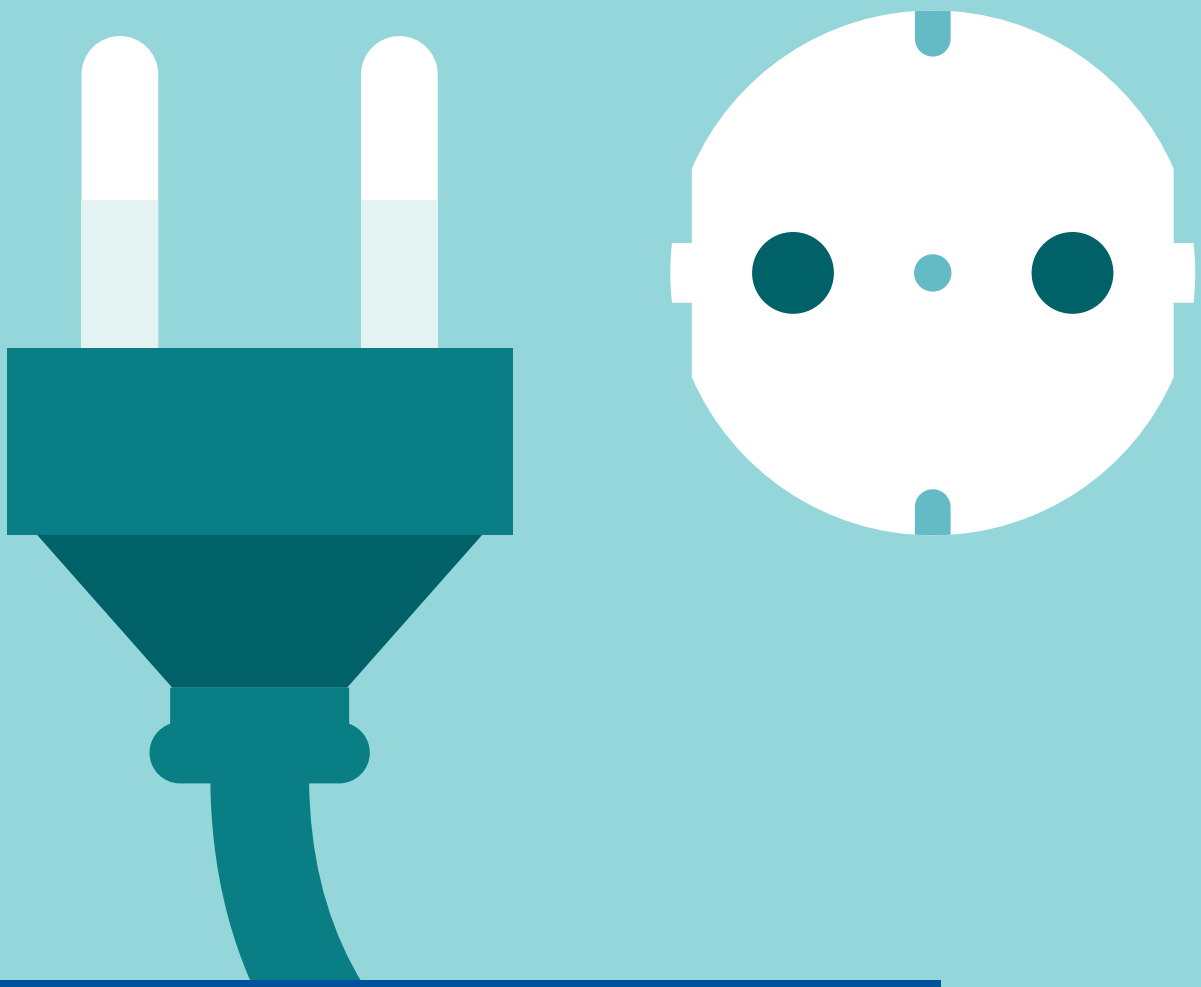
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Handling electrical equipment safely

Training
Work aid for in-house training

Your statutory accident insurance



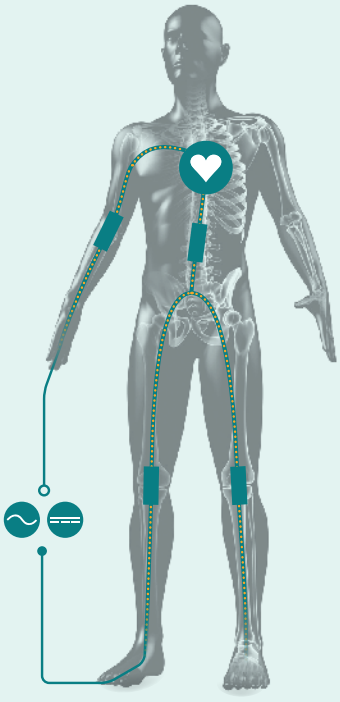
Electricity – possible effects and protection against accidents

Every object connected to a source of electrical voltage (e.g. a socket, but also flat batteries) carries an electric current. If it flows through the human body, this can have life-threatening effects. Hazards arise both from the electricity itself and from consequential effects (such as defensive or shock-related reactions).

When does an electrical hazard exist (thresholds)?

- If the voltage at frequencies of up to 500 Hz is more than 25 V (AC) or 60 V (DC)
- If the current caused by the voltage is more than 3 mA (for AC voltage) or greater than 12 mA (for DC voltage)

The path of current through the body



- Hand/hand current path approx. 1,000 Ω
- Hand/foot current path approx. 1,000 Ω
- Hand/feet current path approx. 750 Ω

Guide values for body resistance (R); simplified assumptions.

At a voltage (U) of 230 V and a resistance of 1,000 Ω, there is a current (I) of I=U/R= 230 V /1000 Ω = 230 mA.

The amount of current (I) that flows through the body depends on the voltage (U) and the resistance (R).

Amperage: measured in amperes (A)
Voltage: measured in volts (V)
Resistance: measured in ohms (Ω)

Which accidents can be caused by electricity?

Current flowing through the body
When electricity flows through a human body, this individual becomes part of the electrical circuit. The resulting risk depends on the following factors:

- Amperage
- Voltage
- Duration of the current flow
- Path of the current flow
- Resistance of the transition to the body
- Frequency of the current

The consequences of current flowing through the body can be
a mild electric shock, burns or even death, depending on the parameters above.

Arc flash
An arc that occurs in the event of a fault is usually created due to unintentional contact between two electric conductors (short circuit). The current flowing between these conductors is called a short-circuit current. What are the possible consequences of this?

- Thermal effects – burns, fires, pressure waves, melting of metal, etc.
- Flashes or light that dazzles the eyes
- Acoustic effects, e.g. acoustic trauma caused by noise

Secondary accident
This consequence of electrical accidents is often overlooked. Secondary accidents can occur when the electric current only flows through the human body for a short period of time.

This does not necessarily have to lead to current-related injuries, but defensive or shock-related reactions often result in accidents such as:

- Trips or falls – someone is carrying out work on a ladder and falls as a result of the feeling of shock triggered by the impact of electricity
- Injuries, e.g. cuts, punctures, crushes, etc. caused by quickly retracting the hand from the danger area
- Scratches from sharp metal edges or similar
- Injuries due to falling parts – objects near the work area that tip over or fall when someone stumbles into them

What should be done in the event of an electrical accident?

Interrupt the circuit
- Switch off the device, pull out the mains plug, unscrew it via the safety fuse or flip the fuse's toggle switch.

Separate injured people from the voltage source
- If this is not possible, injured people must be separated from the voltage source by a non-conductive object (e.g. a wooden broom handle). Injured people must not be touched directly, as this puts the lives of their rescuers at risk.

Perform first aid
- If possible, first aid should be provided by trained first aiders. If no first aider is available, those present are obliged to provide first aid without delay.

Immediate examination by an accident insurance doctor
- An accident insurance doctor must perform an examination to assess any injuries.

Injured persons must not be touched directly, as this poses a danger to the lives of their rescuers.

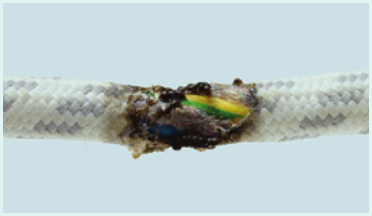
How can you protect yourself?

Follow instructions given by electricians
To protect against electrical hazards, electricians' instructions must be complied with. They are aware of the risks and ensure safe working conditions.

Check that equipment in the proper condition
Before use, you should check that electrical appliances or systems are in perfect condition:

- **Is there visible damage to the electrical system or equipment?**
- **Is the supply line or plug device damaged? (tension relief effective, buckling protection at the cable inlet?)**

Do not tamper with safety equipment
Only the intended switches may be used; safety equipment must not be meddled with. Protective covers and access points to electrical equipment or control cabinets must not be opened without permission.



Many hazards can be identified through regular visual inspections.

Do not carry out repairs yourself
Do not perform out any repairs or 'tinker' with electrical equipment. Repairs may only be carried out by qualified personnel who have been instructed accordingly.

Report damage immediately
Damage or unusual occurrences regarding electrical equipment must be reported immediately to your supervisor or specialist staff. Defective devices must no longer be used and should be withdrawn from use.

Heed the environmental conditions
When using portable devices, e.g. electrical hand tools, the environmental conditions at the site of use must be taken into account. You must ensure that the equipment's functionality is not impaired by the influence of moisture or chemical substances at any time. In potentially explosive atmospheres, you should make sure that the equipment is safe for use. Information on the intended operating conditions can be found in the operating manual.

What should you do in the event of a malfunction or accident?



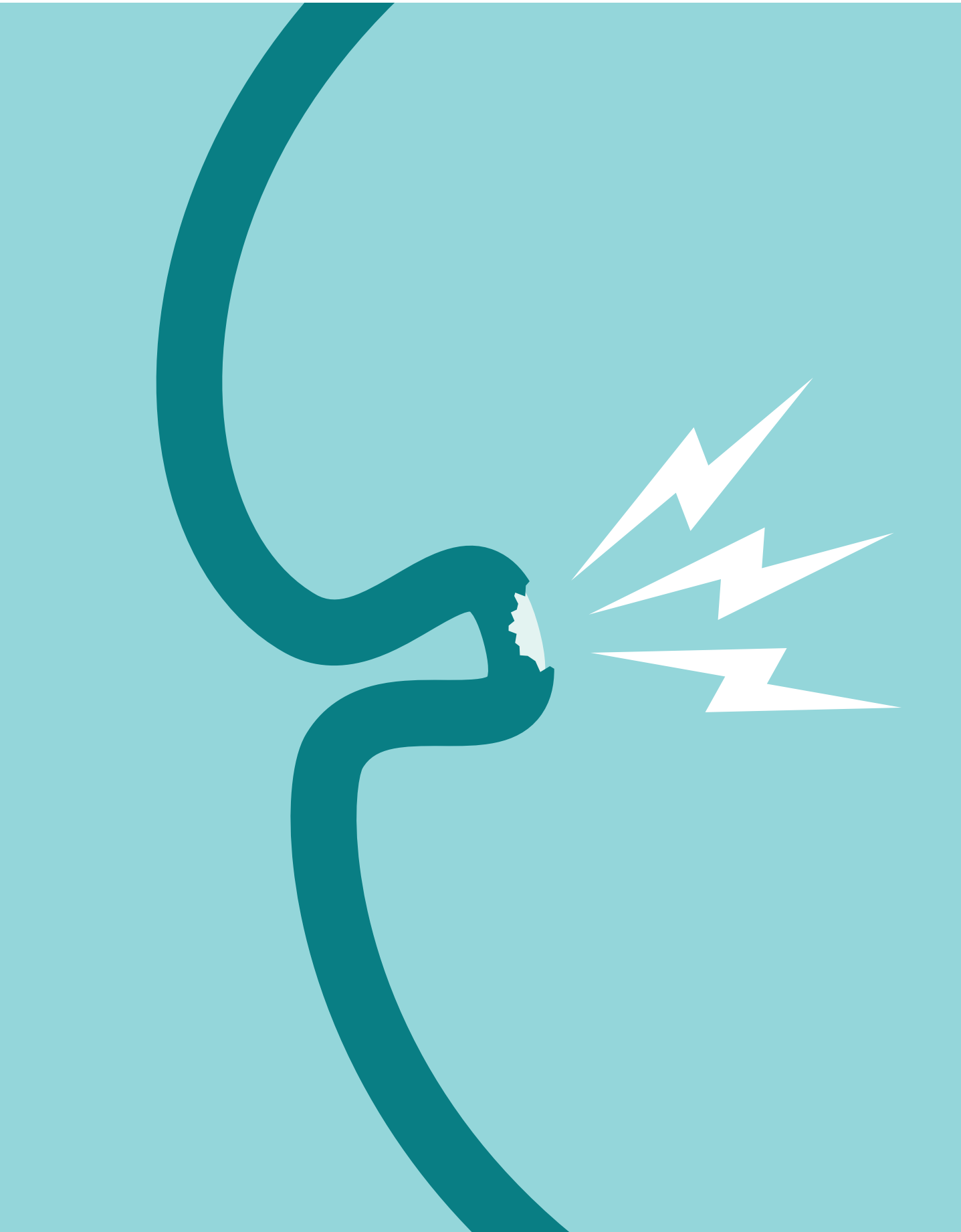
In the event of a malfunction or an accident, switch off the voltage immediately, pull out the plug, unscrew the fuse or toggle the circuit breaker.





Use a non-conductive item to separate injured people from the voltage source!

In the event of an accident: interrupt the voltage source, e.g. switch off the equipment! If not possible: separate injured persons from the voltage source with a non-conductive object!



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