

Management Unit	School of Engineering	Location (Site / Building / Room)	Water Engineering Lab at the Oakbank industrial estate
Assessment Date	.../.../...	Review Date	.../.../...
Assessor's Name	...	Job Title	PhD student
Description of Task	Flume experiment at the demonstration/Shields/Reybolds/Kelvin channel		

Description of the hazard (or hazardous event)	Who might be harmed?	How might people be harmed?	What risk controls are currently in place?	Current risk rating*			Identify any additional controls that may be needed	Timescale for additional controls and responsible person	Residual risk rating*		
				L	C	R			L	C	R
Slippery floor and surfaces	Anyone working at the Water Lab (including technicians)	Slip and fall	Mop, cloth, paper towels to remove any water splashes	2- Unlikely	3- Moderate	6- Low risk	Handle equipment carefully to prevent object from slipping from your hand	Short	1- Very unlikely	2- Minor	2-Low risk
Working at height (elevated platform to operate the equipment from above the channel)	Myself + anyone helping out	Trip and fall from the stairs and/or the elevated platform	Wooden fences to hold on to	3- Fairly likely	3- Moderate	9- Moderate risk	Walk around the workspace carefully; avoid running and rushing the experiments. Get familiarised with the working space beforehand	Short	2- Unlikely	2- Minor	4-Low risk
Poor housekeeping and cluttered workspace	Anyone working at the Water Lab (including technicians)	Trip and fall	Defined working spaces (i.e. flume area, pc-desk space)	3- Fairly likely	3- Moderate	9- Moderate risk	Keep working space tidy. Organise all the material/equipment needed before starting the experiment. Request any missing/needed items beforehand	Short	2- Unlikely	2- Minor	4-Low risk
Water contact with electrical equipment due	Anyone working at the Water Lab (including	Electrical shock, slip and fall	Health & safety meeting. Equipment and	2- Unlikely	4-Major	8- Moderate risk	Flume and equipment demonstrations beforehand. Double-	Medium	1-Very unlikely	3- Moderate	3-Low risk

to a major flume leak or flooding accident	technicians)		facilities checked by the lab leader				check their state with the lab leader or technicians if needed. Report immediately in case of a major spillage				
Manual lifting and handling of equipment	Myself + anyone helping me with the tests	Physical injuries (i.e. back pain due to heavy weight lifting, cuts or bruises due to unappropriated handling)	Available trolleys to carry samples along the lab. Equipment demonstration and training	3- Fairly likely	2- Minor	6-Low risk	Be certain about how the equipment should be handled and operated. Ask for help when moving samples in/out of the flume.	Short	2- Unlikely	2- Minor	4-Low risk

*Likelihood x Consequence = Risk

Risk Rating Calculator

Likelihood that hazardous event will occur		Consequence of hazardous event	
1	Very unlikely	1	Insignificant (no injury)
2	Unlikely	2	Minor (minor injury requiring first aid only)
3	Fairly likely	3	Moderate (Up to three days absence)
4	Likely	4	Major (More than seven days absence)
5	Very likely	5	Catastrophic (Permanent injury or death)

Action Level Table

Risk Rating	Risk Level	Actions to be taken	
20 – 25	Very High Risk	STOP!	Stop the activity and take immediate action to reduce the risk, a detailed plan should be developed and implemented before work commences or continues. Senior management should monitor the plan.
15 – 16	High Risk	Urgent Action!	Take immediate action and stop the activity if necessary, maintain existing controls rigorously. The continued effectiveness of control measures should be monitored periodically.
8 – 12	Moderate Risk	Action	Moderate risks may be tolerated for short periods only while further control measures to reduce the risk are being planned and implemented. Improvements should be made within the specified timescale.
3 – 6	Low Risk	Monitor	Look to improve at the next review or if there is a significant change. Monitor the situation periodically to determine if new control measures are required.
1 – 2	Very Low Risk	No Action	No further action is usually required, but ensure that existing controls are maintained and reviewed regularly.

Some example hazards that may apply to the activity (not exhaustive)

Working at height	Noise	Lighting (including strobe lighting)	Fire and explosion
Falling objects	Vibration	Compressed air	Hazardous chemicals
Slippery, uneven or worn floors	Hand tools	Magnetic fields	Biological risks / disease
Obstructions and projections	Repetitive hand / arm movement	Pressure systems	Animals
Confined spaces	Machine operation	Needles and sharps	Compressed Air
Mechanical Lifting	Manual Handling	Lasers	Hydraulic systems
Poor housekeeping	Vehicle movements	Ionising and non-ionising radiation	Other (please specify on assessment)

Lab responsible signature:

Student signature:

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Water flume laboratory (Oakbank Industrial Estate).

Electrical risk assessment and recommendations for safe use of Electrical equipment in this room.

Background Information

This document is written from an electrical point of view only. There may be other hazards in this laboratory environment, such as laser, biological or mechanical, which are not considered in this document. Seek appropriate advice about other hazards identified.

The water lab uses tanks of flowing water to study water flow in the environment. A significant amount of mains powered electrical equipment is used close to the flowing water.

The fixed electrical installation (which is maintained by the Estates & Buildings department) is appropriate for the location. Wall socket outlets and other fixed electrical equipment is installed in accordance with BS7671. Overhead lighting is splash proof. All electrical socket outlets are protected by an RCD (aka earth leakage circuit breaker or ground fault circuit interrupter) to help to protect against the most common way of receiving an electric shock. Note that an RCD cannot and will not protect against all ways of getting an electric shock – the user must still take care. Exposed extraneous metalwork (such as tanks and frames) will be/are connected to electrical earth to form an equipotential zone to minimise the risk of electric shock from faulty equipment.

The risk of electric shock in this room is much greater than a normal room because of the large amount of open water used in close proximity to electrical equipment which is intended for dry use. A human body will be harmed by a small electric current flowing through the body. A wet human body will be harmed by a considerably smaller electric current due to significantly reduced skin resistance. The human body is particularly susceptible to harm if a very small electric current flows through the chest area (such as arm-arm or arm-leg). Harm can include death in this context.



People using the lab and facilities are generally not from an electrical background and will have minimal training or experience in using mains powered electrical equipment in an area where there is significantly greater than normal risk of harm from electric shock. There are three main groups of lab users. 1- Taught laboratory classes where there are a group of unskilled people working under supervision. 2- Research projects where people are working individually with minimal supervision. 3- Visitors such as technical and cleaning staff who will not operate any equipment and have no knowledge of the specific hazards of this laboratory when equipment is operating.

There is a telephone located close to the entrance of the laboratory. Please make sure you know where it is. In an emergency call Extension 4444. If using a mobile phone call 0141-330-4444. There is no first aid box available in this laboratory. The nearest first aid box is in room 201A or the Janitor's office at the main entrance to the building. A poster showing the first aid treatment of electric shock is/will be on the wall beside the telephone.

When you are working in this lab the main entrance door must remain unlocked, but may remain closed. This is so that others can check on your well-being. This is very important when working alone or out of normal working hours.

Actions to be considered to mitigate risks

- Lone working is not encouraged. If you have to work alone, limit your work to low hazard activities such as routine data gathering or equipment setup.
- Never put any part of your body (hand, arm) into water whilst directly mains powered equipment is operating in the water (such as a submersible pump) because of the electric shock hazard. Any mains powered equipment in the water must be completely unplugged from the power source before reaching into the water for any reason.
- Lone working near open water is not permitted where you have to make adjustments to electrically powered equipment or operating test setups in the flume. Never attempt to adjust sensors and other equipment in water whilst apparatus is in use without someone else present, even if the equipment operates from a low voltage. When adjusting sensors in the water do not try to adjust the sensor in the water and operate dry equipment at the same time. Always have a second person to assist when adjusting equipment in the water – one person working on the sensor in the water, and the other operating the dry measurement equipment.
- Portable electrical equipment is generally bought into the lab by users and may not be suitable for use in some areas of the lab. The user must always take additional care to ensure that portable mains powered electrical equipment is used appropriately and safely, taking into account the risk of splashing and the increased risks to users when working near water. All portable electrical equipment used MUST have a portable appliance tested sticker less than two years old – if in doubt always get the electronics workshop to check and test any equipment you wish to use in this lab. Most problems are caused by cracked plugtops, damaged power leads or insecure covers – please take the time to check any equipment you intend to use, your life may depend on it. If there is any doubt, ask the electronics workshop for further advice before you start to use the equipment.
- The floor of the lab will get wet. It is designed to. Never store or leave any electrical equipment on the floor because once it gets wet it will be damaged beyond repair.
- Extension socket strips and ‘lump in a cable’ type power adapters must never be used or left on the floor, even when unplugged from the supply. Once they become wet they are dangerous to handle. If in any doubt always remove the supply plug from the wall socket before handling any connected plugs.
- Splashed water will dribble along leads into equipment, ruining it. Always ensure that when stored or used, water cannot enter electrical equipment. If a cable is at risk of getting splashed, a method of reducing damage is to form a hanging loop of cable that hangs below the bottom of the equipment (often known as a ‘drip loop’) so that water cannot enter equipment by this route.

- Everyday mains powered electrical equipment must not be used near or above the water channels because of the risk of splashing. Such equipment may be used on the raised benches beside the channel, but no closer to the water. If any alternative platform is required for mains powered electrical equipment (for example on the opposite side of the water channel), then it should be designed and constructed in a similar manner to the existing platforms to ensure safe use of equipment.
- Mains powered electrical equipment and associated wiring used on the platform floor or over water must be designed to be splash proof. Mains powered electrical equipment must never be immersed in the water unless it is expressly designed for the purpose (such as a submersible pump).
- Equipment used over water must be secured so that it cannot accidentally fall into the water. If equipment does fall into the water, never touch anything wet or near the tank until ALL electrical equipment in use has been unplugged from wall sockets. Always verify that the power plug is removed from the wall socket before attempting to handle wet equipment. If equipment has got wet, never attempt to use it until it has been checked by someone competent to verify that it is safe for further use.
- Connectors and trailing cables must be secured so that they cannot fall into the water unless they are designed to be submersible and are used correctly.
- Sensors and other equipment operating from a low voltage may be used directly in the flume interior or water provided that the power source is in a dry location. To minimise any electrical hazard the operating voltage should be less than 12V AC or 30V DC. The power source must be double insulated (marked  on case), 'CE' marked (marked  on case) or otherwise compliant with EN60950 or a similar technical standard. A lab type bench power supply may be used, provided it is located in a dry area. Computer powered and operated USB devices may also be used, provided a desktop type computer in a dry location is used to operate them. Laptop type computers should not be used unless operating on batteries only because of the type of power adaptor commonly used with them.
- Sometimes it is necessary to use low voltage devices near the water that are not splash-proof. To try to prolong the useful life of this equipment, try to shield it from expected splashing. Position and route cables so that water drains away from (rather than into) the device. Secure and cover up connections to avoid splash and dribble damage.
- Try not to route cables or tubes across floors where they will form a trip hazard. Consider routing them overhead well above head height or around the perimeter of where people will want to move. If this is unavoidable, make sure that either a suitable cover or tape is used to secure the cable or tube to the floor. On work platforms, consider routing the cable or tube under the platform floor. Access and exit routes must be kept clear of clutter with no trip or entanglement hazards.
- Always leave your work in a state where other laboratory users who are not familiar with your equipment cannot be harmed. This includes cleaning and security staff who may have good reason to be in the laboratory when you are not present.

Additional Notes

Most of the advice given here is derived from section 702 of BS7671:2016 'Regulations for electrical installations in buildings'. This section describes the specific requirements for electrical installations in and around swimming pools and shower facilities where people will be wet or in the water. In this application, people will not be wet or in the water, so some of the requirements have been modified to take account of this. If there is any doubt, always seek advice from a competent person – in this case the Electronics Workshop or the Estates and Buildings Department will be able to help.

Parts which move under power or automatically must be suitably guarded – advice on guarding is beyond the scope of this document.

Where equipment is installed over water, the operating controls should be located away from water in a dry area.

Appropriate signage needs to be provided in any area where a hazard is present.

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