



Kingdom of Saudi Arabia
Ministry of Interior
General Directorate of Civil Defense

Regulation of Safety Conditions in Laboratories

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Chapter 1

Definitions

Article (1): definitions: the terminologies in this regulation have the following meaning:

1. Laboratory: designed specifically for conducting studies and experiments, for all scientific fields, for the purposes of research, scientific preparation, discovery, analysis or other similar activities that require the use of special equipment, devices and various other materials.
2. Laboratory table: Specifically designed for use in experiments and tests, in addition devices and equipment can be placed on it. Its height ranges from (80–90 cm), and it is equipped with the necessary means that suit the nature of the work such as (water, electricity, butane gas, compressed air, steam, various gases such as nitrogen ... etc.), and a suitable drainage system.
3. Additional equipment: to allow the implementation of additional works such as sanitizing tools and devices, supply and storage, offices and rest rooms, and waste disposal.
4. Explosive materials: non-static materials that disintegrate very quickly by shock, friction or heat, generating large amounts of heat and forming very large volumes of gases that may lead to a powerful explosion. The intensity of the explosion depends on the type of chemical.
5. Law: Civil Defense Law issued by Royal Decree No. (M/10), dated on (10/5/1406H) and all other relevant regulations.
6. Civil Defense Representative: The authorized person or persons by the General Directorate of Civil Defense, or one of its centers to carry out inspection, forfeiture, and investigation of violations as per the rules and procedures specified in the relevant Regulation.
7. The Relevant authority: the Ministry of Interior, the General Directorate of Civil Defense and other public authorities involved in the process of licensing the laboratories.

8. Safety officer: According to Article 25 of the Civil Defense Law, the safety officer is the person (of the laboratory staff or other) appointed or assigned to be responsible for all safety and security matters. The licensee is responsible for safety in all cases. The duties and tasks of such are determined as per the regulation of authorized person in safety works and Industrial security issued in this regard.
9. Approved standards:
 - a) Saudi Standards: issued by the Saudi Standards, Metrology, and Quality Organization, SASO.
 - b) International Standards: international specifications approved by SASO, official documents to be submitted to prove all safety rules and requirements are available in the used machine or material.
10. Corrosive Chemicals: cause harm to the skin, eyes and respiratory upon contact. The risk of each substance varies depending on its physical and chemical properties and the exposed body parts. They are divided into two parts:
 - a) Primary corrosive substances: cause general poisoning and local wounds upon contact.
 - b) Secondary corrosive substances: cause general poisoning as well as local wounds or skin erosion upon contact.
11. Flammable liquids: having a flash point ranging from (21m) to (55m).
 - a) Flashpoint of a liquid: the lowest temperature at which the liquid gives off enough vapour to be ignited (start burning) in the form of a flash upon reaching the source of flame which ends when this source is removed.
 - b) Flammable temperature: the minimum temperature at which a substance gives off enough vapour to form the flammable mixture so that the flame continues even if the source of ignition is removed.
 - c) Explosive range: the concentration range of a vapour in the air that will burn (or explode) if an ignition source is introduced.

12. Oxidizing substances: result in high temperature reactions and explosion when in contact with other substances.
13. Toxic substances: cause severe, serious or chronic effects and may lead to death when swallowed, inhaled or absorbed through the skin.
14. Compressed gases: pure gases or mixtures of a group of gases in a cylinder or container with a pressure of not more than (40 lbs) at (21°C) or pressure above (104 lb/inch) at (45 °C) or a liquid having a vapor pressure exceeding (40 lb/inch) at (38 °C).
15. Flammable gases: any compressed gas that meets the requirements of minimum ignition limits, the extent of the ignition limit and the spread of flames.

Chapter 2

"General Terms and Conditions"

Article (2): According to article (20) of the Civil Defense Law, the licensee shall not be permitted to establish any new laboratory, renewing, renovating or expanding the existent one until he submits a technical study prepared by one of the technical offices specialized in safety and alarm and fire control works and approved by the General Directorate of Civil Defense. This study explains the extent of compliance with the rules mentioned in this regulation and the existing laboratory will be allowed a period of between (6 months and a year) from the time of issuing this Regulation in order to apply the requirements and instructions stated in this regulation. The competent authority should consider that granting or renewal of a license should be in accordance with this regulation.

Article (3): The office that prepared the study mentioned above have to answer to the Civil Defense and other relevant authorities about the accuracy of the study and monitoring its implementation. The office

will undertake to provide a final certificate confirming the establishment compliance with the terms and conditions included in this Regulation. The office shall be considered responsible in solidarity with the laboratory owner for any default or neglect in this regard.

Article (4): The safety officer in the laboratory undertakes to conduct monthly inspections and tests every month for laboratory devices, electrical installations, safety means and fire & alarm equipment and to repair any malfunction or defect immediately after discovered, and he may inform the relevant Civil Defense center to choose a suitable date to attend the tests. Civil Defense representative will sign the safety record as a proof of attending.

Article (5): The safety officer in the laboratory shall assign a register called (safety and firefighting record) according to the application form prepared by Civil Defense. All pages are stamped by the Civil Defense. All the monthly inspections and periodic tests of fire, monitoring, alarm methods, the dates, results, repair works, and other data are recorded in this register. Part of this record is dedicated to the building inspection and maintenance works and the building's electrical installations.

Article (6): All workers in the laboratory must be trained on the fire & rescue, and ambulance in schools and national training institutes approved by the General Directorate of Civil Defense or coordinate with the General Directorate of Civil Defense to hold training courses for this purpose in the regions and cities having such training facilities. In addition, the training requesting party bears the costs of such. However, the number of workers in the laboratories and their nationalities must be confirmed.

Article7: The safety officer shall place instruction and warning signs as per the design approved by Civil Defense. This is to prevent smoking and igniting and to provide guidance of exits and escape routes and safety measures.

Article (8): This regulation is for safety and firefighting requirements without being subject to the rest of the requirements and specifications of other relevant authorities.

Article (9): This regulation must be applied to all governmental and private laboratories.

Article (10): Laboratory must not allow to operate before obtaining the aforementioned license.

Article (11): In the event of selling or renting a private laboratory, the new buyer or tenant shall be responsible for implementing all preventive conditions and requirements, and he must obtain the approval of the licensing authority in this regard and notify the Civil Defense.

Article (12): Violations of this regulation shall be controlled, investigated and imposed as per Civil Defense Law and the regulations or instructions issued by the Civil Defense governing these matters.

Chapter 3

"Safety and Protection Requirements and Conditions"

Article (13): General preventive precautions and personal behavior in laboratories:

1. The laboratory should be equipped with a shower station at the entrance and away from electrical equipment and sockets.
2. The laboratory should be equipped with eyewash station in suitable locations.
3. Marks and signs should be placed indicating the location of the showers.



4. Precautions should be taken to protect outdoor shower equipment from freezing in winter and heat in summer.
5. The laboratory should be provided with a first aid pharmacy appropriate to laboratory risks and placed in a prominent location.
6. All laboratory floors must be sterilized, in a good condition, and of non-slip type.
7. Public corridors and routes leading to exit and emergency doors must be barrier-free and must be provide with guide lines (white color)to indicate the direction of the exits.
8. Minor spills on the ground, especially flammable solvents, broken glass and mercury, and strong acids or alkalis, should be diluted and neutralized before they are removed.
9. The laboratory must have toxic and harmful gas and vapor extractors. The laboratory should be equipped with extraction rooms for toxic gases and fumes resulting from the experiments.
10. Ensure that all capacitor rubber connections are well maintained. Pay attention to the condition of the stopper and check it regularly, as the water usually runs low when opened.
11. Explosive and flammable materials should be stored in special places away from flames, sunlight, high temperature or potential sources of electrical sparks and avoid collisions or fall on them.
12. Information should be prepared on all chemicals used such as quantity, method of transportation and storage, physical and chemical properties including temperature, sensitivity, explosion, flammability, degree of reaction with water and method of disposal of residual chemicals used.
13. Appropriate personal protective equipment should be provided to each laboratory (suits, coats, masks, goggles, shoes, gloves, fireresistant blankets, etc). Workers and trainees must use them during working hours and experiments.
14. Smoking and eating food and beverages are strictly prohibited in all laboratories. Instructions and warning signs in Arabic and English should be place to illustrate this.



15. The laboratory must be organized and permanently arranged.
16. The laboratory administrator/ director is responsible for the general monitoring in all its departments.
17. Work in the laboratory should be carried out in an organized way. In addition, the working table should not be left contaminated with waste and used equipment.
18. Sterilizing must be done after stage of the experiment as well as cleaning the tools and utilities contain harmful chemicals before final sterilizing.
19. Authorized personnel only inside the laboratories. Signs must be placed on doors and corridors to highlight this. Automatic system for access and exit laboratories may be installed.
20. Workers in tuberculosis laboratories should undergo regular chest Xrays, and workers in radioactive materials laboratories should undergo white blood cell testing, in addition to taking the radiation doses they are exposed to regularly. All personnel should be trained in first aid and CPR and directed to the correct behavior within the laboratory and the correct way to use the devices to avoid their mechanical hazards.
21. Extreme caution should be taken against unknown compounds of reagents chemicals.
22. Supervising chemists should ensure that their assistants and technicians are aware of any potential risks.
23. Before starting any experiment, ensure that laboratory personnel are aware of all the risks of materials used and the expected results, and health prevention means the necessary treatment.
24. Leaving the laboratory is not permitted during the ongoing experiment unless the supervisor is consulted in advance and informed of what has actually been accomplished. However, if it is necessary to continue this during the night, frequent monitoring should be performed by a professional, qualified and aware of the potential risks, and in coordination with the responsible supervisor.
25. The experiment must be stopped if the worker is absent for a long period.



26. First aid kits should not be tampered with and routes leading to them must be unobstructed. The same applies to breathing masks, emergency shower equipment, and personal protective clothing and circuit breaker cabinets.
27. The laboratory staff must be qualified technicians specialized in dealing with materials used in the laboratory, especially hazardous materials.
28. It is not allowed to run inside the laboratories or the corridors.
29. It is not allowed to joke with a hand because of its dire consequences.
30. Be careful when opening and closing doors or entering and exiting the laboratory.
31. It is not allowed to operate any electric devices such as (fan, mixer, etc.) before making sure that they do not harm the workers.
32. The laboratory supervisor must deal with the machines with the utmost caution when moving them as a moment of neglect can take the lives of everyone in the laboratory.
33. A student should not take a risk with oral pipettes, but instead use approved filler.
34. Do not insert any tube, glass rod or thermometer into stoppers without lubricating them if necessary.
35. The vertical position method should be followed to carry a rod or tube.
36. Experiment tools and equipment must be used for the intended purposes.
37. Air conditioners and rotors flasks are dangerous as they should be inspected and examined regularly to detect hazard points and cracks that may occur. Flasks must also be protected by a wire network and allow air to enter gradually.
38. Experiments involving the use of toxic chemicals should be carried out in a sterile, isolated place inside a chamber to avoid exposing workers in other experiments to risks, and masks should always be on hand.
39. Particular care should be taken when using a large number of flammable solutions as such experiments must be isolated and enclose electric heating must be used because any igniting fumes or naked flames may lead to a fire or explosion.

40. All personnel in the laboratory must be aware of the locations of main power switches as well as gas and water breakers and valves. They must also ensure that the routes leading to these sites are clear of obstructions that may hinder the emergency evacuation process. An additional copy of the laboratory map showing the locations of these switches and circuit breakers should be available outside the laboratory for reference when needed.
41. When dealing with new materials or when their properties are not well known, the risk may not be apparent and as a result the potential hazards of these materials must be avoided and carefully treated to avoid harming oneself or others.
42. It should be noted that solutions with a degree of ignition below (60 ° C) or around this can be ignited by an electric heater that has been turned off and still maintains a slight heat.
43. Approved procedures must be used to dispose of flammable solutions. Further details may be obtained from the Laboratory Supervisor.
44. Test tubes and glass containers should be attached to the designated holder and large devices should not be touched with wet hands.
45. The laboratory should have electrical means to use instead of flame stoves in order to avoid the ignition of volatile and flammable liquids.
46. It is imperative to ensure that all chemicals used are provided with instructions highlighting hazards, methods of prevention and storage, and appropriate extinguishing materials.
47. A variety of waste containers should be provided for each type of materials to dispose of their waste separately and to avoid environmental pollution.

Article (14): Personal protection requirements:

1st: Prevention of toxic substances:

1. It is imperative to refer to the Toxic and Hazardous Substances Manual to determine the risks associated with the materials handled in the laboratory. A copy of the manual should be at the disposal of laboratory personnel.

2. Small quantities of toxic substances must be handled as needed.
3. Necessary protective equipment such as (gloves, respirator, and protective coats) should be re-worn.
4. Contaminated clothing should be cleaned or disposed of immediately.
5. The workplace should be well ventilated.
6. Regular checks of laboratory personnel (such as urine, blood, etc.) should be performed and the individual should visit a doctor immediately in case of poisoning.
7. The doctor should attend immediately if poisoning occurs.

2nd: Prevention of corrosive substances, compressed gases, carcinogenic chemicals, radioactive materials, oxidized chemicals, explosives and flammable materials.

A. Guidelines for handling compressed gases:

1. Identify type of gas (cylinder contents).
2. Identify the physical and chemical properties of the gas used.
3. Store cylinders in special places and at certain temperatures.
4. Do not use gas cylinders directly without regulators.
5. Do not place the cylinders on top of each other during loading and unloading.
6. Storage of toxic, flammable and corrosive gas cylinders should be in small quantities and in places provided with good ventilation.
7. Cylinder must be kept vertically.

B. Preventive instructions against the risks of flammable substances:

1. Flammable materials should be handled under hoods vent and in an airy place.
2. When dealing with these materials, all naked flame ignition sources should be turned off.
3. Protective masks should be worn for each type of flammable substance.



4. Protective eye glasses should be worn when dealing with flammable substances.
5. Smoking and the use of open flames are strictly prohibited when a flammable material has been leaked or spilled.
6. Flammable materials should not be transported with explosive, toxic, radioactive or oxidizing materials.
7. Container damage should be avoided when unloading and loading.
8. Flammable materials should not be stored with oxidizing substances, especially chemicals because storing such different materials together can pose severe risks.
9. Flammable materials should not be stored directly under the sunlight.
10. Flammable substances should not be stored with acids, especially mineral acids.
11. When dealing with these substances, the individual must be aware of their dangerous interaction with other chemicals in addition to their physical properties.

C. Precautions in the event of a fire:

1. Caution should be taken as the combustion of certain types of flammable substances may result in the spread of toxic and irritating gases.
2. Containers should be cooled with water to avoid explosions due to evaporation of flammable materials.
3. Containers must be removed from the fire area.

Chapter 4

Safety conditions in laboratory buildings

Article 15: Classification of laboratories:

Laboratories are categorized according to the type and quantity of hazardous chemical materials, flammable gases and liquids into the followings:



1. Class (A) high– risk: where large quantities of flammable and combustible liquids are permissible with flash point lower than 0 ° and boiling point lower than or equal to 35 °C.
2. Class (B) medium risk: where the amount of flammable and combustible liquids, less than class A, is permissible, with a flash point less than 21 °C, and contains materials that ignite automatically at normal temperature and solids that burns easily when touching water or wet air.
3. Class (C) low–risk: where flammable liquids are not permissible at all. Laboratory units are classified to the above classes is according to the amount, type and risky of the flammable and combustible liquids used or stored in normal or secured containers, or in storage cabinets.

The classification of the laboratory units into the aforementioned classes is based on the amount, type and risk of the flammable and combustible liquids used and stored in normal or secure containers or in storage cabinets. It is also based on its size, installed fire suppression system and resistance construction materials used within.

The risks can be lowered in the laboratory unit by decreasing the amount of flammable and combustible liquids. This can be achieved by storing them in storage rooms and keeping only the required amount. The laboratory unit can be divided into separate low–risk units by installing fire–resistant barriers between them.

Article (16): Building Requirements:

1st: General requirements for all types of laboratories:

1. Laboratory buildings should be constructed of non–flammable materials having a fire and explosive resistant of at least 2 hours.
2. Class A and B laboratory units in government sectors and public and private facilities must be separated from other units of equal, low and high risk by using similar building materials or more fire–resistant materials.
3. All doors and windows must be installed of metallic materials, and window's glass must be of a reinforced and heat–reflecting type.

4. Doors and windows must be of the type that is manually opened with an easy-to-open handle to remove smoke.
5. Walls and ceilings must be protected against smoke, flames and fumes resulted from the burning of other floors.
6. The floors of the laboratory shall be covered with (linoleum) (plastic) tiles and have a relative slope to allow the flow of fluids towards the drainage.

2nd: Requirements and specifications of biological laboratories:

1. The types of laboratories and the tests that will be conducted within them must be defined, bearing in mind that the workplace must be large enough to distribute the work over several areas to provide more safety.
2. Lighting should be adequate and suitable with volume and type of work.
3. The design of the walls, floors and ceilings should be made of a soft, easy-to-clean material, preferably of vinyl that does not leak water and is not slippery.
4. Laboratory tables must be smooth, anti-leaking and slip-resistant and resistant to disinfectants, acids and solvents.
5. Do not leave corners between tables in the laboratory during design. Spaces between tables and underneath must be opened and easily accessible for cleaning and arrangement of the work.
6. The rooms, especially the rooms of microbial farms, should be provided with ultraviolet rays for continuous sterilization, and fitted with a safety cabinet and filters.
7. The air conditioner must be designed in such a way that it allows permanent movement of air from outside to inside.
8. The laboratory rooms must be equipped with exhaust fans equipped with adequate and appropriate filters for the type and size of work, and to ensure that the environment is not polluted.
9. The warehouse must be designed to be large enough to accommodate all long-term or short-term laboratory supplies.



10. In the microbial laboratories, a flame gas pipe (Bunsen burner) should be provided on each table to use in sterilizing and to ease the work.
11. Sinks must be provided in each laboratory room and preferably near the exit.
12. A private room should be allocated to be a warehouse for solvents and compressed gases.
13. A special sanitation room should be provided to sterilize farms, blood samples and biological wastes.
14. A private pharmacy must be provided in the laboratory for first aid.
15. An outdoor room must be provided in the laboratory for dressing.
16. The waste from the laboratory should be disposed of and treated as a source of vital danger and divided into two parts:

a) Liquid waste:

It is necessary to provide a tank (tank, reservoir) into which the liquid waste is drained so that it is treated with some sterilizers, disinfectants, solvents or acids.

b) Solid waste:

After disinfection, the wastes must be transferred to a special incinerator to burn them. The incinerator chimneys must be equipped with special filters. The incinerator must be away from the populated areas and in accordance with the conditions and instructions issued by the Ministry of Health and the relevant authorities.

17. A special room must be designed as laboratory facility for animal, if any, to be designed in a way that facilitates cleaning as well as healthy ventilation.
18. Biohazard warning signs should be placed on the doors of the laboratory, and non-specialists are prevented from entering.
19. Workers should be trained on how to deal with safety and potential accidents.
20. Biohazard warning signs should be placed on the lab doors and, nonspecialists are prevented from entering.



21. Workers should be trained on how to deal with safety and potential accidents.

3rd: The requirements and specifications of laboratories using Radioisotopes:

In addition to the mandatory conditions in biological laboratories, radioisotope laboratories must fulfil the following conditions:

Lab tables must be lead-layered that prevents the passage of radiation.

1. Buildings and walls must be concrete with a (thick) width that prevents the passage of rays or is equipped with a layer of lead.
2. Doors must be equipped with a layer of lead that prevents the passage of radiation.
3. Radiation-proof clothing must be provided to staffs.
4. A special storage room must be provided for radioactive materials, the wall should be concrete or lead layer to prevent the passage of radiation. In addition to a room with the same specifications for storing solid radioactive waste.
5. A storage made of lead metal must be provided to dispose and store the liquid radioactive waste, keep it for a period comparable to ten times half-life of the material, and then dispose of it in the sewers.
6. Solid radioactive waste must be stored in its own warehouse for a period comparable to ten times half-life.
7. Laboratories contain devices using (U. V) rays and other types of rays must be provided with special glasses for operators.
8. Laboratory personnel must be fully aware of the risks and handle potential accidents in radioisotope laboratories.
9. Warning labels/signs must be placed on the doors highlighting the type of radiation hazard, and preventing the access of unauthorized personnel. The radiation ratio must be measured periodically and must not exceed the permitted limits.
10. It is a must to refer back to the instructions issued by competent authorities in order to protect against radiation hazards.

4th: The requirements and specifications of laboratories of explosive materials:

1. The laboratory workplace (working area) must be classified into two parts:
 - a) Section one: Contains the risk of explosion of some ready-made packages.
 - b) Section two: Contains concentrations of substances that can result in serious or fatal injuries to workers in that working area.
2. Reactive chemicals lead to thermal runaway must not be stored such as polymerization, oxidation, nitrous oxide (super oxidation), hydrogenation, and mineral –organic reactions.
3. The use or installation of substances whose chemical composition indicates inherent dangers, but whose properties are not specific.
4. Adequate precautions must be taken to avoid high-pressure reactions in the devices.
5. Laboratory walls must be reinforced concrete.
6. Firewall type must be installed to prevent the spread of fire.
7. The engineering construction of the laboratory must be specially designed for such purpose.
8. Maintain to reduce the amount of explosive substances and inflamed liquids in the laboratory unit.
9. Use a highly sensitive smoke detector with a water suppression system.
10. Use of reinforced concrete wall or steel barriers to resist explosion of dangerous materials in such place.
11. Use of fans to remove gases resulting from the explosion.
12. Conducting tests on explosive materials in an isolated and protected area.

Article (17): The dangers of environmental pollution and how to deal with hazardous wastes:

The general system of the environment, its executive regulations and the instructions of the competent authorities must be adhered to.

Article18: Safety conditions in electrical and mechanical installations: Adequate measures and precautions should be taken to avoid risks of electrical installations. The following safety conditions must be considered:

1. The installations and extensions of the appliances and electrical equipment in laboratories must be of a type and design that provides protection from hazards of fumes, liquids, gases and dust.
2. The locations of power sockets, switches and handles must be safe from exposure to leaking liquids.
3. The lighting must be fixed and the sockets are mounted in a way that is easy to control from easy and safe locations.
4. Emergency lighting must be installed in the event of a power outage and tested every time to ensure its readiness.
5. All electrical equipment and metal parts must be grounded regularly.
6. The examination of the new electrical appliances must be fully observed and tested before use.
7. Light switches and lamps must be anti-explosion and insulated against dangerous fumes.
8. Lightning rod must be installed in the laboratory to include every metal part.
9. The laboratory and its unit should be equipped with an effective ventilation system to circulate air throughout the laboratory.
10. All electrical and mechanical installations must be designed and installed by specialized authorities and in accordance with the specifications issued by the Saudi Arabian Authority for Specifications and Standards (SASO).
11. All electrical outlets must have three wires and the ground wire is of high quality and low resistance.

Article (19): Means of egress and emergency doors:

1. Exit means such as (doors, emergency exits, corridors, stairs, assembly points, etc.) must be available in all laboratory units so that the evacuation process can be carried out in at least two minutes in emergency situations. The number of exits is determined by the number of employees and visitors to the laboratory.

2. The type, number and methods of installation of the exits should allow the The exits should be of a type, number and installation methods that allow all those present to escape from the building or dangerous area to the outside or to a safe place. so that the distance a person travels from any point of the building to the nearest exit does not exceed 22 meters.
3. The corridors must be free of obstacles and the doors must be equipped with panic bar easily opened and kept open for the duration being inside the laboratory.
4. The number of emergency exits must not be less than (2) per floor, however, number of exits must not be less than (2) in each working area in the laboratory in the following cases:
 - a) If the work area in the laboratory contains explosive materials.
 - b) If the area of the class A laboratory is more than (500) square feet.
 - c) If the area of the class B or C laboratory is more than (1000) square feet.
 - d) If the work area is adjacent to the main exit.
5. Exits must be organized so that none of them will lead to a dead end but to safe assembly points outside the building.
6. All exit doors of dangerous areas must be easily opened in the direction of the exit route.
7. The exit corridor must not be less than (240 cm) high and the exit gate shall not be less than (100) cm wide and. The walls must be fire resistant for at least (2) hours and equipped with fire-proof doors for at least (2) hours.
8. Normal exits and emergency exits must be marked and eliminated in order to be noticed. Curtains and mirrors must not be installed on these exits to be visible and seen.
9. The escape routes light is provided from two power sources, one is the main power of the building the other is a battery powered backup source intended to operate automatically when the main power is cut off.
10. Escape routes must be protected and secures in accordance with SASO standards of building. the ceilings, floor and walls of such must be constructed of non-flammable materials.

Article (20): Firefighting equipment:

1. Fire hose reels must be provided in the building with a distance of no more than (30 m) between each one to extinguish the fire immediately. The covered area shall not be less than (150 square meters).
2. Fire cabinet's locations must be marked to be easily recognized and used.
3. The reels must be designed in a way that water can reach all locations.
4. The pressure of the hose shall be sufficient to ensure that the pressure at the nozzle is not less than (1,2) g / cm² (bar).
4. The pressure in the hose should be sufficient so that it does not lead to a decrease in pressure at the nozzle for / (bar).
5. The water supply should be sufficient to feed the fire hose reels with (380 liters per minute).
6. All laboratory units must be equipped with adequate fire protection and extinguishers (6 kg) of (nafslil naep) at the rate of one extinguisher per (100) square meters of the laboratory area.
7. Fire extinguishers are installed and placed near the exits and within reach, and the advice of Civil Defense is taken in determining their number, types and locations.
8. The fire extinguishers must be installed in visible, accessible and barrier-free locations. The distance between each other should not be more than 30 meters.
9. Fire extinguishers must have their own operating instructions.
10. The fire extinguisher must conform to the characteristics of the fire.
11. The fire sprinkler system should be installed in the laboratory of Class A and Class B while Class C can be protected by fire hose reels.
12. An automatic fire alarm system must be installed in all laboratories and linked to the control panel room. This is to trigger an audible visual alarm in an emergency. In addition, a mechanical and electrical manual alarm device can be used.
13. Other automatic suppression systems are used instead of sprinklers as needed.



14. The fire sprinkler system should be linked with the automatic alarm system.
15. The entity responsible for the laboratory is obligated to submit a technical report prepared by a competent and accredited office. The report includes comprehensive layouts of the required warning, firefighting and evacuation equipment in the building. These are reviewed and approved by Civil Defense before the implementation process.
16. All safety and firefighting equipment and system must comply with SASO standards.

Article (21): The Contingency Plan:

1st: The laboratory manager should cooperate with the safety officer in preparing an emergency plan that includes the following steps:

1. Quickly report the fire to the Civil Defense and the competent authorities.
2. Determine the organizing procedures of the laboratory.
3. Identify intervention methods and implement the evacuation plan to ensure the safety of staff and students in the event of an accident or explosion.
4. Reduce accident factors and achieving the best level of safety.
5. Reduce loss of life and property resulting from fire accidents.
6. The plan should include control of hazardous fire conditions such as release of toxic fumes and pollution.
7. Quickly report the accidents and record them in the safety register.
8. Carry out an assessment of safety services in the laboratory when there is no activity to identify and address negatives and observations.
9. Identify the assembly points.
10. Assess cases and injuries and provide first aid.

2nd: The content of the plan:

1. The plan should contain all documents and information necessary to manage and respond to sudden accidents and other potential situations.

2. The plan shall include a full account of the safety, rescue, firefighting, and ambulance equipment and means in each laboratory, in addition to detailed layouts indicating their location, a list of names of safety officers and teams, working hours and duties assigned to them.
3. Clear signs and panels must be designed and placed in prominent points and include steps and measures to be taken in emergency. The numbers of emergency services are recorded in these signs such as (civil defense, ambulance, police) and other relevant authorities.
4. While conducting an intervention exercise, the safety officer must adjust the plan if a gap is observed preventing implementation of any part of it.
5. Keep a copy of the plan with the Civil Defense after being approved by them.

3rd: Implementation of the plan:

1. Identify critical and dangerous points.
2. Identify fire risky places, explosion and spread.
3. Accounting/define emergency situations such as leakage, poisoning, and hazardous chemical reactions.
4. Define the seriousness of the fire results.
5. Identify intervention tools for each case in order to reduce losses.
6. Record of respond procedures and information of hardware operation.
7. Identify the opinions of the persons involved in operation, maintenance, and monitor, etc. to take their suggestions in regard to the plan.

4th: Training on the plan:

1. Staff in the laboratory must be trained as per chapter 2 Article (6) of this regulation.
2. Periodic trials must be carried out every (3) months on the contingency plan to make sure it is suitable and that workers acting properly , the readiness of safety equipment and tools, evaluating trials and correcting errors if any so that workers are aware about the plan in emergency.

Article (22): The duties of the safety team when accident occurs in the laboratory:

1. Annulment/ eliminating:

To invalidate/ eliminate the unusual cause that has been discovered, in the main time stop the work in the laboratory and carry on the followings:

- a) To immediately trigger the alarm and call civil defense, emergency services and specialists.
- b) Turning off the power supply, gas sources, removing burning or hazardous materials and keeping the fire under the narrowest range.
- c) Evacuate people outside the laboratory.
- d) Follow the escape routes and exits.
- e) Guide Civil Defense teams and emergency services to the danger points and provide them with the necessary information to manage the incident.

2. responding: The safety team when detecting a fire shall:

- a) Apply the safety instructions previously trained on.
- b) Extinguish the fire using extinguisher means available in site until the reinforcements arrive.
- c) Continue to monitor the fire site after the firefighting operation to ensure the fire being permanently and there is no possibility of reignition.

3. Preventing the spread of fire:

The safety team should take all necessary measures to avoid the fire developing into a disaster. They must perform the following measures:

- a) Close the doors and windows of the fireplace after making sure that the place is evacuated from all people.
- b) Stop the work of elevators and load lifts.
- c) Evacuate or cool the flaming and explosive materials if they exist and firefighting team is unable to evacuate them.

In the case of interference with the electrical rescue, the following measures need to be taken:



1. The power supply is shut down by the qualified safety personnel, and quickly notifies the electrical maintenance specialists.
2. Rescue the victim by the use of insulating materials if the power supply is difficult or impossible to cut with an insulated stick.
3. Provide first aid such as artificial respiration and cardiac resuscitation for the injured person.
4. Appropriate fire extinguishers such as carbon dioxide are used.
5. Intervention equipment must be present and close to dangerous areas.

Classification of fires in laboratories and methods of confronting:

1. Chemical Fires:

The appropriate fire material for each substance shall be used in accordance with the hazardous substances manual, and in accordance with the instructions on the packaging of these substances, taking into account the full compliance with not accepting any chemical containers unless the information concerning the name, characteristics and appropriate fire material is indicated.

2. For other materials, the appropriate fire material is used according to the type of fire illustrated in the following schedule:



M	Type of fire	Fire material
1	Combustion of solid materials such as wood, paper, build-up and feed.	water
2	Fires of flammable liquids such as gasoline and diesel.	Foams, carbon dioxide and dry chemical powders.
3	Fire caused by electrical contact	Carbon dioxide extinguishers and dry powder, the electric current is cut off and avoid the use of water or foam because both are a good conductor of electricity. After making sure that the electrical current is completely disconnected the materials to which the fire has been effected can be extinguished according to the schedule.
4	Fire caused by the combustion of metals such as sodium, lithium, magnesium and the like.	Uses non-reactive dry powder devices (dedicated to metals).

