

# Safety Procedures for Laboratory Setups and Report Guidelines

for

Mechanical Project 478  
Mechatronic Project 478  
Postgraduate Students

Within the context of the Occupational Health and Safety Act (OHSA) as well as from an equipment damage point of view, the safety report is an invaluable document in terms of limiting liability when things go wrong. Not only does it serve to make you more aware of the risks to both personal injury and equipment damage, it clarifies the grey area between negligence, ignorance and true accidents. Bearing this in mind, the purpose of a safety report or risk assessment is to demonstrate both a detailed understanding of the flow of the work that is to be performed, as well as an understanding of the associated risks to both the person performing the work and the equipment involved. Once identified, risks can be managed and mitigated appropriately. Where the overall work task to be performed consists of several activities, such as in experimental work, a common approach to risk assessments is the activity-based risk assessment, detailed below.

When compiling a safety report in this manner, one effectively works through the task cycle. As such, it is a valuable tool in evaluating your own understanding of the task at hand and can assist us with identifying areas where you are uncertain about your testing work. One can effectively identify potential problem areas in the testing and can plan ahead for inevitable disruptions to testing work. When compiling the safety report, you should be fully aware that the equipment available to you is scarce, sensitive and very expensive, hence you should think carefully about how damage could occur. Remember that damaging a load cell, for instance, can result in many students beside yourself not completing their experimental work as lead times for equipment replacement are long (often more than 3-5 months).

By making use of the following guidelines, your safety report will be effective, sufficiently detailed, informative and targeted to your specific testing, thus minimising risk to both you and the equipment. Please do note that this is a guideline and does not preclude you from the adhering to the departmental safety instructions and safety report requirements. Safety reports compiled before an induction session is held have no value and will not be accepted.

Your safety report should consist of the following:

- A cover page which clearly shows emergency contact details and has space for the signatures of the Lab Engineer (technician or responsible person), Mr Cobus Zietsman (the Lab Manager) and your Supervisor.
- Clearly indicate if you will be working with vessels or pipes under pressure (any pressure above 50 kPa) as part of your project or engaging in hot work (working with open flames, sparks or heat that could cause a fire), working on heights, confined entry, or excavations work as part of your project. In any of these cases, you will be required to fill out the

relevant permit form. The form must be submitted to the authorising staff member and be approved before any work is allowed. You must indicate the specific special risk on the front page of your report in the designated space, and attach the signed and approved permit as an appendix to your safety report.

- A brief overview specific to your work that must be performed, e.g. for tensile testing.
  - Detail the type of testing to be performed.
  - List the specific standards (ASTM, BS, ISO, SANS, etc.) that apply.
  - Detail the equipment that is to be used (which load cell, extensometer, what grip) – make, model, measurement range and resolution.
  - Detail the number of samples to be tested.
  - Maximum estimated loads must be clearly stated in N or kN.
- General lab safety instructions:
  - In this section general safety mitigating factors, (e.g., wear closed shoes, no afterhours work alone etc.) should be listed in bullet form.
  - Clearly state the procedures for turning equipment on and off, including emergency stoppage.
  - State procedures for electric power outages (load shedding), switch all equipment off at wall socket for example.
- Fire safety:
  - No earphones are allowed while working in lab or workshop areas (alarms may not be audible).
  - Should the fire risks associated with an experiment be deemed too significant by the responsible person(s), testing may be limited to set hours (normally office hours).
  - All fire risks must be identified in the safety report.
  - Evacuation routes and plans relevant to your work area must be included in all safety reports, with special emphasis on after-hours work. Make use of the relevant emergency evacuation plan provided in Appendix C. Cut (crop) and paste from these plans the area(s) applicable to you which clearly indicate the evacuation routes.
  - For any hot work (using an open flame) / working on heights / confined entry / excavations work, a special permit must be completed and approved by Mr Cobus Zietsman (see Appendix B).
- Activity-based risk assessment:
  - Break your tasks in the lab down into individual activities.
  - List the risk associated with each task – indicate whether they are personal (**P**) or equipment (**E**) risks. Consider the health and safety of people who are going to use the setup, people who are in proximity of the setup, the equipment itself, the environment and surrounding buildings.
  - List the **mitigating** factors for each task. Determine the steps that can be reasonably accomplished to minimise the risks, taking the following into account: seriousness and scope of the risk, availability of knowledge regarding the risk, and methods to minimise/remove the risk, availability and appropriateness of methods to minimise/remove the risk, the costs involved to minimise/remove the risk with respect to the associated advantages. **The project must be stopped if funding is not available to minimise/remove significant risks.**
  - Use Table 1 to determine the severity rating of the risk associated with an activity [1]. A rating is identified for each of the categories “likelihood”, “exposure” and “consequence”. These three ratings are then multiplied to obtain the final risk score. Using this risk score, the risk can be classified as in the bottom of the table as “acceptable”, “possible”, or “very high risk” for example.
  - An activity-based risk assessment is best performed in a tabular format – e.g. for applying a tensile load to a brittle material as given in Table 2. Additional examples

are provided in Appendix A.

**Table 1:** Risk severity rating [1]

LIKELIHOOD (THE PROBABILITY OF AN INCIDENT WHEN THE EVENT DOES OCCUR)		VALUE
MIGHT AS WELL BE EXPECTED (HAPPENS OFTEN)		10
QUITE POSSIBLE		6
UNUSUAL, BUT QUITE POSSIBLE		3
ONLY REMOTELY POSSIBLE (HAS HAPPENED SOMEWHERE) CONCEIVABLE, BUT		1
VERY UNLIKELY (HASN'T HAPPENED YET)		0.5
PRACTICALLY IMPOSSIBLE (ONE IN A MILLION)		0.2
VIRTUALLY IMPOSSIBLE (APPROACHES THE IMPOSSIBLE)		0.1
EXPOSURE (THE FREQUENCY OF OCCURRENCE OF THE EVENT)		
CONTINUOUS		10
FREQUENT (DAILY)		6
OCCASIONAL (WEEKLY)		3
UNUSUAL (MONTHLY)		2
RARE (A FEW PER YEAR)		1
VERY RARE (YEARLY)		0.5
NO EXPOSURE		0.1
CONSEQUENCE		
CATASTROPHIC (MANY FATALITIES, OR DAMAGE OVER - R 10 000 000,00)		100
DISASTER (A FEW FATALITIES, OR DAMAGE OVER - R 1 000 000,00)		40
VERY SERIOUS (ONE FATALITY, OR DAMAGE OVER - R 100 000,00)		15
SERIOUS (SERIOUS INJURY, PERMANENT DISABILITY, OR DAMAGE OVER- R 10 000,00)		7
IMPORTANT (TEMPORARY DISABILITY, OR DAMAGE OVER- R 1 000,00)		3
NOTICEABLE (MINOR FIRST AID, OR DAMAGE OVER - R 100,00)		1
NEGLIGIBLE		0.4
RISK SCORE	RISK CLASSIFICATION	
OVER 400	VERY HIGH RISK: CONSIDER DISCONTINUING OPERATION	
200- 400	HIGH RISK: IMMEDIATE CORRECTION REQUIRED	
70-200	SUBSTANTIAL RISK: CORRECTION NEEDED	
20-70	POSSIBLE RISK: ATTENTION INDICATED	
UNDER 20	ACCEPTABLE RISK	

[1] <http://wieta.org.za/wp-content/uploads/2019/03/Hazard-Identification-and-Risk-Assessment-Format-2016.docx>

**Table 2:** Activity-based risk assessment: the example of tensile testing

Activity	Risk	Risk Type* (P/E)	Mitigating Steps	Classification of Risk Severity
Applying tensile load to sample	Compressing load cell	E	Possible risk	Verify crosshead direction is correct
	Overloading 1 kN load cell	E	Substantial risk	Ensure load limits are set to +900 N, -400 N
	Eye damage due to material shattering	P	High risk	Use Perspex equipment guard and wear safety glasses

- Design the laboratory setup with the above-mentioned factors in mind. Examples of measures that can be taken are given below:
  - Use personal protective equipment (PPE).
  - Protective screens on rotating machinery.
  - Adequate ventilation to avoid accumulation of gases.
  - Adequate insulation of electrical equipment, as well as an emergency stop.
  - Maintaining good housekeeping at all times.
  - Table 3 provides further examples of risks that should be considered.

**Table 3:** Examples of risks, their impact and operating instructions

Risk	Design impact	Operating instructions
Moving equipment.	<ul style="list-style-type: none"> <li>• Provide emergency stop (large, red switch, easily accessible).</li> <li>• Protective screens over moving parts (compulsory for V-belts, chains and shafts).</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure that screens are in position before equipment is switched on.</li> <li>• Disconnect power before working on equipment.</li> </ul>
Flammable liquids and gases.	<ul style="list-style-type: none"> <li>• Provide purging of equipment where flammable liquids or gases are being used.</li> <li>• Provide drainage holes that can prevent accumulation of liquids.</li> </ul>	<ul style="list-style-type: none"> <li>• Ventilate before switching on.</li> <li>• Stop fuel first, then air flow during shutdown.</li> </ul>
Gases that can accumulate leading to asphyxiation.	<ul style="list-style-type: none"> <li>• Ensure adequate ventilation by supplying e.g. fans.</li> </ul>	<ul style="list-style-type: none"> <li>• Ventilate adequately before use/entry.</li> </ul>
Structure that can fail causing heavy objects to fall.	<ul style="list-style-type: none"> <li>• Take accidental transverse forces and stability into account.</li> </ul>	<ul style="list-style-type: none"> <li>• Screen environment.</li> <li>• Wear safety shoes.</li> <li>• Wear a hard-hat.</li> </ul>
People working on scaffoldings from where they can fall.	<ul style="list-style-type: none"> <li>• Provide safety ladders and handrails.</li> </ul>	<ul style="list-style-type: none"> <li>• Use safety harness.</li> </ul>
High noise levels.	<ul style="list-style-type: none"> <li>• Screen off the noisy environment.</li> </ul>	<ul style="list-style-type: none"> <li>• Wear ear protection.</li> </ul>
High temperatures.	<ul style="list-style-type: none"> <li>• Screen and prevent people from accidentally accessing the warm area.</li> <li>• Conduct warm gases to an area where it can mix safely with cold gases.</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure screens are in position before use.</li> <li>• Ensure that coolant is flowing.</li> </ul>
Intense light (lasers).	<ul style="list-style-type: none"> <li>• Screen the environment.</li> </ul>	<ul style="list-style-type: none"> <li>• Wear safety glasses.</li> </ul>
Electric shock.	<ul style="list-style-type: none"> <li>• Provide emergency stop.</li> <li>• Use fuses.</li> <li>• Visual feedback that power is switched on (e.g. LEDs).</li> <li>• Insulate live wires.</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure that emergency stops are easily accessible.</li> <li>• Ensure that screens are in position.</li> </ul>
High pressure gas/liquids.	<ul style="list-style-type: none"> <li>• Provide pressure regulators and pressure relief valves.</li> <li>• Screen piping to ensure that leaks cannot cause damage/injuries.</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure the pressure relief valves are working properly.</li> <li>• Ensure that couplings are firmly connected.</li> <li>• Examine pipes for external damage.</li> </ul>

## **APPENDIX A – Example of a Safety Report<sup>1</sup>**

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<sup>1</sup> Disclaimer: This is a simple example abridged for the convenience of fitting in this document. This example applies specifically to tensile testing of PMMA using digital image correlation in the Structure's laboratory. A MS Word template applicable to the Structures laboratory is available on SUNLearn where you can delete all the [yellow highlighted areas] and replace with the prompted information. Contact the relevant laboratory engineer for specific details/templates for other laboratories (for example, the microscope and metallography laboratories will have different safety measures, maps, equipment, procedures, etc. to consider).

# Structures Lab Safety Report

## Tensile Testing of PMMA using ASTM E8M on MTS Load Frame

<b>Date:</b>	22/08/2023
<b>Student &amp; SU nr:</b>	HAR de Werker (12345678)
<b>Student contact nr:</b>	072 xxx xxxx
<b>Supervisor:</b>	Prof IAM Smart
<b>Lab engineer:</b>	G FormerStudent
<b>Head of safety:</b>	Cobus Zietsman

### Emergency Contacts:

Contact:	Room nr.	Work nr.	Cell nr.
G FormerStudent	Mxxx	-	072 xxx xxxx
C. Zietsman	M212	021 808 4275	-
Campus Security	-	021 808 2333	WhatsApp: 082 808 233
Fire Brigade	-	021 808 8888	-
Ambulance	-	021 883 3444	-

### Signatures:

Student:

(HAR de Werker)

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Supervisor:

(Prof IAM Smart)

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Lab Engineer:

(G Formerstudent)

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Head of Safety:

(C Zietsman)

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#### **Pressure Vessels or Pipes (check relevant box):**

- No pressure vessels or pipes with pressure in excess of 50kPa are involved in this project.  
 Pressure vessels or pipes in excess of 50kPa are involved – additional signature and report required (refer to Safety Report Guidelines on SUNLearn).

#### **Hot work / working at heights / confined entry / excavation (check relevant box):**

- No hot work / working heights / confined entry / excavation work involved in this project.  
 Hot work / working heights / confined entry / excavation work (underline relevant work type(s)) involved in this project – additional signature and report required (refer to Safety Report Guidelines on SUNLearn).

## Overview of Testing

Type of test and standard:

Test type	Room temperature tensile testing with DIC
Standard(s)	ASTM E8M, iDIC good practices guide

Equipment to be used:

Equipment type	Make & model	Measurement range (if applicable)	Resolution (if applicable)
Tensile tester fitted with 30 kN load cell	MTS Criterion Model 44	<30 kN (limited to <25 kN for grips)	0.5% of applied load
Standard tensile wedge grips	MTS	Max. load of 25 kN	-
25 mm Extensometer	MFA 25 mm	0 – 25 mm	Largest between 1.5 µm and 0.5% of reading

Sample geometry:

Sample Cross-Section*	Expected Max. Stress*	Expected Max Load	Number of Samples
15 mm x 5 mm	71 MPa	5.3 kN	10

## Detailed Experimental Procedure

Tensile testing of PMMA as per ASTM E8/M is to be performed. The purpose of these tests is to obtain a Young's modulus for the particular sheet of PMMA in order to validate an implementation of the Virtual Fields Method (VFM) for the extraction of material properties from optically measured full field surface displacements. As the data is to be used for validation purposes a high level of accuracy and repeatability is required in order to minimise the effect of the experimental setup on the results.

In order to obtain an accurate measure for the change in length in the longitudinal axis required for determining Young's Modulus, the 25 mm extensometer will be used locally in the gauge of the sample. This will eliminate any error due to extension within the grips that would be included in the calculation should one determine the change in length via the cross head of the tensile machine. Based on the estimated maximum load that will be encountered during the testing, the 30kN load cell is judged to be correct for this testing.

### Setup procedure for tensile tester:

1. The operator must read through the user manual before starting to operate the machine.
2. The location of the emergency stop button should be known and within reach when doing the set-up procedure.
3. The user should be familiar with the exact procedures for testing before starting to prepare for testing.
4. Identify any possible pinch points on the machine and make sure that they are clear.

5. If there are any bystanders, they should be warned to stand clear of the proximity of the machine at a safe distance.
6. Eye protection may be necessary when materials are used that are likely to splinter or shatter.
7. Machine calibration will be done by the lab managers or technicians and should not be attempted by final year students.
8. Ensure standard MTS tensile wedge grips are installed.
9. Check the load shedding schedule for Stellenbosch and ensure that testing does not coincide with these times.

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[Continue]

#### **Testing procedure for tensile tester:**

1. Before starting to test, ensure that all cables and plugs are secure and not damaged.
2. Make sure that the clamps of the machine are clear and there are no remnants of a previous test which could damage the equipment.
3. Move the mechanical limits into the correct positions based on the PMMA specimen and grip lengths before moving the crossheads to avoid possible damage to the machine.
4. Turn on the main switch on the base of the machine.
5. Press the emergency stop button so that the machine can check for any faults in the procedure chain and rotate it counter-clockwise to release.

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#### **Shut-down procedure for tensile tester:**

1. After the specimen has failed, stop the test and press the lock button on the control panel to halt the crossheads from moving while the specimen is removed. Be careful of the sharp edges on the broken specimen.
2. Label and store specimens according to test parameters and/or test sequence. Save all relevant data onto external memory device.
3. Return crosshead to starting test space prior to commencement of this test.

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[Continue]

9. In case of unplanned load shedding, immediately stop test on the software, release the load using control panel roll wheel, press the lock button, remove specimen from grips and turn off the machine and computer (after saving data) before UPS shuts off.....[continue].
10. Follow general housekeeping steps within this report.

## **Warning Symbols**

The following symbols are applicable to this setup.



(a) Electrical hazard



(b) Heavy object



(c) Pinch point

Figure 1: Applicable warning/hazard symbols

## General Laboratory Safety

The following general laboratory safety instructions are applicable:

- No afterhours testing may be performed without the necessary permissions<sup>2</sup>.
- Full supervised training is required before testing may be undertaken. Permission to proceed with unsupervised testing should be signed off by the lab engineer.
- Closed shoes must be worn at all times.
- Emergency equipment must be located and easily accessible.
- Students may not work alone in the laboratory.
- Emergency exits must be known. The nearest exits applicable to the setup are highlighted with red circles in Appendix A.
- Loose clothing may not be worn. Loose hair must be tied up.
- Good housekeeping practices should be maintained during testing. The lab should be completely clean, including all equipment stored away, after testing. Refer to the General Housekeeping section for particulars regarding practices to be followed for this specific setup.
- No food or drink is permitted in the laboratory.
- Safety report must be visible and accessible during testing.
- No equipment or test may be left unattended.

## Anticipated Interactions with other Laboratory Users

Tensile testing and fatigue testing could occur within 10 m of the MTS tensile tester setup during the planned testing time. Users of these surrounding machines will be notified when testing will take place well in advance. Care will be taken to prevent peripheral setups (such as a digital image correlation (DIC) setup) from developing within 2 m of the tensile tester. All other interaction with other laboratory users will be minimised through separating workstations avoiding testing sessions booked during undergraduate practicals for fracture testing for Strength of Materials W334.

## General Housekeeping

The following housekeeping steps must be taken:

<sup>2</sup> Written permission from Prof IAM Smart signed by Cobus Zietsman attached to the end of this report for working from 17h00 to 24h00 on 12 Sept to 25 Sept 2023. A partner will be present during these times.

- Return any tools to their slot in the toolbox within the MTS tensile tester steel cupboard.
- Return MFA extensometer to relevant box in MTS tensile tester steel cupboard.
- Lock the MTS tensile tester steel cupboard and clear the keypad on the lock.
- Sweep any broken Perspex shards or pieces from the machine or floor and dispose of in the black plastic drum next to the DIC laboratory.
- Ensure the MTS machine and computer are turned off properly before leaving. Check that all plug points are turned off.
- Report any damaged or broken components, tools or machinery.
- Ensure the workspace is clear and clean.
- Ensure no personal belongings are left behind.

## Fire Safety

The testing does not include any direct fire risk. In the event of a fire, the evacuation plan seen in Appendix A should be followed with the nearest exits circled in red. No earphones should be worn while testing so that the fire alarm can be heard.

## Activity Based Risk Assessment

The following risks and mitigating steps are associated with certain activities associated with this experimental setup and procedure:

Activity	Risk	Risk Type* (P/E)	Classification of Risk Severity	Mitigating Steps
General				
Entering the lab	Injuries to hands from the gates	P	Acceptable	Use caution when using the gates
Moving around in the lab	Tripping or knocking equipment over	P	Acceptable	Never use a cell phone when moving around and be aware of surroundings
Moving any DIC equipment out of the way	Dropping expensive DIC hardware	E	Possible	Clear a path to the MTS before starting to move the equipment and ask someone to assist with carrying it into position
Turning MTS on	Electrical shock	P	Possible	Inspect cable insulation before switching plugs on
Tensile rig may not be left unattended	Malfunction or damage to equipment	E	Substantial	Always stay at workstation while tests are ongoing
Power outages	Damage to equipment or loss of data	E	Possible	Be aware of load shedding schedules and be sure to switch all equipment
Personal valuables in the laboratory.	Theft of valuables from the laboratory.	P	Acceptable risk	Do not bring unnecessary valuable items to laboratory sessions. Valuables that are brought to the laboratory should be

				placed in a safe and visual location
Tidying lab	Tripping	P/E	Possible risk	Do not trip over cables
	Cuts	P	Possible risk	Be aware of sharp edges on the compact specimen
Locking lab	Hand injuries from gate	P	Acceptable risk	Be careful to not get your hand stuck in the security gate
<b>Tensile testing</b>				
Creating test method	Overwriting test method templates	E	Acceptable risk	Follow instruction guidelines
Changing grips	Injuries to fingers due to tools slipping	P	High risk	Be cautious when working with hand tools
	Dropping a grip on your foot	E/P	High risk	Closed shoes must always be worn and caution should be exercised when removing a grip as they are heavy. Get assistance if necessary
Adjusting the crosshead position	Crushing limbs	P	High risk	Whenever the crosshead position is adjusted, one should keep clear of any potential pinch points
	Overtightening grips	E	High risk	Apply common sense and use a reasonable amount of force when tightening the grips
	Compressing load cell above its limit (30kN)	E	Substantial	Make use of mechanical limits and position them so that equipment cannot be damaged. Only unlock the positional controls when they are in use to avoid accidental adjustments
Fitting a sample	Crushing fingers	P	High risk	Avoid using coarse adjustments – rather use the scroll wheel for finer adjustments. Lock positional controls when inserting a sample
Removing a sample	Crushing fingers	P	High risk	Lock positional controls on MTS when loosening a sample

	Cutting fingers on sharp edges	P	High risk	Be vigilant of sharp edges on the broken sample
Conducting a tensile test	Overloading the load cell	E	Possible risk	Set load limits on software to 25kN, - 400N
	Compressing the load cell	E	Possible risk	Double check direction of crosshead on software
Backing up data.	Data loss	P	Possible risk	Store data as per guidelines and ensure sufficient independent backups are kept
[Continue]				

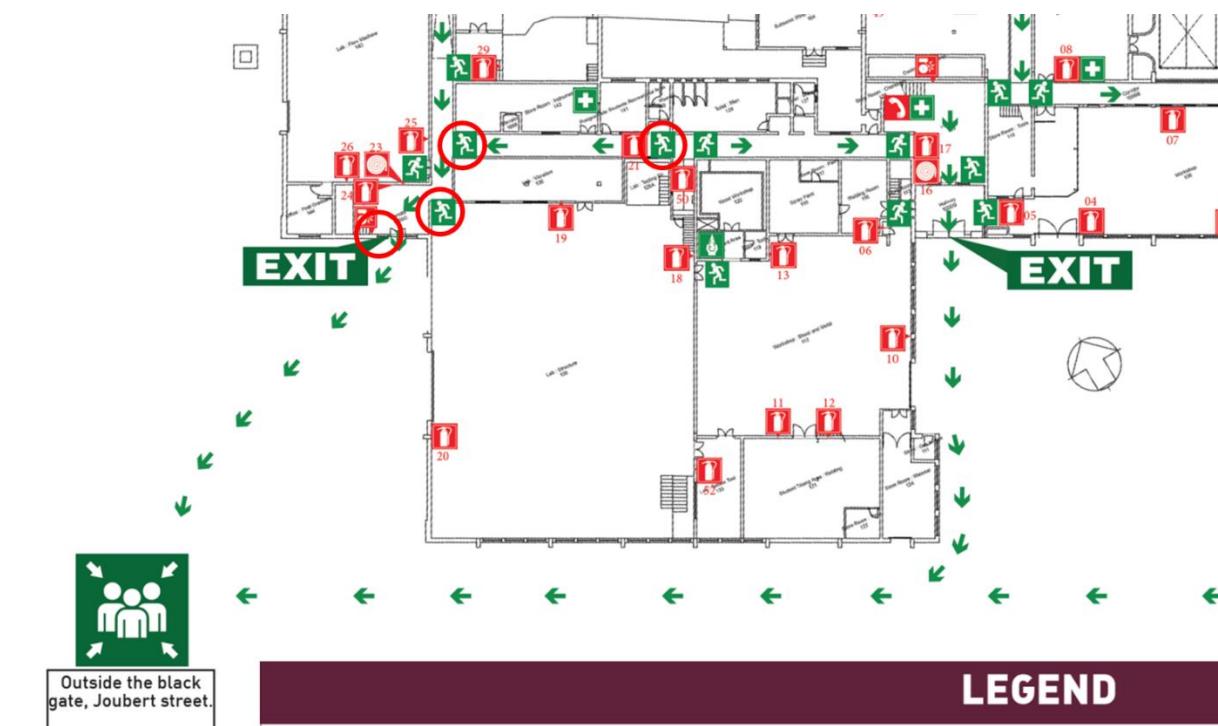
\*P – personal, E - equipment

## Disciplinary Actions

Failure to comply with any of the aforementioned safety regulations or procedures will result in disciplinary action. Students will be issued an initial warning: after three warnings, the lab access is revoked for a month.

## Appendix A: Emergency Evacuation Plans for Structures laboratory

Nearest exits are circled in red.



End of example report.

## **APPENDIX B – Special Work Permits**

## Hot work\*, working on heights, confined entry and excavations permit

GENERAL SAFETY REGULATION (9)						
DATE REQUESTED:						
REQUEST FOR PERMIT BY:						
AREA ON SITE WHERE WORK IS TO BE DONE:						
SITE ADDRESS:						
DESCRIPTION OF WORK: (EG. FUNCTION: Welding closed a hole in diesel tank)						
CONFIRMATION						
Ser no:	Requirements				Yes	No
1	The above location has been inspected?					
2	There are no combustible liquids, vapours, gases or dust?					
3	All combustible material has either been removed or suitably protected against heat and sparks?					
4	A person will be standing by with an extinguisher / hose reel while the operations is in progress?					
5	This person and the operatives have had the nearest fire alarm / telephone pointed out to them and have been told what to do in the event of fire?					
6	The operatives have been inducted?					
7	Fall protection equipment was identified and necessary PPE in place. E.g. lifeline, harness, hooks?					
8	Risks were identified before entering in any confined space?					
9	All risks regarding excavations were identified and addressed?					
PROTECTIVE EQUIPMENT REQUIRED (Office use)						
SAFETY BOOTS / SHOES	HARD HAT	GLOVES	GOOGLES / EYE PROTECTION	WELDING HELMET	APRON	BREATHING APPARATUS
WARNING SIGNS	SCREENS	FIRST AID	EXTINGUISHER	LIFELINE	SPATS	Harness
(Tick the appropriate block below the description of PPE)						
Name and signature of competent person issuing the permit and the position held:						
NAME		DESIGNATION			SIGNATURE	
<b>Confirmation by person issuing the permit</b>						
Work area and all adjacent areas to which sparks and heat might spread were thoroughly inspected on completion of the operation, and thirty minutes later no smouldering fires were discovered.				Yes	No	N/A
<b>Name and signature of person responsible for the work and the position held:</b>						
NAME		DESIGNATION			SIGNATURE	
<b>(AFTER SIGNING, RETURN PERMIT TO PERSON ISSUING THE SAME)</b>						
*Applicable to all operations involving flames, hot air or arc welding and cutting equipment, brazing and soldering equipment, blowlamps, bitumen boilers and other equipment producing heat or having naked flames.						

## **APPENDIX C – M&M Emergency Evacuation Plans<sup>3</sup>**

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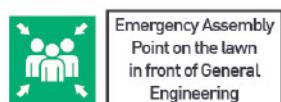
<sup>3</sup> Last updated: 2022. Use newest versions available.

# EMERGENCY EVACUATION PLAN

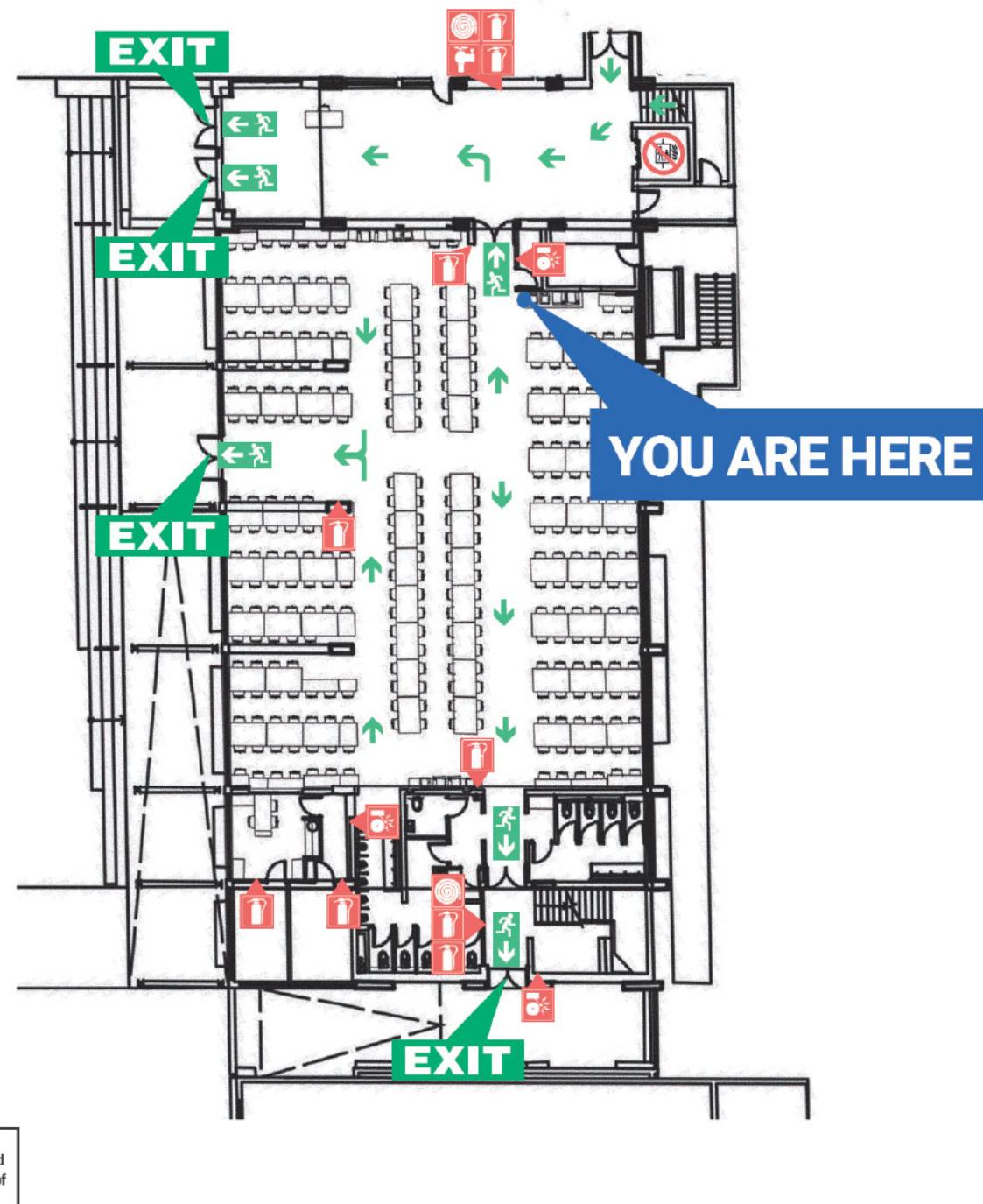


## MECHANICAL & MECHATRONIC BUILDING

### ESCAPE PLAN - LEVEL 1



Emergency Assembly Point on the lawn in front of General Engineering



Emergency Assembly Point at the corner of Banghoek Rd and Bosman St on the lawn of Process Engineering

#### LEGEND



IN CASE OF FIRE DO NOT USE THE ELEVATOR



EMERGENCY KEY BOX



FIRE TELEPHONE



FIRE HYDRANT



FIRE BLANKET



SAFETY SHOWER



EXIT EXIT



FIRE ALARM



FIRE HOSE



FIRE EXTINGUISHER



FIRST-AID EQUIPMENT



DISTRIBUTION BOARD



GENERAL DIRECTION

#### EVACUATION INSTRUCTIONS

- The automated alarm system or staff will announce the evacuation.
- Follow the instructions and evacuate immediately to safe assembly points.
- When a venue is completely evacuated, close all doors and place markers on the outside door handles to indicate the evacuation is complete.
- Assist disabled individuals as well as visitors to safe assembly points.
- Any missing individuals must be reported immediately to the Evacuation Marshal on duty.

#### ONTRUIMING INSTRUKSIES

- Die geautomatiseerde alarm stelsel of personeel sal die ontruiming aankondig.
- Volg die instruksies en ontruim dadelik na die veilige versamelpunte.
- Wanneer 'n lokaal ontruim is, maak alle deure toe en plaas merkers op buitenste deurhandvatsels om aan te dui dat die ontruiming is afgehandel.
- Verleen hulp aan gestremde individue asook besoekers na die veilige versamelpunte.
- Enige vermisde individue moet dadelik aan die Ontruimingsbeampete op diens gerapporteer word.

#### MEDICAL EMERGENCIES

- Campus Health Services (CHS): 076 431 0305 (all hours) for CHS ambulance services during office hours and stand-by doctor after hours.  
If the person involved in the medical emergency has medical aid, also contact ER24 ambulance: 084 124

#### MEDIESE NOODGEVALLE

- Kampusgesondheidsdien (KGD): 076 431 0305 (alle ure) vir KGD se ambulansdien gedurende kantoorure en na-ure 'n bystandsdokter.  
Indien die persoon betrokke mediese fonds dekking het, kontak ER24 ambulans: 084124

#### EMERGENCY NUMBERS

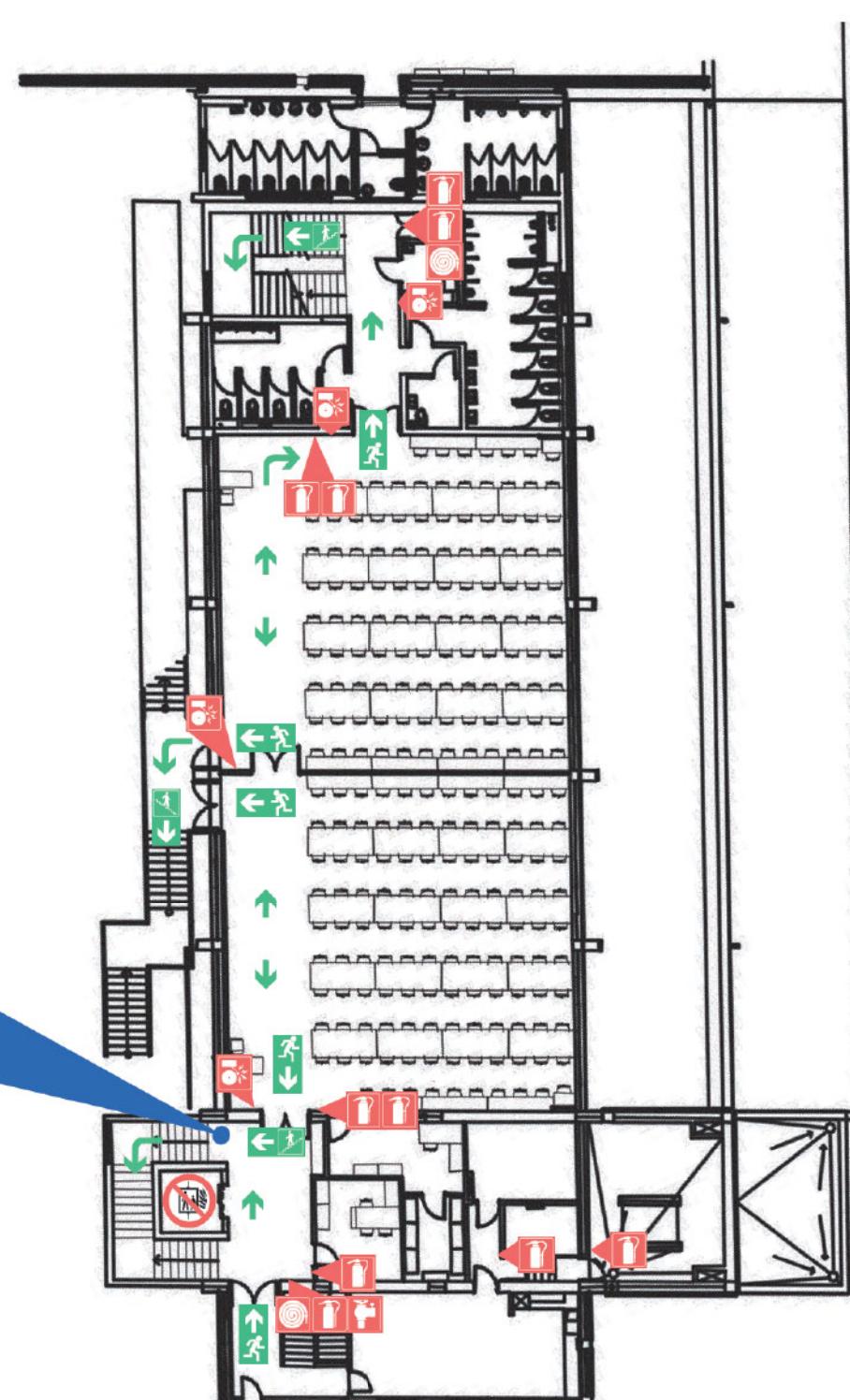
CAMPUS SECURITY (USBD)	021 808 2333
CAMPUS HEALTH SERVICES (CHS)	021 808 3496
Police Flying Squad	021 937 0500/10111
Ambulance	999/10177
Stellenbosch Medi-Clinic	021 861 2095/021 886 9999
Stellenbosch Hospital	021 808 6100/021 808 6147
Stellenbosch Fire and Rescue	021 808 8888
24-Hour Rape Crisis Stellenbosch	082 977 8581
24-Hour Psychology Crisis Service	082 557 0880

# EMERGENCY EVACUATION PLAN



## MECHANICAL & MECHATRONIC BUILDING

### ESCAPE PLAN - LEVEL 2



YOU ARE HERE

Emergency Assembly Point  
at the corner of Banghoek Rd  
and Bosman St on the lawn of  
Process Engineering

Emergency Assembly  
Point on the lawn  
in front of General  
Engineering

#### LEGEND

	IN CASE OF FIRE DO NOT USE THE ELEVATOR		EMERGENCY KEY BOX		FIRE TELEPHONE		FIRE HYDRANT		FIRE BLANKET		SAFETY SHOWER		EXIT
	FIRE ALARM		FIRE HOSE		FIRE EXTINGUISHER		FIRST-AID EQUIPMENT		DISTRIBUTION BOARD				GENERAL DIRECTION

#### EVACUATION INSTRUCTIONS

- The automated alarm system or staff will announce the evacuation.
- Follow the instructions and evacuate immediately to safe assembly points.
- When a venue is completely evacuated, close all doors and place markers on the outside door handles to indicate the evacuation is complete.
- Assist disabled individuals as well as visitors to safe assembly points.
- Any missing individuals must be reported immediately to the Evacuation Marshal on duty.

#### ONTRUIMING INSTRUKSIES

- Die geautomatiseerde alarm stelsel of personeel sal die ontruiming aankondig.
- Volg die instruksies en ontruim dadelik na die veilige versamelpunte.
- Wanneer 'n lokaal ontruim is, maak alle deure toe en plaas merkers op buitenste deurhandvatsels om aan te dui die ontruiming is afgehandel.
- Verleen hulp aan gestremde individue asook besoekers na die veilige versamelpunte.
- Enige vermisde individue moet dadelik aan die Ontruimingsbeampete op diens gerapporteer word.

#### MEDICAL EMERGENCIES

- Campus Health Services (CHS): 076 431 0305 (all hours) for CHS ambulance services during office hours and stand-by doctor after hours.  
If the person involved in the medical emergency has medical aid, also contact ER24 ambulance: 084 124

#### MEDIESE NOODGEVALLE

- Kampusgesondheidsdiens (KGD): 076 431 0305 (alle ure) vir KGD se ambulansdiens gedurende kantoorure en na-ure 'n bystandsdokter.  
Indien die persoon betrokke mediese fonds dekking het, kontak ER24 ambulans: 084124

#### EMERGENCY NUMBERS

CAMPUS SECURITY (USBD)	021 808 2333
CAMPUS HEALTH SERVICES (CHS)	021 808 3496
Police Flying Squad	021 937 0500/10111
Ambulance	999/10177
Stellenbosch Medi-Clinic	021 861 2095/021 886 9999
Stellenbosch Hospital	021 808 6100/021 808 6147
Stellenbosch Fire and Rescue	021 808 8888
24-Hour Rape Crisis Stellenbosch	082 977 8581
24-Hour Psychology Crisis Service	082 557 0880

# EMERGENCY EVACUATION PLAN



## MECHANICAL & MECHATRONIC BUILDING ESCAPE PLAN - LEVEL 3



### LEGEND

	IN CASE OF FIRE DO NOT USE THE ELEVATOR		EMERGENCY KEY BOX		FIRE ALARM		FIRE TELEPHONE		FIRE HOSE		FIRE HYDRANT		FIRE EXTINGUISHER		FIRST-AID EQUIPMENT		SAFETY SHOWER		DISTRIBUTION BOARD		EXIT		GENERAL DIRECTION
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### EVACUATION INSTRUCTIONS

- The automated alarm system or staff will announce the evacuation.
- Follow the instructions and evacuate immediately to safe assembly points.
- When a venue is completely evacuated, close all doors and place markers on the outside door handles to indicate the evacuation is complete.
- Assist disabled individuals as well as visitors to safe assembly points.
- Any missing individuals must be reported immediately to the Evacuation Marshal on duty.

### ONTRUIMING INSTRUKSIES

- Die geautomatiseerde alarm stelsel of personeel sal die ontruiming aankondig.
- Volg die instruksies en ontruim dadelik na die veilige versamelpunte.
- Wanneer 'n lokaal ontruim is, maak alle deure toe en plaas merkers op buitenste deurhandvatsels om aan te dui die ontruiming is afgehandel.
- Verleen hulp aan gestremde individue asook besoekers na die veilige versamelpunte.
- Enige vermisde individue moet dadelik aan die Ontruimingsbeambte op diens gerapporteer word.

### MEDICAL EMERGENCIES

- Campus Health Services (CHS): 076 431 0305 (all hours) for CHS ambulance services during office hours and stand-by doctor after hours.
- If the person involved in the medical emergency has medical aid, also contact ER24 ambulance: 084 124

### MEDIESE NOODGEVALLE

- Kampusgesondheidsdiens (KGD): 076 431 0305 (alle ure) vir KGD se ambulansdiens gedurende kantoorure en na-ure 'n bystands dokter.
- Indien die persoon betrokke mediese fonds dekking het, kontak ER24 ambulans: 084124

### EMERGENCY NUMBERS

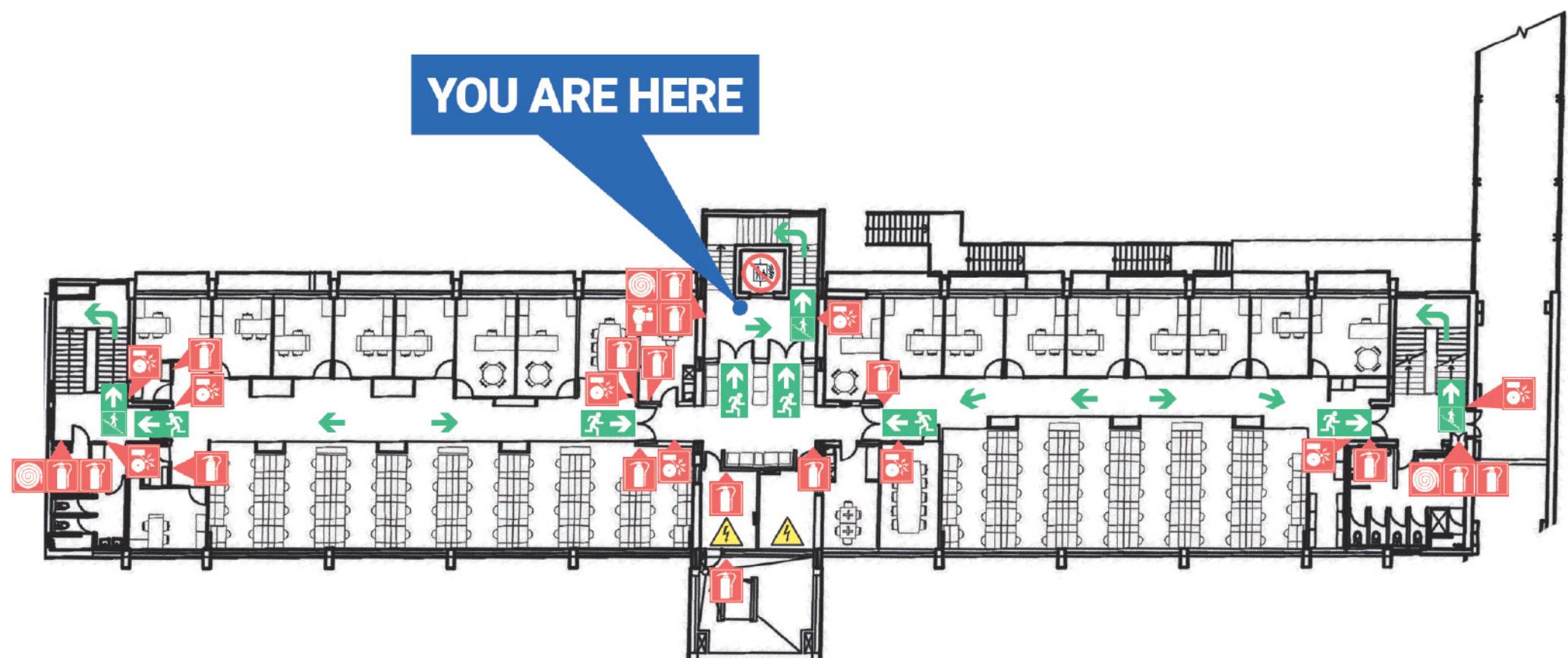
CAMPUS SECURITY (USBD)	021 808 2333
CAMPUS HEALTH SERVICES (CHS)	021 808 3496
Police Flying Squad	021 937 0500/01111
Ambulance	999/10177
Stellenbosch Medi-Clinic	021 861 2095/021 886 9999
Stellenbosch Hospital	021 808 6100/021 808 6147
Stellenbosch Fire and Rescue	021 808 8888
24-Hour Rape Crisis Stellenbosch	082 977 8581
24-Hour Psychology Crisis Service	082 557 0880

# EMERGENCY EVACUATION PLAN



## MECHANICAL & MECHATRONIC BUILDING ESCAPE PLAN - LEVEL 4

YOU ARE HERE



Emergency Assembly Point on the lawn in front of General Engineering



Emergency Assembly Point at the corner of Banghoek Rd and Bosman St on the lawn of Process Engineering

### LEGEND



IN CASE OF FIRE DO NOT USE THE ELEVATOR



EMERGENCY KEY BOX



FIRE TELEPHONE



FIRE HYDRANT



FIRE BLANKET



SAFETY SHOWER



EXIT EXIT



FIRE ALARM



FIRE HOSE



FIRE EXTINGUISHER



FIRST-AID EQUIPMENT



DISTRIBUTION BOARD



GENERAL DIRECTION

### EVACUATION INSTRUCTIONS

- The automated alarm system or staff will announce the evacuation.
- Follow the instructions and evacuate immediately to safe assembly points.
- When a venue is completely evacuated, close all doors and place markers on the outside door handles to indicate the evacuation is complete.
- Assist disabled individuals as well as visitors to safe assembly points.
- Any missing individuals must be reported immediately to the Evacuation Marshal on duty.

### ONTRUIMING INSTRUKSIES

- Die geautomatiseerde alarm stelsel of personeel sal die ontruiming aankondig.
- Volg die instruksies en ontruim dadelik na die veilige versamelpunte.
- Wanneer 'n lokaal ontruim is, maak alle deure toe en plaas merkers op buitenste deurhandvatsels om aan te dui die ontruiming is afgehandel.
- Verleen hulp aan gestremde individue asook besoekers na die veilige versamelpunte.
- Enige vermisde individue moet dadelik aan die Ontruimingsbeampete op diens gerapporteer word.

### MEDICAL EMERGENCIES

- Campus Health Services (CHS): 076 431 0305 (all hours) for CHS ambulance services during office hours and stand-by doctor after hours.  
If the person involved in the medical emergency has medical aid, also contact ER24 ambulance: 084 124

### MEDIESE NOODGEVALLE

- Kampusgesondheidsdien (KGD): 076 431 0305 (alle ure) vir KGD se ambulansdien gedurende kantoorure en na-ure 'n bystandsdokter.  
Indien die persoon betrokke mediese fonds dekking het, kontak ER24 ambulans: 084124

### EMERGENCY NUMBERS

CAMPUS SECURITY (USBD)	021 808 2333
CAMPUS HEALTH SERVICES (CHS)	021 808 3496
Police Flying Squad	021 937 0500/10111
Ambulance	999/10177
Stellenbosch Medi-Clinic	021 861 2095/021 886 9999
Stellenbosch Hospital	021 808 6100/021 808 6147
Stellenbosch Fire and Rescue	021 808 8888
24-Hour Rape Crisis Stellenbosch	082 977 8581
24-Hour Psychology Crisis Service	082 557 0880

# EMERGENCY EVACUATION PLAN



## MECHANICAL & MECHATRONIC BUILDING

### ESCAPE PLAN - LEVEL 5



#### LEGEND

	IN CASE OF FIRE DO NOT USE THE ELEVATOR		EMERGENCY KEY BOX		FIRE ALARM		FIRE TELEPHONE		FIRE HOSE		FIRE HYDRANT		FIRE EXTINGUISHER		FIRE BLANKET		SAFETY SHOWER		EXIT
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#### EVACUATION INSTRUCTIONS

- The automated alarm system or staff will announce the evacuation.
- Follow the instructions and evacuate immediately to safe assembly points.
- When a venue is completely evacuated, close all doors and place markers on the outside door handles to indicate the evacuation is complete.
- Assist disabled individuals as well as visitors to safe assembly points.
- Any missing individuals must be reported immediately to the Evacuation Marshal on duty.

#### ONTRUIMING INSTRUKSIES

- Die geautomatiseerde alarm stelsel of personeel sal die ontruiming aankondig.
- Volg die instruksies en ontruim dadelik na die veilige versamelpunte.
- Wanneer 'n lokaal ontruim is, maak alle deure toe en plaas merkers op buitenste deurhandvatsels om aan te dui die ontruiming is afgehandel.
- Verleen hulp aan gestremde individue asook besoekers na die veilige versamelpunte.
- Enige vermisde individue moet dadelik aan die Ontruimingsbeampete op diens gerapporteer word.

#### MEDICAL EMERGENCIES

- Campus Health Services (CHS): 076 431 0305 (all hours) for CHS ambulance services during office hours and stand-by doctor after hours.  
If the person involved in the medical emergency has medical aid, also contact ER24 ambulance: 084 124

#### MEDIESE NOODGEVALLE

- Kampusgesondheidsdiens (KGD): 076 431 0305 (alle ure) vir KGD se ambulansdiens gedurende kantoorure en na-ure 'n bystandsdokter.  
Indien die persoon betrokke mediese fonds dekking het, kontak ER24 ambulans: 084124

#### EMERGENCY NUMBERS

CAMPUS SECURITY (USB)	021 808 2333
CAMPUS HEALTH SERVICES (CHS)	021 808 3496
Police Flying Squad	021 937 0500/10111
Ambulance	999/10177
Stellenbosch Medi-Clinic	021 861 2095/021 886 9999
Stellenbosch Hospital	021 808 6100/021 808 6147
Stellenbosch Fire and Rescue	021 808 8888
24-Hour Rape Crisis Stellenbosch	082 977 8581
24-Hour Psychology Crisis Service	082 557 0880

# EMERGENCY EVACUATION PLAN



## MECHANICAL & MECHATRONIC BUILDING

### ESCAPE PLAN - LEVEL 6

YOU ARE HERE



Emergency Assembly Point on the lawn in front of General Engineering



Emergency Assembly Point at the corner of Banghoek Rd and Bosman St on the lawn of Process Engineering

#### LEGEND



IN CASE OF FIRE DO NOT USE THE ELEVATOR



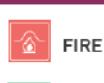
EMERGENCY KEY BOX



FIRE TELEPHONE



FIRE HYDRANT



FIRE BLANKET



SAFETY SHOWER



EXIT EXIT



FIRE ALARM



FIRE HOSE



FIRE EXTINGUISHER



FIRST-AID EQUIPMENT



DISTRIBUTION BOARD



GENERAL DIRECTION

#### EVACUATION INSTRUCTIONS

- The automated alarm system or staff will announce the evacuation.
- Follow the instructions and evacuate immediately to safe assembly points.
- When a venue is completely evacuated, close all doors and place markers on the outside door handles to indicate the evacuation is complete.
- Assist disabled individuals as well as visitors to safe assembly points.
- Any missing individuals must be reported immediately to the Evacuation Marshal on duty.

#### ONTRUIMING INSTRUKSIES

- Die geautomatiseerde alarm stelsel of personeel sal die ontruiming aankondig.
- Volg die instruksies en ontruim dadelik na die veilige versamelpunte.
- Wanneer 'n lokaal ontruim is, maak alle deure toe en plaas merkers op buitenste deurhandvatsels om aan te dui die ontruiming is afgehandel.
- Verleen hulp aan gestremde individue asook besoekers na die veilige versamelpunte.
- Enige vermisde individue moet dadelik aan die Ontruimingsbeamppte op diens gerapporteer word.

#### MEDICAL EMERGENCIES

- Campus Health Services (CHS): 076 431 0305 (all hours) for CHS ambulance services during office hours and stand-by doctor after hours.
- If the person involved in the medical emergency has medical aid, also contact ER24 ambulance: 084 124

#### MEDIESE NOODGEVALLE

Kampusgesondheidsdien (KGD): 076 431 0305 (alle ure) vir KGD se ambulansdien gedurende kantoorure en na-ure 'n bystandsdokter.  
Indien die persoon betrokke mediese fonds dekking het, kontak ER24 ambulans: 084124

#### EMERGENCY NUMBERS

##### CAMPUS SECURITY (USBD)

021 808 2333

##### CAMPUS HEALTH SERVICES (CHS)

021 808 3496

##### Police Flying Squad

021 937 0500/10111

##### Ambulance

999/10177

##### Stellenbosch Medi-Clinic

021 861 2095/021 886 9999

##### Stellenbosch Hospital

021 808 6100/021 808 6147

##### Stellenbosch Fire and Rescue

021 808 8888

##### 24-Hour Rape Crisis Stellenbosch

082 977 8581

##### 24-Hour Psychology Crisis Service

082 557 0880

# EMERGENCY EVACUATION PLAN

## EVACUATION INSTRUCTION

- The automated alarm system or staff will announce the evacuation.
- Follow the instructions and evacuate immediately to safe assembly points.
- When a venue is completely evacuated, close all doors and place markers on the outside door handles to indicate the evacuation is complete.
- Assist disabled individuals as well as visitors to safe assembly points.
- Any missing individuals must be reported immediately to the Floor Marshal on duty.

## ONTRUIMING INSTRUKSIES

- Die geautomatiseerde alarm stelsel of personeel sal die ontruiming aankondig.
- Volg die instruksies en ontruim dadelik na die veilige versamelpunte.
- Wanneer 'n lokaal ontruim is, maak alle deure toe en plaas merkers op buitenste deurhandvatsels om aan te dui die ontruiming is afgehandel.
- Verleen hulp aan gestremde individue asook besoekers na die veilige versamelpunte.
- Enige vermisde individue moet dadelik aan die Vloer Beämpte op diens gerapporteer word.

## MEDICAL EMERGENCIES

- Campus Health Services (CHS): 076 431 0305 (all hours) for CHS ambulance services during office hours and stand-by doctor after hours.

If the person involved in the medical emergency has medical aid, also contact ER24 ambulance: 084 124

## MEDIESE NOODGEVALLE

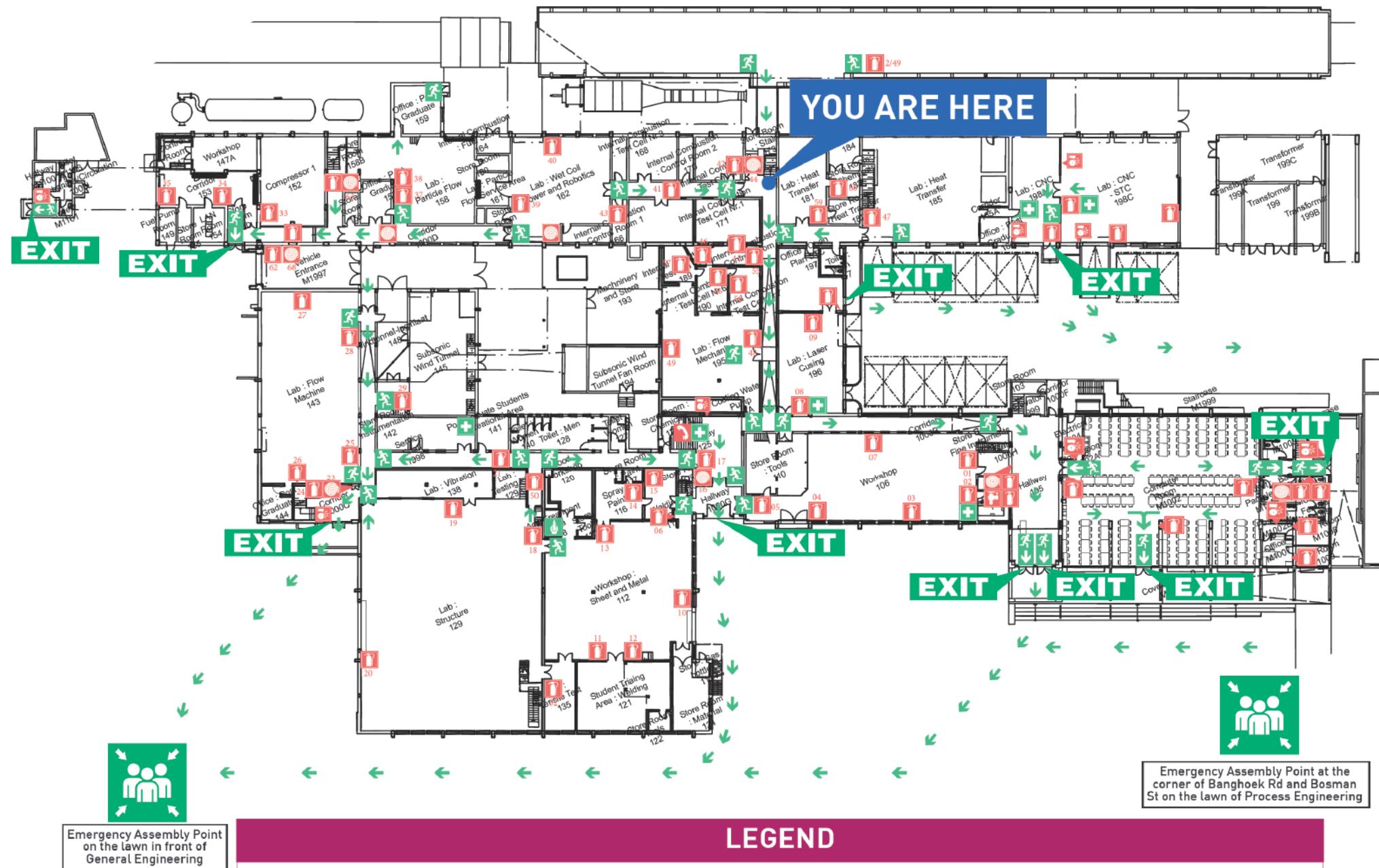
- Kampusgesondheidsdiens (KGD): 076 431 0305 (alle ure) vir KGD se ambulansdiens gedurende kantoorure en na-ure 'n bystands dokter. Indien die persoon betrokke mediese fonds dekking het, kontak ER24 ambulans: 084124

## EMERGENCY NUMBERS

CAMPUS SECURITY (USBD)	021 808 2333
CAMPUS HEALTH SERVICES (CHS)	021 808 3496
Police Flying Squad	021 937 0500/10111
Ambulance	999/10177
Stellenbosch Medi-Clinic	021 861 2095/021 886 9999
Stellenbosch Hospital	021 808 6100/021 808 6147
Stellenbosch Fire and Rescue	021 808 8888
24-Hour Rape Crisis Stellenbosch	082 977 8581
24-Hour Psychology Crisis Service	082 557 0880

## ESCAPE PLAN

### MECHANICAL & MECHATRONIC ENGINEERING Level 1



# EMERGENCY EVACUATION PLAN

## EVACUATION INSTRUCTION

- The automated alarm system or staff will announce the evacuation.
- Follow the instructions and evacuate immediately to safe assembly points.
- When a venue is completely evacuated, close all doors and place markers on the outside door handles to indicate the evacuation is complete.
- Assist disabled individuals as well as visitors to safe assembly points.
- Any missing individuals must be reported immediately to the Floor Marshal on duty.

## ONTRUIMING INSTRUKSIES

- Die geautomatiseerde alarm stelsel of personeel sal die ontruiming aankondig.
- Volg die instruksies en ontruim dadelik na die veilige versamelpunte.
- Wanneer 'n lokaal ontruim is, maak alle deure toe en plaas merkers op buitenste deurhandvatsels om aan te dui die ontruiming is afgehandel.
- Verleen hulp aan gestremde individue asook besoekers na die veilige versamelpunte.
- Enige vermisde individue moet dadelik aan die Vloer Beämpte op diens gerapporteer word.

## MEDICAL EMERGENCIES

- Campus Health Services (CHS): 076 431 0305 (all hours) for CHS ambulance services during office hours and stand-by doctor after hours.  
If the person involved in the medical emergency has medical aid, also contact ER24 ambulance: 084 124

## MEDIESE NOODGEVALLE

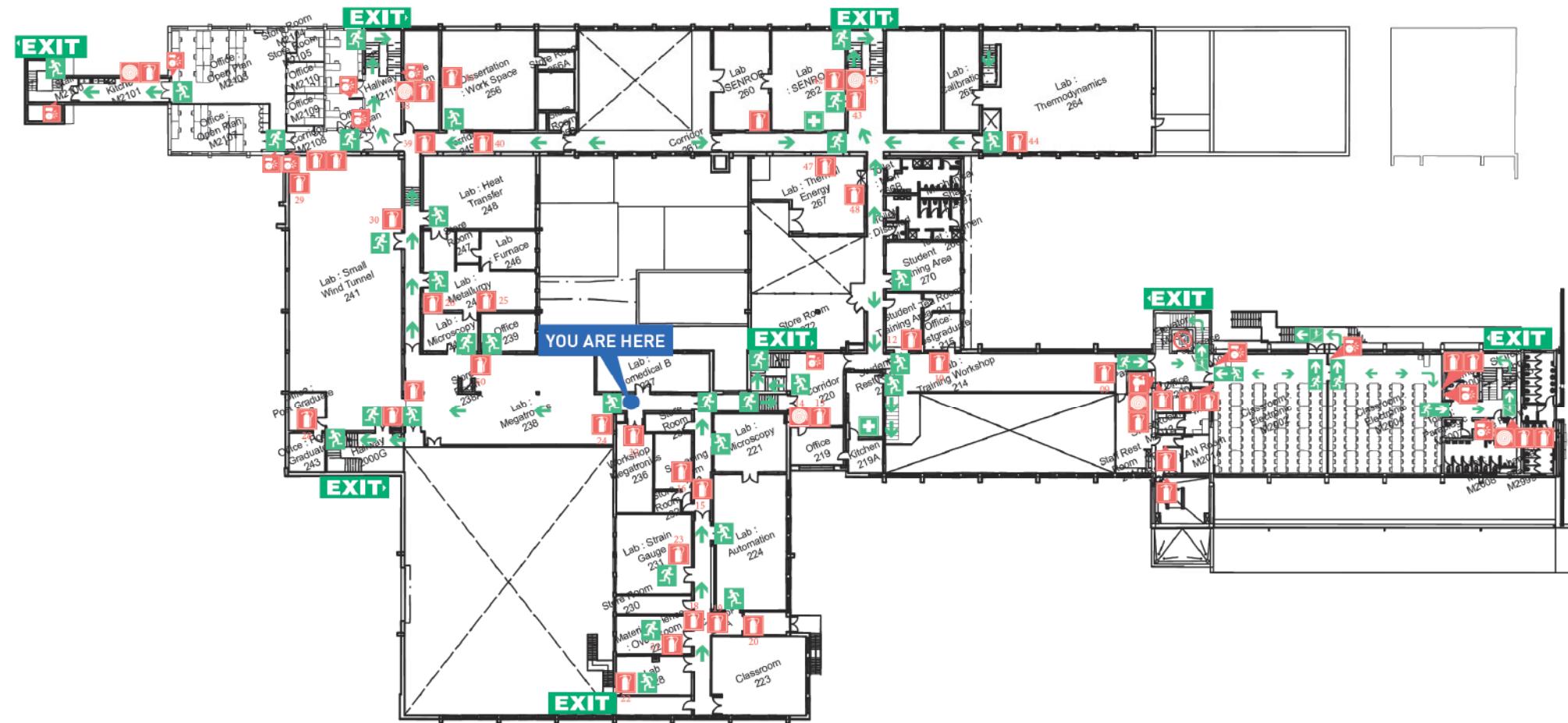
- Kampusgesondheidsdiens (KGD): 076 431 0305 (alle ure) vir KGD se ambulansdiens gedurende kantoorure en na-ure 'n bystands dokter.  
Indien die persoon betrokke mediese fonds dekking het, kontak ER24 ambulans: 084124

## EMERGENCY NUMBERS

CAMPUS SECURITY (USBD)	021 808 2333
CAMPUS HEALTH SERVICES (CHS)	021 808 3496
Police Flying Squad	021 937 0500/10111
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Stellenbosch Medi-Clinic	021 861 2095/021 886 9999
Stellenbosch Hospital	021 808 6100/021 808 6147
Stellenbosch Fire and Rescue	021 808 8888
24-Hour Rape Crisis Stellenbosch	082 977 8581
24-Hour Psychology Crisis Service	082 557 0880

## ESCAPE PLAN

### MECHANICAL & MECHATRONIC ENGINEERING Level 2



### LEGEND

	IN CASE OF FIRE DO NOT USE THE ELEVATOR		FIRE ALARM		FIRE HYDRANT		FIRST-AID EQUIPMENT		DISTRIBUTION BOARD
			FIRE EXTINGUISHER		EYE WASH		SAFETY SHOWER		EXIT
			FIRE BLANKET		GENERAL DIRECTION				