Protection against electrocution

Your customers’ safety is your business
2,300,000 homes are electrically dangerous in France, especially those older than 25 years

National Observatory for Electrical Safety
Electrical safety
A joint venture between electrical contractors and Schneider Electric

As an electrician, the safety of your customers and their families is your constant concern. Your day-to-day-action contributes to reducing electricity-related hazards and the tragedies they can cause.

Schneider Electric, thanks to its worldwide leadership in electrical distribution and a century of experience in safety technologies, is the best provider of:

> Information on evolving techniques and regulations
> Training in state-of-the-art practices and compliance with standards
> Top quality products that are reliable, easy to use, widely available
> Comprehensive solutions tailored for each kind of building

Schneider Electric supplies you with tools that enable you to exchange with your customers:

> Safe behaviour in daily use of electrical goods
> Key points for keeping electrical equipment safe
> Recommendations for upgrades to ageing electrical equipment.

> www.bolobolo.com
How does electricity affect the human body?

Severity of Injuries is closely related to intensity of current

Research worldwide shows that the intensity of current flowing through the body determines the extent and severity of an electric shock.

40 to 50 mA

Injuries become serious when currents exceed 40 to 50 mA during one second.

150 mA

Theoretically, a 150 mA current flows through the body when a person touches a 230 V energised conductor under dry conditions.

In reality, however, current intensity ranges between 5 and 500 mA. A number of factors account for the variation:

- Skin humidity: water or sweat dramatically increase skin’s conductivity and, therefore, current intensity and its impact on vital organs
- Ground connection through the feet – a barefoot person will sustain greater current than one wearing rubber sole shoes
- Skin surface area in contact with the live part.

Current intensity also slightly differs from one person to another, depending upon their age and other physiological factors.
Insulation quality of equipment within reach of end users

The Ingress Protection (IP) code denotes the degree of protection electric equipment provides against the intrusion of foreign bodies. The code uses 2 digits, each of which rates protection from 0 to 9.

- The first digit rates the level of protection against the ingress of solid objects and dust
- The second digit rates protection against the ingress of various forms of moisture.

Each part of the home requires minimum IP:

<table>
<thead>
<tr>
<th>Room</th>
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<th>Room</th>
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</thead>
<tbody>
<tr>
<td>Laundry room</td>
<td>24</td>
<td>Kitchen</td>
<td>21</td>
<td>Attic</td>
<td>20</td>
<td>Trash</td>
<td>23</td>
</tr>
<tr>
<td>Bedrooms</td>
<td>20</td>
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</tbody>
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For floor-standing appliances, the first IP digit should raised to 4 (e.g. laundry room IP 44)

All equipment must ensure required levels of insulation across the years in all conditions, e.g. tractions, impacts, and temperature and moisture variations.

With its products Schneider Electric commits to providing the best insulation quality on the market:

- Insulating materials that ensure high temperature and moisture withstand and mechanical resistance
- Full compliance with standards and certification by government-run quality authorities, as proven by the label stamped on each product.

Unica wiring devices

- Sockets outlets compliant with IEC 60 884
- Switches compliant with EN 60 669
- Unica sockets feature high pull-out withstand thanks to Zamack mounting plate with high pressure claws
- Sockets secured by screws in flush boxes further increases withstand to repeated pullouts
- Automatic shutters inside the sockets prevent children from inserting their fingers or sharp objects.

Optiline 45 trunking system

- EN 50085 compliant
- IP 40: all live parts out of reach even of pointed objects
- High mechanical withstand
- Cover plates and other accessories ensure perfect shrouding and require a specific tool for removal.
Key points for shock-free electrical distribution

Residual current devices that protect bathroom and all power sockets

International wiring regulation IEC 60 364

§ 411.3.3:
“Protection by means of a residual current protective device (RCD), in accordance with 415.1, shall be provided for:
- Socket outlets with a rated current not exceeding 20A, that are for ordinary persons and intended for general use, and
- Mobile equipment with a current rating not exceeding 32A for use outdoors.”

§ 701.415.1:
“In rooms containing a bath or a shower, one or more residual protective devices (RCDs) with a rated current not exceeding 30 MA shall provide protection of all the circuits.”

To comply with this regulation, just one RCD can protect all bathroom sockets and equipment. The neutral conductor must run through the RCD because it operates by comparing the current in the live conductor with the current in the earth conductor.
How RCDs operate in electrical installations

By measuring the intensity difference between live and neutral conductors, RCDs actually detect the current flowing through the human body.

If this current reaches the 30 mA limit, the RCD trips within a few milliseconds, so preventing injury or worse.

Advise customers to check RCDs regularly

As long as the RCD trips immediately when the test button is push, users of electrical equipment are protected. Testing the RCD every 3 months enables detection of any event that may have impaired its operation.
All internal and current-carrying parts of appliances like refrigerators, washing machines and air conditioning units should be out of reach. The risk of direct contact is thus negligible and high-sensitivity RCDs are not necessary. There is still risk, nevertheless: if an internal wire works loose or loses a scrap of its insulating sheath, the metal housing of the appliance may be energised.

Securely bonding each metal-housed appliance to earth with the green-yellow wire prevents such electric shocks: the protective miniature circuit breaker (MCB) trips as soon as the metal housing is energised.
All green-yellow wires in the house must be:

- Be securely connected together
- Have a wide enough cross-section (min ... sq. mm)

None of these safety lines must ever be broken for any reason:

- They should be properly sheltered from any pressure or impact
- They should never be equipped with any switchgear.

The earthing network must also be safely connected to all metal parts of a building’s structure

Local equipotential network in the bathroom

No accessible equipment in a bathroom must ever be energised. Metal-housed electrical appliances, all plumbing parts, and door and window frames must be connected to the green-yellow network.
Key points for shock-free electrical distribution

Safety distances in bathrooms

Mandatory safety distances make it impossible to touch any electrical live part when in the bath or shower.

**Volume 0:**
- No electrical part at all.

**Volume 1:**
- At reach from the bath or shower with arms up
- Only 12V isolated fittings (SELV* supply)

**Volume 2:**
- Maximum reach from the bath or shower
- Transformer isolated sockets ("razor" type)
- Class II insulated lighting and heaters.

**Volume 3:**
- All devices, either protected by 30 mA rated RCD.
- Or SELV* supply (maximum 50 volts).

* SELV: safety extra low voltage

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**300 mA**

The current that flows through the body from a 230V energised conductor, causing severe injury to the heart, lungs, and muscles..
Unica wiring devices

To customise interiors and add an original touch, Schneider Electric has designed Unica wiring devices. They offer an elegant alternative to the colour white and classic materials.

The range comes in two lines:
- Unica Top with its curved form and wood, metal and coloured finish
- Unica Class which comes in sizes that are larger than conventional plates and in spare-lined, square shapes. Unica Class uses natural materials like metal, glass, leather, and ceramic.

Optiline trunking system

OptiLine is a comprehensive range of clip-on office equipment that encompasses columns, floor boxes, and plug boxes. Easy to choose and use, they are simple to install and remove, so ensuring office occupants a perfect finish and faultless performance.

Unica wiring devices

The Domae range of consumer units offers the ultimate in terms of on-site flexibility at a very affordable price.

- The range offers consumer units and devices to help with compliance with the 17th Edition of the Wiring Regulations
- All Domae consumer units are fully type tested to BSEN60439-3
- The products benefit from a right hand incomer for easier installation where existing incoming cables fall on the right
- Front cover locking option on metal units
- Available in insulated or metal clad construction.
For further information

> Benchmark standard: NF C15-100
- All the rules electrical equipment must comply with
- Compulsory by law in all new and renovated buildings since 1969
- Based upon international standard IEC 60 364
- Chapter 4-41 is devoted to protection against electric shocks
- Chapter 7 sets out rules applicable to specific sites (e.g. residential buildings).

Practical guides
- UTE C15-103: Choosing the right equipment for “external influences”
- UTE C15-520: Instructions on the right way to wire, secure connections, etc.

> Partner organisations

Union Technique de l’Électricité
A body that sets and publishes electrical safety standards.
www.ute-fr.com

Promotelec
Association for the promotion of sustainable uses of electricity in residential buildings and small commercial buildings.
www.promotelec.com

Consuel
Body that verifies electrical installations and certifies them compliant.
www.consuel.com

Make the most of your energy™