



The  
University  
Of  
Sheffield.

Electronic &  
Electrical  
Engineering.

# Electrical Machines & Drives Group Safety Policy 2018/2019

## 1 Introduction

This Safety Policy provides the safety information and procedures that must be followed to maintain safe working in and around the Electrical Machines and Drives (EMD) Research Group area. These safety procedures must be used in conjunction with all other safety procedures referred to in the Department of Electronic and Electrical Engineering Safety Information web pages, <https://www.sheffield.ac.uk/eee/safety>

## 2 Important Information

### 2.1 Induction

Do not commence work in the EMD laboratories without completing, signing and returning the Induction to the EMD Laboratories document.

### 2.2 Out of Hours Working

Do not carry out any practical lab work outside the normal working hours of 8:00am to 6:00pm without written authorisation from the EMD Senior Experimental Officer and the Departmental Safety Officer.

### 2.3 Unattended Equipment

Do not leave anything running unattended without written authorisation from your supervisor and the Departmental Safety Officer.

### 2.4 Documentation

Before commencing any lab work the following documentation must be in place:

- A Risk Assessment Document
- An Operating Procedure
- An EMD Lab Information Form
- An EMD Experimental Equipment Check List
- Any Relevant COSHH Risk Assessment Documents

Display these documents in a clear plastic holder at your work area.

## **3 Construction of Experimental Equipment**

### **3.1 Before Commencing Construction**

Contact the EMD group Senior Experimental Officer before commencing the construction of any equipment.

### **3.2 Enclosures**

All equipment should be constructed in a suitable enclosure. Guarding, locks and safety interlocks should be incorporated to protect personnel from potential risks such as contact with moving, hot or live components.

Construction guidelines can be found here under Construction of Experimental Equipment: [http://hercules.shef.ac.uk/eee/local/safety/electrical\\_safety.html](http://hercules.shef.ac.uk/eee/local/safety/electrical_safety.html)

### **3.3 Emergency Shutdown**

All constructed equipment must have a clearly labelled and effective means of safe emergency shutdown.

### **3.4 Earthing**

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

### **3.5 PAT Testing**

Mains powered electrical equipment, either constructed or purchased must be inspected by a Technician and pass a PAT test before it can be connected to the mains electricity supply. It is your responsibility before using any electrical equipment to check that it has been tested and that the test label shows a date for “next test due” that has not yet passed. Refer to the EEE safety web pages for further details on PAT testing.

### **3.6 Cable and Wire Routing**

Wires, cables and other obstructions should not be passed through the enclosure door preventing it from being closed and locked when potential risks are present within the enclosure.

### **3.7 Moving or Rotating Components**

Moving or rotating components should be securely guarded to prevent accidental contact occurring while in motion. Please contact the EMD group Senior Experimental Officer or an EMD group Technician for advice.

### **3.8 Batteries**

The terminals of batteries must be insulated at all times.

Using large batteries safely at work is covered by a HSE booklet available at this link: <http://www.hse.gov.uk/pubns/indg139.pdf> Please read this before starting any work with batteries, also refer to section 5.19 in the EEE Health and Safety Policy.

### **3.9 Permanent Magnets**

Eye protection must be worn when handling magnets, along with gloves for handling larger magnets.

Keep strong magnets away from electronic equipment, credit cards etc.

People with pacemakers or internal medical devices should use caution as magnetic fields can affect the operation of these devices.

Rare earth magnets can exhibit extremely strong magnetic fields and mechanical forces, they can accelerate at high speeds toward each other and ferrous materials. They are

brittle, if they clash together they can shatter and break sending sharp particles at speed, these can cause cuts. They can also pinch strongly and cause injury if allowed to come together against the skin.

### **3.10 Unattended Equipment**

Equipment that is left running unattended, for any period, must incorporate fail-safe features to avert a hazardous situation from arising should a malfunction occur. A departmentally approved "Equipment Information" sign must be clearly visible and indicate that an experiment is unattended and should be left running. It should include the necessary action to be taken in the event of an emergency or malfunction.

### **3.11 Safety signs**

All safety signs should comply with the Health and Safety (Safety Signs and Signals) Regulations 1996. Please refer to the Departmental safety web pages or contact the EMD group Senior Experimental Officer if you require any signage. You can create your own signs from this website - <http://www.online-sign.com/>

## **4 Restricted Areas and Equipment**

This section details specific safety procedures for EMD group activities, items of equipment and restricted areas that have special requirements to ensure safe working.

### **4.1 Three Phase Sockets**

Most EMD labs have 400V three-phase wall socket outlets, rated at either 32A, 63A or 125A. These remain locked off until required. Please consult with the EMD group Senior Experimental Officer or the EMD group Technicians if you require one unlocking. A relevant risk assessment must be produced before the socket can be unlocked. Any equipment plugged in to one of these sockets must have a valid PAT test.

### **4.2 Compressed Air Outlet Points**

Most EMD research labs have compressed air outlet points supplied at 7 Bar from a central compressor maintained by Estates Services. These remain locked off until required. Please consult with the EMD group Senior Experimental Officer or the EMD group Technicians if you require one unlocking. A relevant risk assessment must be produced before the compressed air outlet can be unlocked.

### **4.3 Chilled water system**

Most EMD research labs have circulating, equipment cooling water access points, supplied at up to 70 litres per minute, at a pressure of up to 6 Bar. The system is maintained by Estates Services. Access points remain locked off until required. Please consult with the EMD group Senior Experimental Officer or the EMD group Technicians if you require one unlocking. A relevant risk assessment must be produced before the chilled water outlet can be unlocked. Additionally, to minimise the risk of leaks the system should only be used by personnel who have been made familiar with its safe operation and the connected equipment has been checked by a Technician.

### **4.4 Magnetiser**

The magnetiser may only be used by personnel who have been trained on its safe operation, a log of these personnel is held by the EMD group Senior Experimental Officer. If you wish to be trained to use this equipment, please contact the EMD group Senior Experimental Officer or EMD group Technicians. Keys are available from the EMD group Technicians for authorised users, please return after use. The magnetising fixture is housed in an enclosure with a safety-interlock to prevent operation of the magnetiser

when the cover is open. The magnetiser can be operated locally although when possible it is recommended to operate it at a distance using the wired remote control. The magnetiser must not be operated out of hours.

#### **4.5 EDM Machine Tool (Wire Eroder)**

The EDM Machine tool is a specialist piece of equipment that requires training for safe operation. Only specially trained personnel may use this equipment. A log of trained users is held by the EMD group Senior Experimental Officer

The EMD group Technicians is responsible for the safe operation of the EDM Machine tool.

#### **4.6 Vacuum Impregnation System**

The vacuum impregnation system may only be used by personnel who are familiar with its safe operation. A key to enable its use can be obtained from either the EMD SEO or the EMD Technician. A risk assessment must be completed before it is used. A COSHH risk assessment must be completed for substances used during the impregnation process.

#### **4.7 Workshop Area (C37)**

The EMD group workshop area comprises a soldering station, work benches, various hand and power tools and a lathe which is disconnected from the mains power supply. The Group Technicians are available to assist if you are unsure of their safe operation.

#### **4.8 Dynamometer Facilities**

The EMD group has a range of dynamometer facilities, both built in-house and purchased from specialist manufacturers. These must be operated in a safe manner and may only be used by personnel familiar with their safe operation.

The AVL and Control Techniques dynamometers require specific training, must be used with extreme caution and may only be used by authorised personnel. The list of authorized personnel is held by the EMD group Senior Experimental Officer. If you wish to be trained to use this equipment, please contact the EMD group Senior Experimental Officer or Technicians.

All dynamometer rigs must have one or more clearly labelled, effective emergency stop buttons. All electrical and moving mechanical parts must be guarded and appropriately rated couplings and components must be used.

A dynamometer should not be left running unattended unless there are exceptional circumstances, please contact the EMD Group Senior Experimental Officer before considering this. As with all equipment a Dynamometer must incorporate fail-safe features to avert a hazardous situation from arising should a malfunction occur. A departmentally approved "Equipment Information" form must be clearly visible and should include the necessary action to be taken in the event of an emergency or malfunction. All other safety signs should comply with the Health and Safety (Safety Signs and Signals) Regulations 1996.

Appropriate PPE, referred to in the Risk Assessment must be employed when operating the dynamometer.

#### **4.9 Environmental Chamber**

Environmental chambers should only be used by personnel who have been made familiar with their safe operation. Appropriate PPE must be used when handling equipment within the chamber and the chamber interior surfaces due to the extreme high and low operating temperatures. A cupboard containing PPE specifically for use with the environmental chamber is in the environmental chamber room. When operated

unattended signs must be displayed, these should indicate that the rig is running, explain the shutdown procedure, and show user contact details.

The EMD Group Technicians is responsible for the safe operation of the environmental chamber. The list of personnel authorized to use this equipment is held by the EMD group Senior Experimental Officer. If you wish to be trained to use this equipment, please contact the EMD group Senior Experimental Officer or Technicians.

#### **4.10 Test Cells**

The EMD Group has two acoustically insulated test cells, one in room C16 and one in room G23.

Do not enter a test cell while equipment inside is running unless a second person is aware of what you are doing. In such cases only enter the test cell for brief periods, to take a measurement for example. Do not work in a test cell with the door closed at any time unless a second person is aware of what you are doing.

#### **4.11 Anechoic Chamber**

The EMD Group has one acoustically insulated anechoic chamber in room C23. Do not work in the anechoic chamber with the door closed unless a second person is aware of what you are doing.

#### **4.12 Laser Equipment**

The Rofin Starweld Tool in C37 is a class 4 laser system. Only named authorized personnel who have taken the University laser safety course are permitted to use this laser. Users must also be familiar with the manufacturer's instructions and safety information and the University's laser safety guidelines. The list of authorized personnel is held by the EMD group Senior Experimental Officer. If you wish to be trained to use this equipment, please contact the EMD group Senior Experimental Officer. Keys are available from the EMD group Technicians for authorised users, please return after use. The laser Scheme of work and safety risk assessment is on display by the equipment.

#### **4.13 Regatron Power Supply Units**

These power supply units should only be used by personnel who have been made familiar with their safe operation due to the potentially high voltages and currents at their outputs. The list of personnel authorized to use this equipment is held by the EMD group Senior Experimental Officer. If you wish to be trained to use this equipment, please contact the EMD group Senior Experimental Officer or Technicians.

#### **4.14 Spin Pit**

The Spin Pit is an enclosure for containing high speed rotating equipment under test. The sliding lid must only be used by personnel who have been made familiar with its safe operation. The hydraulic pump for raising and lowering the lid must be locked off when not in use. Keys are available from the EMD group Technicians for authorised users, please return after use. A list of personnel authorized to use this equipment is held by the EMD group Senior Experimental Officer. If you wish to be trained to use this equipment, please contact the EMD group Senior Experimental Officer or Technicians.

#### **4.15 Thermostream**

The Thermostream unit should only be used by personnel who have been made familiar with its safe operation. A list of personnel authorized to use this equipment is held by the EMD group Senior Experimental Officer. If you wish to be trained to use this equipment, please contact the EMD group Senior Experimental Officer or Technicians. Appropriate PPE must be used when handling equipment at the outlet of the Thermostream due to the potentially extreme high and low temperatures. A cupboard containing PPE for use with

extreme temperatures is in C136. When operated unattended signs must be displayed, these should indicate that the rig is running, explain the shutdown procedure, and show user contact details.

#### **4.16 Switching Test Rigs**

The Switching test rigs in C27 should only be used by personnel who have been made familiar with their safe operation. Please contact Mark Sweet if you are interested in using them.

#### **4.17 Working Outside the EMD Group Area**

Contact the EMD group Senior Experimental Officer before commencing any work outside the EMD Research Group area or any part of the EMD Research Group not mentioned in this document.

#### **4.18 Secure Key Box**

A secure key box is used to hold keys for equipment which have restricted access. Key holders to this key box are the EMD group Senior Experimental Officer and the EMD group Technicians.

#### **4.19 Lifting Equipment**

The EMD Group has a number of items of equipment that are specifically intended to lift and transport loads, these are securely stored to prevent unauthorised access. Staff wishing to use these must a suitable risk assessment in place. Contact the EMD group Senior Experimental Officer or EMD group Technicians if you wish to use the lifting equipment.

See the departmental health and safety policy for more details.

#### **4.20 Step Ladders**

The EMD Group has two sets of small step ladders, these are securely stored to prevent unauthorised access. Staff wishing to use these must have received training in the correct use of ladders and step ladders, have a suitable risk assessment in place and have departmental authorisation. Contact the EMD group Senior Experimental Officer or EMD group Technicians if you wish to use the step ladders.

See the departmental health and safety policy for more details.

## **5 Out-of-Hours Working Restrictions**

### **5.1 Out of Hours Times**

All staff, students and visitors must sign-in at the Porters Lodge when working in the Department outside of the hours 8.00 a.m. to 6.00 p.m., Monday to Friday.

Undergraduates are not normally permitted to work out-of-hours.

### **5.2 Working Restrictions**

Do not carry out any practical lab work outside normal working hours without written authorisation from the EMD Senior Experimental Officer and the Departmental Safety Officer. Normally, work out-of-hours should be restricted to library work, computing, writing reports and making non-risk observations.

### **5.3 Procedures and Training Requirements**

Anyone working out-of-hours must:

- Submit a risk assessment signed by their Manager or Supervisor, to the Departmental Safety Officer before permission will be granted.

- Know the University and local emergency procedures.
- Have undertaken fire training in the past year.
- Have completed out-of-hours training at <https://hs.shef.ac.uk/> during the past three years, or have other current approved first aid training certificate. (Dianne Webster can advise).

## 6 Risk Assessment

### 6.1 Risk Assessment Policy

The law requires that all activities that take place in the Department must be assessed to identify any hazards that pose a safety risk. This means that everyone in the Department is responsible for assessing, or contributing to the assessment of, their work to identify any risks involved, and to develop procedures to minimise those risks.

### 6.2 Risk Assessment Procedure

Before commencing any lab work you must conduct a risk assessment which is “suitable and sufficient” for the process or operation that you are undertaking. The general principles of risk assessment can be summarised as follows:

- Look afresh for hazards in your area of work, particularly those that could cause serious harm (e.g. anything involving electricity, chemicals, heavy lifting, heat, trip hazards such as trailing cables, protruding objects etc.)
- Decide who might be harmed, remembering that cleaners, visitors and contractors may enter your area as well as the people who normally work there.
- Evaluate the risks arising from any significant hazards identified; decide whether existing precautions are adequate or whether more are needed. Take into account that extra precautions may be necessary for persons with special needs. Check that any specific legal requirements are adhered to. Aim for a situation where remaining risk is low and the appropriate precautions are reasonable.
- Record findings where significant hazards have been identified. Indicate what checks were made, identify who is at risk and indicate what steps have been taken to reduce or eliminate risk. Hazards already identified and addressed under other legislation (e.g. COSHH) need not be recorded again. The originator should keep records and copy to the Departmental Safety Officer and anyone identified as at risk by the assessment.
- If there is any change in the procedure, or in the materials used, or in the amounts used, a new assessment must be made before the change is implemented

Visit the EEE safety web pages for details on completing risk assessments:

<https://www.sheffield.ac.uk/eee/safety>

## 7 COSHH

### 7.1 COSHH Policy

The EEE department has a clearly defined policy on the management and safe use of chemical substances which in turn meet the requirements of COSHH regulations.

The COSHH policy can be accessed here: <https://www.sheffield.ac.uk/eee/safety>

### 7.2 COSHH Risk Assessment Procedure

It is the hazardous substance user's responsibility to ensure that they have completed and received approval for a COSHH risk assessment before they try to place an order for a hazardous substance and for its subsequent use. They must also ensure that they have in place authorised copies of the COSHH risk assessment in the Health and Safety Folder of the lab they will be conducting the work in (if the work is performed in more than one lab, a copy should be placed in each laboratory folder).

The COSHH risk assessment form can be accessed here:  
<https://www.sheffield.ac.uk/eee/safety>


## 8 Personnel

Dianne Webster	Departmental Safety Officer
Andy Race	EMD Group Senior Experimental Officer & Area Safety Rep.
Laurence Obodo	EMD Group Technician

## 9 Laboratory Information

The following information sign should be displayed in all EMD laboratories.







The University of Sheffield.

Electronic & Electrical Engineering


# Laboratory Information



**In Emergency**  
4444



**No food or drink in the laboratory**



**PPE supply in C37 and C22**

Everyone has the responsibility for the safety of themselves and others. Maintain your work area in a safe and tidy order.

Before commencing any lab work you must have the following documentation in place:

- A RACIE risk assessment,
- An operating procedure for your equipment / process,
- An EMD lab information form,
- An EMD experimental equipment check list,
- All relevant COSHH forms.

Ensure you have read, signed and returned the EMD lab induction document.

Always comply with EEE and EMD safety policies, these are available on the EEE website. <http://www.sheffield.ac.uk/eee/safety>

Do not remove equipment from any work-in-progress without consent from the user or the EMD group Senior Experimental Officer (SEO). Return loaned equipment after use.


Do not carry out any practical lab work outside the normal working hours of 8:00am to 6:00pm without written authorisation from the EMD SEO and the Departmental Safety Officer.

Immediately report any equipment that is broken, faulty or without a valid to PAT test to the SEO or a technician.


EMD Group Senior Experimental Officer	Andy Race	25835	<a href="mailto:a.m.race@sheffield.ac.uk">a.m.race@sheffield.ac.uk</a>
EMD Group Technician	Laurence Obodo	25868	<a href="mailto:Lobodo@sheffield.ac.uk">Lobodo@sheffield.ac.uk</a>

**A list of all first aiders and their contact details is located in each first aid box.**


Departmental Safety Officer	Dianne Webster	25859	<a href="mailto:d.webster@sheffield.ac.uk">d.webster@sheffield.ac.uk</a>
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**Your fire assembly point is the car park beyond the gate house**



**Nearest fire extinguisher in corridor**



**First aid box in C37 & kitchen**

Author	Andy Race
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