**Procedure for Handling a Flammable Gas Leak**

**General**

According to the requirements of the safety regulations, detectors for LPG, hydrogen and other flammable gases have been installed in places where these gases are used, and they are designed to detect the presence of gas in the air and reporting when the concentration reaches the dangerous levels defined.

**Goals**

The goal of this procedure is to define methods of treatment in the event one of these detectors sounds a warning indicating the presence of gas at a concentration that is equal to or higher than the concentration level defined. Generally speaking, the first warning is given at a concentration that is 10% of the LEL (lower explosive limit), and a second warning is sounded at a concentration that is 20% of the LEL.

**Applicable documents**

**Laboratory safety regulations**

* Safety sheets (1998)
* Hazardous Materials Law – 1993
* Hazardous Materials Regulations – 1996
* Business Licensing Regulations (Businesses requiring licensing for hazmat)
* Safety at Work Regulations for Work in Laboratories (medical, chemical and biological) – July 2001
* University Emergency Procedures (2001)

**Definitions**

**LEL (lower explosive limit)**

Explosive limit of mixtures of flammable gases and air, in percentages of volume and under standard conditions.

**Standard conditions**

Conditions at zero degrees Celsius and a barometric pressure of 1 bar (103 kPa per sq.cm.)

**Detector**

An electrochemical or other device installed in a place where there are flammable gases, connected to an electronic switchboard that constantly measures the concentration of the flammable gas in the air and warns when the concentration exceeds the concentration level defined in advance.

**Warning exchange**

An exchange located outside of the room where the detector is installed, and which is connected directly to an exchange in the Security Department where security personnel are stationed 24 hours a day. Alternatively, the detector can be connected directly to the warning exchange in the Security Department, without any intermediate exchange.

**Directing warnings**

* When there is an intermediate exchange inside the building where the detector is installed, the first warning (at 10% LEL) is sounded in the room where the detector is installed and only for that exchange, and the second warning (at 20% LEL) is sounded in both the local exchange and the Security exchange.
* When there is no intermediate exchange, the warnings at 10% LEL and 20% LEL are sounded directly in Security, but also always locally in the room where the detector is installed.

**Emergency and University response team**

A team on behalf of the University under command of the head of the Security Division and consisting of personnel from Security, Maintenance and other entities, who are equipped, trained and practiced in performing rescue operations and dealing with hazmat events, including firefighting activities, and who are connected with the University’s Security Center through communications devices.

**Custodian**

A person whose job is to be responsible for the housekeeping in a building/faculty, who knows the location of all shut-off devices in the building – for electricity, water, compressed air, LPG, centrally supplied laboratory gases, etc., and who also has keys for all rooms in the building.

**Chairperson of the emergency office**

This person is responsible for the University’s emergency system, and in his absence the on-duty manager substitutes for him.

**On-duty manager**

Replaces the person in charge of the emergency system at nights, on Shabbat and on holidays, until his arrival.

**External rescue and assistance entities**

Fire and Rescue services, Israel Police, Magen David Adom (MDA), environmental unit of the Tel Aviv Municipality, Tel Aviv District in the Ministry of the Environment, and the Ministry of Labor’s supervisor.

**University’s hot line for providing information**

The office of the Emergency Division/the on-duty manager receives all calls and notifications involving security and safety events, natural disasters, etc.

**1. Areas of responsibility and authority**

**Approving and disseminating the procedure**

The Procedure for Handling a Flammable Gas Leak at the University will be approved and signed by the University’s administration, and the signed procedure will be distributed to the University’s management, members of the emergency office and the director of the security department, who will brief his personnel.

**Updating the procedure**

The procedure will be updated by the Safety Unit as requested in writing by the chairperson of the emergency office, or when it becomes necessary to do so.

**Operating authority**

The authority and responsibility for implementing the procedure rests with the head of the University’s security division, both during regular hours and outside of regular hours.

**The Method**

**Connecting the detectors to the University’s warning system**

First warnings at concentrations of 10% LEL will be sounded locally, but also in the security exchange.

Second warnings at concentrations of 20% LEL will be sounded both locally and in the security exchange.

**Actions to be taken upon hearing the first warning**

Actions by workers at the site using flammable gas during work hours:

* Stop all activity whatsoever
* Open all of the windows
* Exit the room
* Close the door and the flammable gas shutoff valve (if there is one) located outside the door
* Disconnect the electricity in the entire room using the switch located in the electrical box (do not disconnect the electricity for every device from inside the room).
* Demand that all employees on the floor evacuate the building immediately using the stairs (not the elevator).
* When reaching the ground floor, notify the custodian.

Actions by the security department:

* Using the communications system notify all members of the emergency tea to report to the security unit offices.
* Organize the emergency team and provide them with the appropriate emergency equipment, including open-circuit breathing apparatus.
* Proceed to the site of the event and arrange to enter the building.

Additional actions by the emergency personnel outside of work hours:

* Go up the stairs to the room in which the event has occurred (wearing the open-circuit breathing apparatus).
* Close the gas valve to the room/disconnect (if this is present) the electricity outside the door.

**Actions to take upon hearing the second warning – during work hours:**

Custodian:

* Activate the general warning system in the building
* Announce on the PA system or a loudspeaker to evacuate the entire building immediately using the stairs (and not the elevators), and designate a place for the evacuees to gather, at a distance of at least 50 meters from the building.
* Place an employee from the custodian’s staff with the emergency team, to provide information on the location of various devices in the building.

Actions by the emergency team:

* Notify fire and rescue services and the Israel Police about the event.
* Notify the Ministry of the Environment, Tel Aviv District and the Municipality’s Environmental Unit about the event.
* Put on open-circuit breathing apparatus and have a blast-proof flashlight.
* Disconnect the general electricity in the entire building.
* Disconnect the main valves for all flammable gases supplied to the building.
* Go up the stairs to the room where the flammable gas leak is located, open the door gently (so as not to cause any sparks when opening the lock and the door).
* Enter the room/open all of the windows.
* Check the concentration of flammable gas using an explosimeter and wait until the gas drops to a level below 10% LEL.
* Link up with the firefighting crew and turn on their blast-proof blower to dilute the gas, if it has not yet dropped to below 10% LEL.

Note: The work should be done in pairs, with one person watching and observing.

**Actions to take in the event of a flammable gas canister in the room:**

* If, contrary to regulations, there are canisters of flammable gas placed inside the work room/laboratory, and it is not possible to shut off the gas outside, immediately evacuate the entire building as soon as you hear the first warning of a 10% LEL concentration. Whoever is in the room must turn off the gas and make sure it is shut.
* Only an emergency equipped with an open-circuit breathing apparatus/blast-proof flashlight is permitted to enter the room and shut off the valve among the flammable gas canister.
* Continued handling of the event as stated in paragraph 6.3.2.

**Actions in the case of hydrogen gas in a battery room:**

* When there is a hydrogen detector in a room for electric batteries used to back up the computers, telephone exchanges or other sensitive equipment, and there is a warning of a hydrogen concentration over 10% LEL, you must stop charging the batteries, but under no circumstances should you stop the ventilation blowers in the battery room.
* For this purpose, you must prepare – in advance and outside of the battery room – at least three switches:
	+ One to stop the batteries charging;
	+ One for lighting;
	+ One for the blowers, connected to the emergency electricity, with a sign that they must not be turned off even in the case of a hydrogen gas warning.
* An electrician, together with someone from the security staff equipped with a calibrated explosimeter should go in to verify the detector’s warning. If it is found that there really is hydrogen in the room, the room should be flooded with nitrogen gas through a pipe that is prepared in advance, in order to reduce the hydrogen concentration in the room to below the LEL concentration.

**Actions at the conclusion of the event:**

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| Investigate the event | * Internal investigation will be done by the Safety Unit, which will emphasize drawing conclusions, means to prevent future leaks and improving the procedure for handling flammable gas leaks.
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| Return to work | * Before returning to normal work, a meeting will be held with all the entities involved in the event in order to evaluate the situation, assess damages if any, and determine how to conclude the event.
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**Return to work will always be according to the following steps:**

* Return to work can happen only after the concentration of flammable gas has dropped below 1% LEL.
* Upon returning to work, the electricity will first be restored and workers in the building will return to their places.
* The first action should be to close all of the valves for all flammable gases in their work space.
* Afterwards, a safety specialist will go to all of the rooms in the building to ensure that all the valves are closed.
* When the security specialist returns to the custodian’s office and confirms in writing that all of the valves are, in fact, closed, the main valves for supplying flammable gas to the rooms can be opened and the users can open the regular valves as usual.