

School of Engineering & School of IT
Monash University Malaysia

Laboratory Safety Handbook

For

**All Staff of the School of Engineering, School of IT,
Researchers, Graduate Research Students (GRS), and
Undergraduate Students**

**FOR ALL EMERGENCIES
DURING OR AFTER OFFICE HOURS**

Dial: Ext. 46333 (internal)

Or (03) 5514 6333

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Section 1: Navigation

Identify yourself within the following categories. The associated section on the right hand side represents the minimum list of sections which you should read and understand to meet the occupational health and safety requirements of the School of Engineering, to ensure your safety, and the safety of others, in the Engineering laboratories.

CATEGORY: Staff/Student/Visitor	Sections of Handbook to be Read (minimum requirement)
Undergraduate Students Graduate Research Students	1. Emergency Contacts (P4) 2. What to do during an Emergency (P5) 3. General and Personal Safety Reminders (P10) 4. Electrical Hazards (P11) 5. Mechanical Hazards (P13) 6. Chemical Hazards (P13-P16) 7. Flammability Hazards (P17-P18) 8. Civil Hazards (P18-P22) 9. Appendices: Website Links (P23) Engineering Laboratory Floor plans (P24-P37) General Lab Safety Form for students (P38-P39) Hazard and Incident Report Form (P40-P41)
Staff (Academic, Technical, Research & Administrative)	1. Emergency Contacts (P4) 2. What to do during an Emergency (P5) 3. General and Personal Safety Reminders (P10) 4. Electrical Hazards (P11) 5. Mechanical Hazards (P13) 6. Chemical Hazards (P13-P16) 7. Flammability Hazards (P17-P18) 8. Civil Hazards (P18-P22) 9. Appendices: Website Links (P23) Engineering Laboratory Floor plans (P24-P37) Hazard and Incident Report Form (P40-P41)
Visitors & Contractors (working in the lab)	1. Emergency Contacts (P4) 2. What to do during an Emergency (P5) 3. General and Personal Safety Reminders (P10) 4. Electrical Hazards (P11) 5. Mechanical Hazards (P13) 6. Chemical Hazards (P13-P16) 7. Flammability Hazards (P17-P18) 8. Civil Hazards (P18-P22) 9. Appendices: Engineering Laboratory Floor plans (P24-P37) Hazard and Incident Report Form (P40-P41)
Visitors & Contractors (not working in the lab)	1. Emergency Contacts (P4) 2. What to do during an Emergency (P5) 3. General and Personal Safety Reminders (P10) 4. Electrical Hazards (P11) 5. Mechanical Hazards (P113) 6. Chemical Hazards (P13-P16) 7. Flammability Hazards (P17-P18) 8. Civil Hazards(P18-P22) 9. Appendices: Engineering Laboratory Floor plans (P24-P37) Hazard and Incident Report Form (P40-P41)

Section 2: Useful Emergency Contacts

INTERNAL Emergency Contacts

Health and wellness center (Campus)

Ext 51299 (internal) or 03-55151299

- 1. School Manager** (Engineering)
Ext. 46220 (internal) or 03-5514 6220
- 2. Laboratory Manager** (Engineering):
Ext. 46183 (internal) or 03-55146183
- 3. Safety officer SOE**
Ext 46268 (internal) or 03-55146268
- 4. Security Department:**
Ext. 46354 (internal) or 03-5514 6354
- 5. Campus Reception: 03-5514 6000** (office hours)

EXTERNAL Emergency Contacts

Nationwide Emergency Number: **999**

From mobile phone: **112**

- 1. Police**
 1. Police Bandar Sunway: **03-5638 2122**
 2. Petaling Jaya Police Station: **03-7956 2222**
 3. Sungei Way Police Station: **03-7875 2222**
 4. Subang Jaya Police Station: **03-5633 2222**
- 5. Hospitals**
 1. Sunway Medical Centre: **03-7491 9191**
 2. Subang Jaya Medical Centre: **03-5634 1212**
 3. University Hospital: **03-7956 4422**
 4. Kuala Lumpur Hospital: **03-2615 5555**
- 5. Ambulance Services**
 1. X Medic Services (PJ): **019 284 3704 / 016 606 2219**
 2. Lifeline Ambulance (PJ): **03-7956 9999 / 013 362 7471**
 3. First Ambulance Services (PJ): **03-7784 1191 / 03-7785 1919 / 016 223 1070**
toll free 1 300 88 1919
 4. Puteri Malaysia (Shah Alam): **03-5569 5996 / 012 398 0999**
 5. Extro Ambulance Service (Puchong): **03-7783 8809 / 012 211 5367**

Road Transport Department

1. RTD Hotline : **03-8888 4244**

Section 3: What to do DURING emergency

Fire and Explosion

Do's during outbreak of fire

- Do raise the alarm immediately by:
 - BREAKING the nearest fire alarm glass.
 - Call emergency ext. **46333** or **03-55146333**.
 - Informing nearest Technical Officer/Staff member.
- Do alert others in the vicinity.
- Do keep calm and cool.
- Do walk briskly to the fire escape doors.
- Do walk briskly down to the escape routes (staircase) to the Assembly Area.
- Do crawl on the floor if and when there is a thick smoke.
- Do assemble at allocated area at Assembly Area.
- Do report to **Floor/Zone Marshal** of any injured persons, or persons assumed to be left in the building.
- Do give priority to old, disabled and pregnant ladies.

Do's during explosion

- Do immediately take cover under tables, desks, or under objects which will give protection against falling glass and debris.
- After the initial effects of the explosion have subsided, call emergency ext. **46333** or **03-55146333**.

Don'ts DURING an outbreak of fire or explosion

- Do not return to your workplace to collect personal items.
- Do not panic.
- Do not use the lift.
- Do not rush / run to fire escape door.
- Do not rush / run to the staircases.
- Do not push while on the way to Assembly Area.

Do's BEFORE outbreak of fire or explosion

- Do familiarize yourself with escape route (through staircase, never use the lift).
- Do familiarize yourself with Assembly Area (Monash University Open Field).
- Do keep your important personal items in a safe place for easy retrieval during emergency.
- Do familiarize yourself with fire escape doors (refer floor plan layout).

Accident & Medical Attention

Do's

If it's a medical emergency or severe accident case,

- Do call ext. **46333** or **03-55146333**.
- Give your name; describe the nature and severity of the medical problem and the location of the victim. Do not hang up unless released by the person on the other line.
- Keep the victim still and comfortable until help arrives.

Don'ts

- Don't perform any CPR if you are not trained to do so.
- Don't move the victim.

If it's a non-emergency case

- Inform the nearest Technical Officer.

Basic First Aid Procedures and Response

If chemicals are splashed into the eyes:

- Notify the nearest Technical Officer or Staff member.
- Quickly proceed to eyewash station.
- Wash eyes copiously with water for 10 to 15 minutes. Ensure that the eyes are held open while washing.
- Wash skin areas that come into contact with chemicals, irrespective of the concentration of the substance.

In case of serious cut:

- Notify the nearest Technical Officer or Staff member.
- Stop blood flow using direct pressure with a clean towel.
- Elevate the injury to reduce blood flow.

Fire Drill Marshals in BUILDING 5 (SOE & SOIT)

Name	Designation	Room No.	Contact (ext.)
LEVEL 8			
Ms. Siti Sofia - Floor Marshal	Technical Officer	5-8-02	59639
LEVEL 7			
Mr. Shiv Ashutosh Katiyar - Floor Marshal (leader)	Postgraduate student	5-7-01	61791
Mr. Teo Yu Xuan - Floor Marshal	Postgraduate student	5-7-01	61791
LEVEL 6			
Mr Tharmaa - Floor Marshal	Technical Officer	5-6-07	59687
LEVEL 5			
Mr. C.M. Balaram - Floor Marshal (leader)	Academic staff	5-5-11	44430
Mr. Mohd Isha - Floor Marshal	Technical Officer	5-5-35	59720
LEVEL 4			
Ms. Krishnakumari - Building Marshal (back up)	Administrative Executive	5-4-10	44938
Ms. Norliza Binti Ayub	Administrative Executive	5-4-03	44994
LEVEL 3			
Mr. Paneer - Floor Marshal (leader)	Technical Officer	5-3-02	46267
Mr. Amir - Floor Marshal	Technical Officer	5-2-22	44489
LEVEL 2			
Mr. Manan - Building Marshal	Technical Officer	5-2-03	46268
Mr Suresh - Floor Marshal	Technical Officer	5-2-11	46262
LEVEL 1 & BASEMENT			
Mr. Syed Khalid - Floor Marshal (leader)	Technical Officer	5-1-03	46263
Mr. Afiq - Floor Marshal	Technical Officer	5-2-22	44482

Fire Drill Marshals in BUILDING 4 (SOE)

Name	Designation	Room No.	Contact (ext.)
LEVEL 1 (Workshop)			
Mr.Mohamad Hanif - Floor Marshal	Technical Officer	4-1-09A	59600

Fire Drill Marshals in BUILDING 2 (SOIT)

Name	Designation	Room No.	Contact (ext.)
LEVEL 4			
Dr. Lim Wern Han- Floor Marshal (leader)	Academic staff	2-4-33	59662
Mr Bathmanathan - Floor Marshal	Technical Officer	2-4-11	46265

Staff from SOE & SOIT trained with First Aid

Name	Designation	Room No.	Contact (ext.)
LEVEL 8			
Ms. Nur Liyana	Technical Officer	5-2-16	44464
LEVEL 7			
Mr. Sanush Abeysekera	Postgraduate student	5-7-01	61791
LEVEL 6			
Ms. Azreen	Technical Officer	5-5-35	46260
LEVEL 5			
Ms. Nurul Hidayah	Technical Officer	5-5-39	44462
LEVEL 4			
Ms. Prabakaran A/L Magendran	Administrative Executive	5-4-03	59771
LEVEL 3			
Mr. Md Nasrun	Technical Officer	5-3-09	45824
LEVEL 2			
Mr. Daniel Wong	Lab Manager	5-2-04	46183
LEVEL 1			
Mr. Azarudin Ahmad	Technical Officer	5-1-06	45649

First Aid Kit location

All laboratories contain a first aid kit. For specific location, refer to floor plans on pages 20-38 (Appendix)

First Aid box location and Person in-charge

School/Unit.	No of first aid kits	Locations. (Room No)	Activity SOE &SIT Office, laboratory etc.	Person in charge
	1	2-4-27	Office SIT	Bathmanathan
	1	2-4-09	Staff Lounge SIT	Bathmanathan
	1	2-4-05	Multimedia/Game Development Lab	Bathmanathan
	1	2-4-06	Networking Lab	Bathmanathan
	1	4-1-09	Research Mechanical Workshop	Mohamad Hanif
	1	5-1-01	Mechanical Workshop	Khalid
	1	5-1-02	Mechanical Advance Technology Workshop	Azlan
	1	5-1-12	SEM	Azarudin
	1	5-1-08	TEM	Azarudin
	1	5-1-04	Robotics Lab	Azlan
	1	5-1-18	Heavy Structure Lab	Afiq
	1	5-1-18C	Water Research Lab	Amir
	1	5-1-19	Forklift Parking Area	Afiq
	1	5-1-18B	Concrete Lab	Afiq
	1	5-1-18A	Soil & GeoTech Lab	Amir
	1	5-1-18E	Tensile Machine and Control Room	Afiq
	1	5-2-15	Artificial Intelligence lab	Manan
	1	5-2-14	Electrical Power Lab	Suresh
	1	5-2-12	Signal and Communication Lab	Suresh
	1	5-2-10	Computer Systems Lab	Fatiah
	1	5-2-03	Technical Office	Manan
	1	5-2-08	Staff Pantry Level 2	Manan
	1	5-2-06	Design Lab	Fatiah
	1	5-2-01	Prototyping Lab	Manan
	1	5-2-02	FYP Lab (General)	Manan
	1	5-2-05	Electronics Lab	Manan
	1	5-2-18	Civil Tutorial Room	Sofia
	1	5-2-19	Light Structure Lab	Sofia
	1	5-3-01	Control Lab	Panneerselvam
	1	5-3-03	CIM Lab	Panneerselvam
	1	5-3-04	Mechatronics Lab	Panneerselvam
	1	5-3-06	Project Lab	Bathmanathan
	1	5-3-08	Applied Mechanics Lab	Md Nasrun
	1	5-3-10	Fluids Mechanics Lab	Md Nasrun
	1	5-3-17	Soil & Geotechnique Lab	Amir
	1	5-3-15	Hydrology / Hydraulic Lab	Liyana
	1	5-3-16	Environmental Lab	Liyana
	1	5-3-14	Soil & Geotechnique Research Lab	Amir
	1	5-4-03	Managements Office SOE	Manan
	1	5-4-13	Staff Lounge, Level 4	Manan
	1	5-5-33	Chemical Engineering Lab 1 'Bioprocess Engineering Lab'	Azreen
	1	5-5-34	Chemical Instruments Room	Mohd Isha

1	5-5-36	Chemical Engineering Lab 2 'Catalysis & Energy Lab'	Mohd Isha
1	5-5-36B	Catalysis & Energy B	Mohd Isha
1	5-5-37	Chemical Engineering Lab 3 'Food Engineering Lab' 'MIPO Analytical Lab'	Sharon Wong
1	5-5-40	Chemical Engineering Lab 4 (Entrance) 'Water & Environment Lab' 'Colloidal & Polymer Lab'	Nurul Hidayah
1	5-5-40	Chemical Engineering Lab 4 (Exit) 'Water & Environment Lab' 'Colloidal & Polymer Lab'	Nurul Hidayah
1	5-5-40A	Water and Environment Lab	Nurul Hidayah
1	9-6-02	Fluid Dynamics (Wind Tunnel) Lab	Azlan
1	9-6-01	Instrumentation Room	Azlan
1	5-6-02	Wafer preparation area	Tharmaa
1	5-6-11	Mechatronic Lab	Tharmaa
1	5-6-09	GRS Office	Tharmaa
1	5-7-01	GRS Office (Entrance)	Manan
1	5-7-01	GRS Office (Exit)	Manan
1	5-8-01	Intelligent Lighting lab	Suresh
1	5-8-07	Physics Lab	Suresh
1	5-8-03	Civil Computer Lab - 1	Sofia
1	5-8-04	Civil Computer Lab - 2	Sofia

Standard Contents of the First Aid Box

NO	QTY	CONTENTS
1.	1 unit	Quality ABS Container
2.	1 box	Absorbent Cotton Wool
3.	1 bot	Acriflavine Solution
4.	2 pcs	Alcohol Swabs
5.	1 tub	Antiseptic Cream
6.	1 pc	Content Card
7.	1 box	Cotton Buds
8.	1 pc	First Aid Booklet
9.	1 box	Gauze Swabs
10.	1 pc	Lint Dressing No. 8
11.	10 pcs	Plaster Strips
12.	1 roll	Roll Plaster 1.25 cm x 1 m
13.	1 pc	Scissors s/s Foldable
14.	1 pair	Tweezers
15.	1 roll	W.O.W Bandage 2.5 cm x 5 m
16.	1 roll	W.O.W Bandage 5.0 cm x 5 m
17.	1 roll	W.O.W Bandage 7.5 cm x 5 m

Section 4: General Safety & Personal Safety Reminders

1. Acts of carelessness are prohibited.
2. Do not carry out any unauthorized experiments, tasks or job, and perform given experiments, tasks or job only according to directions.
3. Never work in a laboratory alone or at least without another person within easy call.
4. Smoking is not allowed in any area within the campus.
5. Wear safety glasses or face shields when working with hazardous materials and/or equipment.
6. Wear gloves when using any hazardous or toxic agent. They should be removed before leaving the lab, using telephones, opening refrigerators, or entering common areas.
7. Clothing: When handling dangerous substances, wear gloves, laboratory coats, and safety shield or glasses. Shorts and sandals should not be worn in the lab. Safety shoes are required when working near heavy machineries.
8. Wash hands before leaving the lab and before eating.
9. Consumption of food or beverages in the laboratory is forbidden. Food may not be stored in refrigerators located in a laboratory.
10. Tie back medium length and long hair when working near flames or entangling equipment.
11. Do not use any equipment unless you are trained and approved as a user.
12. Pregnant women should take special care with exposure to certain chemicals, which can be harmful to fetal development. Consult the Material Safety Data Sheet, Supervisor, or contact your Physician.
13. All accidents, no matter how minor, should be reported to the School/Staff member supervising the laboratory or, if unavailable, call **46333** from internal phone or **03-55146333**.
14. Know the location of all safety equipment (e.g. eyewash, fire extinguisher, fire blanket, safety showers, and spill kit) and how to use them.
15. Incident and Hazard Report Forms are also available through University's OH&S Committee. Submitted reports will help alert Committee to hazards on campus or unsafe work practices, and determine the frequency of accidents and/or injuries.
16. Keep aisles clear.
17. Maintain unobstructed access to all exits, fire extinguishers, electrical panels, emergency showers, and eyewashes.
18. Do not use corridors for storage or work areas.

19. If leaving a lab unattended, turn off all ignition sources and lock the doors.
20. Do not store heavy items above table height. Any overhead storage of supplies on top of cabinets should be limited to lightweight items only. Also, remember that a 36" diameter area around all fire sprinkler heads must be kept clear at all times.
21. Be careful when lifting heavy objects. Seek assistance, lift comfortably, avoid unnecessary bending, twisting, reaching out, and excessive weights, lift gradually and keep in good physical shape.
22. Know and follow safety rules, procedures and protocols.
23. Be aware of hazards, and the procedures for dealing with those hazards, before you start your work.
24. Fire doors must be kept closed at all times.
25. Familiarize yourself with all safety equipment and procedures in your work area (telephone, exits, fire extinguishers, fire alarms, fire blankets, safety shower, eyewash fountain, first aid kit, evacuation routes).
26. Never block emergency exits, emergency equipment or electrical panels
27. Post suitable warning signs if a specific hazardous situation exists; include the name and phone number of individual(s) responsible.
28. Maintain a tidy workplace.
29. Research labs must keep lab doors closed to effect proper ventilation of the lab.
30. Keep your work area locked when unoccupied to avoid unauthorized entry.
31. No bicycles, roller blades or pets in the building.

Section 5: Electrical Hazards

1. Electrical equipment must be GFI-protected (i.e. "grounded") when used near any water source. If water or fluid is spilled in or around electrical equipment, FIRST shut off circuit breaker, then unplug the equipment before cleaning up the spill.
2. Maintain a 36" unobstructed access to all electrical panels.
3. Sufficient room for work must be present in the area of breaker boxes. All the circuit breakers and the fuses must be labeled to indicate whether they are in "on" or "off" position, and what appliance or room area is served.
4. Fuses must be properly rated.
5. Avoid using extension cords whenever possible. If you must use one, obtain a heavy duty one that is electrically grounded, with its own fuse, and install it safely. Extension cords should not go under doors, across aisles, be hung from the ceiling, or plugged into other extension cords.
6. Do not route cords over metal objects such as emergency showers, overhead pipes, frames or metal racks.
7. Outline emergency stop button for all high voltage supply, machines and trainers

Response to apparent Electrocution

Step 1: Assess the situation and ensure safety of yourself, the victim and others

Step 2: TURN OFF THE POWER. If it can't be turned off, stand on a dry insulated surface (rubber mat, newspaper, etc.) and use NON-METAL object to move victim from danger

Step 3: Call **46333** from internal phone or **03-55146333** and immediately notify the nearest Technical Officer

Step 4: Wait for help to arrive

Electrical Failures

Electrical failures can disrupt work and study activities throughout individual buildings or large areas of the campus. In order to ensure safety, the following guidelines should be followed:

Before a Power Outage:

- (i) Battery-powered flashlights should be kept at known locations, readily accessible during outages. Candles and other open flame devices are prohibited.
- (ii) Keep duplicates of critical data.
- (iii) Determine if there are emergency power outlets in your area. Use them for critical functions only.
- (iv) Determine if there is emergency lighting in your area. Keep flashlights in all work areas.

Short-Term Power Outage:

- (i) Assess the extent of the outage in your area. Report outages to the nearest Technical Officer or Staff member.
- (ii) If you are told to leave the building, lock or secure your area, collect your personal belongings and leave. Reenter the building only when directed to do so by the Technical Officer or Staff Member. If evacuation of the building is not necessary, restrict movement to areas that are adequately illuminated.
- (iii) Report any losses or equipment damage to School Manager or Lab Manager as soon as possible.

Response to Prolonged Power Outage:

- (i) Move building occupants in darkened work areas to safe locations. Keep refrigerators and freezers closed throughout the outage.
- (ii) Unplug personal computers.
- (iii) Unplug non-essential electrical equipment and appliances.
- (iv) Open windows for additional light and ventilation, if appropriate.
- (v) Campus administration will make the decision to cancel classes as necessary.
- (vi) Report any losses or equipment damage to School Manager or Lab Manager as soon as possible.

After Power Outage:

- (i) After a power outage make sure that all power is restored before turning on any equipment.
- (ii) Before using the lifts, ensure that all lifts are reset as well as security systems reactivated and other alarms are reset, if applicable.

Section 6: Mechanical Hazards

For mechanical workshop and labs

1. When using compressed air, use only approved nozzles and do not direct the air towards any person. Take note of the location of the emergency stop switch for the compressor.
2. Guards on machinery must be in place during operation.
3. Exercise care when working with or near hydraulically- or pneumatically-driven equipment. Sudden or unexpected motion can inflict serious injury. Take note and outline the emergency stop button for all high-risk, critical equipment and heavy machineries.
4. Those who work in the workshop should use appropriate personal protective clothing and equipment that must be carefully selected, used, and maintained to be effective in preventing skin contact with welding fumes. The selection of the appropriate personal protective equipment (PPE) (e.g., gloves, sleeves, encapsulating suits) should be based on the extent of the worker's potential exposure to welding fumes.
5. Splash-proof chemical safety goggles or face shields (20 to 30 cm long, minimum) should be worn during any operation in which a solvent, caustic, or other toxic substance may be splashed into the eyes.
6. Protective clothing should be kept free of oil and grease and should be inspected and maintained regularly to preserve its effectiveness.

Section 7: Chemical Hazards

For Chemical labs

1. Never carry out unauthorized experiments.

2. Avoid inhaling any substances and never taste any substance in the laboratory unless the procedure is part of a supervised experiment.
3. Handling of glassware – Glass breakage is a common cause of injuries in laboratories. Only glass in good condition should be used. Discard or send for repair all broken, chipped, starred, or badly scratched glassware. If you are in doubt, inform the Technical Officer in charge of the situation.
4. Hand protection should be used when picking up broken glass. Protect hands with leather gloves when inserting glass tubing. Hold elbows close to the body to limit movement when handling tubing. Do not attempt to catch glassware if it is dropped or knocked over.
5. Volatile solvents – can pose inhalation, skin and ingestion hazards. Some of the solvents may also be flammable, which could cause fire and/or explosion hazards. Whenever possible, use volatile solvents in a properly operating fume hood to eliminate inhalation hazards, use correct skin and eye protection and use good laboratory and hygienic technique to eliminate any possible ingestion of volatile solvents.
6. Use volatile and flammable compounds only in a fume hood. Procedures that produce aerosols should be performed in a hood to prevent inhalation of hazardous material. Be sure the fan is on at all times when using a fume hood. Fume hoods should not be used for storage.
7. Incompatible chemicals – keep oxidizing agents separated from reducing agents, initiators separated from monomers, and acids separated from alkalis.
8. Make sure all chemicals are clearly and currently labeled with the substance name, concentration, date, and name of the individual responsible.
9. All pressurized containers (e.g. gas cylinders) must be moved and installed only by Technical Officer or authorized Staff member.
10. Secure all gas cylinders and label all chemicals to show nature and degree of hazard.
11. Handling and transportation of chemicals – When large bottles of acids, solvents, or other liquids are transported within the laboratory without a cart, only one bottle should be carried at a time. The bottle should be carried with both hands, one on the neck of the bottle and the other underneath.
12. Material Safety Data Sheets (MSDS) must be provided for all hazardous chemicals before use. MSDS are kept in a predetermined area in the labs.
13. Cleanup of large spills should not be attempted by students or teaching assistants. Ask the nearest Technical Officer for help. Evacuation of a laboratory should be conducted in event of a large chemical spill.
14. Know the proper use of chemicals and proper disposal of waste. Scheduled waste disposal is arranged by the Technical Officers with Kualiti Alam Sdn Bhd. Consult Technical Officers in charge of the Chemical Engineering Lab of the scheduled waste collection.

Dress code

- Student working with hazardous chemicals in laboratories must wear closed-toe shoes, long pants or skirts which fully cover the legs, and a lab coat. Student shall

confine long hair and secure loose clothing and jewelry before beginning work. Each laboratory will determine required additional personal protective equipment (PPE) such as gloves and eye protection appropriate for working with specific materials.

Chemical Spill

Large amount, Hazardous or suspected hazardous substance

Do's

- Call ext. **46333** or **03-55146333** and immediately inform the nearest Technical Officer
- Close the door and leave the area immediately

Don'ts

- Try to clean the spill on your own
- Use water or cleaning powders or clothes to clean the spill

Small amount, non-hazardous, minor spill

Spill kits are available to clean up **minor** spills. The kit includes:

- (i) Usage Instructions
- (ii) Personal protective equipment including gloves, safety goggles and other protective clothing
- (iii) Spill pads or pillows sufficient to contain and absorb 1 liter of liquid
- (iv) Plastic bags or containers to place spill waste material

Do **NOT** attempt to clean up a spill if any of the following conditions apply:

- (i) More than one chemical has spilled
- (ii) The quantity spilled is greater than one liter
- (iii) The substance is unknown or you are uncertain of the hazards of the substance; or
- (iv) You are uncomfortable in the situation.

Chemical splashed on eyes

- (i) Immediately inform the nearest Technical Officer or Staff member
- (ii) Quickly proceed to eyewash station.
- (iii) Wash eyes copiously with water for 10 to 15 minutes. Ensure that the eyes are held open while washing
- (iv) Wash skin areas that come into contact with chemicals, irrespective of the concentration of the substance

Chemical spill on body

- (i) Immediately inform the nearest Technical Officer or Staff member
- (ii) Quickly proceed to emergency shower station.
- (iii) Remove all contaminated clothing
- (iv) Flood exposed area with running water from a faucet or safety shower for at least 15 minutes

Fume Hood

Laboratory fume hoods serve to control exposure to toxic, offensive or flammable vapors, gases and aerosols. Fume hoods are the primary method of exposure control in the laboratory.

Use the right hood for the job. The hood available in the Chemical Engineering Lab is a General Purpose, Standard Fume Hood and **STRICTLY NOT** for per chloric acid use.

Equipment Use

- (i) Place apparatus and equipment as far back as possible in hood for safety and optimal performance. Equipment should be placed a minimum of 8 inches inside the hood. Keep electrical connections outside of hood.
- (ii) Ensure that equipment or materials do not block the baffle vents in the back of the hood.
- (iii) When using a large apparatus inside the hood, place the equipment on blocks, when safe and practical, to allow air flow beneath it.
- (iv) Do not place electrical apparatus or other ignition sources inside the hood when flammable liquids or gases are present. Keep in mind that liquids with low flash points may ignite if they are near heat sources such as hot plates or steam lines.

Fume Hood's Good Work and Housekeeping Practices

- (i) When using the fume hood, keep your face outside the plane of the hood sash and remain alert to changes in air flow.
- (ii) Work at least 6 inches back from the face of the hood. A stripe on the bench surface is a good reminder.
- (iii) Always use splash goggles, and wear a full face shield if there is possibility of an explosion or eruption.
- (iv) Do not make quick motions into or out of the hood, use fans, or walk quickly by the hood opening. All will cause airflow disturbances which reduce the effectiveness of the hood.
- (v) Substitute less hazardous or less volatile chemicals where possible.
- (vi) Limit chemical storage in fume hoods. Keep the smallest amount of chemicals in the hood needed to conduct the procedure at hand. Store hazardous chemicals such as flammable liquids in an approved safety cabinet. Excessive storage of materials or equipment can cause eddy currents or reverse flow resulting in contaminants escaping from the hood.
- (vii) Keep caps on chemical reagent bottles tight and check fitting on laboratory glassware to minimize vapor loss

- (viii) Do not use the hood as a waste disposal mechanism. Apparatus used in a hood should be fitted with condensers, traps, or scrubbers to contain and collect waste solvents, toxic vapors or dust.
- (ix) Look for process changes that improve safety and reduce losses to the environment (e.g. more accurate chemical delivery systems vs. pouring volatile chemicals from bottles)
- (x) Develop a process to evaluate research proposals ahead of time for potential emissions and look for opportunities to reduce them.

Note: Always use good housekeeping techniques to maintain the hood at optimal performance levels.

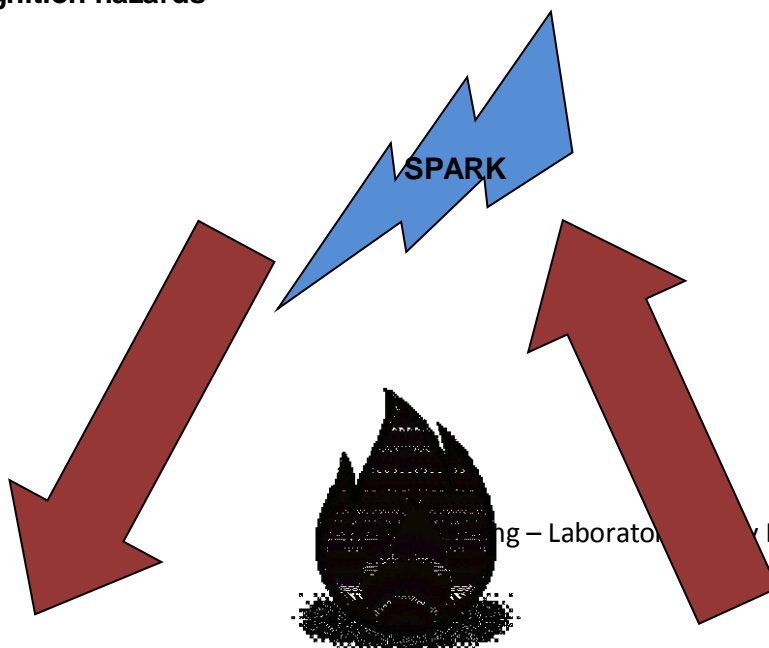
Proper Sash Use

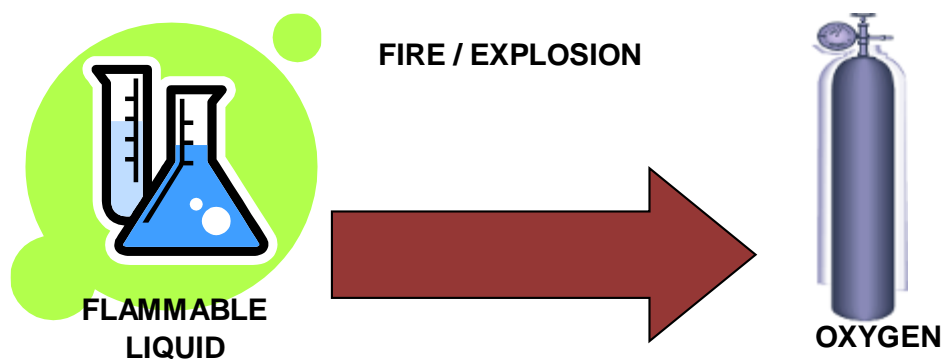
- (i) Do not remove sashes from sliding sash hoods. The hood should be kept closed, except when working within the hood is necessary.
- (ii) Use sliding sash for partial protection during hazardous work.
- (iii) Do not remove the sash or panels except when necessary for apparatus set-up. Replace sash or panels before operating.
- (iv) Keep the slots of the hood baffles free of obstruction by apparatus or containers.
- (v) Keep the hood sash closed as much as possible to maximize the hood's performance. Keep the sash closed when not in use to maximize energy conservation.

Section 8: Flammability Hazards

What is important to note about the flammability range is that some chemicals have a very wide range of flammability (e.g. acetaldehyde, carbon disulfide, ether and methanol). These chemicals are particularly hazardous because the window for ignition is much wider -- increased vigilance must be exercised when using these materials.

Recognizing ignition hazards





Fires don't just happen. Three key ingredients are required for ignition to occur. Each of these three ingredients makes up the three legs of what is known as the "fire triangle". Fuel is one ingredient, and in the laboratory setting, the biggest, and most dangerous, fuel source is the stockpiles of flammable chemicals used daily. The second requirement is oxygen. Fires cannot burn without an oxygen source. This can be in the form of air, [chemical oxidizers](#), or cylinders of oxygen. For the ignition to occur, the fuel and air must come in contact. But mixtures of these two ingredients do not necessarily lead to a fire situation; there must also be enough energy to break and reform the chemical bonds. The final leg of the fire triangle supplies the necessary energy, or spark, that ignites the fuel/air mixture. With the triangle completed, a fire is likely.

It is important to recognize what constitutes an ignition hazard. Many fires occur because people are unaware of what is a hazard, or are careless when working with flammables around potential ignition sources. Examples of ignition sources are:

- cigarettes
- open flames from matches, Bunsen burners, pilot lights
- friction or grinding
- static electricity
- sparks generated when lights or motors switch on (especially common fire hazard for domestic refrigerators where flammables are stored)
- hot plates and heating ovens
- exposure of pyrophoric materials to air, or water reactive materials to moisture
- LASER beam

And do not forget about the vapors given off from an open container of volatile liquid. Many fires have occurred when the vapors from an open container travelled along the lab bench to an ignition source and were ignited.

Ventilation Fan

The use of ventilation fans will minimize the risk of catching up a fire. In any condition, please do switch on the ventilation fan when you are working in the labs equipped with such facility.

Section 9: Civil Hazards

General Laboratory Safety

General

- Know and follow safety rules, procedures and protocols
- Be aware of hazards, and the procedures for dealing with those hazards, before you start your work
- Fire doors must be kept closed at all times
- Familiarize yourself with all safety equipment and procedures in your work area (telephone, exits, fire extinguishers, fire alarms, fire blankets, safety shower, eyewash fountain, first aid kit, evacuation routes)
- Never block emergency exits, emergency equipment or electrical panels
- Post suitable warning signs if a specific hazardous situation exists; include the name and phone number of individual(s) responsible
- Maintain a tidy workplace
- Research labs must keep lab doors closed to effect proper ventilation of the lab
- Keep your work area locked when unoccupied to avoid unauthorized entry
- No bicycles, roller blades or pets in the building

Student/Worker Safety Orientation Checklist

Release of Liability for Visitors and Volunteers

Working Alone

Undergraduate students must not work alone in a laboratory at any time. A second person must be present and must assume responsibility for supervision of the undergraduate. The work carried out must be authorized by a faculty member.

For other members of the Department, working alone is usually defined as working in a laboratory outside of normal working hours (8.30 a.m. to 5.30 p.m., Monday through Friday) in the absence of any other co-workers. Individuals may work alone if their laboratory work is of a non-hazardous nature and if there is someone else working on the same floor and wing of the building and is aware of their presence.

If, for some reason, hazardous work must be performed outside normal working hours then the following procedure must be followed:

1. The work must have your supervisor's approval,
2. A second co-worker must be available in case of emergency, or
3. The Emergency Report Centre (ext. 46040) and/or Campus Security (ext. 46333) must be contacted to set up a check-in routine with you; they must be contacted once your work is completed.

Safety Rules within the Department of Civil Engineering

1. All accidents must be reported to your supervisor and to the Department Safety Officer.

2. Anyone wishing to use any power tools must have the approval of a qualified technician and must have received appropriate training on that equipment prior to any use.
3. Faculty, staff and students must not work alone when using power tools, hazardous substances, or dangerous equipment. Undergraduates must not work alone in a laboratory at any time. No unauthorized work shall be performed in the testing laboratories and shops after normal operating hours.
4. The student/workers must notify their supervisor if they will be working after normal operating hours in any testing laboratories or shops and must abide by the university's policy on working alone.
5. All laboratory and shop doors will be locked after normal operating hours (i.e. 8:30 am to 5:30 pm). If a later lockup time is needed, responsibility for ensuring a particular laboratory is locked may be transferred to a responsible person.
6. An undergraduate student may work in testing laboratory areas only if a faculty member or staff member is notified, and there is a responsible person present (any exceptions to this policy will be made by the Department Head).
7. All supervisors are responsible for ensuring that proper personal protective equipment is worn by their student/worker (e.g. safety shoes, safety glasses, safety helmets etc.).
8. The initial use of any unproven testing system must be supervised by the principal investigator responsible for the project. This includes all testing systems which employ any hazardous substance. The health and safety of all persons who may come in contact with a testing system must be considered.
9. For testing systems which use regulated hazardous substances, a written plan specifying all control measures to be taken to ensure the safe handling of the substance(s) must be developed. This plan should include details of the procedures to be used in case of accidental spill or exposure of workers/students, and the method of disposal should be outlined. The plan must have the approval of the Department of Environmental Health and Safety and the Safety Officer.
10. All hazardous substances purchased or received in the Department must be done via the Environmental Technologist, so proper handling and storage procedures are met. All shipments of hazardous substances must meet the Transport of Dangerous Goods legislation and the universities standard operating procedures.
11. All supervisors are responsible for ensuring that their student/worker completes a Workplace Hazardous Materials Information System (WHMIS) training course.
12. **All students/workers and supervisors must complete and sign the student/worker safety orientation checklist.**

Guidelines on the Operation of Cranes and Hoists

The following guidelines are for persons who request the use of cranes or hoists. Any permission is limited to the crane(s) and/or hoist(s) listed in the description section of a 'Record of Training' **(not everyone requesting the use of cranes and hoists will be granted this permission)**.

A competent certified crane operator will be assigned to provide limited training and guidance. Only those persons who will be operating a crane or hoist may be trained and this training will be tailored to the lift operation(s) needed and no other lift may be attempted.

Guidelines:

1. Only persons who are trained and certified as crane operators and have a completed Record of Training may operate lifting equipment

2. Operators must be tested on each lift operation by a certified competent crane operator and this training must be documented on their Record of Training
3. Only approved lift operations will be performed (some lifts will not be approved)
4. **NO LIFTS MAY BE PERFORMED WHERE THE LOAD PASSES OVER ANOTHER PERSON!**
5. **NO LIFTS MAY BE PERFORMED WHILE WORKING ALONE!**
6. **SAFETY HELMETS MUST BE WORN FOR ALL LIFT OPERATIONS!**
7. In general, the equipment will only be used during normal operating hours and be locked-out when not in use
8. Persons in care and control of any hoisting equipment are responsible for the safety of all personnel in the near vicinity
9. Any lift operations after normal operating hours must have the prior approval of the operator's supervisor and the Departmental Manager

General Operating Instructions

1. Only qualified persons may operate this unit.
2. Ensure the load to be lifted is within the crane, chains or slings capacity.
3. Before picking-up a load, check for hook to be directly above load and load is balanced; **AVOID OFF-CENTER LOADING OF ANY KIND.**
4. Never lift or transport a load until all persons are clear.
5. To lift load adjust control valve clock wise all the way until fully closed and then open by turning counter clock-wise a quarter turn, then pump hydraulic ram slowly until load is suspended.
6. Avoid shock and jerking of hoist load chain. If there is any evidence of overloading, immediately lower load.
7. Before attempting to transport load, test stability of the system and adjust load if necessary.
8. When transporting a load with portable crane, keep the load suspended just clear of the floor and/or supported by crane legs.
9. Install boom to the portable crane to extend reach out and up for load lifting, watch for pinch points while adjusting boom.
10. The load capacity of the crane is significantly diminished with the extension boom installed. Overload relief valve in hydraulic system will not prevent crane from tipping if overloaded.

Operating Instructions for 10 Ton Overhead Crane

Crane pre-operation inspection

1. Visually inspect cables, rope drum, hook (hook should turn freely), and safety latches ensuring they are in good working conditions.
2. Test limit switches by raising the hook block without load (Hook block should stop when there is 3 cable loops on drum) and then lowering the hook block (Hook should not touch the floor). **DO NOT** operate crane if limit switches are not operating properly.
3. Ensure the hoist trolley and brakes work properly by moving crane in all directions.

General Operating Instructions

1. Only qualified persons may operate this unit.
2. Ensure the load to be lifted is within the crane, chains or slings capacity.

3. Before picking-up a load, check for hook to be directly above load and load is balanced; **AVOID OFF-CENTER LOADING OF ANY KIND.**
4. Never lift or transport a load until all persons are clear.
5. Avoid shock and jerking of hoist load chain. If there is any evidence of overloading, immediately lower load.
6. **DO NOT** allow load to bear against the hook latch.
7. Take up a slack load chain carefully and start load slowly to avoid shock and jerking of hoist load chain. If there is any evidence of overloading, immediately lower load.

Safety Procedure

1. **DO NOT use crane for lifting persons.**
2. **DO NOT** use damaged chains or slings.
3. **DO NOT** load hoist, chains or slings beyond the rated capacity.
4. **DO NOT** allow load to swing or twist while hoisting.
5. **DO NOT** leave suspended load unattended.
6. **DO NOT** allow load to bear against the hook latch.
7. **DO NOT** move load over the head of any person. Warn all persons of your intentions to move load into their area.
8. **DO NOT** wrap load chain around load or choke the chain around load.
9. Ensure attachments to the hook are firmly seated in hook saddle.
10. **DO NOT** loads the point of hook; avoid off-center loading of any kind.
11. **DO NOT** operate hoist if reeved hoist chains are twisted.
12. **DO NOT** allow load to bear against the hook latch.
13. **NEVER** operate the hoist when flammable materials or vapors are present. Electrical devices produce arcs or sparks that may cause a fire or explosion.
14. **DO NOT** uses hoist when tired, distracted or under the influence of drugs, alcohol or medication which cause diminished control.
15. **STAY ALERT**, watch what you are doing and use common sense.

Reporting of Accidents

Minor accidents involving hazardous chemicals or the malfunction and/or breakdown of equipment must be reported to your supervisor. More serious accidents must be reported to the Department Safety Officer and the Head of the Department as well as to your supervisor.

All accidents involving personal injury must be reported promptly to your supervisor who is responsible for ensuring that the procedures below are followed. If your supervisor is not immediately available, contact the Department Safety Officer or the Head of the Department.

- Apply first aid (first aid kits available on all floors); first aid should be given by someone who has had appropriate training
- In the case of injuries that are more severe, or there is doubt about the severity of the injury, and emergency assistance is required, call ext. 46333 from an internal phone (or 999 from an external phone). A **SEVERELY INJURED PERSON MUST NOT IS MOVED** without the advice of medical or ambulance personnel.
- If it is necessary to call an ambulance, indicate the location of the injured person and the location of the nearest appropriate entrance to the building. If possible send someone to that entrance to lead the ambulance personnel to the injured person.

For all accidents involving critical injury or death:

- Immediately call ext. 46333 for assistance
- As soon as possible, notify your supervisor, the Head of the Department (or Safety Officer), and the Department of Environmental Health and Safety. The latter will notify the appropriate government agencies.
- Do not touch anything associated with the accident, except for the purpose of saving life, relieving suffering or preventing unnecessary damage to equipment or property. The scene of an accident must be examined by the appropriate authorities.

Section 9: Appendices

APPENDIX A

Useful Website Links

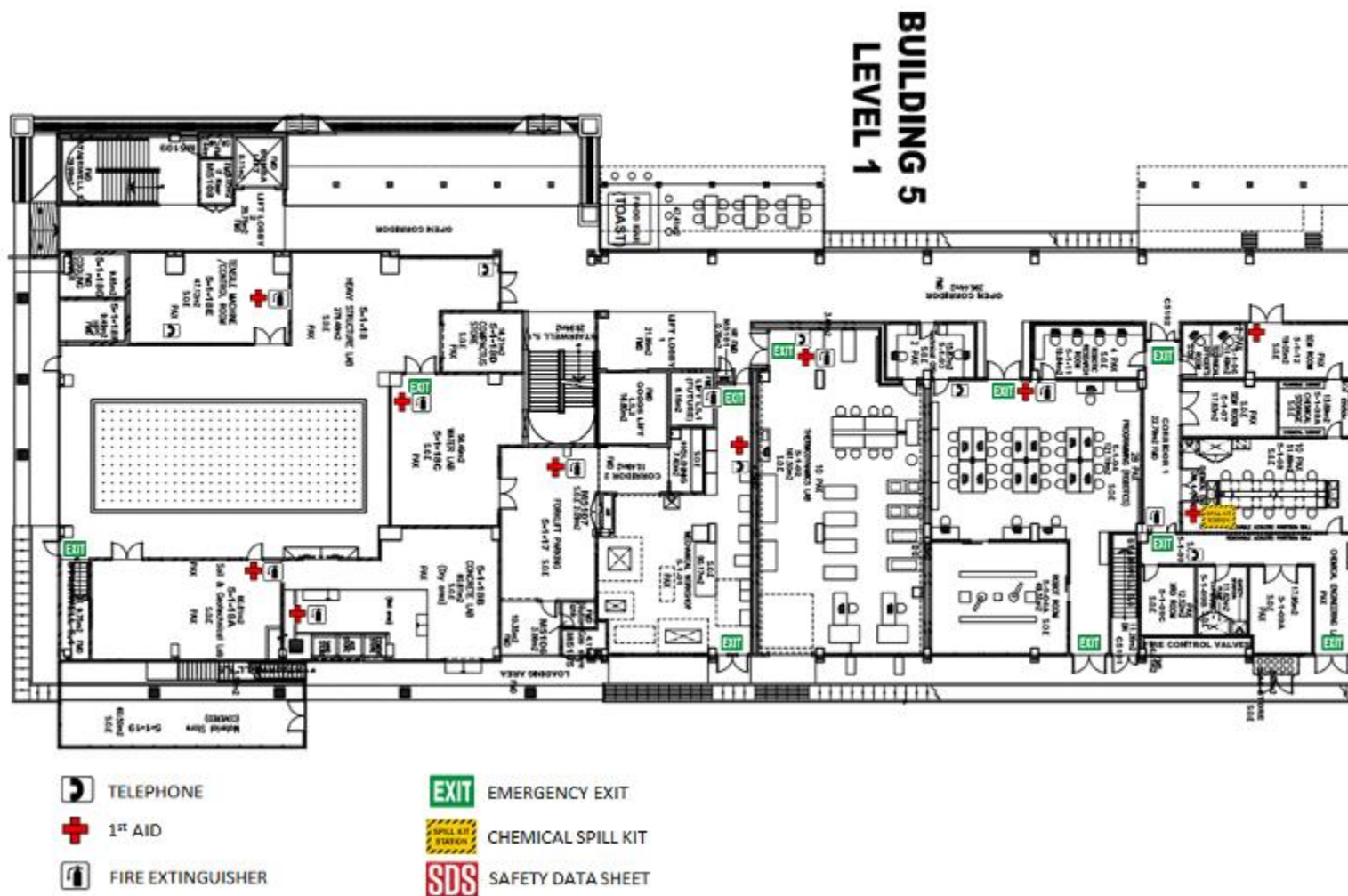
1. Monash University Malaysia OHSE <http://www.monash.edu.my/ohse/>
2. Hazard & Incident Report Form, Industrial Accident Investigation Report Form
<http://students.monash.edu.my/forms/OHSE%20Hazard%20Reporting/Forms/AllItems.aspx>
3. Monash University Australia OHSE <http://www.adm.monash.edu.au/ohse/>
4. Department of Occupational Safety and Health Malaysia
<http://www.dosh.gov.my/index.php/en/>
5. National Institute of Occupational Health and Safety Malaysia
<http://www.niosh.com.my/>
6. WorkSafe Victoria <http://www.workcover.vic.gov.au/wps/wcm/connect/WorkSafe>
7. Occupational Safety and Health Administration <http://www.osha.gov/>
8. Health and Safety Executive, UK <http://www.hse.gov.uk/>
9. Health and Safety, UK <http://www.healthandsafety.co.uk/>
10. The Laboratory Safety Institute <http://www.labsafetyinstitute.org/>
11. The Laboratory Safety Manual, Princeton University
<http://web.princeton.edu/sites/ehs/labsafetymanual/index.html>

12. Electrical Safety Foundation International <http://www.esfi.org>
13. The Safety Data Sheet FAQ <http://www.ilpi.com/msds/faq/>
14. Material <http://www.msds.com.au/>
15. MSDSonline <http://www.msdsonline.com/>

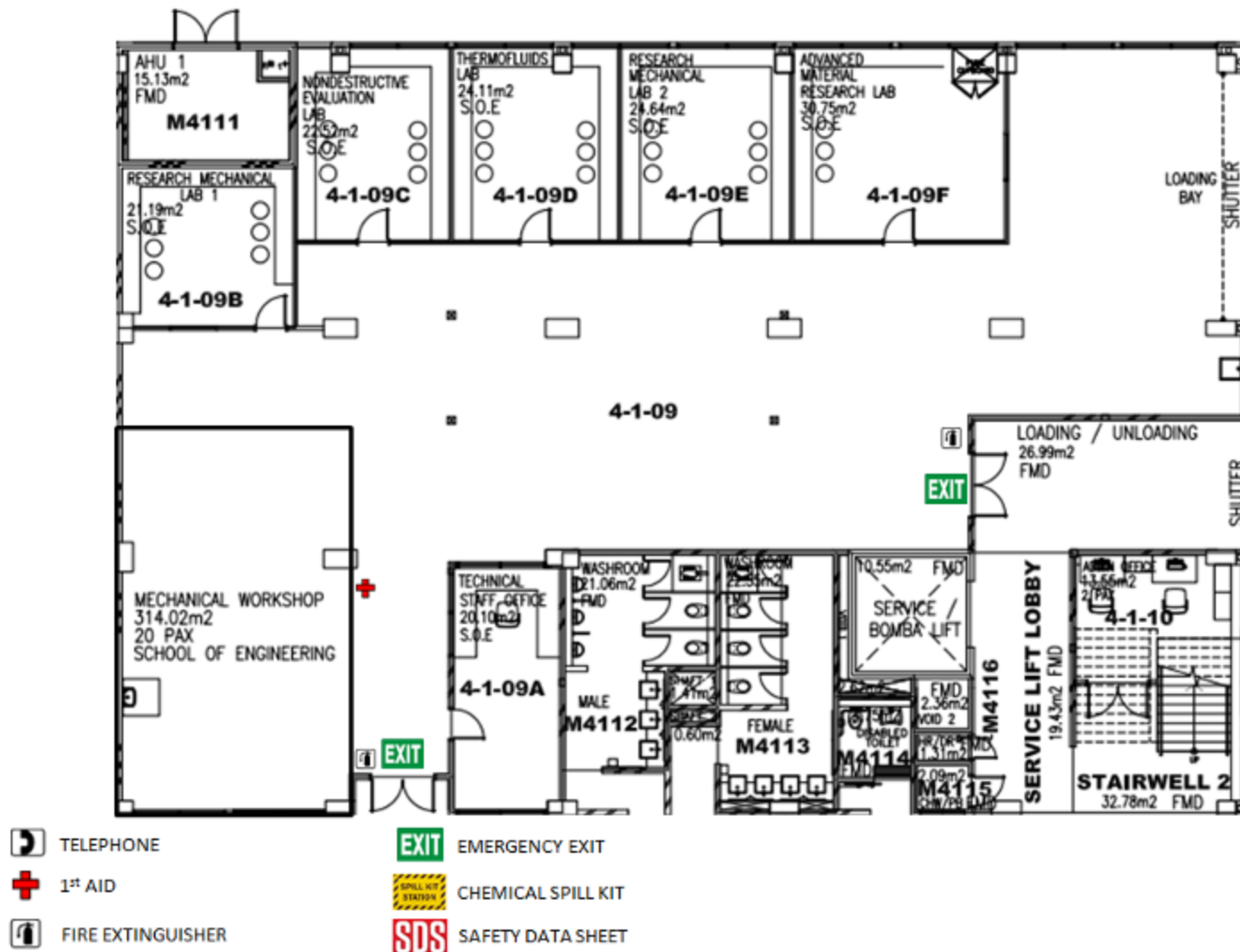
APPENDIX B

Engineering Laboratories Floor Plan

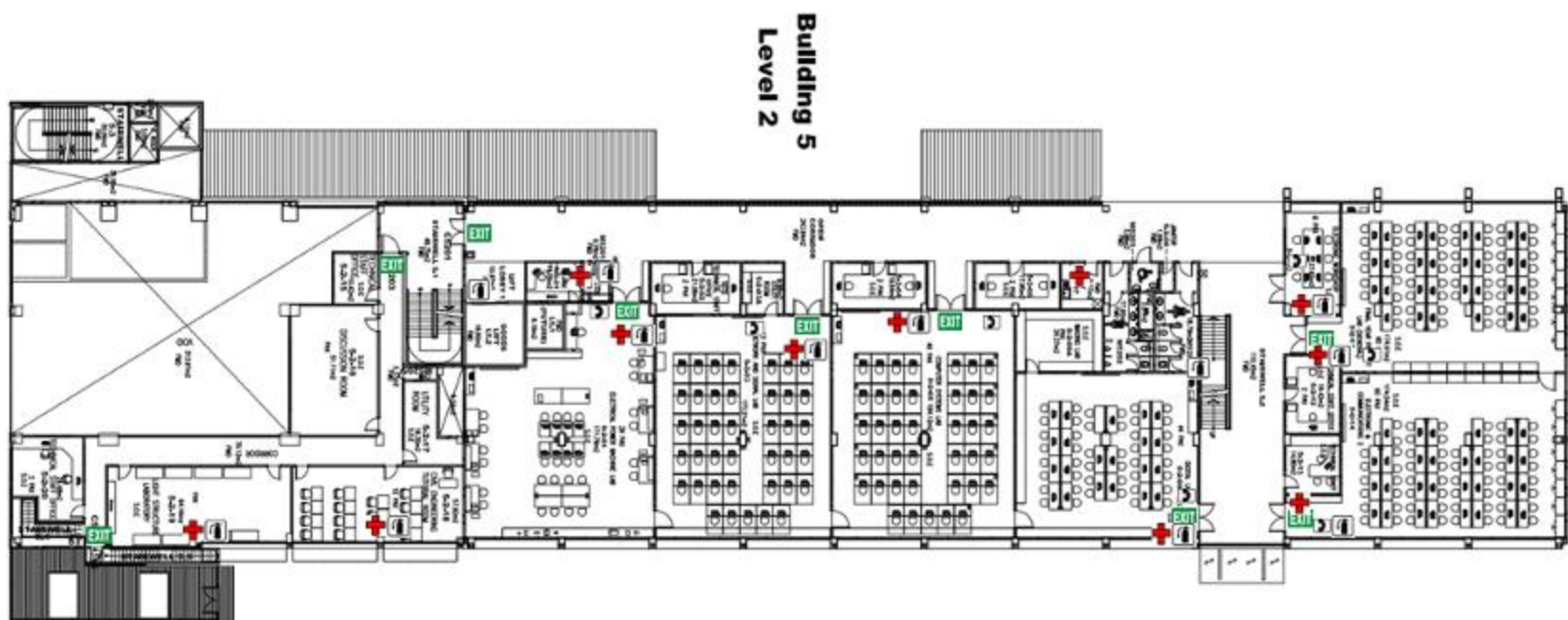
BUILDING 5 LEVEL 1




BUILDING 4 LEVEL 1




BUILDING 5 LEVEL 2



 TELEPHONE

 1st AID

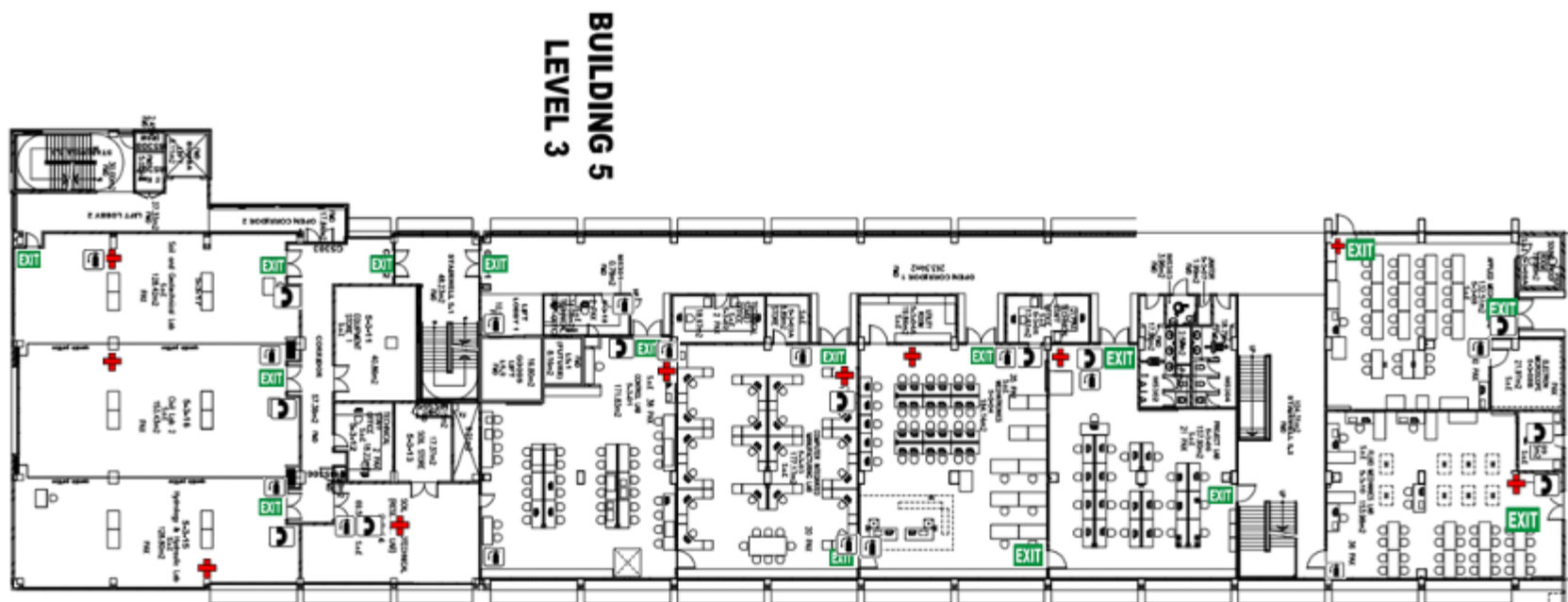
 FIRE EXTINGUISHER

 EMERGENCY EXIT


 CHEMICAL SPILL KIT

 SAFETY DATA SHEET

BUILDING 5 LEVEL 3




 TELEPHONE

 1st AID

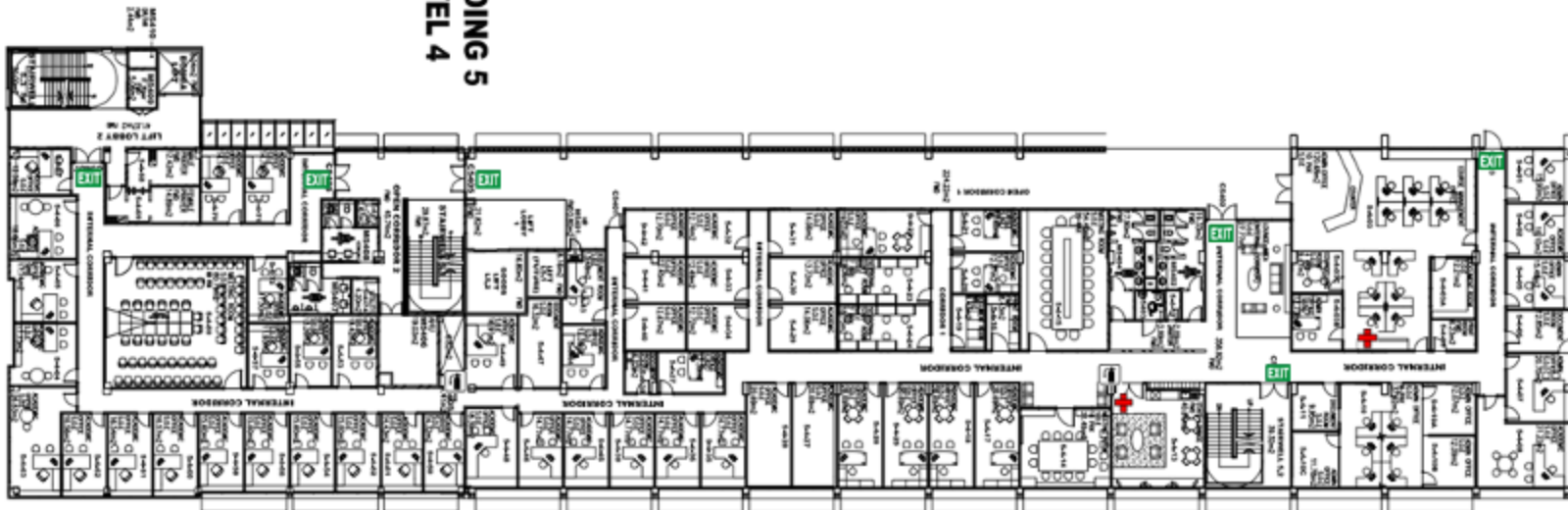
 FIRE EXTINGUISHER

 EMERGENCY EXIT

 CHEMICAL SPILL KIT

 SAFETY DATA SHEET

BUILDING 5
LEVEL 4



TELEPHONE



1st AID



FIRE EXTINGUISHER



EMERGENCY EXIT



CHEMICAL SPILL KIT



SAFETY DATA SHEET

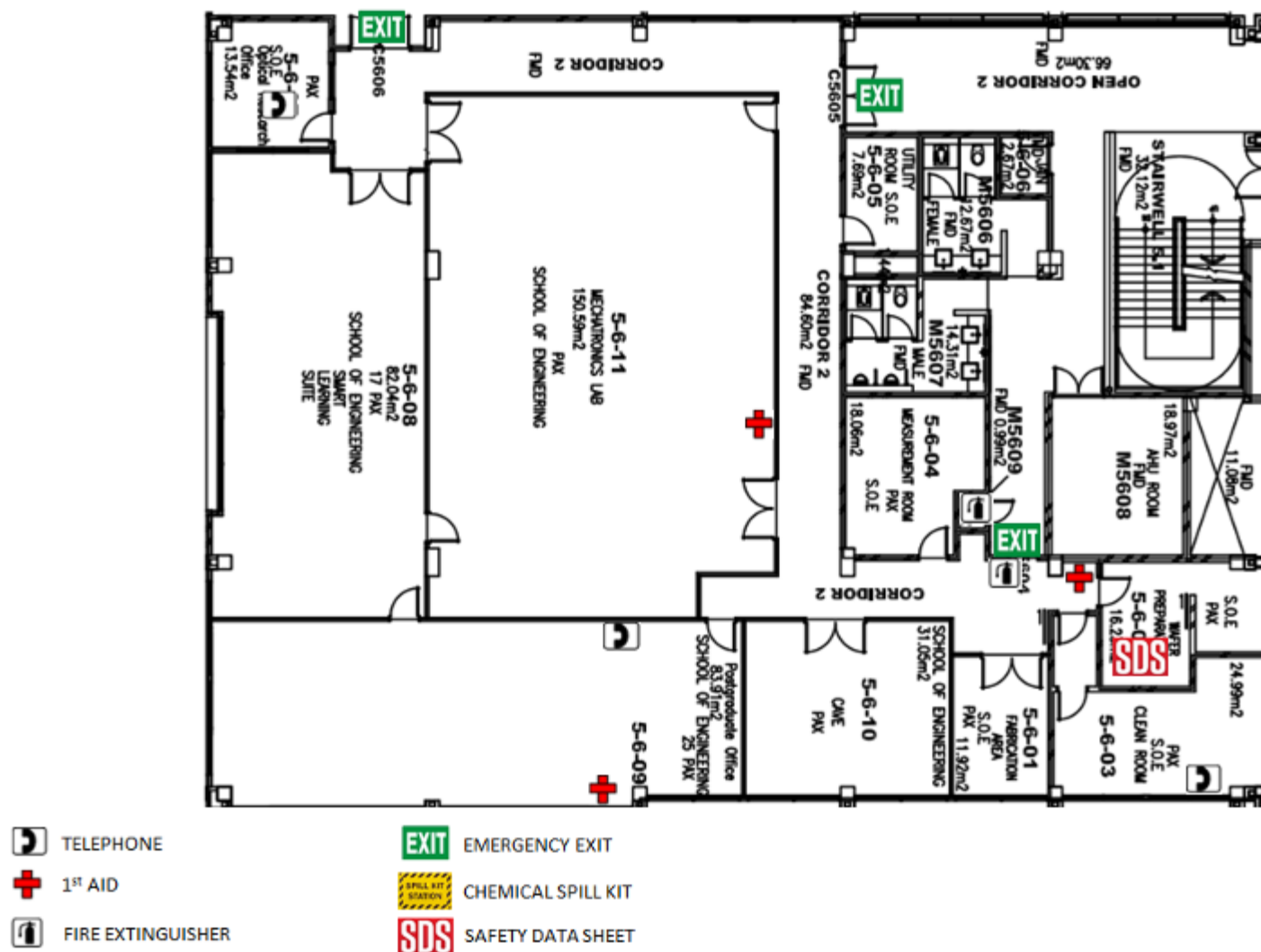
BUILDING 2 LEVEL 4



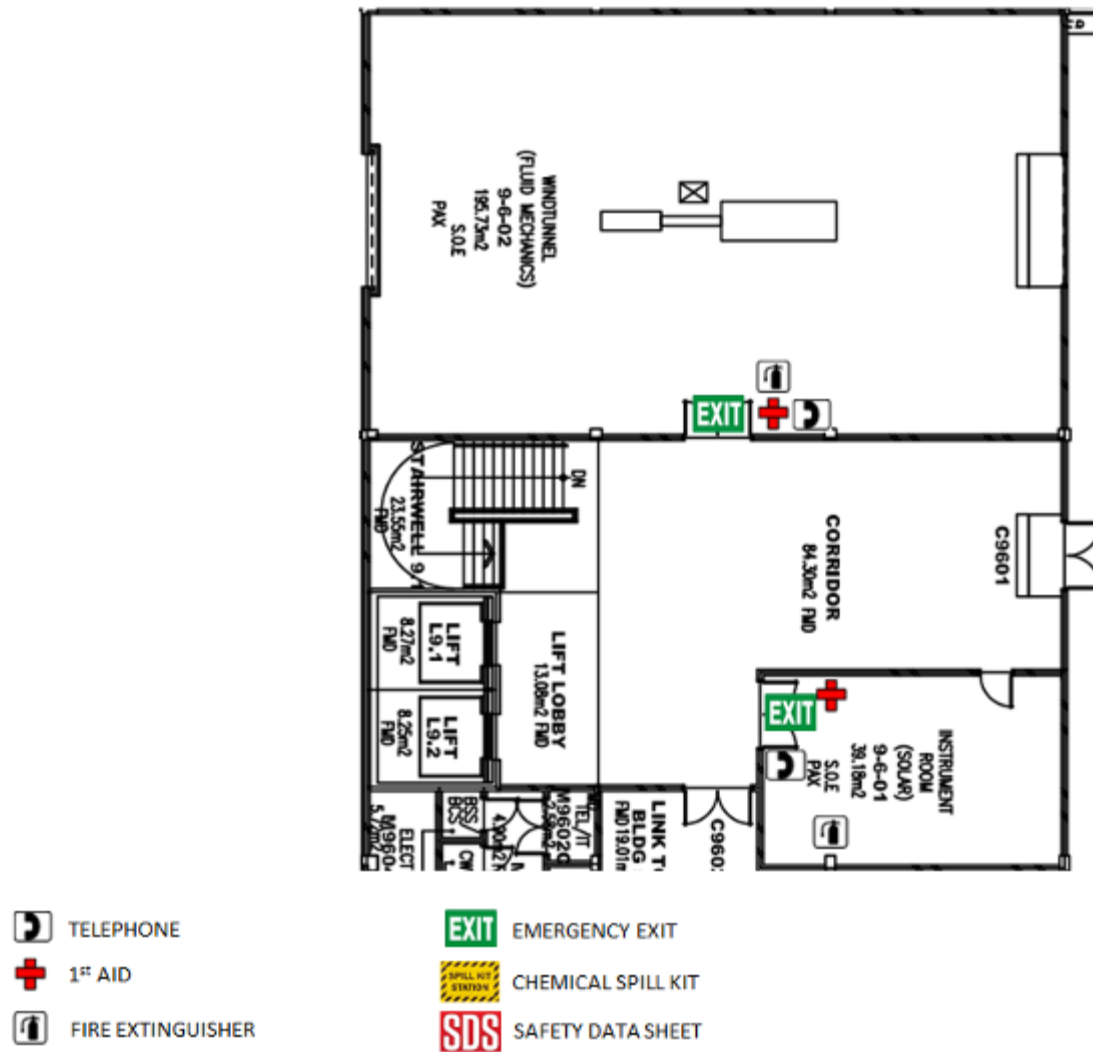
**BUILDING 5
LEVEL 5**



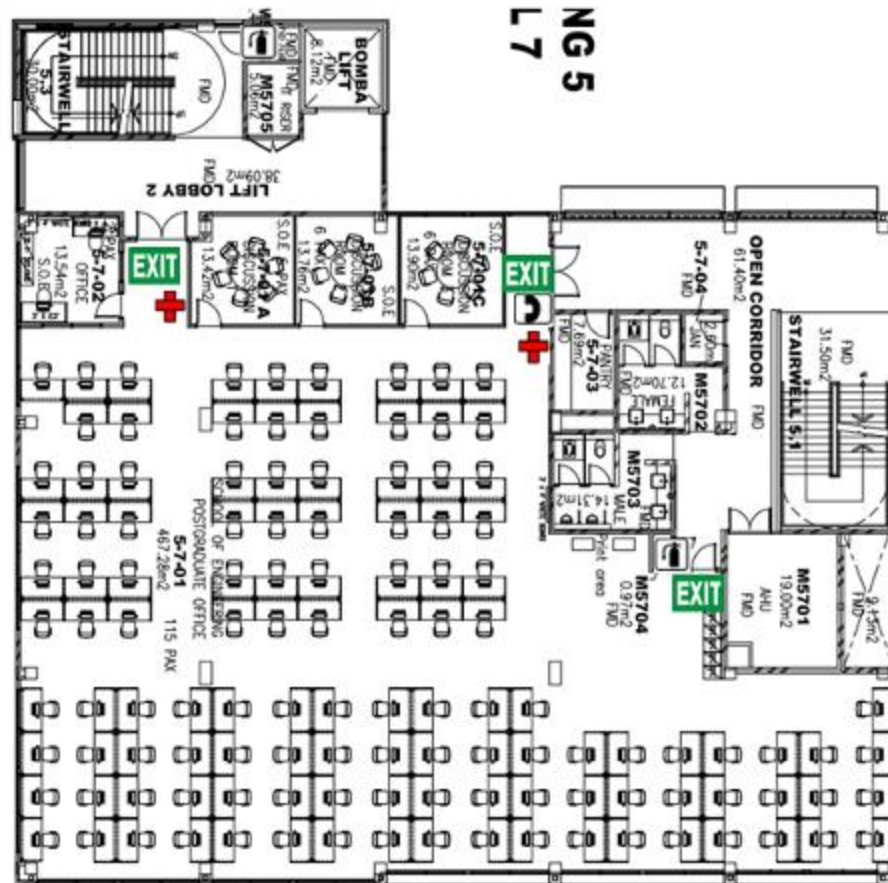
BUILDING 5 LEVEL 6



BUILDING 9 LEVEL 6



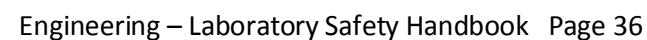
BUILDING 5 LEVEL 7



-  TELEPHONE
-  1st AID
-  FIRE EXTINGUISHER

-  EMERGENCY EXIT
-  CHEMICAL SPILL KIT
-  SAFETY DATA SHEET

8 65



APPENDIX C



Engineering Laboratories Laboratory Procedures for ALL Students and Graduate Research Students

Please read the following notice carefully and understand the procedures outlined in it. The details are to be filled-in and the last portion is to be **SIGNED** and **RETURNED** to the technical officer-in-charge.

Students who for any reason neglect these instructions will be excluded from laboratory sessions and will have to bear the consequences, including being excluded from the examination for the unit concerned

ATTENDANCE IS COMPULSORY FOR ALL STUDENTS including repeating students.

General Safety Procedures

1. Acts of carelessness are strictly prohibited.
2. Perform no unauthorized experiments, tasks or job and perform given experiments, tasks or job only according to directions.
3. Never work in a laboratory alone or at least without another person within easy call.
4. Smoking is not allowed in any area within the laboratories.
5. Wear safety glasses or face shields when working with hazardous materials and/or equipment.
6. Wear gloves when using any hazardous or toxic agent. They should be removed before leaving the lab, using telephones, opening refrigerators, or entering common areas.
7. Clothing: When handling dangerous substances, wear gloves, laboratory coats, and safety shield or glasses. Shorts and sandals should not be worn in the lab. Safety shoes are required when working near machinery.
8. Wash hands before leaving the lab and before eating.
9. Consumption of food or beverages in the laboratory is strictly forbidden. Food may not be stored in refrigerators located in a laboratory.
10. Tie back medium length and long hair when working near flames or entangling equipment and machineries.
11. Do not use any equipment unless you are trained and approved as a user.
12. Wear safety goggles when soldering or wire-cutting with side-cutters.
13. Avoid breathing in flux fumes when soldering. Switch on the fume extractor during soldering process.
14. Take special care of a **HOT** soldering iron. **NEVER** touch the wires or cables.
15. Pregnant women should take special care with exposure to certain chemicals, which can be harmful to fetal development. Consult the Material Safety Data Sheet, Supervisor, or contact your Physician.
16. All accidents, no matter how minor, should be reported to the School/Staff member supervising the laboratory or, if unavailable, call the University's Emergency number at ext. **46333** or **03-55146333**
17. Know the location of all safety equipment (e.g. eyewash, fire extinguisher, fire blanket, safety showers, and spill kit) and how to use them.
18. Maintain unobstructed access to all exits, fire extinguishers, electrical panels, emergency showers, and eyewashes.
19. Do not use corridors for storage or work areas.
20. Keep aisles free from obstructions – place bags at appropriate shelves which are located outside/inside the lab.
21. If leaving a lab unattended, turn off all ignition sources and lock the doors.

22. Be careful when lifting heavy objects. Lift comfortably, avoid unnecessary bending, twisting, reaching out, and excessive weights, lift gradually and keep in good physical shape.
23. Inform the unit lecturer of any medical conditions that you may have which could affect your performance in the laboratory, or could be aggravated by the work environments in the laboratory. Please produce evidence of your condition when requested.
24. Ensure all electrical circuits are checked by your supervisor or tutor or the relevant technical staff BEFORE powering up. When in doubt, please approach the nearest Staff member.
25. Let your group member(s) know of hazards that exist in your work area.

Disciplines and Attitudes

1. The laboratories are meant for conducting your experimental work, not for other non-academic activities. You will be asked to leave the lab immediately and serious action may be taken if you are found misusing or not adhering to the lab rules and regulations.
2. Never indulge in reckless behavior in the laboratory.
3. Never adopt a casual attitude in the laboratory and always be conscious of potential hazards.
4. Never run in the laboratory or corridors.
5. Do not sit on workbenches.
6. Tidy up your workplace after each use.

Good Practice

1. Take care to ensure that electrical leads are not weakened by pulling in and out, and the plugs, sockets, etc, are in a serviceable condition.
2. Report all incidents or near misses to your supervisor or respective technical staff immediately.
3. Keep benches clean and free from apparatus that is not being used.
4. Clean working areas and return back equipment after use.
5. Wear a Lab Coat, apron and gloves when handling the chemicals solution at Chemical Engineering Lab.

✂ Please cut along this line ✂

Personal detail portion (Use CAPITAL letters)

I have read, understood and attended the safety instruction briefing and will abide to the rules and regulations of all laboratories under the School of Engineering

Full Name _____

ID Number _____

Laboratory _____

Signature _____

Date _____

HAZARD AND INCIDENT REPORT FORM

For the Schools Only

Reporting incident, hazard, fire or property damage (where there has been personal injuries)

- Person involved is to fill in Sections A to C of the hazard & incident report form, sign the it and make a copy for own reference
- Pass the form on to your supervisor and participate in the investigation of the incident as and when requested
- Supervisor or person providing initial treatment to the injured person should fill in the form if the injured person is unable to do so.

Person reporting incident, hazard, fire or property damage (where there has been no personal injury)

- To fill in section A & B of the form and then sign it.
- To pass the filled & signed form on to your supervisor.

Responsibilities of the Supervisor

- To ensure first aid treatment rendered and if necessary send the victim to the hospital
- To pass a copy of this form within 24 hours to:-
 1. The Chairman of your School Safety Committee
 2. Head Of School
 3. Director of Human Resources
 4. OH&S Manager (Original)
- To participate in investigation of the hazard or incident with your Safety representative and OHS unit.

Responsibilities of Occupational Health & Safety Unit

- To receive all initial incident report within 24 hours.
- To sign and acknowledge the receipt of the form
- To inform the Campus OHS chairman on the incident
- To report appropriate incidents to relevant regulatory authorities.
- To assist in investigation of incidents as and when necessary

Incident Number

SECTION A: DETAILS OF PERSON INVOLVED IN INCIDENT or PERSON REPORTING HAZARD

School/Division/Address:Telephone:

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SECTION D :
