



CODE OF PRACTICE **Rankine Building Room 223a**

Level 2 Rankine Building Electronic & Nanoscale Engineering,
James Watt School of Engineering, University of Glasgow
Prepared by Dr Matteo Clerici
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The adoption and practice of good safety procedures is of paramount importance for both the health and safety of fellow workers, and for the integrity of the fabric of the 223A Laboratory. Visitors as and users must adhere to these guidelines. Failure to follow these rules will result in denial of access to the facilities.

1) LAB SAFETY MANAGEMENT RESPONSIBILITIES

- **Everyone** has a role in protecting the health and safety of both other lab users and themselves, and thus should be familiar with the **School's Safety Manual**.
- **Academic Supervisors** take full responsibility for the health and safety of their own group's research activities, and consequently must ensure their staff and students are familiar with both the content of this **Code of Practice** and the **School's Safety Manual** and apply its requirements. The role of the **Academic Supervisors** is specified in **Appendix B**
- No research activities shall be carried out in Room 223 Rankine Building, without the prior permission of the **Lab Guardian** (Matteo Clerici).
- No work shall be carried out until a **Risk Assessment** has been conducted by the research staff/students, **approved by their Supervisor** and the **Director of Safety**, and acknowledged by the **Lab Guardian**.
- An **electronic copy** of the approved Risk Assessment shall be sent to the Lab Guardian to be kept as record (note that this can be done using the online risk assessment system). A hard copy of the approved risk assessment shall be displayed next to the relevant research rig and equipment for inspection. The procedures of the preparation of Risk Assessment are summarised in **Appendix C**.
- **All lab users** should make themselves aware of the **general safety procedures** highlighted in the School's Safety Manual and of the location of safety equipment in the lab.
In case of emergency, dial telephone number: **4444 (internal), 0141 330 4444 (external)**.
Emergency exits are located in the lab or via the main building.
The **fire extinguisher** is located in the main corridor level 2.
- Work outside normal office hours (including weekend working) requires the permission of your supervisor. This can be given by an e-mail trail for audit purposes in the event of an accident and can be for multiple or extended periods of time. If permitted, the out-of-hours working book located in the foyer of the Rankine building must be signed and the





time recorded on arrival and the time of departure. Potentially dangerous operations **must never** be undertaken out-with normal hours **unless a second responsible person is present**. (Please read the safety regulations in the School's Safety Manual for more details.)

2) PRACTICE OF GENERAL ACTIVITIES

- The experimental area must be **kept tidy and clean**. Cleaning shall be performed by lab users and only using the dedicated tools. Cleaners are not allowed in the lab.
- Good housekeeping must be maintained by the lab users and be monitored by the responsible person of each area (see Appendix C).
- **Food and drink are not permitted in the lab**. Sealed water bottle may be left in the ante-room but must not be taken into the lab.
- The **walkways** leading to the exit must remain clear. Under no circumstances should lab equipment be stored in the route from your place of work to the exit route. If things are possibly impeding your exit then you should either move them, contact the person who placed them there, or inform both the Lab Guardian person and your supervisor.
- **Laboratory doors should remain shut** at all times to ensure security and fire safety.
- Users and visitors will **wear overshoes or the available lab shoes** when entering the lab.
- Activities that may create dust or contaminants, e.g., drilling, **shall not be performed in lab** inner area.
- Jackets, overcoats and bags shall be kept outside the inner lab area.
- All items shall be dusted and cleaned before moving them into the lab.
- Equipment must be placed in appropriate locations to safe-guard its integrity, minimise potential damage and to allow other researchers access to it.
- Once experimental work has been completed and the experimental setup is no longer required, the **experimental area must be cleared** in preparation for other experiments and researchers.
- If it is necessary to remove equipment from the lab, permission must be given by your supervisor (inform the Lab Guardian). If necessary, seek assistance with moving heavy items. Loans of any equipment either into or out of the lab are to be documented in the loan book.
- If equipment breaks down or is not working, report the fault to your supervisor and the responsible person immediately.
- A fault with the fabric of the room, such as a lighting failure, should be reported through the Maintenance Request portal found on the Estates and Commercial Services webpage, <http://www.gla.ac.uk/services/estates/>.
- All lasers used are governed by the University of Glasgow Radiation Safety of Laser Products (BS EN 60825: 1992) and/or Guidance on the Safe Use of Lasers in Education



and Research (Association of University Radiation Protection Officers Guidance Note No 7: 2012 Revised Edition) as appropriate. Operators shall work in compliance with the General Local System of Work.

- Wear safety goggles and suitable protective clothing appropriate to the laser being used. If in doubt, please ask your supervisor or the Lab Guardian. 
- Use equipment in accordance with manufacturer instructions. 
- Report any faulty equipment immediately to your supervisor and to the Lab Guardian.
- Access to the lab controlled by user ID card. **Do not allow any unauthorised person in the lab** (authorised persons will have an active and enables access card).
- The lab **air conditioning** system has been provided for optimum operation and maintenance of the laser systems and not for personal comfort. If the air-con system fails, the lab temperature will quickly rise due to the heat output from the large number of laser systems and electronics. This will cause potentially irreparable damage to equipment, many hours of lab downtime, and tens-hundreds of thousands of pounds is equipment costs. If any change is noticed in the operation of the lab air-con system, please inform one of the emergency contacts immediately.

3) COVID-19 MEASURES

- Guidance from the HSE, UK Government and Scottish Government to manage the risk related to Covid-19 pandemic must be applied to the R223 Lab. See the [Covid-19 Draft Code of Practice & Risk Assessment](#) on the School Safety pages for general details of working practices and risks that must be observed during the Covid-19 pandemic: <https://www.gla.ac.uk/schools/engineering/informationforstaff/safety/> General guidelines include physical distancing, frequent hand washing and hygiene measures, cough etiquettes and face covering in enclosed public space.
- Physical distancing within the R223 means a maximum capacity of 1 person working in the inner area and 1 person in the outer area. To allow 2 people in the lab effective communication is required. Any user entering the lab will announce its intention to enter with the buzzer. If there is an occupant in the lab, they will agree verbally on the procedure to adopt to avoid coming close to each other. Similar arrangements will be taken when a user is required to exit the lab. All users shall clear the contact surfaces with the provided sanitiser.
- Demand to use the lab will be managed by the Lab Guardian in collaboration with the Safety Coordinator. Collaboration will be required between lab users, supervisors, PIs and the lab guardian to establish a rota where necessary. Impact on the overall capacity of the Rankine Building will be reviewed by the Technical Services Manager.
- Lab users must wash their hands regularly and wipe surfaces, materials, and equipment at the start of their work and before leaving.
- Emergency support (First Aiders and Fire Area Officer) might be constrained due to



Covid-19 restriction on building capacity. Task risk assessments need to be reviewed to include the above measures and to review with personnel through the risk assessment, which work can be safely undertaken with reduced access to emergency support. A Covid-19 risk assessment template can be found here (https://www.gla.ac.uk/media/Media_723618_smxx.docx).

4) PRACTICE OF HAZARDOUS ACTIVITIES

- **A list of the common activities, their risks, and control measures for Lab 223 are reported in Appendix A.**
- **Electrical connections** between different devices or equipment should be safe. If in doubt, speak with technicians in the Electrical Workshop.
- To minimise **trip hazards**, extension cables should be plugged into the closest socket and avoid crossing pathways. If crossing a pathway is totally unavoidable then, only as a temporary measure, the cable must be secured to the floor and covered with a suitable (commercially supplied) floor cable cover, cable protector, floor cable tidy to prevent tripping hazards. However, leads crossing pathways at the top or bottom of stairways is not allowed, even as a temporary measure – they should be routed at least 2 m (i.e. two paces) away from these areas.
 - a. Once equipment is not in use, it must be turned off and any extension cables used should be tidied to a suitable location.
 - b. Leads and plugs should **only** be used on the allocated item of equipment and should **not** be switched between equipment.
 - c. All equipment plugged into university outlets must be PAT tested (contact the electrical workshop for testing).
- To minimise the risk of **falling objects**, no equipment or lab materials should be kept on top of cupboards and file cabinets, particularly those next to the edge of the upper floor.
- Fire hazards:
 - a. All **flammable materials** (gases, liquid and solids) should be stored and handled in accordance to the School's Safety Manual and relevant SEPS guidelines.
 - b. All equipment or experimental rigs using flammable materials should be certified and have adequate measures for preventing fire hazards.
 - c. All users of flammable gases should be trained.
- Explosion hazards when using compresses gases:
 - a. All gas cylinders should be secured to prevent falling.
 - b. All pressure vessels should be certified by a professional manufacturer.
 - c. All pressure vessels should have measures to preventing over-charging, such as relief valves.
 - d. You should seek support from technicians when moving gas cylinders.
 - e. All users of compressed gases should be trained.
- **Only F-gas** qualified individuals can charge or discharge the system when using Freon refrigerants.



- Ear protection and laser safety spectacles should be used when appropriate. Laser safety glasses for suitable for each of the systems in the lab must be worn at all times when the lasers are in use. Goggles are to be left in the lab ante-room; if goggles are not available entry to the lab is not permitted. Before using any of the laser systems each user must be trained in its operation to ensure safe handling of laser radiation.
- If you are unsure how to correctly use an item of equipment, seek assistance from an appropriate responsible person(s) (see Appendix C).



APPENDIX A: CATEGORIES OF ACTIVITY

1. Use of lasers:

1.1. Laser sources

- 1.3.1.1. Continuous wave Titanium-doped Sapphire laser (Class 4);
 - Wavelength: 725-875 nm;
 - Average power: 500 mW
- 1.3.1.2. Pulsed Erbium Laser (Class 4)
 - Wavelength: 780 ± 10 nm; 1560 ± 10 nm
 - Average power: ≤ 200 mW @780 nm; ≤ 500 mW @ 1560 nm
 - Pulse duration: < 100 fs
 - Repetition rate: 80 MHz
- 1.3.1.3. Pulsed Ytterbium Laser (Class 4)
 - Wavelength: 1030 ± 10 nm;
 - Average power: ~ 2.5 W
 - Pulse duration: < 200 fs
 - Repetition rate: 100 MHz
- 1.3.1.4. CW aligning sources (Class 3B)
 - Wavelength: $630\text{nm} \pm 10$ nm;
 - Average power: < 200 mW

1.2. Potential risks

- Eye Safety
- Skin burns
- Fire
- Electric shocks

1.3. Control measures

- All commercial lasers and controllers will be PAT tested.
- Door entry warning system and interlocked shutters or power supply interlocks are used when operating the Class 3B or Class 4 lasers
- All users will have undergone laser safety training.

2. Use of Gasses:

2.3. Available gasses

- Compressed air
- Nitrogen

2.4. Potential risks

- Asphyxiation
- Failure of cylinder

2.5. Control measures

- Cylinders are securely mounted to wall in the adjacent plant room. The plant room has its own air conditioning running 24/7
- The main cylinder valve should be closed when not in use.



- All users will undergo gas safety training.
- Correct tools will be used for mounting or moving the gas cylinder

3. Electrical Apparatus

3.1. General Guidelines

3.1.1. Potential Risks

- Electric Shock
- Fire

3.1.2. Control Measures

- All electrical equipment is PAT tested.
- Instrument housing will not be removed when the equipment is connected to the power supply.
- A grounding strap and grounding mat should be used when handling or modifying delicate electronics.

4. Use of Optical Fibres

4.1. Fibre Splicer^[SEP]

4.1.1. Potential Risks

- Electric Shock, Cuts and splinters from fibre

4.1.2. Control Measures

- PAT testing of splicer and maintenance of electrodes.
- Sharps bin for Fibre fragments.
- No open toed shoes or sandals should be worn in lab.

4.2. Fibre Cleaver^[SEP]

4.2.1. Potential Risks

- Cuts and splinters from fibre

4.2.2. Control Measures

- Sharps bin for Fibre fragments.
- No open toed shoes or sandals should be worn in lab.

5. Use of chemicals

5.1. Isopropanol and ethanol^[SEP]

5.1.1. Potential Risks

- Flammable

5.1.2. Control Measures

- Less than 200 ml to be kept in lab.
- Will be kept away from soldering irons and other heat sources
- Will be stored in safety chemical cabinet when not in use.
- Disposal will be carried out according to building chemical disposal procedures.

5.2. Acetone^[SEP]



5.2.1. Potential Risks

- Flammable
- Irritant

5.2.2. Control Measures

- Less than 200 ml to be kept in lab.
- Gloves and safety goggles will be worn when handling
- Will be kept away from soldering irons and other heat sources
- Will be stored in safety chemical cabinet when not in use.
- Disposal will be carried out according to building chemical disposal procedures.

5.3. Epoxy Resin

5.3.1. Potential Risks

- Irritant, toxic if ingested

5.3.2. Control Measures

- Wear gloves when handling, dispose of according to building safety procedures.

5.4. Conductive Silver Paste

5.4.1. Potential Risks

- Irritant, flammable, toxic if ingested

5.4.2. Control Measures

- Small quantities in use only (under 20ml). Wear gloves when handling.

5.5. Other Equipment

5.5.1. Potential Risks

- Corrosion over time leading to failure
- Damage to equipment and release of toxic chemicals.

5.5.2. Control Measures

- Batteries are checked regularly via voltmeter. Batteries will be removed from equipment not in use. Expired batteries will be replaced and disposed of according to building procedures.



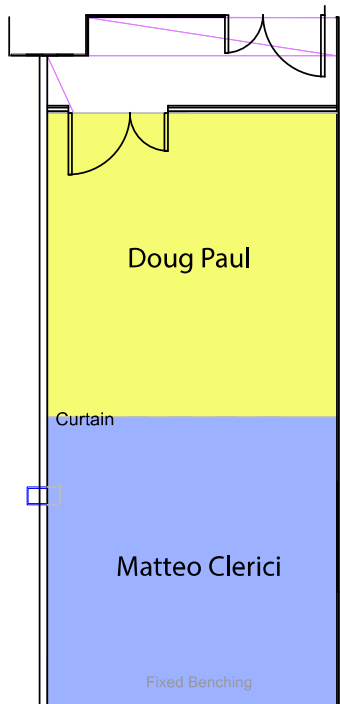
APPENDIX B: RESPONSIBLE PERSON OF AREAS IN THE R223 LAB

The current allocation of the space within the Energy Lab is shown in the Figure below. Each academic is responsible for **implementing safety policies in Energy Lab on a day-day basis** including:

- to maintain the Code of Practice (CoP);
- to ensure the lab users keep their area in tidy and clean condition;
- to ensure each activity (experimental rig/equipment) has a Risk Assessment before work commences;
- to coordinate actions according to the School's Director of Safety's report / instructions following inspections;

The current responsible people include:

- **Doug Paul**
- **Matteo Clerici**





APPENDIX C: PROCEDURES OF THE PREPARATION OF THE RISK ASSESSMENT

1. PDRAs and PG/UG students are responsible for formulating Risk Assessments on a day-day basis. For potentially hazardous activities, in addition to assessing the risks, the risk assessment form should include a standard operating procedure/method statement (and/or instrument manual) as an appended document.
2. Whilst the preference is for the persons undertaking the practical work to make their own risk assessments, it is permissible to use the on-line multi-user risk assessment forms for activities that will be undertaken by groups of people. However, in this case, each person involved in the practical work must sign the multi-user form online and a strict regime of user training should be in place that encompasses both the risks associated with the work as well as the practicalities of undertaking it.
3. Academic supervisors should assist the PDRAs and PG/UG students in preparing the risk assessment (this would typically be the case for less experienced PDRAs and PG/UG students). They should **ensure** foreseeable risks have been identified and adequate mitigation measures have been provided to reduce them as far as possible.
4. The academic supervisors should then approve the risk assessment form online (or ask for further information to be added).
5. After the risk assessment has been approved/acknowledged by the supervisor and Lab Guardian, the School's Director of Safety approves, seeks further clarifications, or (exceptionally) rejects the risk assessment if there are clearly hazards that cannot be sufficiently mitigated.
6. An e-copy of the **approved** Risk Assessment should be sent to the Lab Guardian by the PDRA or PG/UG student that originated the assessment (n.b. pdf's of the online form can be made by using the Print to PDF option available in most browsers)
7. A hard copy of the approved Risk Assessment and standard operating procedure should be kept or displayed next to the relevant experimental rig or equipment.
8. The Lab Guardian approves the start of activity after receiving the **approved** Risk Assessment.
9. If there is any substantial change to the people or research activity as stated in the Risk Assessment, it **MUST** be revised accordingly, and pass procedures 1-7 as above.