

4123:1-3-18 Heating, ventilating and exhaust equipment.

(A) Scope.

- (1) This rule relates to methods of controlling air contaminants (as defined in paragraph (B) of this rule) which have been established as hazardous.
- (2) Appendix II, "Occupational exposure limits (OEL)," to this rule, is for information and guide purposes only and is not to be construed as specific requirements of this rule.

(B) Definitions.

- (1) "Air contaminants" as used in this rule, means hazardous concentrations of fibrosis-producing or toxic dusts, toxic fumes, toxic mists, toxic vapors, or toxic vapors, or toxic gases, or a combination of these, suspended in the atmosphere.
- (2) "Collector" - see "separator."
- (3) "Confined space" means any tank, vessel, container, or pit so enclosed that adequate ventilation is not obtained by natural air movement.
- (4) "Duct" means any pipe, flue, or channel forming a part of a ventilating system used to convey air, dusts, fumes, mists, vapors, or gases.
- (5) "Dust" means particles of solid matter, other than fumes, no more than one hundred microns in their greatest dimension.
- (6) "Exhaust system" means a complete suction system, including all hoods, ducts, fans, separators, and receptacles, when required, and any other part necessary for the proper installation and operation thereof.
- (7) "Fan" means the equipment which creates the movement of air in a mechanical system of ventilation.
- (8) "FPM" means the rate of lineal air movement in feet per minute.
- (9) "Fumes" means solid particles generated by condensation from the vapor or gaseous states, usually of metallic elements and often accompanied by oxidation.
- (10) "Gas" means a formless fluid occupying the space of enclosure.
- (11) "Hazardous concentrations" as applied to air contaminants, means concentrations which are known to the employer to be in excess of those which

would not normally result in injury to an employee's health if the employee had not been previously exposed to such air contaminants.

(12) "Hood" means that part of an exhaust system into which the contaminated air or dust, fumes, mist, vapor, or gas first enters.

(13) "Mist" means liquid droplets or wet solids suspended in air.

(14) "Separator (collector)" means that part of an exhaust system, the purpose of which is to separate the entrained material from the air which conveys it.

(15) "Vapor" means the gaseous form of a substance normally in the liquid or solid state.

(16) "Velocity" means:

(a) "Capture velocity" means the velocity at any point in front of the hood necessary to overcome the opposing air currents and to capture the contaminated air by causing it to flow into the exhaust hood.

(b) "Duct velocity" means the velocity of air or gas in a duct.

(c) "Transport velocity" means the velocity of air required to keep the material being exhausted in the exhaust system.

(17) "Ventilation" means:

(a) "Dilution ventilation" means ventilation provided to reduce the concentration of air contaminants in the atmosphere of all of or part of the place of employment.

(b) "General ventilation" means ventilation of the general atmosphere in the place of employment.

(c) "Local exhaust ventilation" means that type of ventilation in which suction is applied at the point of generation or escape of air contaminants.

(C) Temporary heating devices.

(1) General.

When heaters are used, ventilation shall be provided to maintain the health and safety of employees.

(2) Solid fuel salamanders.

Solid fuel salamanders are prohibited in buildings and on scaffolds.

(3) Oil-fired heaters.

- (a) Flammable liquid-fired heaters shall be equipped with a primary safety control to stop the flow of fuel in the event of flame failure.
- (b) Heaters designed for barometric or gravity oil feed shall be used only with the integral tanks.
- (c) Heaters specifically designed and approved for use with separate supply tanks may be directly connected for gravity feed, or an automatic pump, from a supply tank.

(4) Liquefied petroleum gas (LP-gas).

(a) Approval of equipment and systems.

Each system shall have containers, valves, connectors, manifold valve assemblies, and regulators of an approved type.

(b) Container valves and container accessories.

Valves, fittings, and accessories connected directly to the container, including primary shut-off valves, shall have a rated working pressure of no less than two hundred fifty P.S.I.G. and shall be of material and design suitable for LP-gas service.

(c) Dispensing.

Filling of portable containers mounted on skids from storage containers shall be performed no less than fifty feet from the nearest building.

(d) Containers and regulating equipment installed outside of buildings or structures.

Containers shall be upright upon firm foundations or otherwise firmly secured. The possible effect on the outlet piping of settling shall be guarded against by a flexible connection or special fitting.

(e) Containers and equipment used inside of buildings or structures.

- (i) When operational requirements make use of portable containers necessary, and their location outside of buildings or structures is impracticable, containers and equipment shall be permitted to be used inside of buildings or structures.

- (ii) "Containers in use" means connected for use.
 - (iii) Valves on containers having water capacity greater than fifty pounds (nominal twenty pounds LP-gas capacity) shall be protected from damage while in use or storage.
 - (iv) Hose used for LP-gas shall have a working pressure of no less than two hundred fifty P.S.I.G. The use of aluminum piping or tubing is prohibited.
 - (v) Portable heaters, including salamanders, shall be equipped with an approved automatic device to shut off the flow of gas to the main burner, and pilot, in the event of flame failure, except that this provision does not apply to portable heaters under seven thousand five hundred B.t.u. per hour, input when used with containers having a maximum water capacity of two and one-half pounds. Portable heaters, having inputs above fifty thousand B.t.u. per hour, shall be equipped with either a pilot, which must be lighted and proved before the main burner can be turned on, or an electrical ignition system.
 - (vi) Containers, regulating equipment, manifolds, piping, tubing, and hose shall be located to avoid exposure to high temperatures or physical damage.
 - (vii) Containers having a water capacity greater than two and one-half pounds (nominal one pound LP-gas capacity) connected for use shall stand on a firm and level surface and shall be secured in an upright position.
 - (viii) The maximum water capacity of individual containers shall be two hundred forty-five pounds (nominal one hundred pounds LP-gas capacity).
 - (ix) For temporary heating, heaters (other than integral heater-container units) shall be located no less than six feet from any LP-gas container.
 - (x) When heaters are connected to containers for use in an unpartitioned area on the same floor, the total water capacity of containers, manifolded together for connection to a heater or heaters, shall be no greater than seven hundred thirty-five pounds (nominal three hundred pounds LP-gas capacity). Such manifolds shall be separated by no less than twenty feet.
- (f) Multiple container systems.

- (i) Valves in the assembly of multiple container systems shall be arranged so that replacement of containers can be made without shutting off the flow of gas in the system.
 - (ii) Heaters shall be equipped with an approved regulator in the supply line between the fuel cylinder and the heater unit. Cylinder connectors shall be provided with an excess flow valve.
- (g) Storage of LP-gas containers.
- Storage of LP-gas within buildings is prohibited.
- (h) Storage outside of buildings.
- (i) Storage outside of buildings for containers awaiting use, shall be located away from the nearest building or group of buildings, in accordance with the following:

Table 4123:1-3-18(C)(4)(h)

Quantity of LP-Gas Stored:	Distance (feet)
500 lbs. or less	0
501 to 6,000 lbs.....	10
6,001 to 10,000 lbs.....	20
Over 10,000 lbs.....	25

- (ii) Containers shall be in a ventilated enclosure and also protected against tampering.

(D) Control of air contaminants.

- (1) General.

Air contaminants shall be minimized by one or more of the following methods:

- (a) Substitute nonhazardous, or less hazardous material;
- (b) Confine or isolate the contaminant;
- (c) Remove at source;
- (d) Remove by dilution ventilation;
- (e) Remove by general ventilation;
- (f) Using wet methods to allay dusts. Note: Good housekeeping is of definite value in minimizing air contaminants created by dusts.

(2) Asbestos.

- (a) Mixing asbestos shall be done wet or in an enclosed, ventilated area.
- (b) The employer shall provide and shall require the employee to wear approved respirators when mixing, sawing, spraying, applying, and cleaning up where asbestos is used.
- (c) Damaged bags or containers of asbestos shall be wrapped or enclosed in an airtight container before handling.
- (d) When cleaning up, all surfaces shall be sprayed with water or shall be vacuumed by high-efficiency particulate air (HEPA) filtered equipment capable of trapping and retaining at least 99.97 per cent of all monodispersed particles of 0.3 micrometers in diameter or larger.

(E) Exhaust systems: machinery and equipment.

(1) Grinding, polishing and buffing.

(a) Abrasive wheels and belts.

(i) Abrasive wheels and belts shall be hooded and exhausted when there is a hazardous concentration of air contaminants.

(ii) This does not apply to abrasive wheels or belts:

(a) Upon which water, oil, or other liquid substance is used at the point of the grinding contact; or

(b) To small abrasive wheels used occasionally for tool grinding.

(b) Separate exhaust systems.

Abrasive wheel and buffing wheel exhaust systems shall be separate when the dust from the buffing wheel is of flammable material.

(2) Manufacturing processes.

When toxic materials are generated in hazardous concentrations during their application, drying, or handling, they shall be minimized or eliminated.

(3) Internal combustion engines.

Hazardous concentrations of air contaminants produced by internal combustion engines shall be exhausted.

(F) Exhaust systems - structural requirements.

(1) Exhaust or ventilating fan.

Each exhaust or ventilating fan located seven feet or less above the floor or normal working level shall be guarded.

(2) Ductwork.

The ductwork of the exhaust system shall be of a size suitable for conducting the contaminated air outdoors, or the exhaust ductwork shall provide no less than the minimum transport velocity necessary to remove the particulate material produced by the operation being performed, to a collector.

(3) Discharge.

The outlet from every separator or from every collector shall discharge the air contaminants collected by the exhaust system, in such manner that the discharged materials shall not re-enter the working area in hazardous concentrations.

(4) Location of air supply openings or inlets.

Air supply openings or inlets through which air enters the building or room in which the local exhaust system is in operation shall be isolated from any known source of contamination from outside of the building.

(G) Confined spaces.

Under no circumstances shall a confined space be entered to make any of the following prescribed tests.

- (1) No employer shall permit entrance into any confined space unless a confined space entry procedure, incorporating one of the following, is used:
 - (a) Air sampling shall be performed by qualified, trained personnel prior to and periodically during occupancy to determine either that:
 - (i) The atmosphere within the confined space contains an adequate quantity of oxygen (19.5 per cent) and harmful atmospheric contaminants have been diluted to safe concentrations; or
 - (ii) Adequate mechanically induced dilution ventilation is used prior to entry and continued in use during occupancy to ensure that no less than 19.5 per cent oxygen is maintained in the confined space.
 - (b) A supplied-air respirator or self-contained breathing apparatus is provided and used.
- (2) When the confined space has been exposed to, contained, or is likely to have combustible gases within its confines (such as sewage treatment plants), it shall not be entered if any reading in excess of ten per cent of its lower flammable limit (LFL) is obtained on a combustible gas indicator (see Appendix III to rule 4123:1-3-16 of the Administrative Code).
- (3) If tests under paragraph (G)(1)(a) or (G)(2) of this rule indicate that the atmosphere in the space to be entered contains:
 - (a) A concentration of flammable vapor or gas in excess of ten per cent of its LFL; and/or,
 - (b) A concentration of toxic contaminants above the threshold limit value; and/or,
 - (c) Less than 19.5 per cent oxygen;

Then appropriate control measures shall be instituted. Control measures may consist of forced or natural ventilation, use of personal protective equipment, a combination of these, or other effective control techniques.

(H) Procedures.

- (1) Procedure for safe entry.
 - (a) A procedure for safe entry into confined spaces shall be established and used.

(b) The following are recommended procedures to comply with standards:

- (i) Designate at least one trained person to be responsible for adherence to entry procedures and require written approval by that person before permitting anyone to enter the confined space;
- (ii) Post danger signs or by any other equally effective means, of the existence and location of the permit spaces.

Note: A sign reading "Danger -- Permit - Required Confined Space, Do Not Enter," or using other similar language would satisfy the requirement for a sign.

- (iii) Provide periodic instruction and training in proper entry procedures to be used;
- (iv) Standby personnel where provided shall be required at all times to be in communication with the employee within the confined space; an alarm or two-way radio system for the standby employee will be effective;
- (v) Approved rescue equipment should be available; since entry ports for confined spaces vary in size, precaution should be used in obtaining proper size equipment;
- (vi) Establish procedures to prevent ignition of combustible atmospheres or re-entry of gases or liquids by locking out switches and blanking off transmission pipes; use nonsparking tools;
- (vii) Prevent generation of contaminants by neutralizing or flushing out residual materials;
- (viii) In testing for contaminants use only approved instruments maintained in proper working order;
- (ix) Continual monitoring of oxygen and contaminant concentrations during occupancy;
- (x) If respiratory equipment is used off of an air compressor piped system, this system shall meet the specifications of the "Compressed Gas Association," to assure a supply of uncontaminated air;
- (xi) When supplied-air or self-contained respiratory apparatus is used, personnel should be trained in the proper use of such apparatus.

(xii) Many employers use tags to show that a confined space may be entered safely. An example of such a tag is as follows:

CONFINED SPACE ENTRY PERMIT					
Area or Equipment to be Entered _____					Date: _____
Location _____					
Purpose of Entry _____					
Testing Instruments Used _____					
Ventilation Equipment Provided _____					
Rescue Equipment Provided _____					
Pipes Blanked Off & Switches Locked Out _____					
Periodic Checks Prior to Entry	Time	Oxygen %	%LEL Reading	Tested By	Comments
1.					
2.					
3.					
4.					
5.					
6.					
7.					
THIS CONFINED SPACE HAS BEEN INSPECTED AND FOUND SAFE FOR ENTRY FOR PERIOD SHOWN.					
Signed _____			_____		
(Person in Charge)			Date/Time		

(2) Emergency rescue procedures.

- (a) In all cases when an employee is stationed outside a compartment, tank, or space, as a tender for the employees working inside, the tender shall have immediately available for emergency use all necessary personal protective equipment. The tender shall wear the personal protective equipment if exposed for prolonged periods which are hazardous to the tender's health.
- (b) When entering a toxic or flammable atmosphere, an employee shall be provided with and use an adequate, attended, lifeline.

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