress cone. Afterwards grease as well the O-ring at the connector stud with silicone grease.
Don´t touch the stress cone again to avoid any contamination of the stress cone.

Bolt the insulator housing to the base plate with the defined maximum torque of 40 Nm.
Fasten the screws of the cable gland with a defined maximum of torque of 34 Nm.

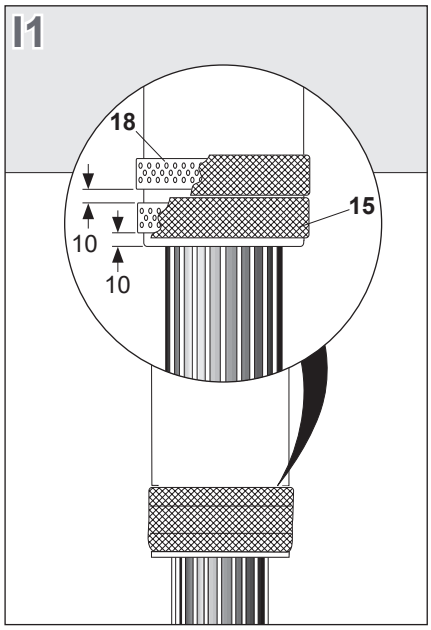


Screw the pins by hand into the insulator to the max. limit. Check that all pins are screed in up to the same lenght.



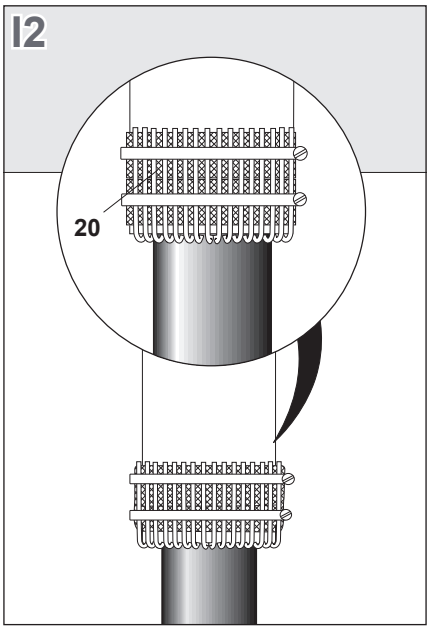


I Earthing the Cable Screen



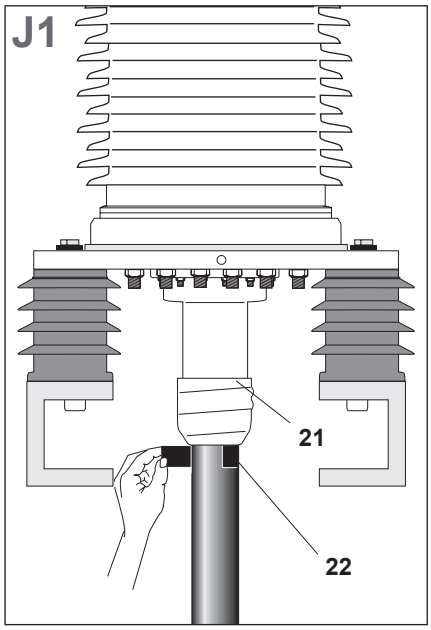
Abrade, degrease and clean the cable outer jacket and the cable gland.

Wrap two contact bands (18) around the cable gland and fix them with two or three layers of copper mesh tape (15).



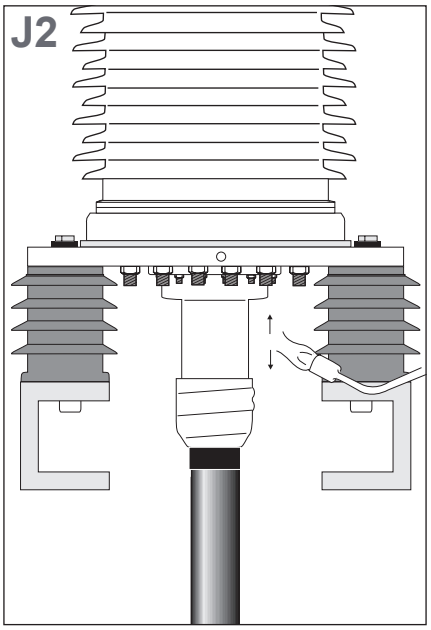
Cut the shield wires and bend them back onto the cable gland. Fix the shield wires as shown using two armour clamps (20).

J Sealing the Cable Gland

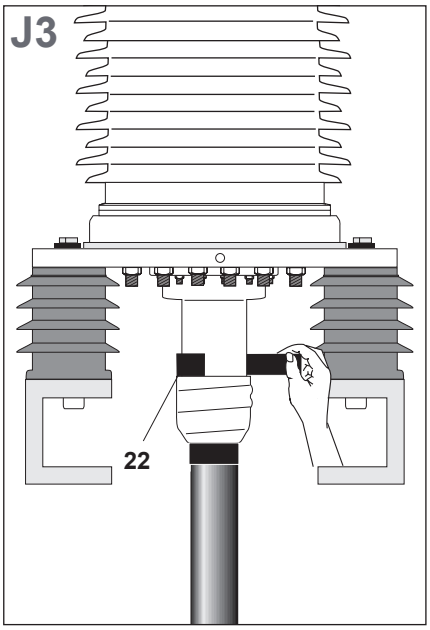


Cover the armour clamps with textile tape (21).

Wrap one layer of black mastic tape (22) around the outer jacket cut.

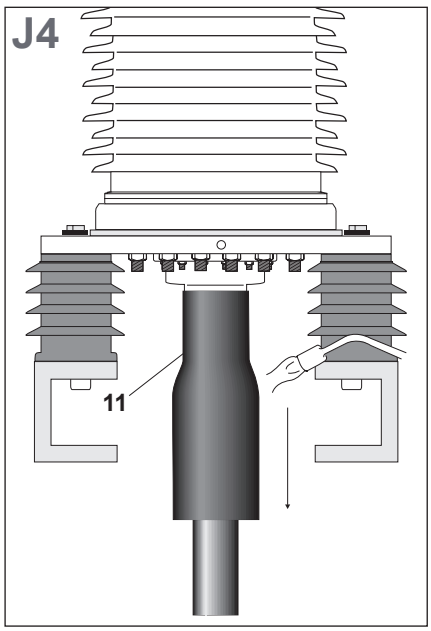


Preheat the cable gland stud.



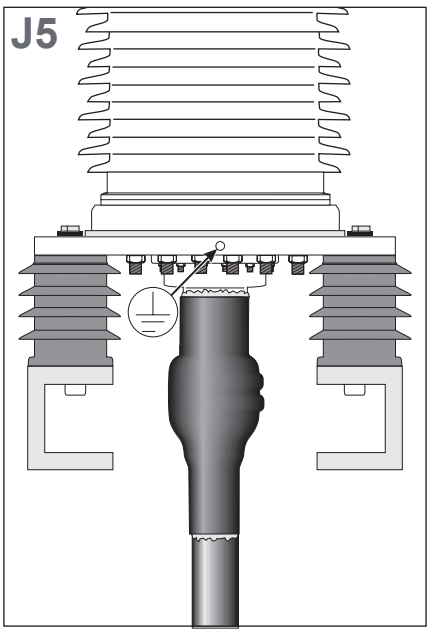
Wrap 1 layer of black mastic (**22**) around the gland above the textile tape.

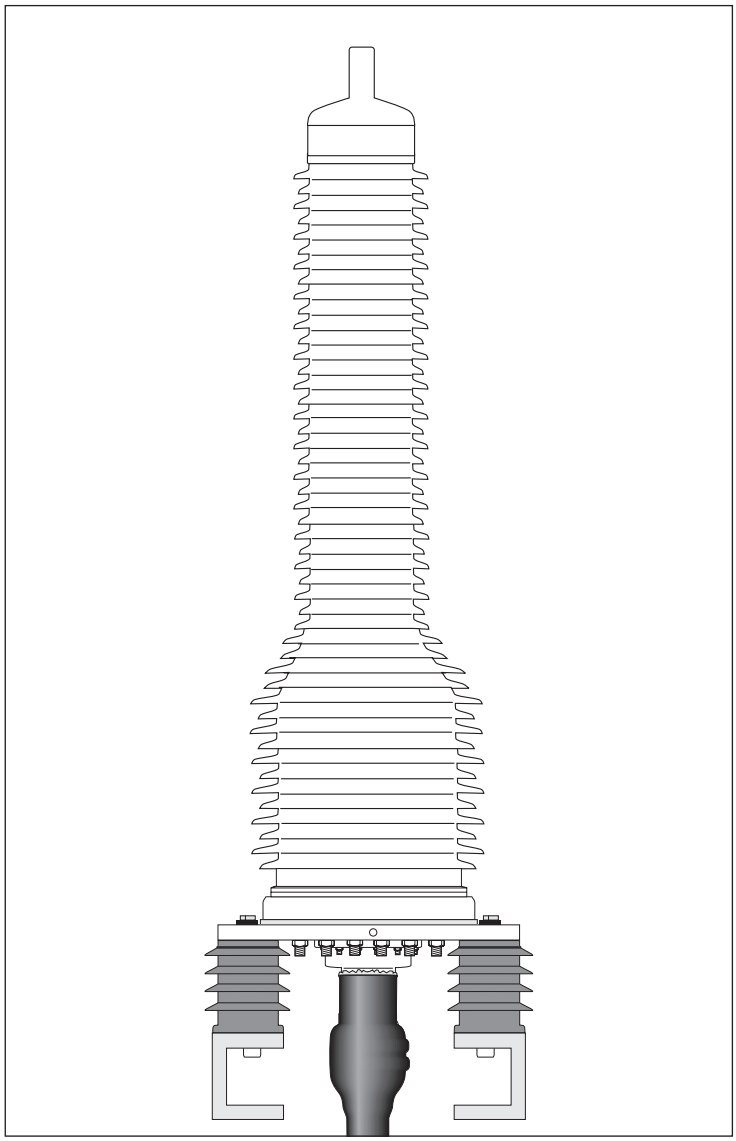
Position the heat shrinkable thick wall tubing (11) on the gland stud and shrink it into place. Start shrinking at the top then move downwards.



The tubing is fully shrunk when the outer surface is smooth, has a glossy appearance and a flow of sealant is visible at each open end. Intimate surface contact should be made along the whole tubing length, conforming to the profile of the components underneath. The tubing should be smooth and wrinkle free with inner components clearly defined.

Connect the ground lead to the substation ground according to local requirements (6 x M12).





Connect the ground lead to the substation ground according to local requirements.

Termination complete.