

DESIGN OF A SAFETY MANUAL FOR WORKSHOPS AND LABORATORIES OF HIGHER MIDDLE LEVEL INSTITUTIONS

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Abstract: Due to the various transformative activities carried out in different technical training institutions (workshops and laboratories), the safety and physical integrity of students and teaching staff are constantly compromised due to the risks involved in these activities.

If we consider each area as a natural environment, it is almost immediate to relate it to well-being and safety, as everyone must feel comfortable in the place where they perform any activity. It is very common for incidents to occur in workshops and laboratories of technical education schools at the upper secondary level, given that students rarely have previous experiences, and monitoring groups of teenagers can become complicated for teachers. That is why it has become essential to have the confidence of being safe within these environments. To achieve this, there are rules that govern procedures and safety measures. Unfortunately, these rules are generally broad and do not focus on specific aspects.

That is why it is proposed to design a standard safety manual for the different workshops and laboratories of upper secondary level educational institutions.

Keywords: Design, Manual, Workshop, Laboratories, Institutions.

INTRODUCTION

Industrial Safety is a necessary and mandatory field in every company in which the processes by which risks are minimized in the industry are constantly studied, applied and renewed. Every industry must have the responsibility to comply with a series of standards and conditions that must be provided to its workers in order to guarantee their safety, protection and health (WHO 1975).

Its main objective is the promotion and maintenance of the highest degree of safety and health at work. This involves creating the

right conditions to prevent work accidents and occupational diseases from occurring.

Based on previous experiences of the students, we realize that having a notion of safety when carrying out an activity in which the perception of space can become distorted, it is essential to trust that the work area has the necessary preventive measures corresponding to any Sinister.

Safety is not a condition that occurs spontaneously in a work area, it is necessary to identify the risk factors that may occur both inside and outside these spaces, as well as to identify and promote the factors that protect to the student community and occupationally exposed staff (POE).

In higher education institutions with technical training, various activities are carried out in workshops and laboratories, avoiding risks and reducing the possibility of suffering an accident is a priority for them.

Currently there is a security and civil protection manual that includes upper secondary schools with the purpose of establishing prevention and recovery actions aimed at safeguarding the physical and emotional integrity of students, teachers and workers of all upper secondary education schools, as well as protect the facilities in the presence of accidents of any nature.

The security manual will be directly focused on the areas of workshops and laboratories of upper secondary schools, since these areas are more prone to an accident that could affect the population of these institutions.

Even with all the measures available, higher education institutions are unable to fully combat all security problems, turning them into cases of incidents on multiple occasions. In addition, a continuous improvement in terms of occupational safety and risk prevention for students and teachers of higher education institutions is always necessary.

With the safety manual, upper secondary

educational institutions that offer curricula with subjects focused on technical careers in the context of workshops and laboratories within their facilities, prevent risks, in order to safeguard the physical and emotional integrity of the population, providing them with a feeling of security and confidence while they carry out their daily activities.

The manual not only seeks to improve the workshops and laboratories, but also that the population that uses these facilities is aware of how to handle the machine tools and instruments correctly.

By reducing the risks within these institutions, we not only protect the student population, but also reduce the costs of injuries, claims or damage to the facilities, creating a good working environment.

The manual will be available to all higher education institutions that require it and find it useful to evaluate the measures against risks in their workshops and laboratories, making their work easier and ensuring the integrity and health of their students and teachers.

With the purpose of reducing the negative impact of accidents in the student community of upper secondary level institutions with technical training. Offering an impact to future generations, and showing a vision of change to present and past generations.

For the elaboration of the manual we decided to carry out a field investigation since this allows us to observe the workshops and laboratories in their natural environment, without controlling or altering the variables, we will obtain data on the levels of risk and we will determine the safety conditions in which the Poe is found.

Once the data is collected, we will objectively carry out an analysis and identify the factors that are compromising the safety of personnel, we will generate a proposal based on already existing standards and procedures.

In order to assess the risks that arise in

the workshops and laboratories of upper secondary schools with technical training, we need a tool with which to control or analyze the events that occur in the facilities, this way you can make a history of the accidents that have happened in the laboratories.

In carrying out an effective analysis, an instrument called a checklist must be used, which is a checklist or control lists, these are formats generated to carry out repetitive activities, control compliance with a list of requirements or collect data in an orderly and consistent manner. systematic way.

They are used to make systematic checks of activities or products making sure that the worker or inspector does not forget anything important.

Another tool that we will use for data collection is through the questionnaire addressed to students and teachers who use the workshops and laboratories of upper secondary schools. The questionnaire is made up of a series of questions, in this case closed yes and no questions will be used, to collect the information in a more concise way.

The measurements will be made to collect the necessary information to discuss our hypothesis, which is that the lack of safety manuals generates unsafe conditions in the workshops and laboratories of upper secondary schools with technical training.

For this, it is necessary to measure the unsafe conditions that are present in the work areas of workshops and laboratories. For this measurement we will use two instruments, which are a verification list or checklist and a questionnaire.

The checklist is directed to evaluate the security conditions of the workshops and laboratories, and the questionnaire is directed to the student community that has been previously chosen in the sample of students to evaluate the veracity and degree of pregnancy that have caused some type of disturbance

physically or mentally due to exposure to the risks present in the work areas.

Through direct observation, the checklist will be applied, and through direct contact with the sample of students from upper secondary schools with technical training, the questionnaire will be applied.

Once the application of the instruments has been carried out, the responses and the data obtained in these will be transferred to a computer database for subsequent analysis with a statistical tool.

PROGRAM

The following preventive activities take place before the start of the school year, are measures to keep risk levels as low as possible and do not create latent risk conditions or unsafe conditions.

The teaching and research activities carried out in the laboratories and workshops entail, in certain cases, a risk, depending on the type of work carried out.

Laboratory work, including research, with non-permanent staff, must be properly hierarchical, with clearly defined chains of responsibility.

PERSONAL HABITS

With respect to the personal habits of the worker, understanding as such those inherent to his behavior apart from those he has developed for work, the following precautions must be observed:

- Keep smocks and dresses fastened at all times.
- Do not leave personal belongings on work tables or benches.
- Do not eat or drink in the laboratories.
- Do not store food or drinks in the laboratory refrigerators.
- Do not smoke in the laboratories.

- Gowns must not be taken to places of common use: libraries, cafeterias, dining rooms, etc. It is advisable to wear safety glasses when handling chemicals or boiling liquids. Do not wear contact lenses in the laboratory.

- It is not advisable to store street clothes in the laboratory

- Wash hands before leaving the laboratory, when removing protective gloves, and whenever they have been in contact with irritant, caustic, toxic, or infectious material.

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ORGANIZATION OF THE LABORATORY

Specific aspects related to the organization of the laboratory that must be taken into account are the following:

- The organization of the laboratory must be adapted to maintain a good level of prevention.
- No one person must ever work alone in the laboratory and especially outside normal hours or in operations with risk.
- Operations with risk must be informed even to people who are not involved in them.
- You must work in the cabinets whenever toxic or flammable products are handled

Activities:	Directed to:	Duration	Place:
Training on the use of machines and tools, and personal protective equipment.	Teachers and those in charge of the workshop or laboratory.	2-3 Days	``Instituto tecnológico de Villahermosa``.
Training on the use of solid waste and hazardous waste containers.	Teachers and those in charge of the workshop or laboratory.	1 Día	``Instituto tecnológico de Villahermosa``.
Contact with a company qualified to carry out the final disposal of hazardous solid waste.	The educational institution.	2 Days	In the company in charge of the final disposal of waste.
Carry out a manual for the elaboration of practices for each workshop and laboratory.	Teachers and those in charge of the workshop or laboratory.	5 Days	Corresponding educational institution.
Place signs for each area of the workshops and laboratories.	Teachers, managers and students.	1 Day	Corresponding educational institution.
Place the signage for the use of personal protection.	Teachers, managers and students.	1 Day	Corresponding educational institution.
Place prohibition signage.	Teachers, managers and students.	1 Day	Corresponding educational institution.

and periodically check their correct operation.

- The reagents stored in the laboratory must be preserved from the sun, not kept on high shelves, take care of their labeling and keep them in the essential quantities.
- Conventional refrigerators must not be used to contain flammable products, if they have not been modified to reduce the risk of sparks.

RISKS RELATED TO THE WORKING ENVIRONMENT

When addressing the risks linked to the environment at work, we refer to all those factors generated in the development of the work activity and that can affect the health of the worker, by affecting the air environment in which they are located.

The different risks to which the worker may be exposed in this work environment originate from different agents, which we can classify as follows:

Risks caused by physical agents:

- Noise
- Vibrations
- Radiations
- Lightning
- Temperature
- Chemical agents.
- Risks caused by chemical agents
- Biological agents.
- Risks originated by biological agents

HOW MUST YOU CHOOSE A PPE?

The need to use individual protection equipment in the laboratory derives from the technical or economic impossibility of installing effective collective protection and the existence of residual risks.

For this, it is necessary to carry out the risk assessment in the laboratory as a whole, specifically studying the chemical products used, their handling, the instruments used, the applied technology and all those activities and operations that are carried out, assessing all the aspects thereof that may constitute risk factors.

The use of PPE or a combination of PPE against one or several risks can cause a series of discomforts. Therefore, when choosing an appropriate PPE, not only the necessary level of safety must be taken into account, but also comfort, for which laboratory workers and their representatives must be consulted.

Table 1 below describes some of the most frequent operations and activities carried out in a laboratory and the risks associated with them.

COLLECTIVE PROTECTION TEAMS

They are elements of help in case of emergencies (spills, splashes, spills, etc.). They must be kept in good condition and within reach so that their use can be carried out with the required speed, as well as duly marked.

Most common collective protection equipment in the laboratory

The laboratory has a series of security action elements that are described below and that must be correctly signposted.

- Extractor hoods
- Biologically safe cabins
- Eyewash

- Safety showers
- Fire safety equipment:
- Alarms
- Fire extinguishers

USE OF GLASSWARE

In the handling of glassware, apart from the necessary revisions and periodic replacements that are required due to the fatigue of the materials, it is convenient to observe the following guidelines:

- Discard the material that presents the slightest defect. Carefully check the temperature of containers, connectors, etc. That they have been subjected to heat, before applying the hands directly.
- Dispose of defective pieces or fragments of broken pieces in specific containers for glass, never in wastebaskets.
- Do not force directly with your hands the closures of jars or bottles, stopcocks, connectors, glasses, etc., that have become clogged.
- In the event that it is necessary to proceed to the opening of sealed bottles with ground-glass caps and sealed ampoules, proceed as follows:

- ü Facial protection will be worn.
- ü The operation will be carried out under a hood and with a protective screen.
- ü The opening will be carried out on a tray or preferably in a container of material compatible with the product contained in the open bottle.

To cut a glass rod it must be held with a rag near the mark. Rod ends must be shaped in the flame to avoid sharp surfaces.

WASTE MANAGEMENT

Regarding the characteristic waste from the chemical laboratory, the following recommendations must be taken into account:

- The information and instructions for the segregation of laboratory waste provided by the contracted waste manager must be available.
- Waste will be properly labeled indicating date and owner. Do not throw products or impregnated fabrics or papers in the bins.
- Sharp and cutting waste must be deposited in suitable containers to avoid cuts and/or punctures.

WHAT TO DO IN CASE OF AN ACCIDENT?

Fire in the laboratory. [Ref. Legal: Basic Building Standard / Fire Protection conditions, NBE-CPI-96 (does not affect industrial establishments) and American Standard NPFA 101.

Follow the general advice of the building evacuation plans.

CONCLUSIONS

Based on the results obtained, it is concluded that upper secondary schools do not have the necessary security measures to prevent risks in laboratories and workshops, therefore, students do not have any knowledge of what to do in case of an accident, or how to avoid it, and even the teachers have not received training in safety in the laboratory and how to handle them. Therefore, implementing the safety manual at the upper secondary level will be a success and very well accepted, with which everyone will have more knowledge on how to handle the instruments in the workshops and laboratories.

RECOMMENDATIONS

Work in the laboratory with non-permanent staff, students, teachers, etc. It must be properly hierarchical, with clearly defined chains of responsibility.

The committee or person in charge of safety, health and working conditions must ensure the permanent improvement of these, together with the head of the laboratory.

The organization of the work in the laboratory must allow any alteration (work after hours, devices out of service, anomalies in the water and energy supply, etc.) to be known by all.

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