

# Labour Protection Law Obligates

## Choice, Use And Maintenance of Earthing And Short-circuiting Devices

Qualified electricians are well aware of and familiar with the five safety rules as their health and life insurance. But what about the safety and reliability of earthing and short-circuiting devices which are used to secure absence of voltage during the work?

Disconnected parts of electrical systems will be earthed and short-circuited in order to avoid dangerous voltages and electric arcs in case of an unintended reconnection. Due to a near electric arc the operating staff may suffer severe burnings or may even be killed. Using state-of-the-art earthing and short-circuiting devices (EN/IEC 61230) can prevent dangerous voltages and electric arcs, provided that

- ⇒ the equipment is correctly dimensioned
- ⇒ chosen for the range of application
- ⇒ attached in accordance with the instructions for use and
- ⇒ in a proper state.

Practice shows that earthing and short-circuiting devices have to be as light in weight as possible. Consequently, extremely high temperatures are allowed and have to be accepted. Touching an equipment shortly after short-circuiting may therefore result in burn injuries, if the operating staff does not wear the necessary protective clothing. Insulating materials causing toxic and/or corrosive cleavage products are subject to the following restrictions with regard to their permission for indoor application:

- ⇒ The escape route must not be impaired by poor visibility.
- ⇒ A short period of exposure must not lead to toxication.
- ⇒ Systems and buildings must not be permanently damaged.

The maximum expected permanent short-circuit current and the maximum expected impulse short-circuit current during the whole chosen period of disconnection has to be taken into account for the selection of the earthing and short-circuiting devices. The user has to specify whether the total disconnection period is based on the disconnection period of the main or back-up protection. If an automatic re-connection cannot be prevented effectively when a short-circuited system part is switched on again, an adequate total disconnection period has to be determined.

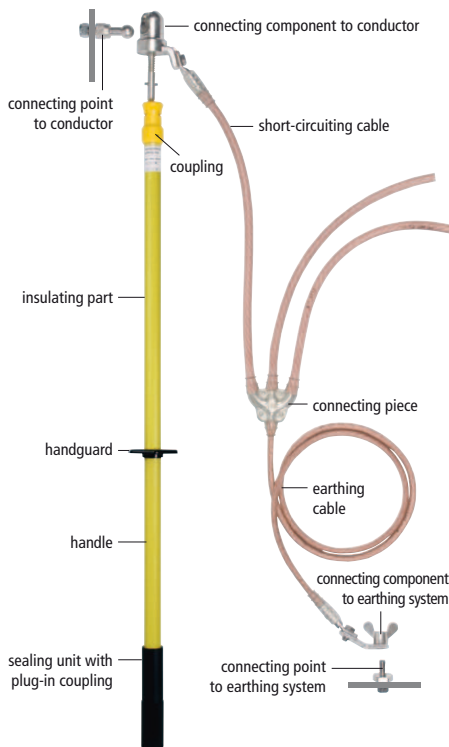
### Choice

The length of short-circuiting cables must suit for the system dimensions and for the distances between the connecting points. Short cables can limit mobility. The cables shall have a minimum length of at least 1.2 times the distance between the connecting points. Too long short-circuiting

cables implicate inadmissibly high voltage drops and heavy movement at current passage.

Not short-circuit current tested earthing cables must be as long as not to limit the mobility of the earthing and short-circuiting devices in case of a short-circuit and not to have a negative influence on the effective forces.

Connecting points, connecting components and insulating means have to allow for an easy connection in the system. Taking its weight into account and the required forces for attaching the equipment at the conductors the device has to be chosen accordingly.



Safe insulation of the operating staff will be achieved by the correct application of insulating means. Usually not the insulating characteristics are decisive for the length of an earthing stick but rather the necessity to provide a sufficient distance from unearthed parts of the electrical system in case of earthing and short-circuiting.

### Use

In order to avoid hazard of residual voltage when attaching the equipment it first has to be connected with the earthing system. Further connection will be implemented with an insulating tool (earthing stick) till the equipment finally is connected and fixed entirely. Exposed to a short-circuit current, the equipment may move intensely. Due to the limited weight, the thermal stressing of the conductor material is high, meaning that the earthing and short-circuiting equipment will reach high temperatures in case of a short-circuit.

Therefore it neither should be installed in the direct vicinity of the staff's working place nor in escape routes.

Long short-circuiting cables have to be fixed at solid objects.

### Maintenance, Exclusion From Reuse

For safety reasons earthing and short-circuiting devices have to be handled with greatest care. Prior to any application they have to be thoroughly examined. Any damage of the cable sheath or any appearance of a bare conductor cable has to be considered as severe damage and has to exclude reuse.

Due handling of the earthing and short-circuiting devices should ensure a reliable state of cables for approximately five years of vehicle transported equipment and for approximately 10 years of stationary equipment. After this period, which may be corrected due to experience, a destructive test (just as following the fatigue test) is recommended. Cutting the damaged cable sections as well as reconstruction has to be implemented in complete compliance with the type specification. Duration of the following use then depends on the respective state of cables.

An equipment which was exposed to a short-circuit current has to be excluded from reuse until evidence has been provided by thorough examination, calculation and visual check, that this stressing did not exceed the indicated limit values and thus had no remaining mechanical or thermal effects. Even in case of the slightest doubt about the safe state of the earthing and short-circuiting device, exclusion from reuse has to be definite.

Quality-oriented thinking, customer proximity and a wide range of service make DEHN + SÖHNE a reliable and safe partner in terms of safety equipment:

- ⇒ We gladly give you advice in the selection of the suitable safety equipment and devices.
- ⇒ We offer practice-oriented seminars with participation certificate in the field of safety equipment in electrical systems.

**We provide examination service such as maintenance test of earthing and short-circuiting devices, for example.**

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