

**Work Safety**  
**Electrical Safety and You**

Occupational Safety and Health Branch  
Labour Department

Occupational Safety & Health Council

# Introduction

Improper use of electricity can cause electric shock, fire or explosion, resulting in serious or permanent injury, or even death, to workers. Accidents arising from electric shock may lead to fall from ladders, scaffolds or other working platforms. Defective electrical installation or damaged electrical appliances can also cause fire, which will not only endanger the user but also result in injury or death to others. However, with careful use of electric power and proper safety precautions, most electrical accidents can be avoidable.

This leaflet outlines the basic electrical safety precautions to help employers and employees reduce the risks from use of electricity at work. Under the Factories and Industrial Undertakings (Electricity) Regulations, the proprietor of an industrial undertaking must ensure that proper precautions are taken for use of electricity. For the provisions of the Regulations, please refer to “A Guide to the Factories and Industrial Undertakings (Electricity) Regulations” published by the Labour Department.

## Potential Hazards of Electricity

- In Hong Kong, the voltage of electricity supply is generally 220 volts single phase or 380 volts three phase. Improper use of electrical installation or apparatus at this voltage are dangerous. If contacts are made with the live parts, it can result in electric shock, burn or even death;
- Damaged electrical installation or apparatus, overloaded power cords and short-circuited electrical appliances can cause fire;
- In places where large amounts of inflammable liquids or gases are used or stored, such as paint spray rooms and LPG storage sheds, sparks produced during the operation of electrical equipment or when operating a switch can become an ignition source leading to explosion and fire.

## Risks in the Work Environment

The risk of injury or death due to electricity is closely related to where and how the electrical equipment is used. The risk is higher if the site conditions are poor. For instance:

- In damp or wet places, electrical equipment not properly insulated and protected are susceptible to electricity leakage, thus causing an unsafe working environment and the nearby metallic structures / appliances may become live;
- In outdoor areas (e.g. a construction site), electrical equipment can become dangerous and defective due to water ingress if they are not weatherproof;
- In congested areas full of unearthed metal parts such as metallic troughs, steel structures (I-beam structures) or container vessels, the risk of electric shock is high.

Electrical equipment can be hazardous if they are not installed and protected properly. For example, electric extension cords can be damaged easily. Extra care and attention should also be given to flexible power cords, especially those connected to equipment frequently being moved around.

## Ways to Reduce Risk

### **1. To ensure the safety of electrical installation**

- The installation and maintenance of fixed electrical systems must be performed by competent persons (e.g. registered electrical contractors / electrical workers);
- Electrical installation and systems must comply with the legislative requirements and relevant standards. They should also be regularly maintained to ensure safety;
- Provide sufficient sockets so that each socket is inserted with one plug as far as possible. If adaptors are used, do not plug too many electrical appliances into the same socket circuit lest it becomes a fire hazard due to overloading;
- Electrical installation must be properly earthed.

### **2. To provide safe and suitable electrical equipment**

The employer must provide his employees with suitable and safe electrical equipment to ensure their safety. The following are some tips on safe use of electrical equipment:

- Choose electrical equipment that are suitable for the working environment. For example, electric lamps or apparatus for outdoor use should be weatherproof in design;
- In a poor working environment, such as a humid workplace, use pneumatic, hydraulic or hand-operated tools as far as possible. Do not use electric tools in a hazardous workplace unless they are designed for such purpose;
- Ensure that the electrical equipment provided are safe, and are properly and regularly maintained so that they are always in safe working order;
- The casing at the end of a flexible power cord must be tightly clamped inside the plug (see right figure) to prevent the cord (especially the earth line) from slipping off the plug when pulled;

- When using a portable electric tool, connect it to the nearest socket so that the power supply can be cut off immediately in case of emergency;
- For every fixed machine, provide an easily accessible and clearly marked emergency stop switch near to it so that you can cut off the power source during an emergency;
- Replace damaged power cords immediately;
- Use suitable connecting plugs or electric wire couplings to connect electric wires;
- All electrical equipment or apparatus should be either double insulated or properly earthed for prevention of electric shock;
- Double insulated electrical apparatus are usually marked by a sign (see right figure). Power supply is by a two-wire power cord consisting of the phase wire (live, brown) and the neutral wire (blue);
- For light bulbs or other electrical apparatus that are easily breakable, extra protection such as a protective cover (see right figure) should be provided. When these apparatus are damaged, the live parts exposed can pose an electric shock hazard;
- Where there are flammable liquids or gases, electrical equipment in use should be spark-proof in design to avoid the presence of sparks as an ignition source. If in doubt, professional advice from relevant experts should be sought.

### **3. To provide safe devices**

“Residual current devices” (RCD) must be built into all socket circuits for earth leakage protection. The RCD operating current should be 30 milli-amperes (mA) or below.

Tips on use of RCD:

- The RCD is an essential safety device which should not be omitted in design and installation;
- Tripping of the RCD is a sign of circuit malfunction. Before re-energising the concerned electrical installation, check for any defects and irregularities;
- If the RCD keeps tripping, inspection by a registered electrical worker is required;
- The RCD has a test switch for checking proper functioning of the device. Such tests should be conducted on a regular basis (at least every three months).

Figure showed Residual current device in a distribution board

#### **4. Safety at work**

All electrical equipment or apparatus should be regularly inspected, tested, repaired and maintained by competent persons to prevent danger. The frequency of inspections and tests depends on the category, frequency of use and the environment of the equipment used. The employer should ensure that only a person who is competent in electrical work, is allowed to perform such work. Even a mistake in a simple work step (e.g. improper connection of a flexible cord and a plug) can make the whole installation dangerous. Under the Electricity Ordinance administered by the Electrical and Mechanical Services Department (EMSD), installation, repairs, maintenance, alterations, additions, tests and inspections in relation to fixed electrical installation must be performed by registered electrical workers. Listed below are some matters requiring attention:

- Employees operating electrical equipment should report any damage or malfunctioning of the equipment to the employer;
- When equipment failure is suspected, stop operating the electrical equipment immediately and put up a warning sign to suspend its use. The equipment should then be inspected and repaired by a competent person;
- Switch off the electrical equipment or the electrical socket before inserting the plug into the socket or pulling it out
- Cut off power supply or pull out the plug before cleaning or adjusting an electrical apparatus.

#### **Related Legislation**

1. Factories and Industrial Undertakings (Electricity) Regulations
2. Construction Sites (Safety) Regulations
3. Factories and Industrial Undertakings (Spraying of Flammable Liquids) Regulations
4. Factories and Industrial Undertakings (Cargo and Container Handling) Regulations
5. Factories and Industrial Undertakings (Work in Compressed Air) Regulations
6. Electricity Ordinance (administered by EMSD)

## Related Publications

1. A Guide to the Factories and Industrial Undertakings (Electricity) Regulations
2. A Guide to the Factories and Industrial Undertakings (Cargo and Container Handling) Regulations
3. Guide for Safety at Work - Safety Use of Electric Plugs
4. Basic Electrical Safety Measures in the Workplace
5. Code of Practice for the Electricity (Wiring) Regulations (published by EMSD)

## Enquiry

If you wish to enquire about this guide or require advice on occupational safety and health, you can contact the Occupational Safety and Health Branch through:

Telephone : 2559 2297 (auto-recording after office hours)

Fax : 2915 1410

E-mail : [enquiry@labour.gov.hk](mailto:enquiry@labour.gov.hk)

Information on the services of the Labour Department and on major labour legislation can also be found by visiting our Home Page on the Internet at <http://www.labour.gov.hk>.

Information on the services offered by Occupational Safety and Health Council can be obtained through hotline 2739 9000.

## Complaints

If you have any complaints about unsafe workplaces and practices, please call the Labour Department's occupational safety and health complaint hotline on 2542 2172. All complaints will be treated in the strictest confidence.