

Workshop Safety Guidelines

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1. Preface

This document is a summary of some of the design considerations and safety requirements for an all-purpose workshop. For detailed specifications, readers are advised to consult with the applicable statutory requirements in their respective jurisdictions, with the installation and operating specifications provided by the manufacturers and suppliers of shop machines, and with the materials safety data provided by the suppliers of workshop chemicals.

2. Spatial Arrangements

- The space between machines, installations, or piles of materials or goods shall be a minimum of 600 millimeters (approx. 2 ft.).
- Walkways shall be clearly marked. Yellow lines are recommended to separate walkways from designated work areas.
- Walkways shall be 1100 millimetres (3.6 ft.) in width if considered as direct access to exits.
- Walkways shall not be slippery even through wear or humidity.
- Walkways shall be kept in good condition and free from obstructions.

3. Ventilation

1. Dilution

Dilution ventilation systems shall provide a minimum of 3 fresh air exchanges per hour and a minimum of 7.1 litres per second per person.

2. Local Exhausts

All processes involving the release of toxic, flammable, or corrosive gases, vapours, dusts, mists, or fumes shall be equipped with a local exhaust system capable of capturing contaminants at the source. Design requirements are specified in the Industrial Ventilation Manual - A manual of recommended practice, American Conference of Governmental Industrial Hygienists.

The outlets from local exhausts should be located at the roof level, and a minimum of 25 ft. distance from the nearest air intake.

4. Fire Prevention

1. Storage of Flammables

All flammable liquids shall be stored in NFPA or UL approved flammable liquid storage cabinets.

Quantities of flammable liquids kept on hand shall not exceed the limits established by the NFPA (see McGill University Safety Manual for table).

Flammable liquids shall be handled and stored away from sources of heat, spark, or open flame.

2. Fire extinguishers

Fire extinguishers shall be available for the three classes of fires common to workshops:

Class A Combustibles (paper, wood, cardboard)

Class B Liquid fuels (solvents, oil based paints, gasoline)

Class C Electrical fires

A-B-C dry chemical extinguishers are suitable for all three types

CO2 extinguishers are suitable for electrical fires and moderately effective for Class B fires.

Water is suitable for Class A fires only.

Consult FPO for other fire prevention issues

5. Emergency Wash Devices

- An emergency eye wash meeting ANSI standards shall be within 50 feet of any work station where toxic, corrosive, or oxidizing substances are handled, or where dusts or projectiles are likely to be released.
- A drench hose or emergency shower meeting ANSI standards shall be within 50 feet of any work station where toxic, corrosive, or oxidizing substances are handled, or where there is a significant risk of clothing fires.

6. Gas Cylinders

- Gas cylinders shall be securely affixed to a wall or bench using appropriate chains or clamps.
- Gas cylinders shall be transported in the upright position and be securely affixed to the transport device.
- When not in use or during transport, the regulator shall be removed and the protective cap shall be attached.
- Regulators for use on gas cylinders shall be CGA approved for the type of gas used, and the pressure gauge range shall be appropriate for the pressures being delivered.
- Empty cylinders should be stored separate from full ones.
- Cylinders of oxygen or other oxidizers shall be stored a safe distance (20 ft.) away from fuels (hydrogen, acetylene, propane, etc).
- All gas delivery components shall be leak-tested weekly.
- Lubrication shall never be applied to the high pressure side of an oxygen or oxidizer regulator. Teflon tape is preferred.

7. First Aid

A first aid kit shall be readily accessible to all shop users at all times of shop occupancy.

Each first aid kit shall contain the minimum contents, as prescribed by the provincial first aid regulations:

1. a first aid manual
2. 1 pair scissors
3. 1 pair splinter forceps
4. 12 safety pins
5. 25 sterile dressings (25 mm x 75 mm), individually wrapped
6. 25 sterile gauze squares (101.6 mm x 101.6 mm), individually wrapped
7. 4 rolls sterile gauze bandage (50 mm x 9 m), individually wrapped
8. 4 rolls sterile gauze bandage (101.6 mm x 9 m), individually wrapped
9. 6 triangular bandages
10. 4 sterile bandage compresses (101.6 mm x 101.6 mm), individually wrapped
11. 1 roll adhesive tape (25 mm x 9 mm)
12. 25 alcohol swabs, individually wrapped

8. Training

Provincial first aid regulations call for a minimum number of staff members to be certified in first aid and CPR. Using formulas, the Commission de la Santé et de la sécurité du travail, determines the minimum number of trainees for each building and then provides subsidies to cover the costs for such training. Using this training allocation, the Building Director of each building then identifies the staff members to be trained. It is highly recommended that persons supervising workshop operations be certified.

9. Personal Protection

- Eye protection shall be mandatory for **all** workshop occupants whenever any operations likely to involve the release of dust or projectiles is being conducted, and whenever any corrosive, toxic or oxidizing chemicals are being employed.
- UV eye protection shall be worn during welding operations.
- Steel-toed protective shoes shall be worn by anyone handling or moving heavy pieces of apparatus.
- A workshop gown or coat should be worn whenever working with chemical products.
- Long hair must be tied back or otherwise restrained whenever in the workshop. The same applies to ties, scarves or other loose items of clothing.
- Rings, bracelets (including watches), or other loose jewelry shall not be worn in the workshop.

10. Respiratory Protection

Respiratory protection should be considered as a last resort when engineering (ventilation) controls are inadequate. Where suitable local exhausts are not available and when work involving the release of toxic dusts, mists, vapours, gases, or fumes at a concentration believed to be hazardous is performed, respirators shall be worn.

Respirator requirements to be met include:

1. The respirator and the filter cartridge must be NIOSH approved for the concentration of contaminants being generated.
2. Individuals required to wear respirators must be medically fit (ie. no pulmonary ailments) to be able to work comfortably with the added breathing resistance.
3. Individuals required to wear respirators must undergo a qualitative fit test to ensure that the mask shape and person's face are compatible and that the individuals are trained in their use.
4. Individuals required to wear respirators must undergo training in the correct selection, care and use of respirators.
5. A maintenance program shall be in place to ensure that respirators are properly sanitized, gaskets and seals are functional, filters are replaced when required, and that respirators are packaged and sealed when not in use.

11. Administrative Controls

- All persons using the workshop shall receive training in the safety precautions, the safe operation of all tools, and the relevant emergency procedures (fire, first aid, chemical spills or leaks, etc.) before starting work.
- All workshop users and visitors shall be made aware of the aforementioned safety requirements. General safety rules should be explained, distributed, and posted.
- Inexperienced persons shall be supervised at all times.
- Regular inspections shall be conducted by the department or its designated safety committee. The performance of one inspection per semester and one during the summer is recommended.
- Maintenance problems should be reported immediately to the supervisor who shall lock out the power supply if a machine cannot be operated safely.

12. Lock-Out Procedures

Before commencing any maintenance procedures, energized equipment shall be deactivated and the power supply locked-out with a suitable padlock. It is recommended that the shop supervisor be responsible for performing the lock-out procedure prior to maintenance work.

13. Machine Guarding

- It is strictly forbidden to disable safety interlocks, machine guards, or emergency stop (e-stop) devices.
- Machine guards shall never be removed or altered except for maintenance procedures, during which the machine shall be locked out.
- Shop machines shall be equipped with emergency cut off switches, readily accessible to the user. If there is no means of emergency stopping a machine then a second person must remain present in the workshop while the machine is in use.
- The START switch shall never be altered or impeded. A vertical surface is the preferred location for the START switch, to prevent accidental activation in the event that an object is placed upon the switch. Two-handed START switches are preferred for machines operated in the hands free mode.
- When machines are not in use, the guards should remain in place.
- Machine guarding requirements are provided in more detail in the Quebec regulation respecting occupational health and safety (S-2-1, r.19.01).

14. Electrical Safety

- All electrical outlets shall carry a ground connection requiring a 3-pronged plug.
- The grounding pin of a 3-pronged plug shall not be removed.
- All wiring operations shall be conducted by a licensed electrician.
- In the event that equipment becomes wet, or in the event of a water flood in the shop, power should be disconnected at the breaker, and a lock applied.

- All frayed or damaged wires or plugs should be replaced. In the interim, the electrical equipment involved should be taken out of service.
- Electrical potential shall be discharged before conducting work on equipment containing high voltage power supplies or capacitors.
- Use only CO2 or dry chemical extinguishers on electrical fires.
- The use of extension cords should be avoided and they shall never be placed across areas of pedestrian traffic.

15. Housekeeping

- All walkways, work stations, access to emergency equipment and exits shall be free from obstruction at all times.
- Liquid spills shall be cleaned up immediately.
- Heaps or stacks of equipment shall be stable and shall not obstruct lines of view necessary for supervision of shop users.
- Wood and metal dusts shall be collected at the end of each operation. Dry sweeping is not recommended and the use of air hoses is not permitted.
- Flammable and combustible materials shall not be allowed to accumulate in open areas of the workshop.