

## Laboratory regulations ENG Department of Energy Technology

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The laboratory regulations can be found at following link:

<https://www.fh-ooe.at/campus-wels/die-fakultaet/services/laborordnungen/fb-energietechnik/>

### Introduction

1. The laboratories of the Department of Energy Technology may only be entered after a detailed safety briefing and signing of the following confirmation that this has been carried out and understood.
2. Laboratory tours of customers, partners... may only be carried out in the presence of an employee (or a person who has been given written permission by the Head of Department), whereby this employee must ensure that there is no violation of the laboratory regulations.
3. The employees and/or students must inform themselves about the location and function of the respective safety equipment (emergency shower, fire blanket, fire extinguisher, smoke detector, gas sensors, emergency stop button...).
4. The course leaders of laboratory and project courses commit themselves to instruct the students at the beginning of the course about the guidelines for orderly operation and safety-relevant regulations.
5. The users shall take note of and comply with the laboratory regulations. In case of violation of the obligations according to these regulations, the work permit will be withdrawn from the user.
6. The instructions of the respective supervisors/supervisors/heads of department must be followed without fail. The laboratory regulations must be noted and followed by the users!
7. Eating, drinking or smoking in the laboratory is not allowed!
8. Working in the laboratory under the influence of drugs and alcohol is prohibited!
9. Clothing must be kept in the lockers outside the laboratory during the exercise
10. Working in the laboratories of the Department of Energy Technology is generally allowed on MO-DO between 8 and 17 o'clock and on FR between 8 and 14 o'clock
11. The computers may only be used as part of the laboratory exercise (no surfing, no installation of additional programs).

### General guidelines for the use of the laboratory

1. Knowledge of this regulation is a prerequisite for participation in the respective laboratory exercises
2. All devices and chemicals may only be used with the express permission of the respective responsible technicians, Head of Department or a professionally instructed lecturer as well as scientific staff.
3. Various test, project and exercise setups in the laboratories may not be changed or manipulated under any circumstances.
4. There are test facilities which can only be secured to a limited extent for reasons of accessibility for measurement purposes. The training supervisor must expressly point this out and these instructions must be followed without exception.
5. In case of alarm, fire and injuries, the supervisor and persons at risk must be informed immediately. In case of danger to persons or sounding of the alarm sirens, the

laboratory/building is to be left immediately in a calm and orderly manner and waiting at the collection point for further instructions by the teaching staff of the FH. If possible without endangering yourself, the EMERGENCY OFF switch must be operated. If it is necessary to call qualified help (emergency doctor, fire department, police) immediately.

6. The gas supply cabinets may only be opened by technicians and professionally instructed lecturers.
7. Escape routes must always be kept clear.

### Lone work

1. FH employees (card with P-number):  
The lone working regulation according to "Lone Work General Guidelines" applies.
2. Students (card with S-number):  
Students are not permitted to work alone in the laboratories.

### Handling chemicals and gases

1. As a general rule, chemicals and gases may only be handled where appropriate safety equipment such as extraction systems and gas warning systems are available.
2. ALWAYS switch on the extraction system before starting to work with gases or chemicals.
3. Wear suitable protective clothing (work coat, goggles, gloves...) when handling chemicals and when in the vicinity of persons handling chemicals.
4. The general and special guidelines for handling hazardous substances must be observed. Before using chemicals, their hazard potential must generally be determined by studying the literature (safety data sheets, H&P phRAes, disposal regulations). Substances whose harmlessness cannot be established beyond doubt must be handled in the same way as hazardous substances.
5. The most common safety data sheets are visibly displayed in the entrance area of the respective laboratory.
6. The labelling obligation applies to the storage of chemicals in suitable containers. It must be clear which substance is involved and who is using the substance (formula, pictogram, name, date of preparation...).
7. All equipment used must be cleaned after use according to the instructions of the supervisor. Chemical residues must be disposed of according to the instructions of the supervisor. After use, the chemicals must be returned to the designated place.
8. The use of chemicals requiring a toxic certificate (with a skull and crossbones pictogram) is strictly prohibited.
9. The burn-back safety devices at the hydrogen tapping points must not be removed under any circumstances.
10. To prevent the occurrence of explosive atmospheres, the use of chemicals is prohibited.
11. In order to avoid the creation of explosive atmospheres, the gas concentration in the room must not exceed 10% of the lower explosion limit (LEL).

### Handling electric current

1. When working in and on electrical installations, the five safety rules apply to prevent electrical accidents. These five safety rules are applied in the stated order before work is carried out on electrical installations. After the work, they are cancelled in reverse order.
  1. Disconnect all poles and all sides.
  2. Secure against reconnection.
  3. Determine the absence of voltage at all poles.
  4. Earth and short-circuit.
  5. Cover or isolate adjacent live parts.

2. Circuit assemblies must always be carried out in a de-energised state. Bare live parts must be assembled in such a way that accidental contact can be ruled out.
3. Electrical circuits must not be mounted on wooden boards.
4. Electrical assemblies with voltages > 50V DC and 25V AC may only be put into operation in the direct presence of a supervisor.
5. Accumulators may only be charged during regular laboratory operating hours and on non-flammable surfaces. All flammable substances etc. must be removed from a sufficiently large radius. "High-power" batteries (Ni-Cd, Ni-MH, Li-Ion, Li-Fe...) may only be charged in a fire-safe metal enclosure. Make sure you choose the right charger! A personal check of the charging process approx. every 1-2 hours is required!
6. If a person gets into the circuit or if there is a risk of this happening, immediately press the nearest emergency stop button (red mushroom button). If necessary, call qualified help (emergency doctor, fire brigade...) as soon as possible.

### Accident prevention and behaviour in case of accidents

1. Tampering with safety equipment (e.g. switching off alarm devices) is strictly forbidden.
2. Sources of danger, damage to equipment (e.g. broken glass, spillage of chemicals, etc.) must be reported to the supervisors immediately.
3. Wash hands after using chemicals, especially toxic ones. Pipetting by mouth is strictly prohibited. It is recommended that hands be rubbed with skin protection cream and gloves be worn before working with chemicals.
4. Gas cylinders must be secured to prevent them from falling over.
5. Gas cylinders may only be transported with the gas cylinder trolleys provided for this purpose. Furthermore, it must be ensured that the bottle cap is screwed on.
6. Injuries (including minor cuts and burns) must be reported immediately to the supervisors, who will then decide on the further course of action.
7. In the event of an accident, first aid must be given.
  - Call for help loudly, inform first aiders
  - Call 0144 or 0112 or 001-4064343 (Poison Control Centre). Where? What? How? Who?
  - Secure the accident site, rescue the injured
  - Immediate life-saving measures
  - Further first aid
8. In case of contact with chemicals, immediately rinse the affected area with plenty of running water that the way of the water is as short as possible (e.g. hold the affected eye downwards...). In case of fire or extensive contact with chemicals, use the emergency shower and remove contaminated clothing.
9. When working with or in the vicinity of highly flammable or explosive substances, all sources of ignition must be eliminated. These are e.g. lighters, Bunsen burners, sparking tools (steel tools, angle grinders...), radios, mobile phones, hot plates, fan heaters and soldering irons. Static electricity, including through clothing, must be avoided.
10. Appliances that are switched on must not be operated without a person being present. This does not apply to specially secured and labelled continuous experiments.
11. Increased caution is required in the vicinity of rotating machine parts. Long hair, ties, etc. must be protected.
12. The wearing of protruding jewellery is prohibited.
13. Exercise participants must take all precautions in their own interest to reduce the risk of accidents in the laboratory.
14. Expectant and breastfeeding mothers must inform the respective supervisor (employment restriction!). As a general rule, expectant and nursing mothers are not allowed in the

laboratory! Specific exceptions for individual exercises are possible in consultation with the Head of Department and the lecturers in compliance with the Maternity Protection Act.

### Specific guidelines for the individual laboratories

#### Photovoltaics Laboratory (PV)

- The test stands and measuring set-ups may only be operated when technicians, professionally instructed teachers or professionally instructed research assistants are present.
- When working with the solar simulator, suitable protective goggles and clothing must always be worn.
- It is forbidden for unauthorised persons to cross the barrier or the yellow-black line in the area of the inverter field, the electrolyser and the fuel cell!

#### **Safety equipment:**

- Gas detection system with acoustic and optical warning device
- Measuring gas H<sub>2</sub>+CH<sub>4</sub>
- Measuring range 0-100 % of the LEL
- There are 2 alarm thresholds that strike at the different alarm limits:
  - Alarm threshold: 20 % LEL
  - Alarm threshold: 40 % LEL
- 2 table fume cupboards with warning device
- 11 ceiling extraction points
- Maximal air extraction volume flow:  $\dot{V} = 1380 \text{ m}^3 / \text{h}$
- Emergency shower
- Sprinkler system

#### **Working materials used:**

Ar, H<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>, CH<sub>4</sub>, KOH, compressed air.

**To ensure safe operation with flammable gases, the gas concentration must not exceed 10 % of the lower explosion limit (LEL).**

#### Heating, Ventilation and Air Conditioning Laboratory (HVAC)

- The test stands and measuring set-ups may only be operated if technicians, professionally instructed teachers or professionally instructed research assistants are present.

#### **Safety equipment:**

- Gas detection system with acoustic and optical warning device
- Measuring gas H<sub>2</sub>+CH<sub>4</sub>
- Measuring range 0-100 % of the LEL
- There are 2 alarm thresholds that strike at the different alarm limits:
  - Alarm threshold: 20 % LEL
  - Alarm threshold: 40 % LEL
- 8 ceiling extraction points
- Maximal air extraction volume flow:  $\dot{V} = 1340 \text{ m}^3 / \text{h}$
- Emergency shower
- Sprinkler system

#### **Working materials used:**

Ar, H<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>, CH<sub>4</sub>, compressed air.

**To ensure safe operation with flammable gases, the gas concentration must not exceed 10 % of the lower explosion limit (LEL).**

#### Components of Energy Technology (CET)

- The test benches and measuring set-ups may only be operated if technicians, professionally instructed teachers or professionally instructed RA are present.
- The gas supply cabinets may only be opened by technicians, professionally instructed teachers or professionally instructed research assistants.

#### **Safety equipment:**

- Gas detection system with acoustic and visual warning device.
- Measuring gas H<sub>2</sub>+CH<sub>4</sub>
- Measuring range 0-100 % of the LEL
- There are 2 alarm thresholds that strike at the different alarm limits:
- Alarm threshold: 20 % LEL
- Alarm threshold: 40 % LEL
- 2 table fume cupboards with warning device
- 8 ceiling extraction points
- Maximal air extraction volume flow:  $\dot{V} = 1480 \text{ m}^3 / \text{h}$
- Emergency shower
- Sprinkler system

#### **Working materials used:**

Ar, H<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>, CH<sub>4</sub>, compressed air

#### **Storage room for flammable liquids:**

Acetone, Ethanol, Propanol

**For safe operation with flammable gases, the gas concentration must not exceed 10 % of the lower explosion limit (LEL).**

#### Solar Laboratory (SOL)

- The test stands and measuring set-ups may only be operated if technicians, professionally instructed teachers or professionally instructed RA are present.
- Appropriate protective goggles are to be worn as required.

#### **Safety equipment:**

Fire alarm

#### **Working materials used:**

Antifreeze, compressed air

#### Spectroscopy laboratory (SP)

- The test stands and measuring set-ups may only be operated if technicians, professionally instructed teachers or professionally instructed research assistants are present.
- Liquid nitrogen is used to operate the spectrometer. When handling liquid nitrogen, appropriate protective clothing (face shield, gloves...) must be worn.

#### **Safety equipment:**

Fire alarm

#### **Working materials used:**

Liquid nitrogen

Built in laser class 2

#### Thermal Engineering Laboratory (WT)

- The test benches and measuring set-ups may only be operated if technicians, professionally instructed teachers or professionally instructed RA are present.
- Appropriate protective clothing must be worn.

**Safety equipment:**

Fire alarm

**Working materials used:**

Solid fuels (pellets)

O<sub>2</sub> in 20l/200bar gas cylinder

Thermal oil (temperatures up to 250 °C)

#### Building and Air Conditioning Technology Laboratory (BP)

- The test stands and measuring set-ups may only be operated if technicians, professionally instructed teachers or professionally instructed research assistants are present.
- When manipulating the test specimens or masonry work, protective helmets, safety shoes and gloves must be worn.
- When manipulating materials that cause dust formation, appropriate protective masks must be worn.
- When working with the hoist, make sure that there are no persons in the manipulation area.
- The instructions for use of the adhesives used must be followed.
- The hoist may only be operated by trained persons.
- When working with the climate simulation chamber, be aware that parts in the system can be either very cold or hot. Appropriate protective clothing must also be worn here.

**Safety equipment:**

Fire alarm

**Working materials used:**

Adhesives, various building materials

#### Solar roof on building B with hydraulic room on 4th floor (SDA)

- The SDA may only be entered in the presence of authorised persons.
- The test stands and measuring set-ups may only be operated if technicians, professionally instructed teachers or professionally instructed RA are present.
- Crossing the boundary rope is strictly prohibited.
- All objects must be secured against falling.

**Safety equipment:**

Railing, boundary rope

**Working materials used:**

Anti freeze

#### Solar roof on building A (SDN)

- Unauthorised persons are not permitted to enter the cordoned-off roof area where the PV and solar thermal systems are located.
- The test stands and measurement set-ups may only be operated if technicians, professionally instructed teachers or professionally instructed RA are present.
- Unauthorised persons are prohibited from crossing the tracker fence!

- It is forbidden to cross the boundary rope.
- All objects must be secured against falling.

**Safety devices:**

Perimeter rope

Thermoelectric Laboratory (TE)

- The test stands and measuring set-ups may only be operated if technicians, professionally instructed teachers or professionally instructed RA are present.

**MAGNETS**

- Magnets can influence the function of pacemakers and implanted defibrillators.
- There is a risk of bruising and haematoma. Very large magnets can cause bone fractures due to their force.
- Keep magnets away from all devices and objects that can be damaged by strong magnetic fields.

**LASER**

- Before working with lasers, appropriate instruction must be given by the laser safety officers.
- When working with lasers, the protective equipment appropriate to the respective laser class (e.g. safety goggles) must be worn.

High-voltage laboratory (HS)

- For the operation of the HS Laboratory, special knowledge of high-voltage technology (HS technology) is required, which is primarily available to FH Prof. Dr. Peter Zeller. Therefore, Prof. Dr. Peter Zeller is solely responsible for all technical, organizational and safety matters etc. (see also "Agreement HS Laboratory").

List of abbreviations:

|         |                                 |
|---------|---------------------------------|
| Dept... | Department                      |
| HoD...  | Head of Department              |
| RA...   | Research Associate              |
| R&D...  | Research and Development        |
| FTL...  | Full-time lecturer FH professor |
| PTL...  | part-time lecturer FH-lecturer  |



Head of Department Energy Technology

Professor responsible for the laboratory

I hereby confirm that I understand the laboratory regulations FB-ENG. I have informed myself about the potential dangers of the laboratory equipment and undertake to comply with the laboratory regulations as well as the general and special safety regulations.

Furthermore, I confirm that I will comply with the campus regulations and the fire protection regulations.

Link to the Laboratory Regulations FB-ENG:

<https://www.fh-ooe.at/campus-wels/die-fakultaet/services/laborordnungen/labor-eng/>

Link to the Campus Regulations incl. Fire Protection Regulations:

<https://www.fh-ooe.at/campus-wels/die-fakultaet/services/campusordnung/>

Place, date

Signature

Activation of laboratory access

I request access to the following laboratories:

| Laboratory name | Room number | Activation from | Activation until |
|-----------------|-------------|-----------------|------------------|
|                 |             |                 |                  |
|                 |             |                 |                  |

Project name: .....

I hereby confirm that I understand the Laboratory Regulations FB-ENG. I have informed myself about the potential dangers of the laboratory equipment and undertake to comply with the laboratory regulations and the general and special safety regulations. Furthermore, I confirm that I will comply with the campus regulations and the fire protection regulations.

Link to the Laboratory Regulations FB-ENG:

<https://www.fh-ooe.at/campus-wels/die-fakultaet/services/laborordnungen/labor-eng/>

Link to the Campus Regulations incl. Fire Protection Regulations:

<https://www.fh-ooe.at/campus-wels/die-fakultaet/services/campusordnung/>

My data:

| First and last name | Mat. Nr. | Tel. Nr. | Signature |
|---------------------|----------|----------|-----------|
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Date :

Signature of supervisor (project management)