

SCHOOL OF ENGINEERING LOCAL LABORATORY RULES

Fluid Mechanics Laboratory

To be read in conjunction with the School's safety handbooks, policies and guidance: [School Policies, Guidance & Resources | School of Engineering | The University of Aberdeen \(abdn.ac.uk\)](#)

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Contents

Areas covered by this document	1
1. Training and Risk Assessment	2
2. Electricity and Dangerous Moving Parts	2
3. Slips and Trips	2
4. Falls from Height	2
5. Manual Handling	2
6. Chemicals	3
7. Drowning.....	3
8. Hand Tools.....	3
9. Pedestal Drill	3
10. Legionella.....	3
10.1 Legionella Prevention	4
11. Laser Safety	5
12. Procedures for Entry Into Underfloor Passage	5
12.1 Tasks covered by these procedures	5
12.2 Personal Protective Equipment.....	5
12.3 Risk Assessment	6
12.4 Equipment required.....	6
12.5 Items NOT permitted in the ducts under these procedures	6
12.6 The Work team	6
12.7 Pre entry checks.....	6
12.8 Work in the Passage.....	6
12.9 Emergency procedures.....	7
Review Record.....	7

Areas covered by this document	
Fluid Mechanics Laboratory	Meston 086

1. Training and Risk Assessment

All persons commencing work in the lab must undergo a formal Laboratory Induction in addition to the Basic Induction they received on arrival at the School. In addition to records of induction training, records must also be kept of any further training provided.

No work should commence in the lab until a risk assessment has been completed in conformance with School procedures as stated in the School Safety Handbook.

2. Electricity and Dangerous Moving Parts

The Estates Section are responsible for the provision and maintenance of a safe electrical supply.

When undertaking maintenance work on electrically powered equipment, the power supply should either be isolated and padlocked off or, in the case of 13Amp plugs, plugs should be removed from their sockets and the plug and cable returned to the equipment.

Extension leads and boards should be routed off the floor where there is the possibility of water splashes and leaks.

3. Slips and Trips

There should be no trailing cables or hoses across main walkways in the Lab. If it is necessary to have supply or drain hoses across the floor, they should be covered with a suitable ramp.

Floor coverings should be in good condition. Defective areas should be reported initially to the resident technician who will then instigate repairs.

Water spillage should be immediately mopped up. Warning notices 'DANGER – WET FLOOR' must be displayed when necessary.

4. Falls from Height

When floor panels are lifted for inspection or maintenance work, the area must be cordoned off one metre away from the edge. Warning notices and hazard warning tape must be used.

Ladders, steps, platforms and elevated walkways must be inspected regularly and maintained in good condition by the Laboratory Technician. Particular attention should be paid to kick boards and handrails. Tables must not be used to work at heights.

Care must be taken when removing pipes and items from the ceiling storage racks. On no account should persons stand on the tables to access the racks. Secure steps must be used.

5. Manual Handling

Whenever possible, mechanical lifting devices should be used to move sand and sediment in the Lab. Barrows, roller trucks, trolleys and the battery powered truck and high stacker must be kept in good condition and maintained regularly. Lifting

equipment, shackles and slings should be entered on the School's Lifting Register and inspected by the University Insurance inspector at proscribed intervals. In the case of lifting equipment this is annual and for lifting accessories the interval is 6 months. Training in the correct use of powered lifting equipment may be required. The TRO is responsible for making sure all this happens and that records are kept.

6. Chemicals

A list of chemicals and their safety data sheets must be kept up to date and filed in the appropriate folder.

Solvents and acids must be stored in separate cabinets.

Chemicals used in both maintenance and experimental work must be addressed in the Risk Assessment.

7. Drowning

The main sump in the Fluids Lab runs almost the full length of the lab from North to South. The pump intake is at the North end where the depth of the sump is approximately 2.5 metres deep. The width is approximately 1.5 metres. The base tapers to the South end where the depth is approximately 1.5 metres deep.

Care must be taken when lifting inspection covers over the main sump. The area must be cordoned off with barriers and warning tape. The sump must be drained before maintenance work is carried out and several inspection aluminium covers removed. On no account should anyone go into parts of the sump which are covered by the inspection slabs.

8. Hand Tools

Hand tools must be maintained in good condition.

Safety goggles, footwear and gloves must be used when necessary.

9. Pedestal Drill

A list of authorised users is posted next to the drill and only they can operate the pedestal drill. The Resident Technician(s) will maintain this list.

The following points must be adhered to by all users:-

- The guard must be in position at all times.
- Eye protection must be worn.
- Beware of loose clothing.
- No jewellery or bandages, and gloves must not be worn.
- Long hair must be tied back.

10. Legionella

Legionnaires' disease [legionellosis] is a form of pneumonia, which is caused by inhaling airborne water droplets [aerosols] that are contaminated with bacteria of the *Legionella* species. There is no evidence to show that the disease can be contracted from someone who is already infected.

Legionellosis principally affects those who are susceptible due to age, illness,

Immune suppression, smoking etc and can be fatal. Legionella can also cause less serious illnesses which are not fatal or permanently debilitating but which can affect any person.

Legionella is commonly found in water systems. However the issue of concern is the avoidance of the conditions necessary for the growth and proliferation of the organism. These include:

- Dirty water systems – the presence of sludge, scale, rust, algae and organic matter.
- Water temperatures in the range 20 to 45C – *Legionella* multiplies within this range. It is killed rapidly at water temperatures above 60C. Below 20C it stays dormant but will grow if the temperature is raised and other conditions are favourable.

10.1 Legionella Prevention

The fluid tanks and systems used in and around the laboratory are used for experiments and use a large volume of water which in some cases may sit stagnant for prolonged periods or are dosed or treated with chemicals etc. for the purposes of the experiments being carried out.

It is generally accepted in the water hygiene industry, that when faced with assessing the risks associated with Legionellosis from a system such as that found in the Fluids Lab, 3 questions must be asked of that system:

- Is the water dirty/stagnant/potentially contaminated?
- Is an aerosol generated by the system?
- Could this aerosol be inhaled by a susceptible person?

If the answer to all the above questions is yes, then there is a potential risk from Legionella. However, if we remove any of the issues, for example prevent an aerosol from being created, in theory we lower the risk.

In general prevention of Legionella in the lab is by managing and controlling the environment and equipment such that Legionella bacteria do not develop.

The following checklist for the control and management of the water system is used:

1. Storage tanks should be fitted with lids made of materials which resist Legionella such as plastic, fiberglass or metal. Wood or fabric materials must be avoided as these are breeding grounds for Legionella.
2. Corrosion in systems should be prevented or treated as this can harbour Legionella bacteria.
3. Water outflows should be designed with a lid to prevent aerosols which could be breathed in by lab users.
4. Water should be kept at below 20°C and where possible storage tanks should be sheltered from direct sunlight.
5. Where water is intended to be stored for more than one week without being used then the storage tank should be emptied to prevent stagnation.
6. The water systems should be regularly monitored for temperature.
7. A regular maintenance regime involving cleaning, water changes and disinfecting is necessary.

The technical staff are responsible for the monitoring and maintenance of the water systems.

11. Laser Safety

Lasers are an area of significant risk in the Fluids Lab. Anyone wanting to work with lasers in the laboratory must have express permission from the Laser Protection Supervisor (LPS) for the laboratory. Permission will be granted only after necessary training has been provided and competence demonstrated.

Separate local rules are maintained for the work with lasers. The LPS will provide copies and discuss them with anyone wanting to work with lasers before that work can commence.

The LPS is supported by the School's Lead Laser Protection Supervisor, and the University's Laser Protection Adviser (LPA).

12. Procedures for Entry Into Underfloor Passage

The laboratory contains an underfloor passage used to service some of the laboratory facilities. The passage is approx. 2.0m deep and approx. 22m long. It is fitted with lighting, smoke detection and alarm systems linked to the building and carries electrical and water supplies and sensor cables. The passage is spacious although overhead pipes require the wearing of head protection. The passage is fitted with two electric pumps in a side room used to feed the Aberdeen Open Channel Flume (AOCF). The passage has hatches at both ends with built-in ladders. The TRO arranges for ladders to be checked at prescribed intervals. The normal access route is at the north end. Entry to the passage is required primarily to gain access to turn on/off water supplies. Occasional access is required for maintenance/reconfiguration of facilities. Major works such as plumbing are undertaken by contractors in association with Estates.

12.1 Tasks covered by these procedures

- Turning on/off water.
- Cleaning – mopping up cold water
- Minor maintenance e.g., reconfiguring transducers/wiring, checking pumps

All other tasks require additional risk assessments to be conducted in consultation with the Local Safety Adviser.

NOTE: A separate risk assessment is required for entry to the sump.

12.2 Personal Protective Equipment

Always required:

- Bump cap or safety hat.

Other items that may be required:

- Safety shoes (sensible footwear)
- Boiler suite or coverall.
- Gloves.

- All other PPE as may be deemed necessary by the job in hand.

12.3 Risk Assessment

Always required: A completed assessment of the risks involved in the task and stating the potential risks i.e. ladder, lighting failure, head knocks, unbreathable atmosphere, no solo working and how these will be checked and monitored (check ladder before entry, always wear bump cap, check with Crowcon gas detector before entry and take Crowcon with you into passage and always have a person on standby above in case of any problems).

12.4 Equipment required

- Gas detector: Crowcon Tetra gas monitor.

The TRO will arrange for the detector to be checked for calibration at the recommended periods.

12.5 Items NOT permitted in the ducts under these procedures

- Adhesives, solvents, degreasers and paints.
- Gas cylinders or equipment connected to gas cylinders.
- Petrol/diesel fuelled equipment.

Any tasks that require the use of any of these substances will require an additional risk assessment to be conducted in consultation with the Local Safety Adviser.

12.6 The Work team

- Minimum of two persons one to remain outside at all times.
- Only authorised persons are permitted to enter.
- All persons will receive an induction which includes these procedures.

12.7 Pre entry checks

- Check the flume and the passage are empty of water.
- Confirm no gas cylinders or hoses, chemicals or solvents are being taken into the passage.
- Switch on and ZERO the gas monitor in fresh air prior to entering the duct.
- Check that no work that requires Estates or other approvals is being undertaken.
- Open the hatches at both ends and place barriers around the access points.
- Confirm the passage is safe to enter by lowering the gas monitor or using the intake hose.

12.8 Work in the Passage

- The person(s) working in the passage and the standby person must remain in contact with one another.
- Entry is normally via the north end.
- The lighting switch is inside the passage and is accessible on entry.
- The gas monitor can be taken with the person(s) working in the passage or left with the standby person. If left with the standby person, it should be left with the intake hoses remaining in the passage and sampling the air.

12.9 Emergency procedures

In the event of gas detection alarm:

- Evacuate passage immediately
- Contact Local Safety Adviser, technician or other responsible member of staff.
- No further entry into the passage is permitted until the gas monitor gives the all-clear. If the air does not clear a specialist contractor with breathing apparatus must be contacted.

In the event of injury or accident:

- Standby person to call for help either using the laboratory telephone or shouting to other personnel to do so.
- Contact the TRO.

In the event of a fire alarm in the building:

- Evacuate passage immediately.
- Secure barriers around entrances.
- Leave by the nearest exit.

Review Record

Issue	Who	Date	Reason for Review
2	ES	22/01/2024	General update, merged duct work document. Reviewed and approved by the Lab Coordinator.