1. Laying of Cable on Land

The cables are supplied on big drums with a diameter of 4.2 m and a width of 2.2 m. The cable drums, including 900 m of land cable, weigh approx. 15 tonnes. Solid aluminium sheets around the drums protect the cables against damage.

If the air temperature drops below 5° C, the cable on the drum must be heated up using hot air for approx. 24 hours before the laying of the cable.

Prior to cable laying, the cable drum is placed in a special-purpose cable carrier which transports the drum to the cable trench.

The cable carrier features a hydraulic brake which secures the cable in the event of interruptions during cable laying.

The protective sheets are removed from the drum immediately before the cable is taken to the laying site.

The cable ends are fitted with pulling rings. A maximum traction of 4,800 kg can be applied to the cable. If the cable sheath is pulled with a cable sleeve, the maximum traction is about 500 kg.

The pulling wire is attached to the pulling ring. It is necessary to use at least two turning joints so the cable does not become twisted when it is being pulled. To avoid cable damage a wire is set in which can tolerate a pull of max. 2000 kg. In addition, the traction in the cable is measured so it is possible to check how much traction the cable has been subjected to.

The cable is normally pulled using a winch. In undulating terrains the cable is pulled by a digger which drives along the cable route. This means that both the wire and the front part of the cable being laid remain in the trench during the laying operation.

In some situations it is a good idea to pull the cable off the drum by driving with the drum – for example in connection with the feed-in of the cable to the transition compound Bramslev.

The cable is pulled out in the cable trench on cable rollers so as to avoid damage to the cable sheath.

Laying cable around sharp bends is carried out by means of special rollers, to make the bending radius sufficiently large and to prevent the cable from sliding against sharp edges.

In connection with directional drillings, rollers are used at the point of entry to the pipe so that the cable is not damaged against the edge of the pipe.

Once the cable has been laid and the length has been adapted to the position of the joint, the cable is cut. It is sealed using waterproof sealant to prevent the ingression of moisture.

After the cables have been laid, they are positioned in the trench with a spacing of 300 mm.

Empty pipes are laid for a fibre-optic cable which can be used for temperature monitoring of the cable. If the cables are laid in a flat configuration, the empty pipe is placed close to the middle cable. The pipe is attached to the cable by means of strips to ensure a well-defined positioning in relation to the cable.

On the Katbjerg-Bramslev section, the shield is only earthed at one end of the cable. Consequently, a continuous earthing cable is also laid. The earthing cable (or equipotential cable) is a 300 mm^2 copper cable connected to the earthing grid at the cable transition compounds. In the event of an overhead line fault, a zero-sequence current will be led through the earthing cable. The establishment of this equipotential cable for single-point bonded systems ensures low zero-sequence impedance.

Cables and empty pipes are subsequently covered by 10 cm of sand. Certain requirements are made in respect of the maximum grain size of the sand as well as grain size variation. The more the sand is compacted, the greater the thermal conductivity.

After the cables and pipes have been covered, a sheath test is carried out on the cables which have just been laid. This is done by applying a direct voltage of 10 kV to the cable shield in relation to the earth. The voltage is increased to 10 kV without the current being allowed to exceed approx. 2 mA. After approx. one minute the voltage is disconnected, and the cable shield is slowly discharged. An unsuccessful test is a sign that the cable has been damaged during the laying operation. Routine testing of the cable sheath will also have been carried out at the factory. It is, of course, also possible to carry out a sheath test prior to the laying of the cable. Whatever the case may be, it is always important to monitor the cable as it leaves the cable drum. Any damage and defects should be reported to the cable supplier’s supervisor on site, and the damage is marked on the cable.