

British Orienteering

Electrical safety

The Organiser has a general responsibility to ensure safety at the event site. Suppliers of equipment and services are responsible for the safety of the equipment they provide. Especially, care should be taken during setup and take down phases and over any unplanned changes.

Therefore all reasonable care must be taken to shield users, competitors and 3rd parties from any possible hazard created by any electrical equipment. This includes items such as PA system, generator, computers and printers.

Here is a summary of the actions that should be carried out to ensure reasonable care has been taken:

1. Carry out a risk assessment to identify the hazards, the risks arising from those hazards, and the control measures you should use.
2. Visually inspect all electrical equipment for suitability, damage, stress and burn marks before use. If the equipment appears damaged or suspect do not use.
3. Use a RCD (rated at 30mA) to protect the users of equipment. Test the RCD before use.
4. Ensure all equipment, cables and plugs that are used in exposed outdoor locations are suitable and rated for outdoor use.
5. Ensure that all electrical equipment is well protected from damp and wet conditions (such as damp ground, rain or mist).
6. Ensure that all cables are located / run so as to prevent trip hazard and also to prevent damage by vehicles or pedestrians especially those with studded shoes. Where necessary cables should be buried or cable protectors should be used.
7. Ensure that the generator or power supply you intend to use is suitably rated to supply the peak current requirement of the equipment in use.
8. Your generator supplier should provide an earth spike to enable the electrical supply to be earthed. This should be used.
9. If a non-standard electrical supply is to be used or significant amount of onsite equipment ensure someone experienced and competent is responsible for checking and planning for electrical safety. See next section.
10. Cordon off the area around the generator by tapes or other appropriate barriers.

Here is more detail for a competent person to refer to.

- **INTRODUCTION** Most Orienteering events will use electrical equipment such as computers, printers, PA systems and sometimes lighting. This equipment will usually be powered from a 240volt power source in the UK and in most cases will be used outdoors. This imposes a particular responsibility on the Organiser to ensure that this equipment is safe, is installed safely, is used safely and complies with the various regulatory requirements.
- **SCOPE** This document is intended to provide guidance to Organisers so that they are aware of the risks and hazards and are able to minimise the risks to an acceptable level. Although there are a number of technical issues involved, the actual practical precautions are straightforward.
- **SPECIALIST ADVISOR** Organisers are strongly advised to appoint a competent person to oversee all of the electrical equipment used at an event, especially at large events where extensive electrical networks and multiple supplies might be used and introduce additional hazards.
- **CONTRACTORS** and other 3rd parties (e.g. Catering and Traders) must be made aware of their responsibility to ensure that any electrical equipment they install or use is safe and complies with all regulatory requirements.
- **TYPES OF SUPPLY** 240volt electrical supplies will typically be derived from:
 - Existing Fixed supply E.g. Farm Building, Caravan Site
 - Portable Petrol Driven Generator
 - 12V Lead Acid Battery + Inverter (12volt to 240volt electronic converter)
- **RISKS AND HAZARDS**
 - Death or serious injury from electrocution
 - Death from carbon monoxide poisoning
 - Fire due to excessive overload currents in electrical circuits
 - Fire/Explosion due to use and storage of highly inflammable fuels
 - Acid burns from Lead Acid batteries
 - Explosion caused by short circuit of Lead Acid batteries
 - Trip hazards from cables etc.
- **MINIMISING THE RISK (1) GENERAL PRECAUTIONS**
 - **Plan your requirements well in advance.** Last minute changes or ill-considered schemes are often the root cause of accidents
 - **Ensure that your supply is adequate** for the electrical load (the total wattage of all the equipment you plan to use) As a general guide the total load should be about 2/3 of the supply capacity. Cables and connectors must also be adequate for the electrical load.
 - **Consider the location of electrical equipment** and cable runs when planning your Assembly layout. Always minimise the length of cable runs and ensure that generators, cables etc are separated from competitors, the public and animals.

- Cables must avoid, wherever possible, crossing competitor, public or vehicle routes. If there is no alternative, cables must be protected with suitable, appropriate cable protectors or buried in the ground. Cables which are required to follow high level routes must be separately supported e.g. with a steel catenary wire. Use black/yellow tape to mark cable routes and generator enclosures.
- **Ensure that cables and connectors are suitable and in good condition.** Many electrical incidents are caused by damaged or unsuitable cables, plugs or sockets; always carefully examine all plugs, cables, connectors etc for signs of damage, overheating, loose or exposed wires etc. Reject and replace any that are not in first class condition; do not attempt to repair, always replace with new. Only use cables, switches and connectors which are suitable for outdoor use (IP rated).
 - **Ensure that all electrical equipment is protected from water ingress (rain).** It should only be used inside buildings or tents. Generators should be in the open protected by a simple canopy.
 - **Always use devices designed to protect.** e.g. MCBs or Fuses and RCDs
 - **MCBs or Fuses** protect against excess current and reduce the risk of overheating, fire and damage to equipment.
 - **RCDs** limit the level of electric shock by switching off the supply under certain fault conditions. They may not always work, particularly when used in conjunction with generators.
 - **Always fully unwind cable reels** before use, even if you only require a shorter cable.
 - **Do not run cables inside tents or marquees in places where they might be damaged by metal tables or chairs.** Try to keep cables and electrical equipment off the ground and in a compact area.
 - **MINIMISING THE RISK (2) FIXED SUPPLIES.** Electrical installations in remote farm buildings, barns etc can sometimes have compromised levels of safety. **ALWAYS** use protective devices such as RCDs when connecting to 3rd party supplies.
 - **MINIMISING THE RISK (3) PORTABLE PETROL GENERATORS.**
 - **Small (up to 10kVA) single phase generators are fundamentally different to normal mains supplies in the way that electric shock risks are minimised***(NOTE 1). They generally operate as “floating supplies” so that, in theory, it should be impossible to receive an electric shock. However, this is only true if there are no earth faults on the system, so that is **very important that the general advice above concerning the condition of cables and connectors, cable routing and separation is followed.** **Generators should only be used to supply a single item of electrical equipment or a small number of items in a compact area (e.g. all on one table).**
 - **Where 2 or more generators are in use at an event, the network of wiring and equipment from the individual generators MUST be widely separated.**
 - **Generators MUST NOT be operated inside enclosed areas.**

- **Generators will generally involve the use and storage of highly inflammable fuel. This fuel MUST be stored in suitable, properly marked containers. Fire extinguishers suitable for use with liquid and electrical fires should be located in the vicinity.**
- **MINIMISING THE RISK (4) LEAD ACID BATTERY SUPPLIES**
 - Lead Acid batteries are able to supply extremely large currents under short circuit conditions. This can lead to overheating and/or explosion.
 - The use of a current limiting device (fuse or MCB) directly in the positive battery line is highly recommended.
 - The connections to the battery MUST use fully insulated connectors.
 - Acid spillage, even in very small quantities, will cause damage to skin and clothing. The use of plastic battery boxes is highly recommended.

* NOTE 1. The earth terminal of small generators is not connected to one side of the generator winding. This means that there is no Neutral and that the supply is simply floating with respect to true earth even if an earth spike is used. RCD protective devices will not work correctly in this type of installation. This is considered a safe mode of operation provided the risk of accidental connection to earth is minimised by using short protected cable runs and small, compact networks of cables.