Electrical Safety
Construction of Experimental Equipment
Accessing the Laboratories

To work in the EMD laboratories you must undertake lab safety induction training.
Ensure relevant safety documentation is in place. An EMD Lab Information sign must be clearly visible and indicate the necessary action to be taken in the event of an emergency or malfunction. You may require a COSHH form.
Help and Advice

A list of staff available to give advice on the safe construction of equipment and apparatus is given in the Departmental web pages. Ask if you’re unsure.

http://hercules.shef.ac.uk/eee/local/safety/construction.html

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<tr>
<th>Type of work</th>
<th>Contact name</th>
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<tbody>
<tr>
<td>Electronic systems</td>
<td>Mr Ian Wraith</td>
</tr>
<tr>
<td>Electrical and energy storage systems, high voltage apparatus</td>
<td>Mr Andy Race</td>
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<tr>
<td>Electrical machines &amp; rotating apparatus</td>
<td>Mr Andy Race</td>
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<tr>
<td>Mechanical systems and materials, woodworking</td>
<td>Mr Karl Rotchell</td>
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<tr>
<td>Hydraulic &amp; pneumatic supplies/services</td>
<td>Mr Karl Rotchell</td>
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<td>Gases</td>
<td>Mr Paul Haines</td>
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Plan Your Work

Develop a schematic diagram. Calculate the physical size of your project from the components you plan to use.

If your circuit includes capacitors incorporate a discharge circuit in your design.
Enclosures

All electrical equipment, especially equipment operating at over 50V should be constructed in an appropriate enclosure. This is to protect the equipment from damage and to protect personnel from contact with it. Allow plenty of space for future development and for heat dissipation.
Fail Safe Features

Fuses  Circuit Breakers  Over Temperature Protection  Indicator Lamps

Equipment must incorporate fail-safe features to avert a hazardous situation from arising should a malfunction occur.

Fit indicator lamps to show what’s happening.
Use the current EU wire colours when building new equipment and use sizes appropriate for the current they will carry.
Use slotted trunking when possible, this protects the internal wiring makes it easier to obtain a safe & tidy job. Number the wires and components to correspond to your diagram. Terminate the wires with crimp terminals.
Earthing

If the equipment is connected to the mains electricity supply the enclosure and any other associated metalwork should be connected to earth.
Emergency Shutdown

Electrical equipment should have a **clearly labelled** and effective means of safe emergency shutdown.

Emergency stop push buttons should be latching and the emergency stop circuit should be 12V or 24V. Test emergency stop push buttons periodically.
Wires, cables and other obstructions should not be passed through the enclosure door. Use grommets, glands, cut-outs and sockets. Cut outs should not allow finger access. Fit sockets for points which require regular testing. Cables should be protected by appropriately rated fuses or circuit breakers.
DC power cables should be double insulated. Suitable sleeving is available in the EEE stores. Anderson style connectors should be enclosed before switching on the power. This is to prevent accidental contact should they be pulled apart with the power switched on.

Suitable enclosures are available from RS, Rapid and Onecall. Andy Race has the stick-on safety labels.
Mains Cables & Connectors

All mains cables must be installed and tested by a member of the technical staff. Three-phase flexible cables should be SY type. It is flexible, has a galvanised steel wire braid and a transparent outer sheath so that damage can easily be seen. All cable assemblies must be tested and labelled before use.
Ensure you have space to safely carry out your planned work.
Keep your workspace tidy at all times.
Safety Signs

Safety signs should comply with the Health and Safety (Safety Signs and Signals) Regulations 1996. You can print your own signs on:

http://www.online-sign.com/

Andy Race has a stock of desk top holders
PAT Testing

Mains powered electrical equipment, either constructed or purchased pass a PAT test before it can be connected to the mains electricity supply. It is your responsibility to check that it has been tested and the test date has not expired. Contact an authorised PAT tester if a PAT test is required.

Authorised PAT Testers

• Ian Wraith
• Tom Templeman
• Fahmi Mohammad
Disconnect external power supplies before commencing work. Take measures to prevent accidental reconnection, lock off and display signs. Test the power is off and any capacitors are discharged.
Moving or rotating components should be securely guarded to prevent accidental contact occurring while in motion.
Installing Other Equipment in the Lab

Equipment that you install in the lab should be positioned as to no impede safe access. Heat generating equipment should be adequately ventilated and positioned as to not cause damage to anything nearby. Appropriate signage should be displayed. Cables should be kept tidy and protective covering should be fitted where they cross any walkway.
Any Questions?