

ELECTRONIC AND ELECTRICAL SAFETY

Personal Safety

Please follow these general guidelines pertaining to electrical safety.

1. Turn off power and unplug from the wall before working on electric or electronic circuits, except when absolutely necessary.
2. Do not use extension cords as a permanent power source.
3. Do not work on electrical equipment in a wet area or when touching an object that may provide a hazardous earth ground path.
4. Turn off power and unplug equipment before checking or replacing fuses. Locate and correct the cause of a blown fuse or tripped circuit breaker before replacing the fuse or resetting the circuit breaker.
5. Replace defective cords and plugs. Inspect cabling for defects such as frayed wiring, loose connections, or cracked insulation.
6. Remove metal jewelry, watches, rings, etc., before working on electrical circuits.
7. Always check the electrical ratings of equipment you use and be sure you use that equipment within its ratings.
8. Never overload circuits.
9. Never leave unprotected systems unattended.
10. Never place containers of liquid on electrical systems.
11. Never defeat the purpose of a fuse or circuit breaker. Never install a fuse of higher amperage rating than that specifically listed for your circuit.
12. Make sure equipment chassis or cabinets are grounded. Never cut off or defeat the ground connection on a plug.
13. Safely discharge capacitors in equipment before working on the circuits.

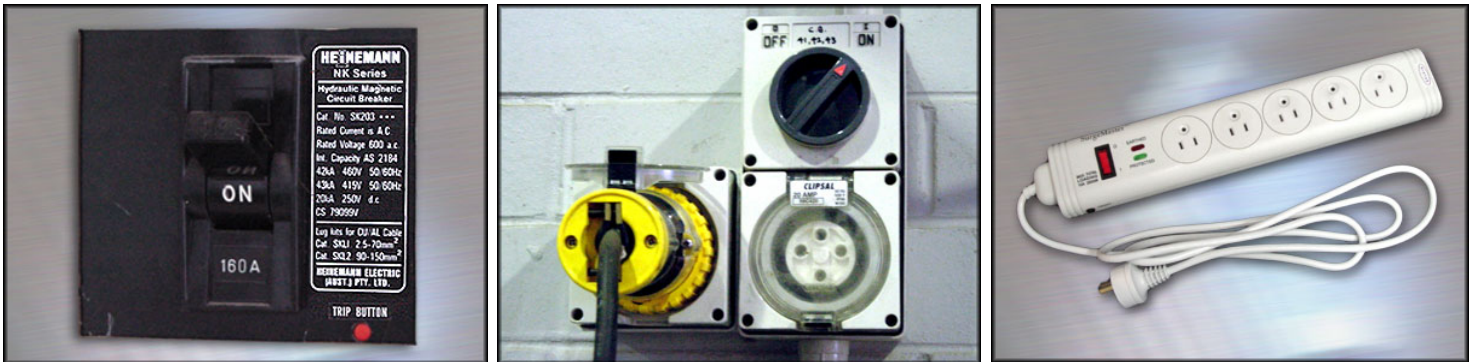
Questions regarding operation, maintenance, or safety of electrical or electronic equipment should be directed to your lab supervisor or an appropriate electronics expert.

Safety in the Workshop

Many people are injured by electricity in workshops. Poor electrical safety practices can cause shocks and burns, as well as fires and explosions.

Electricity supply

- Make sure you know where the electrical switchgear for your workshop is located.
- All electrical switches and fuses should be clearly labeled so that you know which circuits and functions they control. In the case of an emergency, you may need to know how to shut off the electricity supply to a work area, or to your entire workshop .



- Keep the switch and distribution covers closed. It is important that you do not block or obstruct access to this installation, so keep equipment and tools well away so emergency access is not hindered.
- There should be a sufficient number of socket outlets in your work area for all your needs. Do not connect multiple appliances to a single socket with a simple double adaptor. If necessary, use a multi-outlet safety plug board that has a built-in overload cutout feature.
- Electric socket outlets should be at least one meter above floor level to reduce the risk of igniting spilt fuel or other flammable liquids.
- Always switch the socket off before connecting or disconnecting any electrically powered device.

Portable electrical equipment

- If you need to use an extension lead, make sure that it is made of flexible cable – not the stiffer type of domestic cabling – and that it is fitted with an earth wire.



- Portable electric tools and hand lamps, particularly those that operate at 240 volts, are often sources of serious shock and burn accidents. Be particularly careful when using these items. Always inspect the cable for damage and check the security of the attached plug before connecting the item to the supply and switching it on.



- Choose to use 110-volt or lower voltage tools if they are available. If you have to use 240-volt tools, only use 'double-insulated' or 'all-insulated' tools.
- Never use any high voltage tool in a wet environment.
- Air operated tools cannot give you an electric shock, so these are safer to use in the wet.

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- Electric hand lamps are a common source of shocks, especially if they are the wrong type for the purpose, or if they are poorly constructed or maintained.
- All hand lamps should be 'double-insulated' or 'all-insulated', and the bulb should be completely enclosed in a transparent insulating case, or protected within a robust insulating cage. The bulbs are very vulnerable to impact and must not be used without this protection.
- Incandescent bulbs present an extreme fire hazard if broken in the presence of flammable vapors or liquids and should not be used in repair shops. Fluorescent bulbs, while still hazardous, are much safer.








- If available, choose to use hand lamps that operate at lower voltages, such as 110 volts or less. Only totally enclosed hose-proof hand lamps operating at 24 volts or less should be used in a wet environment. Under no circumstances should mains power be used in a lead light application.
- Always inspect the power cable for damage and check the security of the attached plug before connecting test equipment to the power supply and switching on.
- Always switch off and unplug a hand lamp before changing the bulb.

Fire Extinguishers

Fire extinguishers should always be on hand, especially in workshops. Always use the correct fire extinguisher for the job at hand.

- **Class A fire extinguishers**, for example, have the green triangle on them and also the special numerical rating, showing the amount of water this extinguisher holds and the amount of fire it is able to extinguish.
- **Class B fire extinguishers** are marked with the red square and have the numerical rating indicating the approximate area of fire (in square feet) it is able to extinguish.
- **Class C fire extinguishers** are marked with the blue circle, but they don't have any numerical rating. As a rule they contain the non-conductive extinguishing agent, because they are often used for electrical fire fighting.
- **Class D fire extinguishers** have the yellow decagon on them and are mostly regarded as the part of chemical laboratory firefighting equipment. They also don't have any numerical rating on them. There are also class K fire extinguishers, marked with the black hexagon. They are intended for the fighting the fire, caused by any cooking oils, fats or trans-fats combustion and are highly recommended for restaurant or cafeteria kitchens.

A		Common Combustibles	Wood, paper, cloth etc.
B		Flammable liquids and gases	Gasoline, propane and solvents
C		Live electrical equipment	Computers, fax machines
D		Combustible metals	Magnesium, lithium, titanium
K		Cooking media	Cooking oils and fats

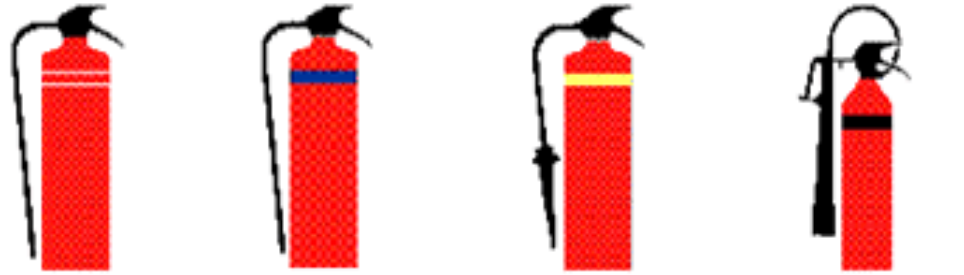
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There is also another fire extinguishers classification based on their contents nature. According to this classification there are **water, foam, dry-powder** and **CO2 fire extinguishers**.

- **Water or APW (Air pressurized water) fire extinguishers** are as a rule recommended for class A fire fighting and are effective in case of wood, paper or plastic ignition.
- **Dry powder fire extinguishers** as a rule contain some powder based agent, able to break the chemical chain reaction, sustaining the fire.
- **Carbon dioxide(CO2) and other clean agents containing fire extinguishers** operate almost on the same principle that the dry-powder extinguishers do. They inhibit the chemical chain reaction, sustaining the fire, but have one great advantage here – they don't leave any residue after the discharge, what

TYPES OF FIRE EXTINGUISHERS

their uses and their colour coding according to BS EN 3: 1996



WATER **POWDER** **FOAM** **CARBON DIOXIDE (CO₂)**

For wood, paper, textile and solid material fires	For liquid and electrical fires	For use on liquid fires	For liquid and electrical fires
DO NOT USE on liquid, electrical or metal fires	DO NOT USE on metal fires	DO NOT USE on electrical or metal fires	DO NOT USE on metal fires

The contents of an extinguisher is indicated by a zone of colour on the red body of the extinguisher

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Halon extinguishers are not shown since no new halon production is permitted in the UK