

Republic of the Philippines  
**DEPARTMENT OF LABOR AND EMPLOYMENT**  
Intramuros, Manila

**RULE 1170**  
**UNFIRED PRESSURE VESSELS**

**1171 : Definitions :**

(1) "Unfired pressure vessels" shall mean any closed vessel other than a boiler constructed to hold steam, hot water, gas or air, ordinarily supplied from an external source or from the indirect application of heat. This definition shall not include portable cylinders for the storage of compressed gases.

(2) "Steam heated pressure vessels" shall mean an airtight vessel or an open pan or kettle, which is steam jacketed or equipped with steam coil or steam supply piping and is used in such operation as cooking, distilling, drying, evaporating and hardening.

(3) "Water pressure tank" shall mean a pressure vessel used for heating water by means of live steam or steam coil, or for the storage of cold water to be dispersed by means of pressure.

(4) "Air pressure tank" shall mean a pressure vessel used as primary and secondary tank in connection with ordinary compression cycles, and receiving its air supply direct from the compressor.

(5) "Refrigeration tank" shall mean a pressure vessel in refrigeration system, excluding the piping of such system.

(6) "Working pressure" shall mean a gauge pressure or pressure above the atmospheric pressure in kg./cm.2g (psig).

**1172 : General Provisions :**

Application of this provision is provided under Rule 1162. The term pressure vessel shall be used in lieu of boiler and the same is referred as "unfired pressure vessel" in the application and usage of this RULE.

**1172.01 : Standards Requirement :**

Application of this provision is provided under Rule 1162.01

**1172.02 : Construction :**

(1) Pressure vessels construction procedural process, material, fittings and attachments shall be in accordance with the standards requirements provided under rule 1162.01

(2) Pressure Vessels shall be designed for their intended use and suitability to local condition.

(3) Every pressure vessel shall be accompanied by a certificate issued by the Manufacturer showing the technical specifications to which the vessel has been constructed.

(4) Application for permit for locally fabricated pressure vessels shall be filed with the Bureau or to the Regional Office (with available PME) accompanied by design and specification in five (5) copies (white print).

#### **1172.03 : Installation :**

(1) Pressure vessels shall be installed in a way that all parts are readily accessible for inspection.

(2) Pressure vessels installed underground shall be placed in concrete or brick pits with removable covers protected by suitable corrosion protection systems i.e. cathodic protection or other cathodic coatings as approved by the enforcing inspection authority.

(3) Requirements in the preparation of pressure vessels installation plans including internal combustion engine and other mechanical equipments shall be as provided under Rule 1168.

#### **1172.04 : Factor of Safety :**

The permissible working pressure of the pressure vessel shall be reduced to maintain a factor of safety of not less than five (5) or such other factor as may have been specified/fixed in the specification when an inspection of the pressure vessel shows signs of deterioration unless suitable repairs are done. It shall be reduced or de-rated in accordance to the provisions of its design code based on the remaining thickness as determined by conducting thickness-gauging measurement.

#### **1172.05 : Access and Inspection Openings :**

(1) Except for those types of pressure vessels, where such inspection openings are impracticable, pressure vessels shall be provided with:

- a. suitable manhole, handhole or other openings or inspection, examination and cleaning or
- b. removable heads or cover plates of a size not less than the required area of the openings and located to provide adequate view of its interior.

(2) Provisions for manhole and handholes shall be as provided and specified under ASME requirement based on vessel diameter.

(3) Handhole openings in pressure vessels shall be not less than 70 mm. (2 3/4 in.) in size.

#### **1172.06 : Safety Appliances :**

Pressure vessels shall be protected by such safety and relief valves, indicating and controlling devices to ensure their safe operation. The appliances shall be constructed, located and installed to avoid any mechanical damage.

### **1172.07 : Safety Valves :**

(1) Safety valves in pressure vessels shall have mechanical lifting devices to lift the valve disc from its seat when testing. The safety valve shall be set within plus or minus ten percent (10%) of its designed pressure.

(2) Safety valves of pressure vessels where pressure is supplied from an outside source shall be connected to the vessels or system which are protected to prevent a rise in pressure beyond the allowable maximum.

(3) Pressure vessels in which pressure is generated, shall be provided with safety valves and connected:

- a. directly to the vessels, or
- b. if the contents of the vessels are likely to clog or cause interference with the operation, safety valves may be connected to the pipe lines leading to the vessels.

(4) Safety valves having either the seat or the disc of cast iron shall not be used in pressure vessels.

(5) The discharge capacity of safety valves on pressure vessels shall be sufficient for the size of the supply pipes and the pressure at which the vessels are operated.

(6) Outlets of safety valves on pressure vessels shall be located or piped to avoid hazards to persons.

(7) When two or more safety valves are fitted on a pressure vessel, all except one of the valves shall be set to blow at a pressure slightly above but not more than ten percent (10%) of the maximum permissible working pressure.

(8) When two or more safety valves are placed in one connection for a pressure vessel, such connection shall have a cross-sectional area of at least equal to the combined areas of the safety devices.

(9) Safety valves on pressure vessels shall be provided with continuous drain.

### **1172.08 : Rupture Discs :**

(1) Safety rupture discs, shall be made of suitable materials which are:

- a. uniform in thickness;
- b. capable of withstanding any chemical action; and
- c. durable enough to withstand the least possible change.

(2) Where safety rupture discs are used for additional protection of pressure vessels, they shall be designed to fail at a pressure above the safety valve setting.

### **1172.09 : Identification of Control Valves :**

Where a battery of pressure vessels is operated, control valves shall be plainly marked by numbering or by the use of a distinctive color system. If the valve is located on the vessel, each vessel shall carry a mark corresponding to that on its valve.

### **1172.10 : Indicating and Recording Devices :**

Indicating and recording devices on pressure vessels shall be protected against breakage or clogging and clearly legible to the operators.

### **1172.11 : Inspection :**

Inspection proceedings for Pressure Vessels shall be the same as provided under Rule 1162.02.

### **1173 : Liquefied Petroleum Gas (LPG) Vessels and other Cylinders :**

(1) Vessels containing or are used as containers for liquefied petroleum gas (LPG), chemicals, catalyst and other corrosive gases shall be subjected to internal and/or external inspection, including hydrostatic tests equal to 1.2 times the maximum working pressure at intervals not exceeding two (2) years in the case of cylinders for corrosive gases and five (5) years for other gas cylinders. However, internal inspection shall be conducted on such a vessel at any time within this period if in the opinion of the competent authority, said inspection is deemed necessary due to known or inspected defects.

(2) The result of the internal and/or external conduct of inspection on all pressure vessel parts and appliances, may upon the discretionary power/privilege of the inspection authority, decide whether or not to subject the pressure vessel to a hydrostatic test

(3) In lieu of hydrostatic test, radiographic, ultrasonic thickness gauging, magnetic particle, liquid penetrant and/or other equivalent non-destructive test shall be performed on such vessel.

### **1173.01: Cylinder Records :**

Every cylinder owner/user or person responsible for the maintenance of the cylinder shall keep a cylinder maintenance logbook/register which shall show the corresponding dates of all tests, internal and/or external inspection, cleaning and repairs undertaken. Such logbook/register shall be made available upon request by the inspection authority.

### **1173.02 : Fittings :**

(1) Every cylinder shall be provided with a device that prevents damage to the bottom of the gas cylinder;

(2) Only materials resistant to the contents of the cylinder shall be used for parts of valves and fittings.

(3) Copper and alloy containing copper shall not be used for parts or fittings on cylinders for liquefied ammonia dissolve under pressure.

(4) All fittings of cylinders for oxygen and other oxidizing gases shall be kept free from grease.

(5) For all flammable gases, the connection screw shall always be right handed except for LPG cylinders.

### **1173.03 : Markings and Identifications :**

(1) Cylinders shall be legibly marked for the purpose of identifying the content inside with:

- a. chemical symbols - to be stamped on the metal at the shoulder of the cylinder; and
- b. chemical name and trade name - to be stenciled, labeled or stamped and shall not be easily removed.

(2) All markings shall be located on or near the shoulder of the cylinders.

(3) Metal stampings shall have a minimum height of 0.31 cm. (1/8 in.).

(4) The height of lettering by printing, stenciling, labeling and paint or ink stamping shall not be less than one over twenty five (1/25) of the diameter of the cylinder with a minimum height of 0.62 cm. (1/4 in.).

### **1173.04 : Handling and Storage :**

(1) Cylinders shall be adequately protected against excessive variations of temperature, direct rays of the sun and continuous dampness.

(2) Storage of charged cylinders inside factory buildings shall be:

- a. limited to such number as to be reasonably safe for the workers therein;
- b. suitably placed and secured against their falling and rolling.

(3) Storage rooms containing charged cylinders should be appropriately marked on the outside with clearly visible danger signs.

(4) Cylinders shall be segregated for storage by type of gas and empty cylinders shall be stored apart from charged cylinders.

(5) Cylinders shall not be placed:

- a. in or near gangways, stairways, elevator installations or other places where moving objects may strike or fall against them;
- b. close to highly flammable substances;
- c. adjacent to air intake; and
- d. basement or cellar.

(6) Storerooms shall:

- a. be provided with adequate ventilation facilities to the outside air; and
- b. have an adequate number of exits having regard to the quantity and nature of the gas stored.

(7) Smoking in cylinder rooms is prohibited.

**1173.05 : Transport :**

(1) Cylinders shall be transported in a way that no part of the cylinders shall project beyond the sides or ends of the vehicle.

(2) Adequate precaution shall be taken to prevent rough handling, excessive shocks or local stress.

(3) No cylinder shall be moved by a lifting magnet.

(4) When cylinders are moved by a hoisting mechanism, a properly designed cradle with suitable slings shall be used.

**1174 : Steam Heated Pressure Vessels:**

1174.01 :

Where steam heated pressure vessel is operated at a pressure less than that of the main steam supply line, an effective reducing valve shall be properly secured against any manipulations by an unauthorized person.

1174.02 :

Reducing valves and safety valves on steam lines for pressure vessels shall be tested occasionally. Steam supply pipes for steam heated pressure vessels shall be placed in floor trenches, where practicable, or covered with insulating materials within 2 m. from the floor or working level to prevent excessive increase of temperature in the atmosphere of the workroom.

**1175 : Closed Steam Heated Pressure Vessels:**

1175.01 : Interlocks :

(1) Closed steam heated pressure vessels equipped with bayonet-joint covers shall be provided with interlocks or other effective means for preventing:

- a. the rise of pressure inside the vessel before the cover is in fully locked position, and
- b. the release of the cover from the locked position before the pressure inside the vessel has been reduced to atmospheric pressure.

#### 1175.02 : Steam Agitation :

Where the contents of the closed vertical pressure vessels are stirred by means of a live steam, the vessel shall be provided with heavy coiled springs or other suitable shock absorbers under their supports.

#### 1175.03 : Revolving Closed Vessels:

(1) Pressure gauges and safety valves on revolving cylindrical steam heated pressure vessels, such as revolving autoclaves, devulcanizers, and rotary driers, shall be located on the steam lines at the trunnions thru which steam is admitted into the vessels.

(2) Driving mechanisms of revolving steam heated pressure vessels shall be provided with:

- a. appropriate locking device; and
- b. safeguards in accordance with the requirement of Rule 1200.

(3) Before filling or emptying a revolving steam heated pressure vessel, the driving mechanism shall be locked in off position and the stop valves shall be locked in closed position.

(4) Revolving steam heated pressure vessels shall be enclosed or guarded to a sufficient height to prevent any person from coming into contact with them when in motion.

#### 1175.04 : Autoclaves :

(1) Autoclaves shall be provided with casings that shall:

- a. prevent the contents from being forced out directly in the working spaces, and
- b. extend down to the floor to prevent any person from walking under the vessel.

(2) Autoclaves containing liquids shall be installed over pits or in casings of light steel or other suitable materials, tight at the bottom and capable of holding the charge or draining to a suitable receiver.

(2) All electrical equipment in rooms where autoclaves containing flammable substances are installed shall be:

- a. effectively grounded; and
- b. of approved explosion - proof type.

(4) Linings of autoclaves shall be examined frequently for leaks and shall be renewed before the shells are damaged.

(5) The heating of oil for oil-jacketed autoclaves shall be performed at points remote from the vessels.

#### 1175.05 : Digesters :

- (1) Digesters used for the cooking of wood chips shall be equipped with piping of corrosion resistant materials and of adequate thickness, particularly between the blow-off and blow-pits.
- (2) Blow-off valves on digesters shall be so arranged that they can be operated from a location outside the digester room or from protected point remote from the valves.
- (3) Openings of blow-pits shall be so constructed as small as possible with raised sides or guarded by standard railings of not less than 1.25 m. (48 in.) in height.
- (4) Openings of blow-pits shall be preferably on the side of the pits.
- (5) Ladders for access to blow-pits shall be constructed that the doors of the blow-pits cannot be closed when the ladders are in place.
- (6) An effective warning system consisting of bells, whistles or other signalling devices, shall be installed in digesters and blow-pits rooms, to be sounded or operated before and while digesters are being blown.
- (7) Before opening blow-off valves to discharge the contents, the following procedures shall be observed:
  - a. the blow-pit shall be free from stock and water;
  - b. precautions shall be taken to ensure that all workers are out of the blow-pit;
  - c. the door of the blow-pit shall be securely fastened; and
  - d. workers in the digesters and blow-pit rooms shall be warned by signals that the blow-off valve is to be opened.
- (8) Blow-off valves on digesters shall be opened slowly.
- (9) Head covers on digesters shall not be loosened while any pressure is indicated on the steam gauge.
- (10) Persons not directly concerned shall not be permitted in digester buildings while digesters are being blown.
- (11) Each floor of digester buildings shall be provided with not less than two (2) unobstructed means of egress.

#### 1175.06 : Distilling Apparatus

- (1) Stills shall be equipped with duplicate pressure gauges, safety valves and recording thermometers or pyrometers.
- (2) Charging vapor and steam lines on stills shall be:
  - a. fitted with dual valves, with a bleeder between them, and
  - b. provided with arrangements for disconnecting and blanking the lines.



(3) Convenient and safe access for quick manipulation of overhead valves on stills shall be provided.

(4) Where horizontal shell stills are mounted at varying heights to allow gravity flow, the manhole ladders shall be of different lengths to fit the front manhole of each still at the proper angle.

(5) When preparing apparatus used in distilling flammable, corrosive or toxic fluids for cleaning or repairs, the following procedure shall be observed:

- a. steam inlet valves shall be locked in close position
- b. all charging fluid shall be pumped out;
- c. all inlet lines shall be disconnected and blanked or the inlet valves shall be locked in position; and
- d. the stills shall be blown through with live steam admitted through a top connection.

(6) When stills are to be charged with cold liquids, they shall first be filled with steam until all the air has been expelled and steam shows at the safety and vacuum relief valves.

(7) When stills are charged with hot liquids, they shall be steamed progressively from the stills through the tower and condensing equipment to a try cock on the gas line.

1175.07 : Kiers:

Where hot liquids, such as solutions of caustic soda, lime sulphuric acid are used in circulating kiers coiling out textile materials or in similar closed pressure vessels, the liquids:

- a. shall be prepared in separate vessel or tanks, and.
- b. shall not be admitted to the pressure vessels until loading of the materials to be processed has been completed.

1175.08 : Vulcanizers and Devulcanizers:

(1) Vulcanizers and devulcanizers door fastening shall be of ample strength, properly spaced and carefully secured.

(2) Vulcanizers and devulcanizers shall be installed above the floors high enough to permit piping valves and traps on the same floors as the vessels. This requirement shall not apply where it is necessary to install bottoms of horizontal vulcanizers below floor levels in order to place the car tracks on the vulcanizers on the same level as the floor tracks.

(3) Periodic and thorough internal and external inspections shall be made of vulcanizers including all attachments and connecting equipment, at intervals not exceeding three (3) months.

(4) Before allowing workers to enter vulcanizers or devulcanizers for the purpose of releasing jammed or derailed vulcanizer cars or for any other necessary operation, the following shall be observed:

- a. steam valves and other supply valves shall be locked in closed position;
- b. the blow-down valves on the individual vessel and on any other vessel using the same drain shall be locked in closed position;
- c. the vessels shall be free of hazardous fumes or vapor; and
- d. the vessels shall be cooled sufficiently to prevent workers from being burned or over exposed to heat.

(5) Safety valves for vulcanizers and open-steam type devulcanizers shall be attached directly to the shells of the vessels.

(6) Vulcanizers and open-steam type devulcanizers equipped with bolted doors shall be provided with hinged type door belts securely attached to lugs on the shell rings.

(7) Before any attempt is made to open the doors of vulcanizers or open-steam type devulcanizers, the following shall be observed:

- a. the steam supply valves shall be closed;
- b. the blow-down and telltale valves shall be opened until the telltale valve indicates that all internal pressure has been relieved; and
- c. the drain valves shall be opened.

(8) Vulcanizers and open-steam type devulcanizers shall be equipped with individual blow-down piping and the use of common blow down is prohibited.

(9) Horizontal vulcanizers and open type devulcanizers shall be equipped with:

- a. a drain valve at the bottom near the front of the vessel for draining condensed for cooling water from the vessels and to avoid scalding of workers when the doors are opened, and
- b. an additional drain valve near the center, when the vessel is more than 0.75 m. (2.5ft.) in length.

(10) Vertical vulcanizers and devulcanizers shall be provided with suitable platforms equipped with standard railings and toeboards and arranged to make all working areas accessible.

#### 1175.09 Vulcanizers:

(1) Doors on vulcanizers shall be of quick opening type, with fastening and locking arrangements in full sight of the operators.

(2) Quick opening vulcanizers doors shall be equipped with automatic interlocks that will prevent doors from being opened until all pressure has been relieved.

(3) Power-operated vulcanizer doors running in vertical guides shall be equipped with automatic latches in the guides to prevent the doors from falling in the event of failure of the hoisting mechanism.

(4) Vulcanizers shall be equipped with telltale valves, preferably located on the vulcanizer doors, for reducing the pressure inside to atmospheric level before the doors can be opened.

(5) Where bottoms of horizontal vulcanizers extend below the floor levels, the pits shall be guarded at the sides by standard railings and toeboards, and at the ends by removable rails or by chain carrying warning signs.

(6) Where vulcanizers cars are used, car stops shall be provided in the rear part of the vulcanizers to prevent the cars from striking workers when rolled in.

(7) Plates over spiders on top of hydraulic rams on vertical type vulcanizers shall be perforated and provided with center holes large enough to prevent the accumulation of steam within the rams and the blowing out of the moulds or plates upon removal of the covers.

(8) Vertical type vulcanizers shall be provided with overflow pipes of the water operating the hydraulic rams, with a capacity not less than that of the water inlet pipes, inserted through the cylinder wall at the limit of travel necessary for the ram.

#### 1175.10 : Alkali Devulcanizers:

(1) Where safety valves on alkali devulcanizers may be clogged by rubber or other foreign materials from the contents of the vessels, safety rupture discs should be substituted

(2) Alkali devulcanizers shall be provided with baffles directly on the inner shells at the entrance to the safety valves, steam gauges, and blow-down lines.

(3) Workers exposed to splashes from caustic liquids used in alkali devulcanizers shall be provided with suitable personal protected equipment conforming to the requirement of Rule 1080.

(4) Discharge pipes and closed dump tanks for stationary alkali devulcanizers shall be designed to withstand devulcanizers pressure in the event the lines are opened under high pressure.

(4) Revolving spherical alkali devulcanizers shall be provided with:

- a. individual motor drives or effective means of locking the driver to prevent the possibility of accidental starting;
- b. remote power controls, beyond the reach of persons standing in front of the manhole; and,
- c. automatic interlocking devices which will prevent starting the driving mechanism until the manhole covers are loose and locked except when the operators keep their hands on the power controls.

#### 1176 : Open Steam Heated Pressure Vessels:

##### 1176.01 : General Provisions:

(1) Where the top edges of large open steam pressure vessels are less than 1.20 m. (4 ft.) above the floor or working level, the vessels shall be surrounded by standard railings to the floor, so that workers can watch the operations, without the possibility of falling into the vessels or being burned by splashing materials.

(4) Batteries of open kiers or similar open steam heated pressure vessels shall be arranged that:

- a. the distance between the edges of the vessels is at least 45 cm. (18 in.); and
- b. there is unobstructed space for passage around each vessel of at least 45 cm. (18 in.).

(5) Planks, ladders, stairs and other gangways placed over open steam heated pressure vessels containing hot liquid or hot water shall be securely fastened and provided with standard railings and toeboards preferably fitted with fillers.

(4) Sitting or standing on the edges of open steam heated pressure vessels or on guards surrounding such vessels is prohibited.

(5) Where open steam heated pressure vessels give rise to excessive water vapor, adequate steps shall be taken to reduce the relative humidity of the workroom.

#### 1176.02 : Open Jacketed Kettles :

(1) Jackets of steam jacketed cooking or tenderizing kettle shall be thoroughly drained before the steam supply valves are open.

(2) When admitting steam to cold steam jacketed kettles, the steam supply valves shall be opened slowly.

(3) Wooden scrapers should be provided and used for removing semi-solid or sticky finished products from steam jacketed pivoted kettles or kettles with side discharged doors.

(4) Open steam jacketed starch kettles used in textile industry shall be provided with covers arranged that the process can be observed, and with large overflow rings with ample drains.

(5) Workers around open steam jacketed kettles shall be provided with, and used suitable protective clothing conforming to Rule 1080.

(5) Before cleaning or making repairs inside open steam jacketed kettles, all:

- a. agitating devices shall be locked or blocked to be inoperative;
- b. valves or drains connected on common heads shall be closed or blocked; and
- c. pipings for introducing steam or other dangerous substances shall be disconnected and blanked or their inlet valves shall be locked in the closed position.

#### 1176.03 : Open Evaporating Pans :

(1) Open evaporating pans for substances which are flammable when dry, shall be kept free of impurities and the steam coils always covered by liquids when operated.

(2) Steam coils in open evaporators pans shall prevent the creation of a vacuum through steam condensation drawing the material processed into the coils, which may cause explosion.

## **1177 : Water and Air Pressure Tanks:**

### 1177.01 : General Provisions :

The water supplied to water pressure tanks shall be free from suspended solids and sedimentary matters.

### 1177.02 : Hot Water Pressure Tanks:

- (1) Hot water pressure tanks shall be designed to withstand full boiler pressure.
- (2) Every hot water pressure tank not designed to withstand full boiler pressure shall be equipped with:
  - a. a reducing valve located between the steam stop valve and the tank; and
  - b. one or more relief or safety valves on the low pressure side of the reducing valve.
- (3) Every hot pressure tank should be equipped with automatic temperature regulator set to prevent the generation of steam.
- (4) Pressure gauges for hot water pressure tanks shall be installed between the reducing valves and the relief safety valves.
- (5) Steam and hot water piping for hot water pressure tanks shall be adequately insulated where it is exposed to contact.
- (6) Hot water tanks shall be examined frequently for leaks of steam or water, which shall include hydrostatic tests when deemed necessary by the Safety Engineer of the Regional Labor Office or authorized representative.

### 1177.03 : Cold Water Pressure Tanks:

- (1) Pressure gauges for cold water pressure tanks for sprinkler system shall be provided with separate shut-off valves with arrangements for draining.
- (2) Discharge valves on cold water pressure tanks for sprinkler system shall be locked or sealed in the open position and shall be inspected frequently to make sure that they are open.
- (3) Cold water pressure system shall be provided with one or more pressure relief valves adjusted to release over the maximum air pressure of the system.

### 1177.04 : Air Receivers :

- (1) Air receivers shall be:
  - a. protected from the weather; and
  - b. accessible for external and internal inspection.
- (2) Air receivers shall be provided with suitable openings for inspection and cleaning.

(3) Where two or more receivers are served by one compressor, the air supply piping for each tank shall be equipped with a stop valve and with a safety valve between the stop valve and the compressor.

(4) Safety valves for air receiver shall be proportional to the maximum quantity of free air that can be supplied.

(5) Stop valves shall be installed between air receivers and each consuming appliance at points convenient to the operator.

(6) Pipe lines of compressed air systems shall be :

- a. securely fastened in place; and
- b. installed not to interfere with free contraction or expansion of the pipings between fixed points.

(7) Air receivers shall be equipped at the lowest point possible with automatic drain traps or with valves which shall be opened daily, for relieving the vessels of air, moisture and oil accumulated at the bottoms.

(8) Air receivers shall be kept clean of oil, carbon and other foreign substances.

(9) Compressed air shall not be handled or used by any person except in the performance of his duties. In no case shall a jet of compressed air be directed against any person.

(10) No vessel shall be used as an air receiver unless it meets the requirements of Rule 1171.02.

(11) Compressed air shall not be used to force liquid or substance out of containers which are not constructed to withstand the pressure of the air supplied.

### **1178 : Refrigeration Tanks**

1178.01 : Refrigeration Rooms:

(1) Factory rooms in which refrigeration tanks and other parts of refrigeration systems are permanently installed and operated shall:

- a. be provided with tight-fitting doors;
- b. have no partitions or openings that will permit the passage of refrigerants to other parts of buildings; and
- c. be provided with mechanical means of ventilation.

1178.02 :

Not more than two (2) refrigeration tanks shall be located one above within the same area between floor and ceiling.

#### 1178.03 : Open Flames:

All electrical equipment shall be of the approved explosion proof type. No flame producing devices or hot surfaces shall be permitted in rooms where refrigeration tanks are installed.

#### 1178.04 : Materials:

All materials used in the construction and installation of refrigeration tanks shall be capable of withstanding the chemical action.

#### 1178.05: Gauge Glasses:

Liquid level gauge glasses for refrigeration tanks, except the bull's type, shall be fitted with automatic shut-off valves.

#### 1178.06 : Stop Valves:

Refrigeration tanks shall be equipped with stop valves at each inlet and outlet pipes.

#### 1178.07 : Pressure Relief Device:

(1) Refrigeration tanks shut off by valves from other parts of the refrigeration system, shall be equipped with:

- a. at least two (2) pressure relief valves or one pressure relief valve in parallel with a rupture member when the capacity of the tank exceeds 140 liters (5 cu. ft.) and its diameter exceeds 15 cm. (6 in.) and
- b. a pressure relief device or a fusible plug, when the capacity of the tank is 140 liters (5 cu. ft.) or less.

(2) Pressure relief devices for refrigeration tanks shall be connected directly to the vessels and shall be placed above the liquid refrigerant level.

(3) Pressure relief valves and fusible plugs for refrigeration tanks shall be provided with discharge pipes, leading directly and separately to the outside of the building, with outside outlets located to protect persons from exposure to any irritating or toxic fumes or vapors.

(7) Pressure relief valves and fusible plugs for refrigeration tanks containing ammonia or sulphur dioxide shall discharge into substantial tanks of the closed type or provided with hinged covers, used for no other purpose than the absorption of the refrigerants.

#### **1179: Compressor:**

##### 1179.01: Installation

All compressors shall be installed on firm foundations and securely fastened in place.

#### 1179.02 : Machine Guarding:

All moving parts of air compressors shall be safeguarded in accordance with the provisions of Rule 1200.

#### 1179.03 : Pressure Limiting Device:

(1) Air compressors or shall be equipped with:

- a. automatic mechanisms which will stop the air compressing operation when the maximum allowable pressure is reached; and
- b. electrically operated pressure limiting devices on air compressors shall be designed and constructed that the electric contracts cannot lock or fuse in a position which will cause the compressors to continue its air-compressing operations.

#### 1179.04: Speed Governors

Unloaded air compressor or governor controls of engines shall be inspected frequently and regularly and maintained in good working conditions.

#### 1179.05: Lubrication:

Air compressor cylinder shall be lubricated with just sufficient oil to avoid excess oil from flowing into the intercoolers, receivers and other parts of the system.

#### 1179.06 : Cooling

(1) Where air compressors cylinders are equipped with water cooling jackets, a visible indication of water flow be provided.

(2) Intercoolers and after-coolers shall be designed and constructed to withstand safety the maximum pressure in their discharge piping.

#### 1179.07: Air Intake and Discharge Piping:

(1) Air intakes for air compressors shall be located at a place where the air is pure, clean and free from any flammable or toxic gases or fumes.

(2) Air discharge piping from air compressors operating at high temperature shall be provided with insulating cover.

(3) If necessary, separator shall be installed at a convenient point between the compressor and the receiver.

#### 1179.08 : Valve:

(1) Where stop valves are installed in the air discharge piping from air compressor:

- a. the valves shall be easily accessible for inspection and cleaning; and

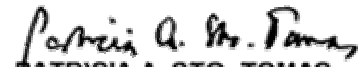


b. one or more safety valves shall be installed between the compressor and stop valve.

(2) Steam or gas supply lines to steam driven air compressor shall be provided with a manually operated throttle valve in a readily accessible location

(3) Compressor valves shall be inspected frequently and regularly and leaking valve shall be immediately repaired or replaced.

Manila, Philippines, 18 December 2001.

  
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Secretary