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## CLEANING WITH COMPRESSED AIR

In the province of Quebec, using compressed air for cleaning purposes is a widely spread practice. Several industrial processes make use of this source of energy, and a great number of workers also apply it to cleaning. Unfortunately, compressed air devices are often used excessively, much to the dismay of people working to improve health and safety in the workplace.

Compressed air devices are put to use for many tasks, including cleaning and maintaining machinery, workshops, floors, walls and ceilings. Some workers also use compressed air devices to remove dust or other debris from their clothing. This bad habit is deeply rooted with workers although it should be corrected.

How should businesses go about convincing workers to stop using compressed air for cleaning purposes? Whatever the solution found, the answer lies in modifying everyday behaviors. Inspectors from the Quebec health and safety board (CSST) have a lot of work to do before all Quebec companies manage to meet the requirements of the *Regulation respecting occupational health and safety* (RROSH) concerning use of compressed air.

Defining a strategy to restrict the use of compressed air is a tall order, particularly in the textile sector. Yet it makes perfect sense. Think about it for a moment: would you consider using the air pulsed out of your vacuum

## Regulation concerning compressed air

The following sections are excerpts from the *Regulation respecting occupational health and safety* applicable to the use of compressed air:

**17. Cleaning:** Subject to section 326, the upkeep of the work premises of an establishment shall be ensured through vacuuming, wet mopping or any other method that controls and reduces to a maximum the stirring up of dust.

**130. Operations and organization:** Any establishment the operation of which is likely to emit noise at the auditory level of workers shall be operated in accordance with section 136 so that the noise measured at any work station does not exceed the standards prescribed in sections 131 to 135 for any time period indicated therein.

An establishment shall be designed, constructed or equipped so that the standards and requirements prescribed in the first paragraph are complied with and so that the ceilings, walls, floors, corridors, stairwells, or freight or passenger elevator hoist ways of the establishment do not emit noise toward any building or facility adjacent to the establishment.

**228. Inspection and maintenance:** Hand tools and portable power tools shall be examined regularly and if found defective, be repaired or replaced.

**229. Storage of hand tools :** Hand tools shall not:

- ◆ be left on the floor, in passages, on stairs or in other areas where people work or circulate;
- ◆ be placed in elevated locations from where they could fall on people.

**238. Electrical wire and flexible hose :** If they hamper circulation, the electrical wire feeding an electric power tool and the flexible hose supplying an air-driven power tool with compressed air shall:

- ◆ when left on the ground, be protected so as not to be damaged and be secured so as to eliminate any risk of falling;
- ◆ when suspended, be at a sufficient height to ensure clearance, but at least at 2 meters.

**326. Air pressure limit:** The pressure of compressed air used for the cleaning of a machine or piece of equipment shall be less than 200 kilopascals, unless the cleaning is carried out in an enclosure specially designed for abrasive air blasting and equipped with a vacuum system.

This section does not apply to automated cleaning systems.

**327. Piping for compressed air:** Piping in which compressed air flows shall be protected from all impacts and be clearly identified as to the nature of its contents.

**328. Attachments:** Flexible hose lines in which compressed air flows shall be equipped with one of the following attachments in the event of section-by-section assembly:

- ◆ collars located on either side of the connection and held together by an attachment;
- ◆ an automatic locking device;
- ◆ a coupling fitted with a clamping device.



# CLEANING

cleaner to clean floors and furniture at home? So why would you do it at work?

Despite the fact that the number of accidents caused by inadequate use of compressed air devices is relatively low, many cases of respiratory allergies and eye infections caused by dust have been reported. Investigations of those cases have identified compressed air as the cause.

The present information bulletin is designed to raise workers' awareness of the hazards associated with inappropriate use of compressed air and to provide information about the proper use of tools and procedures to ensure their safety, in accordance with the *Regulation respecting occupational health and safety*.

## General cleaning (Section 17)

In most cases, cleaning with compressed air should be done with the aid of industrial vacuum cleaners or with brooms. This marks an important change from the usual procedure, but it will rapidly prove cost-effective: dust and particles are picked up in one operation and are not stirred up in the air or onto other workstations or machinery, eliminating the need for a second cleaning operation.

## Cleaning machinery (Section 326)

Here again, the Regulation specifies that machinery should be cleaned with industrial vacuum cleaners. Using vacuums will avoid sending dust and particles flying through the air. However, machine parts that are oiled or greased cannot be cleaned in this way and will require the use of scouring agents to remove accumulated dirt with minimal effort for the worker, while reducing the use of compressed air devices. If compressed air still needs to be used, operator should follow safety instructions.

When cleaning machinery, measures should be taken to avoid scattering dust particles. Screens,

curtains or other structures should be used to contain dust within the cleaning area.

The Regulation recommends undertaking cleaning operations when the number of workers is at a minimum.

If vacuum cleaning and scouring are not efficient and workers choose to resort to compressed air, protection equipment should be worn. When cleaning machinery, workers should wear ear protection, gloves, air-tight safety eyeglasses and/or a visor, a shield especially designed for the specific types of dust and cleaning products, as well as overalls. Workers in the vicinity of the cleaning zone should wear safety eyewear and perhaps a special purpose shield.

## Hazards linked to the use of compressed air systems

The hazards linked to compressed air are not well documented. In addition, it remains possible that workers who have been using compressed air devices for 5, 10 or even 20 years have never had any injury. Considering these facts, it is rather difficult to convince workers to avoid using compressed air.

### ➤ Noise generated by the compressed air device (Section 130)

Repeated use of air compressors can lead to hearing loss. The noise emitted when compressed air is pulsed out can damage hearing if workers are inadequately protected. A guide is available to help you select and appropriately use mufflers and air guns, in accordance with the 90dB(A) standard for noise level applicable in the province of Quebec.

### ➤ Flying dust particles (Sections 17 and 326)

Most accidents occur while cleaning machinery or facilities, particularly if air pressure at outlet exceeds 200 kilopascals (or 30 PSI, pounds per square inch). Blowing out compressed air stirs

up dust and other particles. The ideal solution would be to vacuum dust and dirt, or else to sweep them up with a broom.

### ➤ Using compressed air to clean clothes (Section 326)

Using compressed air devices to clean dust or dirt on clothing or body is a hazardous practice. Dust and dirt in the compressed air can cause the smallest skin wounds to become infected and have serious health consequences. Here is an illustration of the potential dangers: During his work shift, John gets a metal shard splinter in his right hand. After removing the splinter, he decides to clean his hands with compressed air. However, he fails to remove small shards of metal and compressed air pushes the tiny shards deeper into the wound, resulting in a serious infection to the hand.

Other injuries can be caused by use of compressed air. Consider the following information:

- Only 37 kilopascals (5.5 PSI) of air pressure can dislodge the eyeball from the eye socket.
- A jet of compressed air directed into the ear can rupture the ear drum.
- A jet of compressed air directed near the mouth can cause injury to the esophagus.
- A jet of compressed air directed near the buttocks can cause the intestine to rupture if the air enters the body through the anus.
- A jet of compressed air directed on the skin can cause an embolism and ultimately result in death.

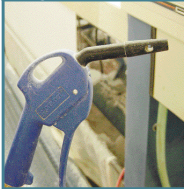
**Those are some of the reasons why workers should never use compressed air to clean themselves.**

# Préventex

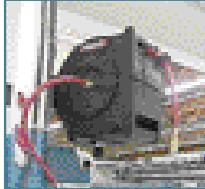
## Inspection and storage of hoses and equipment related to compressed air systems (Sections 228, 229, 238, 327 and 328)

Hoses should be carefully inspected to detect any cracks or distortions. Collars and end pieces should also be in good condition. Defective equipment should be replaced immediately. When not in use, hoses should be rolled up on a rack: hoses left lying on the floor can get damaged and cause workers to trip.

Air gun



Rack



Hose



Nozzles and air guns should be free of cracks. Triggers should operate freely, and no air should leak out when triggers are released. End pieces should be free of distortions and perforations. Replace defective equipment without delay.

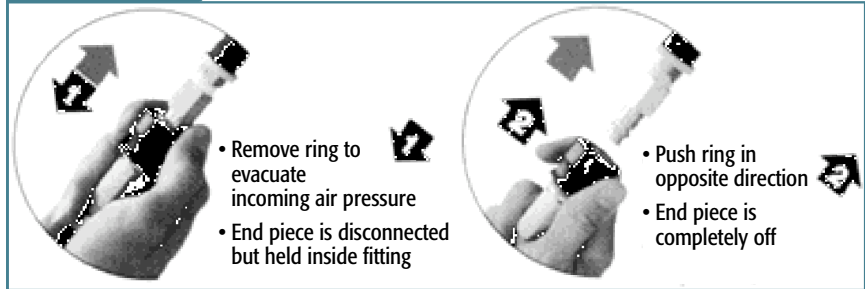
Open valve



Closed valve



Safe disconnection



For the same reasons, air guns should never be left on the floor and should be secured in a safe location. The air inlet valve should be closed off when the compressed air system is not in use in order to spare the system and save money.

## Multiple injuries caused by inappropriate method of disconnecting pneumatic tools from compressed air hoses

Pneumatic fittings on hoses should be safe and should be designed for disconnection in two stages.

This system allows users to purge the incoming air, preventing hose whiplash.

## Using compressed air systems

When was the last time you assessed your requirements concerning compressed air systems?

Changing work processes, or adding or dismantling machinery can affect your needs in terms of compressed air systems, and addressing these issues can save your company a lot of money.

Restricting the use of air guns is an easy way to control costs. Identify the people who really need to use compressed air systems and specify uses. Supply air guns adapted to the task and in each case, identify the people who are authorized to use them: this will help workers become responsible for ensuring the equipment is in good condition.

Note that air guns equipped with a "Quick Plug" system can only be used by one owner.

The maximum air pressure at outlet is 200 kilopascals (30 PSI). If that limit is exceeded, pressure regulators will have to be installed or air guns providing this level of this pressure will have to be purchased. For all tasks requiring higher pressure, set up a safety procedure and provide training to workers.

After a few weeks, make sure that procedures are being followed.

## Safety equipment

### ► Pre-set pressure regulator

This device is used to regulate air pressure to set standards (e.g. regulate air pressure at outlet to 200 kilopascals or 30 PSI). Regulators can be installed directly on the air piping and cannot be easily removed. Regulators will keep air pressure at the outlet to 200 kilopascals, even if perforations are made near the air gun in an attempt to increase outlet pressure.

### ► Pneumatic quick fitting

This device prevents hose whiplash. It is airtight, reliable and easy to use.

### ► Safety air guns

This type of air gun is designed to supply a high level of air pressure while limiting the static pressure to under 200 kilopascals (30 PSI) if the end is obstructed, in which case the air is let out through lateral openings.

Safety air guns



# CLEANING

When cleaning machinery, an extension can be added to air guns (12 in. to 72 in.) to provide a safe distance between the worker and the machine. The extension also prevents workers from turning the air guns toward themselves.

Double ring



Screw ring



## ► Coupling rings

Coupling rings that are screwed into place can be used for hoses carrying air up to 217 kilopascals, or 31.5 PSI. For higher pressure, double rings or male/female connectors should be used to avoid cutting into hoses.

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