

RULES AND REGULATIONS

the operator when facing the area to be served by the load hook, or while facing the direction of travel of the cab. The arrangement shall allow the operator a full view of the load hook in all positions.

(ii) The cab shall be located to afford a minimum of 3 inches clearance from all fixed structures within its area of possible movement.

(iii) The clearance of the cab above the working floor or passageway should be not less than 7 feet.

(2) *Access to crane.* Access to the cab and/or bridge walkway shall be by a conveniently placed fixed ladder, stairs, or platform requiring no step over any gap exceeding 12 inches. Fixed ladders shall be in conformance with the American National Standard Safety Code for Fixed Ladders, ANSI A14.3-1956.

(3) *Fire extinguisher.* A carbon dioxide, dry-chemical, or equivalent hand fire extinguisher should be kept in the cab. Carbon tetrachloride extinguishers shall not be used.

(4) *Lighting.* Light in the cab shall be sufficient to enable the operator to see clearly enough to perform his work.

(d) *Footwalks and ladders.* (1) *Location of footwalks.* (i) If sufficient headroom is available on cab-operated cranes, a footwalk shall be provided on the drive side along the entire length of the bridge of all cranes having the trolley running on the top of the girders. To give sufficient access to the opposite side of the trolley, there should be provided either a footwalk mounted on the trolley, a suitable footwalk or platform in the building, or a footwalk on the opposite side of the crane at least twice the length of the trolley.

(ii) Footwalks should be located to give a headroom not less than 78 inches. In no case shall less than 48 inches be provided. If 48 inches of headroom cannot be provided, footwalks should be omitted from the crane and a stationary platform or landing stage built for workmen making repairs.

(2) *Construction of footwalks.* (i) Footwalks shall be of rigid construction and designed to sustain a distributed load of at least 50 pounds per square foot.

(ii) Footwalks shall have a walking surface of antislip type.

Note: Wood will meet this requirement.

(iii) Footwalks should be continuous and permanently secured.

(iv) Footwalks should have a clear passageway at least 18 inches wide except opposite the bridge motor, where they should be not less than 15 inches. The inner edge shall extend at least to the line of the outside edge of the lower cover plate or flange of the girder.

(3) *Toeboards and handrails for footwalks.* Toeboards and handrails shall be in compliance with section 1910.23 of this part.

(4) *Ladders and stairways.* (i) Gantry cranes shall be provided with ladders or stairways extending from the ground to the footwalk or cab platform.

(ii) Stairways shall be equipped with rigid and substantial metal handrails. Walking surfaces shall be of an antislip type.

(iii) Ladders shall be permanently and securely fastened in place and shall be constructed in compliance with § 1910.27.

(e) *Stops, bumpers, rail sweeps, and guards.* (1) *Trolley stops.* (i) Stops shall be provided at the limits of travel of the trolley.

(ii) Stops shall be fastened to resist forces applied when contacted.

(iii) A stop engaging the tread of the wheel shall be of a height at least equal to the radius of the wheel.

(2) *Bridge bumpers.* (i) A crane shall be provided with bumpers capable of stopping the crane (not including the lifted load) at a rate of deceleration not to exceed 3 feet per second per second when traveling in either direction at 20 percent of the rated load speed.

(ii) The bumper shall be so mounted that there is no direct shear on bolts.

(iii) Bumpers shall be so designed and installed as to minimize parts falling from the crane in case of breakage.

(3) *Trolley bumpers.* (i) Trolley shall be provided with bumpers capable of stopping the trolley (not including the lifted load) at a rate of deceleration not to exceed 4.7 feet per second per second when traveling in either direction at one-third of the rated load speed.

(ii) When more than one trolley is operated on the same bridge, each shall be equipped with bumpers on adjacent ends.

(iii) Bumpers shall be designed and installed to minimize parts falling from the trolley in case of breakage.

(4) *Rail sweeps.* Bridge trucks shall be equipped with sweeps which extend below the top of the rail and project in front of the truck wheels.

(5) *Guards for hoisting ropes.* (i) If hoisting ropes run near enough to other parts to make fouling or chafing possible, guards shall be installed to prevent this condition.

(ii) A guard shall be provided to prevent contact between bridge conductors and hoisting ropes if they could come into contact.

(6) *Guards for moving parts.* (i) Exposed moving parts such as gears, set screws, projecting keys, chains, chain sprockets, and reciprocating components which might constitute a hazard under normal operating conditions shall be guarded.

(ii) Guards shall be securely fastened.

(iii) Each guard shall be capable of supporting without permanent distortion the weight of a 200-pound person unless the guard is located where it is impossible for a person to step on it.

(f) *Brakes.* (1) *Brakes for hoists.* (i) Each independent hoisting unit of a crane shall be equipped with at least one self-setting brake, hereafter referred to as a holding brake, applied directly to the motor shaft or some part of the gear train.

(ii) Each independent hoisting unit of a crane, except worm-gear hoists, the angle of whose worm is such as to prevent the load from accelerating in the

lowering direction shall, in addition to a holding brake, be equipped with control braking means to prevent overspeeding.

(2) *Holding brakes.* (i) Holding brakes for hoist motors shall have not less than the following percentage of the full load hoisting torque at the point where the brake is applied.

(a) 125 percent when used with a control braking means other than mechanical.

(b) 100 percent when used in conjunction with a mechanical control braking means.

(c) 100 percent each if two holding brakes are provided.

(ii) Holding brakes on hoists shall have ample thermal capacity for the frequency of operation required by the service.

(iii) Holding brakes on hoists shall be applied automatically when power is removed.

(iv) Where necessary holding brakes shall be provided with adjustment means to compensate for wear.

(v) The wearing surface of all holding-brake drums or discs shall be smooth.

(vi) Each independent hoisting unit of a crane handling hot metal and having power control braking means shall be equipped with at least two holding brakes.

(3) *Control braking means.* (i) A power control braking means such as regenerative, dynamic or counter-torque braking, or a mechanically controlled braking means shall be capable of maintaining safe lowering speeds of rated loads.

(ii) The control braking means shall have ample thermal capacity for the frequency of operation required by service.

(4) *Brakes for trolleys and bridges.* (i) Foot-operated brakes shall not require an applied force of more than 70 pounds to develop manufacturer's rated brake torque.

(ii) Brakes may be applied by mechanical, electrical, pneumatic, hydraulic, or gravity means.

(iii) Where necessary brakes shall be provided with adjustment means to compensate for wear.

(iv) The wearing surface of all brake-drums or discs shall be smooth.

(v) All foot-brake pedals shall be constructed so that the operator's foot will not easily slip off the pedal.

(vi) Foot-operated brakes shall be equipped with automatic means for positive release when pressure is released from the pedal.

(vii) Brakes for stopping the motion of the trolley or bridge shall be of sufficient size to stop the trolley or bridge within a distance in feet equal to 10 percent of full load speed in feet per minute when traveling at full speed with full load.

(viii) If holding brakes are provided on the bridge or trolleys, they shall not prohibit the use of a drift point in the control circuit.

(ix) Brakes on trolleys and bridges shall have ample thermal capacity for the frequency of operation required by

(c) *Maximum load imposed by filling the container with ammonia warmer than the design storage temperature.*

(ii) More than one storage container may be handled by the same refrigeration system.

(9) *Compressors.*

(i) A minimum of two compressors shall be provided either of which shall be of sufficient size to handle the loads listed in subparagraphs (8) (i) (a) and (b) of this paragraph. Where more than two compressors are provided minimum standby equipment equal to the largest normally operating equipment shall be installed. Filling compressors may be used as standby equipment for holding compressors.

(ii) Compressors shall be sized to operate with a suction pressure at least 10 percent below the minimum setting of the safety valve(s) on the storage container and shall withstand a suction pressure at least equal to 120 percent of the design pressure of the container.

(10) *Compressor drives.*

(i) Each compressor shall have its individual driving unit.

(ii) An emergency source of power of sufficient capacity to handle the loads listed in subparagraphs (8) (i) (a) and (b) of this paragraph shall be provided unless facilities are available to safely dispose of vented vapors while the refrigeration system is not operating.

(11) *Automatic control equipment.*

(i) The refrigeration system shall be arranged with suitable controls to govern the compressor operation in accordance with the load as evidenced by the pressure in the container(s).

(ii) An emergency alarm system shall be installed to function in the event the pressure in the container(s) rises to the maximum allowable operating pressure.

(iii) An emergency alarm and shutoff shall be located in the condenser system to respond to excess discharge pressure caused by failure of the cooling medium.

(iv) All automatic controls shall be installed in a manner to preclude operation of alternate compressors unless the controls will function with the alternate compressors.

(12) *Separators for compressors.*

(i) An entrainment separator of suitable size and design pressure shall be installed in the compressor suction line of lubricated compression. The separator shall be equipped with a drain and gaging device.

(ii) An oil separator of suitable size shall be installed in the compressor discharge line. It shall be designed for at least 250 p.s.i.g. and shall be equipped with a gaging device and drain valve.

(13) *Condensers.* The condenser system may be cooled by air or water or both. The condenser shall be designed for at least 250 p.s.i.g. Provision shall be made for purging noncondensibles either manually or automatically.

(14) *Receiver and liquid drain.* A receiver shall be provided with a liquid-level control to discharge the liquid ammonia to storage. The receiver shall be designed for at least 250 p.s.i.g. and be equipped with the necessary connections, safety valves, and gaging device.

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(15) *Insulation.* Refrigerated containers and pipelines which are insulated shall be covered with a material of suitable quality and thickness for the temperatures encountered. Insulation shall be suitably supported and protected against the weather. Weatherproofing shall be of a type which will not support flame propagation.

(e) *Systems utilizing portable DOT containers.* (1) *Conformance.* Cylinders shall comply with DOT specifications and shall be maintained, filled, packaged, marked, labeled, and shipped to comply with 49 CFR Chapter I and Marking Portable Compressed Gas Containers to Identify the Material Contained, ANSI Z44.1-1954 (R1970).

(2) *Storage.* Cylinders shall be stored in an area free from ignitable debris and in such manner as to prevent external corrosion. Storage may be indoors or outdoors.

(3) *Heat protection.* Cylinders filled in accordance with DOT regulations will become liquid full at 145° F. Cylinders shall be protected from heat sources such as radiant flame and steam pipes. Heat shall not be applied directly to cylinders to raise the pressure.

(4) *Protection.* Cylinders shall be stored in such manner as to protect them from moving vehicles or external damage.

(5) *Valve cap.* Any cylinder which is designed to have a valve protection cap shall have the cap securely in place when the cylinder is not in service.

(f) *Tank motor vehicles for the transportation of ammonia.* (1) This paragraph applies to containers and pertinent equipment mounted on tank motor vehicles including semitrailers and full trailers used for the transportation of ammonia. This paragraph does not apply to farm vehicles. For requirements covering farm vehicles, refer to paragraphs (g) and (h) of this section.

Paragraph (b) of this section applies to this paragraph unless otherwise noted. Containers and pertinent equipment for tank motor vehicles for the transportation of anhydrous ammonia, in addition to complying with the requirements of this section, shall also comply with the requirements of DOT.

(2) *Design pressure and construction of containers.* (i) The minimum design pressure for containers shall be that specified in the regulations of the DOT.

(ii) The shell or head thickness of any container shall not be less than three-sixteenth inch.

(iii) All container openings, except safety relief valves, liquid-level gaging devices, and pressure gages, shall be labeled to designate whether they communicate with liquid or vapor space.

(3) *Container appurtenances.* (i) All appurtenances shall be protected against physical damage.

(ii) All connections to containers, except filling connections, safety relief devices, and liquid-level and pressure gage connections, shall be provided with suitable automatic excess flow valves, or in lieu thereof, may be fitted with quick-closing internal valves, which shall remain closed except during delivery operations.

(iii) Filling connections shall be provided with automatic back-pressure check valves, excess-flow valves, or quick-closing internal valves, to prevent backflow in case the filling connection is broken. Where the filling and discharge connect to a common opening in the container shell and that opening is fitted with a quick-closing internal valve as specified in subdivision (ii) of this subparagraph, the automatic valve shall not be required.

(iv) All containers shall be equipped for spray loading (filling in the vapor space) or with a vapor return valve of adequate capacity.

(5) *Piping and fittings.* (i) All piping, tubing, and fittings shall be securely mounted and protected against damage. Means shall be provided to protect hoses while the vehicle is in motion.

(ii) Fittings shall comply with paragraph (b) (6) of this section. Pipe shall be Schedule 80.

(6) *Safety relief devices.* (i) The discharge from safety relief valves shall be vented away from the container upward and unobstructed to the open air in such a manner as to prevent any impingement of escaping gas upon the container; loose-fitting rain caps shall be used. Size of discharge lines from safety valves shall not be smaller than the nominal size of the safety-relief valve outlet connection. Suitable provision shall be made for draining condensate which may accumulate in the discharge pipe.

(ii) Any portion of liquid ammonia piping which at any time may be closed at both ends shall be provided with a hydrostatic relief valve.

(6) *Transfer of liquids.* (i) The content of tank motor vehicle containers shall be determined by weight, by a suitable liquid-level gaging device, or other approved methods. If the content of a container is to be determined by liquid-level measurement, the container shall have a thermometer well so that the internal liquid temperature can be easily determined. This volume when converted to weight shall not exceed the filling density specified by the DOT.

(ii) Any pump, except a constant speed centrifugal pump, shall be equipped with a suitable pressure actuated bypass valve permitting flow from discharge to suction when the discharge pressure rises above a predetermined point. Pump discharge shall also be equipped with a spring-loaded safety relief valve set at a pressure not more than 135 percent of the setting of the bypass valve or more than 400 p.s.i.g., whichever is larger.

(iii) Compressors shall be equipped with manually operated shutoff valves on both suction and discharge connections. Pressure gages of bourdon-tube type shall be installed on the suction and discharge of the compressor before the

erations. The control mechanism for such valves may be provided with a secondary control remote from the delivery connections, and such control mechanism shall be provided with a fusible section (melting point 208° F. to 220° F.) which will permit the internal valve to close automatically in case of fire.

(iii) Filling connections shall be provided with automatic back-pressure check valves, excess-flow valves, or quick-closing internal valves, to prevent backflow in case the filling connection is broken. Where the filling and discharge connect to a common opening in the container shell and that opening is fitted with a quick-closing internal valve as specified in subdivision (ii) of this subparagraph, the automatic valve shall not be required.

(iv) All containers shall be equipped for spray loading (filling in the vapor space) or with a vapor return valve of adequate capacity.

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(iii) Compressors shall be equipped with manually operated shutoff valves on both suction and discharge connections. Pressure gages of bourdon-tube type shall be installed on the suction and discharge of the compressor before the

shutoff valves. The compressor shall not be operated if either pressure gage is removed or is inoperative. A spring-loaded, safety-relief valve capable of discharging to atmosphere the full flow of gas from the compressor at a pressure not exceeding 300 p.s.i.g. shall be connected between the compressor discharge and the discharge shutoff valve.

(iv) Valve functions shall be clearly and legibly identified by metal tags or nameplates permanently affixed to each valve.

(7) *Full trailers and semitrailers.* (1) All full trailers shall be firmly and securely attached to the vehicle drawing them by means of suitable drawbars supplemented by a safety chain (or chains) or safety cables.

(ii) Every full trailer or semitrailer shall have a reliable system of brakes, and adequate provision shall be made to operate the brakes from the driver's seat.

(iii) Every full trailer shall be equipped with self-energizing brakes.

(iv) Full trailers shall be so designed that the towed vehicle will follow substantially in the path of the towing vehicle and will not whip or swerve dangerously from side to side.

(v) Where a fifth wheel is employed, it shall be ruggedly designed, securely fastened to both units, and equipped with a positive locking mechanism which will prevent separation of the two units except by manual release.

(8) *Protection against collision.* Each tank motor vehicle shall be provided with properly attached bumpers or chassis extension arranged to protect the tank, piping, valves, and fittings from physical damage in case of collision.

(9) *Chock blocks.* At least two chock blocks shall be provided. These blocks shall be placed to prevent rolling of the vehicle whenever it is parked during loading and unloading operations.

(10) *Portable tank containers (skid tanks).* Where portable tank containers are used for farm storage they shall comply with paragraph (c) (1) of this section. When portable tank containers are used in lieu of cargo tanks and are permanently mounted on tank motor vehicles for the transportation of ammonia, they shall comply with the requirements of this paragraph.

(g) *Systems mounted on farm vehicles other than for the application of ammonia—(1) Application.* This paragraph applies to containers of 1,200 gallons capacity or less and pertinent equipment mounted on farm vehicles (implements of husbandry) and used other than for the application of ammonia to the soil. Paragraph (b) of this section applies to this paragraph unless otherwise noted.

(2) *Design pressure and classification of containers.* (i) The minimum design pressure for containers shall be 250 p.s.i.g. (ii) The shell or head thickness of any container shall be not less than three-sixteenths of an inch.

(3) *Mounting containers.* (i) A suitable "stop" or "stops" shall be mounted on the vehicle or on the container in such a way that the container shall not

be dislodged from its mounting due to the vehicle coming to a sudden stop. Back slippage shall also be prevented by proper methods.

(ii) A suitable "hold down" device shall be provided which will anchor the container to the vehicle at one or more places on each side of the container.

(iii) When containers are mounted on four-wheel trailers, care shall be taken to insure that the weight is distributed evenly over both axles.

(iv) When the cradle and the tank are not welded together suitable material shall be used between them to eliminate metal-to-metal friction.

(4) *Container appurtenances.* (i) All containers shall be equipped with a fixed liquid-level gage.

(ii) All containers with a capacity exceeding 250 gallons shall be equipped with a pressure gage having a dial graduated from 0-400 p.s.i.

(iii) The filling connection shall be fitted with combination back-pressure check valve and excess-flow valve; one double or two single back-pressure check valves; or a positive shutoff valve in conjunction with either an internal back-pressure check valve or an internal excess-flow valve.

(iv) All containers with a capacity exceeding 250 gallons shall be equipped for spray loading or with an approved vapor return valve.

(v) All vapor and liquid connections except safety-relief valves and those specifically exempted by paragraph (b) (6) (v) of this section shall be equipped with approved excess-flow valves or may be fitted with quick-closing internal valves which, except during operating periods, shall remain closed.

(vi) Fittings shall be adequately protected from damage by a metal box or cylinder with open top securely fastened to the container or by rigid guards, well braced, welded to the container on both sides of the fittings or by a metal dome. If a metal dome is used, the relief valve shall be properly vented through the dome.

(vii) If a liquid withdrawal line is installed in the bottom of a container, the connections thereto, including hose, shall not be lower than the lowest horizontal edge of the vehicle axle.

(viii) Provision shall be made to secure both ends of the hose while in transit.

(5) *Marking the container.* There shall appear on each side and on the rear end of the container in letters at least 4 inches high, the words "Caution—Ammonia" or the container shall be marked in accordance with DOT regulations.

(6) *Farm vehicles.* (i) Farm vehicles shall conform with State regulations.

(ii) All trailers shall be securely attached to the vehicle drawing them by means of drawbars supplemented by suitable safety chains.

(iii) A trailer shall be constructed so that it will follow substantially in the path of the towing vehicle and will not whip or swerve dangerously from side to side.

(iv) All vehicles shall carry a can containing 5 gallons or more of water.

(h) *Systems mounted on farm vehicles for the application of ammonia.* (1) This paragraph applies to systems utilizing containers of 250 gallons capacity or less which are mounted on farm vehicles (implements of husbandry) and used for the application of ammonia to the soil. Paragraph (b) of this section applies to this paragraph unless otherwise noted. Where larger containers are used, they shall comply with paragraph (g) of this section.

(2) *Design pressure and classification of containers.* (i) The minimum design pressure for containers shall be 250 p.s.i.g.

(ii) The shell or head thickness of any container shall be not less than three-sixteenths inch.

(3) *Mounting of containers.* All containers and flow-control devices shall be securely mounted.

(4) *Container valves and accessories.* (i) Each container shall have a fixed liquid-level gage.

(ii) The filling connection shall be fitted with a combination back-pressure check valve and an excess-flow valve; one double or two single back-pressure check valves; or a positive shutoff valve in conjunction with an internal back-pressure check valve or an internal excess-flow valve.

(iii) The applicator tank may be filled by venting to open air provided the bleeder valve orifice does not exceed seven-sixteenths inch in diameter.

(iv) Regulation equipment may be connected directly to the tank coupling or flange, in which case a flexible connection shall be used between such regulating equipment and the remainder of the liquid withdrawal system. Regulating equipment not so installed shall be flexibly connected to the container shutoff valve.

(v) No excess flow valve is required in the liquid withdrawal line provided the controlling orifice between the contents of the container and the outlet of the shutoff valve does not exceed seven-sixteenths inch in diameter.

§ 1910.112 [Reserved]

§ 1910.113 [Reserved]

§ 1910.114 Effective dates.

(a) The provisions of this Subpart H shall become effective on August 27, 1971, except as provided in the remaining paragraphs of this section.

(b) The following provisions shall become effective on February 15, 1972:

§ 1910.101 (b).

§ 1910.102.

§ 1910.103 (a) (2), (b) (1) (i), (b) (1) (iii), (b) (2) (ii), and (b) (3).

§ 1910.105.

§ 1910.106 (b) (1), (b) (2), (b) (3), and (b) (4).

§ 1910.108 (b) (5), (c) (1), (c) (2), (c) (3), (c) (4), (c) (6), (d) (3), (d) (4) (i), (d) (4) (iii), (d) (4) (iv), (d) (5) (v), (d) (5) (vi) (a), (e) (3) (iii), (e) (3) (v), (e) (4), (e) (7), (f) (2) (iii), (f) (3) (i), (f) (4) (ii), (f) (4) (iv), (f) (4) (viii), (f) (5), (g), (h), and (i).

(1) "Bridge" means that part of a line consisting of girders, trucks, end ties, footwalks, and drive mechanism which carries the trolley or trolleys.

(2) "Bridge travel" means the crane movement in a direction parallel to the crane runway.

(3) A "bumper" (buffer) is an energy absorbing device for reducing impact when a moving crane or trolley reaches the end of its permitted travel; or when two moving cranes or trolleys come in contact.

(4) The "cab" is the operator's compartment on a crane.

(5) "Clearance" means the distance from any part of the crane to a point of the nearest obstruction.

(6) "Collectors current" are contacting devices for collecting current from runway or bridge conductors.

(7) "Conductors, bridge" are the electrical conductors located along the bridge structure of a crane to provide power to the trolley.

(8) "Conductors, runway" (main) are the electrical conductors located along a crane runway to provide power to the crane.

(9) The "control braking means" is a method of controlling crane motor speed when in an overhauling condition.

(10) "Counter torque" means a method of control by which the power to the motor is reversed to develop torque in the opposite direction.

(11) "Dynamic" means a method of controlling crane motor speeds when in the overhauling condition to provide a retarding force.

(12) "Regenerative" means a form of dynamic braking in which the electrical energy generated is fed back into the power system.

(13) "Mechanical" means a method of control by friction.

(14) "Controller, spring return" means a controller which when released will return automatically to a neutral position.

(15) "Designated" means selected or assigned by the employer or the employer's representative as being qualified to perform specific duties.

(16) A "drift point" means a point on a travel motion controller which releases the brake while the motor is not energized. This allows for coasting before the brake is set.

(17) The "drum" is the cylindrical member around which the ropes are wound for raising or lowering the load.

(18) An "equalizer" is a device which compensates for unequal length or stretch of a rope.

(19) "Exposed" means capable of being contacted inadvertently. Applied to hazardous objects not adequately guarded or isolated.

(20) "Fail-safe" means a provision designed to automatically stop or safely control any motion in which a malfunction occurs.

(21) "Footwalk" means the walkway or handrail attached to the bridge or trolley for access purposes.

(22) A "hoist" is an apparatus which may be a part of a crane, exerting a force for lifting or lowering.

(43) "Hoist chain" means the load bearing chain in a hoist.

Note: Chain properties do not conform to those shown in ANSI B30.9-1971, Safety Code for Slings.

(44) "Hoist motion" means that motion of a crane which raises and lowers a load.

(45) "Load" means the total superimposed weight on the load block or hook.

(46) The "load block" is the assembly of hook or shackle, swivel, bearing, sheaves, pins, and frame suspended by the hoisting rope.

(47) "Magnet" means an electromagnet device carried on a crane hook to pick up loads magnetically.

(48) "Main hoist" means the hoist mechanism provided for lifting the maximum rated load.

(49) A "man trolley" is a trolley having an operator's cab attached thereto.

(50) "Rated load" means the maximum load for which a crane or individual hoist is designed and built by the manufacturer and shown on the equipment nameplate(s).

(51) "Rope" refers to wire rope, unless otherwise specified.

(52) "Running sheave" means a sheave which rotates as the load block is raised or lowered.

(53) "Runway" means an assembly of rails, beams, girders, brackets, and framework on which the crane or trolley travels.

(54) "Side pull" means that portion of the hoist pull acting horizontally when the hoist lines are not operated vertically.

(55) "Span" means the horizontal distance center to center of runway rails.

(56) "Standby crane" means a crane which is not in regular service but which is used occasionally or intermittently as required.

(57) A "stop" is a device to limit travel of a trolley or crane bridge. This device normally is attached to a fixed structure and normally does not have energy absorbing ability.

(58) A "switch" is a device for making, breaking, or for changing the connections in an electric circuit.

(59) An "emergency stop switch" is a manually or automatically operated electric switch to cut off electric power independently of the regular operating controls.

(60) A "limit switch" is a switch which is operated by some part or motion of a power-driven machine or equipment to alter the electric circuit associated with the machine or equipment.

(61) A "main switch" is a switch controlling the entire power supply to the crane.

(62) A "master switch" is a switch which dominates the operation of contactors, relays, or other remotely operated devices.

(63) The "trolley" is the unit which travels on the bridge rails and carries the hoisting mechanism.

(64) "Trolley travel" means the trolley movement at right angles to the crane runway.

(65) "Truck" means the unit consisting of a frame, wheels, bearings, and axles

which supports the bridge girders or trolleys.

(b) *General requirements—(1) Application.* This section applies to overhead and gantry cranes, including semigantry, cantilever gantry, wall cranes, storage bridge cranes, and others having the same fundamental characteristics. These cranes are grouped because they all have trolleys and similar travel characteristics.

(2) *New and existing equipment.* All new overhead and gantry cranes constructed and installed on or after August 31, 1971, shall meet the design specifications of the American National Standards Institute, ANSI B30.2-1967, Overhead and gantry cranes constructed before August 31, 1971, should be modified to conform to those design specifications by February 15, 1972, unless it can be shown that the crane cannot feasibly or economically be altered and that the crane substantially complies with the requirements of this section.

(3) *Modifications.* Cranes may be modified and rerated provided such modifications and the supporting structure are checked thoroughly for the new rated load by a qualified engineer or the equipment manufacturer. The crane shall be tested in accordance with paragraph (k) (2) of this section. New rated load shall be displayed in accordance with subparagraph (5) of this paragraph.

(4) *Wind indicators and rail clamps.* Outdoor storage bridges shall be provided with automatic rail clamps. A wind-indicating device shall be provided which will give a visible or audible alarm to the bridge operator at a predetermined wind velocity. If the clamps act on the rail heads, any beads or weld flash on the rail heads shall be ground off.

(5) *Rated load marking.* The rated load of the crane shall be plainly marked on each side of the crane, and if the crane has more than one hoisting unit, each hoist shall have its rated load marked on it or its load block and this marking shall be clearly legible from the ground or floor.

(6) *Clearance from obstruction.* (i) Minimum clearance of 3 inches overhead and 2 inches laterally shall be provided and maintained between crane and obstructions in conformity with Crane Manufacturers Association of America, Inc., Specification No. 61 (formerly The Electric Overhead Crane Institute, Inc.).

(ii) Where passageways or walkways are provided obstructions shall not be placed so that safety of personnel will be jeopardized by movements of the crane.

(7) *Clearance between parallel cranes.* If the runways of two cranes are parallel, and there are no intervening walls or structure, there shall be adequate clearance provided and maintained between the two bridges.

(c) *Cabs—(1) Cab location.* (i) The general arrangement of the cab and the location of control and protective equipment shall be such that all operating handles are within convenient reach of

the exclusive use of one worker should be cleaned after each day's use, or more often if necessary. Those used by more than one worker shall be thoroughly cleaned and disinfected after each use.

(6) Respirators shall be stored in a convenient, clean, and sanitary location.

(7) Respirators used routinely shall be inspected during cleaning. Worn or deteriorated parts shall be replaced. Respirators for emergency use such as self-contained devices shall be thoroughly inspected at least once a month and after each use.

(8) Appropriate surveillance of work area conditions and degree of employee exposure or stress shall be maintained.

(9) There shall be regular inspection and evaluation to determine the continued effectiveness of the program.

(10) Persons should not be assigned to tasks requiring use of respirators unless it has been determined that they are physically able to perform the work and use the equipment. The local physician shall determine what health and physical conditions are pertinent. The respirator user's medical status should be reviewed periodically (for instance, annually).

(11) Approved or accepted respirators shall be used when they are available. The respirator furnished shall provide adequate respiratory protection against the particular hazard for which it is designed in accordance with standards established by competent authorities. The U.S. Department of Interior, Bureau of Mines, and the U.S. Department of Agriculture are recognized as such authorities. Although respirators listed by the U.S. Department of Agriculture continue to be acceptable for protection against specified pesticides, the U.S. Department of the Interior, Bureau of Mines, is the agency now responsible for testing and approving pesticide respirators.

(c) *Selection of respirators.* Proper selection of respirators shall be made according to the guidance of American National Standard Practices for Respiratory Protection 288.2-1969.

(d) *Air quality.* (1) Compressed air, compressed oxygen, liquid air, and liquid oxygen used for respiration shall be of high purity. Oxygen shall meet the requirements of the United States Pharmacopeia for medical or breathing oxygen. Breathing air shall meet at least the requirements of the specification for Grade D breathing air as described in Compressed Gas Association Commodity Specification G-7.1-1966. Compressed oxygen shall not be used in supplied-air respirators or in open circuit self-contained breathing apparatus that have previously used compressed air. Oxygen must never be used with air line respirators.

(2) Breathing air may be supplied to respirators from cylinders or air compressors.

(3) Cylinders shall be tested and maintained as prescribed in the Shipping Container Specification Regulations of the Department of Transportation (49 CFR Part 178).

(4) The compressor for supplying air shall be equipped with necessary safety and standby devices. A breathing air-

type compressor shall be used. Compressors shall be constructed and sited so as to avoid entry of contaminated air into the system and suitable in-line air purifying sorbent beds and filters installed to further assure breathing air quality. A receiver of sufficient capacity to enable the respirator wearer to escape from a contaminated atmosphere in event of compressor failure, and alarms to indicate compressor failure and overheating shall be installed in the system. If an oil-lubricated compressor is used, it shall have a high-temperature or carbon monoxide alarm, or both. If only a high-temperature alarm is used, the air from the compressor shall be frequently tested for carbon monoxide to insure that it meets the specifications in subparagraph (1) of this paragraph.

(3) Air line couplings shall be incompatible with outlets for other gas systems to prevent inadvertent servicing of air line respirators with nonrespirable gases or oxygen.

(4) Breathing gas containers shall be marked in accordance with American National Standard Method of Marking Portable Compressed Gas Containers to Identify the Material Contained, Z48.1-1954; Federal Specification BB-A-1034, June 21, 1968, Air, Compressed for Breathing Purposes; or Interim Federal Specification GG-B-00675b, April 27, 1965, Breathing Apparatus, Self-Contained.

(e) *Use of respirators.* (1) Standard procedures shall be developed for respirator use. These should include all information and guidance necessary for their proper selection, use, and care. Possible emergency and routine uses of respirators should be anticipated and planned for.

(2) The correct respirator shall be specified for each job. The respirator type is usually specified in the work procedures by a qualified individual supervising the respiratory protective program. The individual issuing them shall be adequately instructed to insure that the correct respirator is issued. Each respirator permanently assigned to an individual should be durably marked to indicate to whom it was assigned. This mark shall not affect the respirator performance in any way. The date of issuance should be recorded.

(3) Written procedures shall be prepared covering safe use of respirators in dangerous atmospheres that might be encountered in normal operations or in emergencies. Personnel shall be familiar with these procedures and the available respirators.

(4) In areas where the wearer, with failure of the respirator, could be overcome by a toxic or oxygen-deficient atmosphere, at least one additional man shall be present. Communications (visual, voice, or signal line) shall be maintained between both or all individuals present. Planning shall be such that one individual will be unaffected by any likely incident and have the proper rescue equipment to be able to assist the other(s) in case of emergency.

(5) When self-contained breathing apparatus or hose masks with blowers

are used in atmospheres immediately dangerous to life or health, standby men must be present with suitable rescue equipment.

(6) Persons using air line respirators in atmospheres immediately hazardous to life or health shall be equipped with safety harnesses and safety lines for lifting or removing persons from hazardous atmospheres or other and equivalent provisions for the rescue of persons from hazardous atmospheres shall be used. A standby man or men with suitable self-contained breathing apparatus shall be at the nearest fresh air base for emergency rescue.

(7) Respiratory protection is no better than the respirator in use, even though it is worn conscientiously. Frequent random inspections shall be conducted by a qualified individual to assure that respirators are properly selected, used, cleaned, and maintained.

(8) For safe use of any respirator, it is essential that the user be properly instructed in its selection, use, and maintenance. Both supervisors and workers shall be so instructed by competent persons. Training shall provide the men an opportunity to handle the respirator, have it fitted properly, test its face-piece-to-face seal, wear it in normal air for a long familiarity period, and, finally, to wear it in a test atmosphere.

(9) Every respirator wearer shall receive fitting instructions including demonstrations and practice in how the respirator should be worn, how to adjust it, and how to determine if it fits properly. Respirators shall not be worn when conditions prevent a good face seal. Such conditions may be a growth of beard, sideburns, a skull cap that projects under the facepiece, or temple pieces on glasses. Also, the absence of one or both dentures can seriously affect the fit of a facepiece. The worker's diligence in observing these factors shall be evaluated by periodic check. To assure proper protection, the facepiece fit shall be checked by the wearer each time he puts on the respirator. This may be done by following the manufacturer's facepiece fitting instructions.

(10) Providing respiratory protection for individuals wearing corrective glasses is a serious problem. A proper seal cannot be established if the temple bars of eye glasses extend through the sealing edge of the full facepiece. As a temporary measure, glasses with short temple bars or without temple bars may be taped to the wearer's head. Wearing of contact lenses in contaminated atmospheres with a respirator shall not be allowed. Systems have been developed for mounting corrective lenses inside full facepieces. When a workman must wear corrective lenses as part of the facepiece, the facepieces and lenses shall be fitted by qualified individuals to provide good vision, comfort, and a gas-tight seal.

(11) If corrective spectacles or goggles are required, they shall be worn so as not to affect the fit of the facepiece. Proper selection of equipment will minimize or avoid this problem.

(12) *Maintenance and care of respirators.* (1) A program for maintenance and

(g) *Changing and charging storage series.* (1) Battery charging installations shall be located in areas designated for that purpose.

(2) Facilities shall be provided for flushing and neutralizing spilled electrolyte, for fire protection, for protecting charging apparatus from damage by trucks, and for adequate ventilation for dispersal of fumes from gassing batteries.

(3) When racks are used for support of batteries, they should be made of materials nonconductive to spark generation or be coated or covered to achieve this objective.

(4) A conveyor, overhead hoist, or equivalent material handling equipment shall be provided for handling batteries.

(5) Reinstalled batteries shall be properly positioned and secured in the truck.

(6) A carboy tilter or siphon shall be provided for handling electrolyte.

(7) When charging batteries, acid shall be poured into water; water shall not be poured into acid.

(8) Trucks shall be properly positioned and brake applied before attempting to change or charge batteries.

(9) When charging batteries, the vent caps should be kept in place to avoid electrolyte spray. Care shall be taken to assure that vent caps are functioning. The battery (or compartment) cover(s) shall be open to dissipate heat.

(10) Smoking shall be prohibited in charging areas.

(11) Precautions shall be taken to prevent open flames, sparks, or electric arcs in battery charging areas.

(12) Tools and other metallic objects shall be kept away from the top of uncovered batteries.

(h) *Lighting for operating areas.* (1) Controlled lighting of adequate intensity should be provided in operating areas. (See American National Standard Practice for Industrial Lighting, A11.1-1965 (R1970)).

(2) Where general lighting is less than 2 lumens per square foot, auxiliary directional lighting shall be provided on the truck.

(i) *Control of noxious gases and fumes.* (1) Concentration levels of carbon monoxide gas created by powered industrial truck operations shall not exceed the levels specified in § 1910.93.

(2) Questions concerning degree of concentration and methods of sampling to ascertain the conditions should be referred to a qualified industrial hygienist.

(j) *Dockboards (bridge plates).* See § 1910.30(a).

(k) *Trucks and railroad cars.* (1) The brakes of highway trucks shall be set and wheel chocks placed under the rear wheels to prevent the trucks from rolling while they are boarded with powered industrial trucks.

(2) Wheel stops or other recognized positive protection shall be provided to prevent railroad cars from moving during loading or unloading operations.

(3) Fixed jacks may be necessary to support a semitrailer and prevent upending during the loading or unloading

when the trailer is not coupled to a tractor.

(4) Positive protection shall be provided to prevent railroad cars from being moved while dockboards or bridge plates are in position.

(l) *Operator training.* Only trained and authorized operators shall be permitted to operate a powered industrial truck. Methods shall be devised to train operators in the safe operation of powered industrial trucks.

(m) *Truck operations.* (1) Trucks shall not be driven up to anyone standing in front of a bench or other fixed object.

(2) No person shall be allowed to stand or pass under the elevated portion of any truck, whether loaded or empty.

(3) Unauthorized personnel shall not be permitted to ride on powered industrial trucks. A safe place to ride shall be provided where riding of trucks is authorized.

(4) The employer shall prohibit arms or legs from being placed between the uprights of the mast or outside the running lines of the truck.

(5) When leaving a powered industrial truck unattended, load engaging means shall be fully lowered, controls shall be neutralized, power shut off, brakes set, key or connector plug removed. Wheels shall be blocked if the truck is parked on an incline.

(6) A safe distance shall be maintained from the edge of ramps or platforms while on any elevated dock, or platform or freight car. Trucks shall not be used for opening or closing freight doors.

(7) Brakes shall be set and wheel blocks shall be in place to prevent movement of trucks, trailers, or railroad cars while loading or unloading. Fixed jacks may be necessary to support a semitrailer during loading or unloading when the trailer is not coupled to a tractor. The flooring of trucks, trailers, and railroad cars shall be checked for breaks and weakness before they are driven onto.

(8) There shall be sufficient headroom under overhead installations, lights, pipes, sprinkler system, etc.

(9) An overhead guard shall be used as protection against falling objects. It should be noted that an overhead guard is intended to offer protection from the impact of small packages, boxes, bagged material, etc., representative of the job application, but not to withstand the impact of a falling capacity load.

(10) A load backrest extension shall be used whenever necessary to minimize the possibility of the load or part of it from falling rearward.

(11) Only approved industrial trucks shall be used in hazardous locations.

(12) Whenever a truck is equipped with vertical only, or vertical and horizontal controls elevatable with the lifting carriage or forks for lifting personnel, the following additional precautions shall be taken for the protection of personnel being elevated.

(1) Use of a safety platform firmly secured to the lifting carriage and/or forks.

(2) Means shall be provided whereby personnel on the platform can shut off power to the truck.

(3) Such protection from falling objects as indicated necessary by the operating conditions shall be provided.

(4) Spinner knobs must not be attached to steering handwheels of trucks not originally equipped with such.

(5) Fire aisles, access to stairways, and fire equipment shall be kept clear.

(n) *Traveling.* (1) All traffic regulations shall be observed, including authorized plant speed limits. A safe distance shall be maintained approximately three truck lengths from the truck ahead, and the truck shall be kept under control at all times.

(2) The right of way shall be yielded to ambulances, fire trucks, or other vehicles in emergency situations.

(3) Other trucks traveling in the same direction at intersections, blind spots, or other dangerous locations shall not be passed.

(4) The driver shall be required to slow down and sound the horn at cross aisles and other locations where vision is obstructed. If the load being carried obstructs forward view, the driver shall be required to travel with the load trailing.

(5) Railroad tracks shall be crossed diagonally wherever possible. Parking closer than 8 feet from the center of railroad tracks is prohibited.

(6) The driver shall be required to look in the direction of, and keep a clear view of the path of travel.

(7) Grades shall be ascended or descended slowly.

(8) When ascending or descending grades in excess of 10 percent, loaded trucks shall be driven with the load up-grade.

(9) Unloaded trucks should be operated on all grades with the load engaging means down-grade.

(10) On all grades the load and load engaging means shall be tilted back if applicable, and raised only as far as necessary to clear the road surface.

(11) Under all travel conditions the truck shall be operated at a speed that will permit it to be brought to a stop in a safe manner.

(12) Stunt driving and horseplay shall not be permitted.

(13) The driver shall be required to slow down for wet and slippery floors.

(14) Dockboard or bridgeplates, shall be properly secured before they are driven over. Dockboard or bridgeplates shall be driven over carefully and slowly and their rated capacity never exceeded.

(15) Elevators shall be approached slowly, and then entered squarely after the elevator car is properly leveled. Once on the elevator, the controls shall be neutralized, power shut off, and the brakes set.

(16) Motorized hand trucks must enter elevator or other confined areas with load end forward.

(17) Running over loose objects on the roadway surface shall be avoided.

(18) While negotiating turns, speed shall be reduced to a safe level by means

References in parentheses are to the corresponding classification as used in the National Electrical Code (NFPA No. 70, ANSI Standard CI-1968) for the convenience of persons familiar with those classifications.

(i) Power-operated industrial trucks shall not be used in atmospheres containing hazardous concentration of acetylene, butadiene, ethylene oxide, hydrogen (or gases or vapors equivalent in hazard to hydrogen, such as manufactured gas), propylene oxide, acetaldehyde, cyclopropane, diethyl ether, ethylene, isoprene, or unsymmetrical dimethyl hydrazine (UDMH).

(ii) (a) Power-operated industrial trucks shall not be used in atmospheres containing hazardous concentrations of metal dust, including aluminum, magnesium, and their commercial alloys, or other metals of similarly hazardous characteristics, or in atmospheres containing carbon black, coal or coke dust except approved power-operated industrial trucks designated as EX may be used in such atmospheres.

(b) In atmospheres where dust of magnesium, aluminum or aluminum bronze may be present, fuses, switches, motor controllers, and circuit breakers of trucks shall have enclosures specifically approved for such locations.

(iii) Only approved power-operated industrial trucks designated as EX may be used in atmospheres containing acetone, acrylonitrile, alcohol, ammonia, benzene, butane, ethylene dichloride, gasoline, hexane, laquer solvent vapors, naphtha, natural gas, propane, propylene, styrene, vinyl acetate, vinyl chloride, or xylenes in quantities sufficient to produce explosive or ignitable mixtures and where such concentrations of these gases or vapors exist continuously, intermittently or periodically under normal operating conditions or may exist frequently because of repair, maintenance operations, leakage, breakdown or faulty operation of equipment.

(iv) Power-operated industrial trucks designated as DY, EE, or EX may be used in locations where volatile flammable liquids or flammable gases are handled, processed or used, but in which the hazardous liquids, vapors or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems, or in the case of abnormal operation of equipment; also in locations in which hazardous concentrations of gases or vapors are normally prevented by positive mechanical ventilation but which might become hazardous through failure or abnormal operation of the ventilating equipment; or in locations which are adjacent to Class I, Division 1 locations, and to which hazardous concentrations of gases or vapors might occasionally be communicated unless such communication is prevented by adequate positive-pressure ventilation from a source of clear air, and effective safeguards against ventilation failure are provided.

(v) In locations used for the storage of hazardous liquids in sealed containers

or liquefied or compressed gases in containers, approved power-operated industrial trucks designated as DS, ES, GS, or LPS may be used. This classification includes locations where volatile flammable liquids or flammable gases or vapors are used, but which, would become hazardous only in case of an accident or of some unusual operating condition. The quantity of hazardous material that might escape in case of accident, the adequacy of ventilating equipment, the total area involved, and the record of the industry or business with respect to explosions or fires are all factors that should receive consideration in determining whether or not the DS or DY, ES, EE, GS, LPS designated truck possesses sufficient safeguards for the location. Piping without valves, checks, meters and similar devices would not ordinarily be deemed to introduce a hazardous condition even though used for hazardous liquids or gases. Locations used for the storage of hazardous liquids or of liquefied or compressed gases in sealed containers would not normally be considered hazardous unless subject to other hazardous conditions also.

(vi) (a) Only approved power-operated industrial trucks designated as EX shall be used in atmospheres in which combustible dust is or may be in suspension continuously, intermittently, or periodically under normal operating conditions, in quantities sufficient to produce explosive or ignitable mixtures, or where mechanical failure or abnormal operation of machinery or equipment might cause such mixtures to be produced.

(b) The EX classification usually includes the working areas of grain handling and storage plants, room containing grinders or pulverizers, cleaners, graders, scalpers, open conveyors or spouts, open bins or hoppers, mixers, or blenders, automatic or hopper scales, packing machinery, elevator heads and boots, stock distributors, dust and stock collectors (except all-metal collectors vented to the outside), and all similar dust producing machinery and equipment in grain processing plants, starch plants, sugar pulverizing plants, malting plants, hay grinding plants, and other occupancies of similar nature; coal pulverizing plants (except where the pulverizing equipment is essentially dust tight); all working areas where metal dusts and powders are produced, processed, handled, packed, or stored (except in tight containers); and other similar locations where combustible dust may, under normal operating conditions, be present in the air in quantities sufficient to produce explosive or ignitable mixtures.

(vii) Only approved power-operated industrial trucks designated as DY, EE, or EX shall be used in atmospheres in which combustible dust will not normally be in suspension in the air or will not be likely to be thrown into suspension by the normal operation of equipment or apparatus in quantities sufficient to produce explosive or ignitable mixtures but where deposits or accumulations of such

dust may be ignited by arcs or sparks originating in the truck.

(viii) Only approved power-operated industrial trucks designated as DY, EE, or EX shall be used in locations which are hazardous because of the presence of easily ignitable fibers or flyings but in which such fibers or flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures.

(ix) Only approved power-operated industrial trucks designated as DS, DY, ES, EE, EX, GS, or LPS shall be used in locations where easily ignitable fibers are stored or handled, including outside storage, but are not being processed or manufactured. Industrial trucks designated as E, which have been previously used in these locations may be continued in use.

(x) On piers and wharves handling general cargo, any approved power-operated industrial truck designated as Type D, E, G, or LP may be used, or trucks which conform to the requirements for these types may be used.

(xi) If storage warehouses and outside storage locations are hazardous only the approved power-operated industrial truck specified for such locations in this paragraph (c) (2) shall be used. If not classified as hazardous, any approved power-operated industrial truck designated as Type D, E, G, or LP may be used, or trucks which conform to the requirements for these types may be used.

(xii) If general industrial or commercial properties are hazardous, only approved power-operated industrial trucks specified for such locations in this paragraph (c) (2) shall be used. If not classified as hazardous, any approved power-operated industrial truck designated as Type D, E, G, or LP may be used, or trucks which conform to the requirements of these types may be used.

(d) *Converted industrial trucks.* Power-operated industrial trucks that have been originally approved for the use of gasoline for fuel, when converted to the use of liquefied petroleum gas fuel in accordance with paragraph (f) of this section, may be used in those locations where G, GS or LP and LPS designated trucks have been specified in the preceding paragraphs.

(e) *Safety guards.* (1) High Lift Rider trucks shall be fitted with an overhead guard manufactured in accordance with paragraph (a) (2) of this section, unless operating conditions do not permit.

(2) If the type of load presents a hazard and the user shall equip fork trucks with a vertical load backrest extension manufactured in accordance with paragraph (a) (2) of this section.

(f) *Fuel handling and storage.* (1) The storage and handling of liquid fuels such as gasoline and diesel fuel shall be in accordance with NFPA Flammable and Combustible Liquids Code (NFPA No. 30-1969).

(2) The storage and handling of liquefied petroleum gas fuel shall be in accordance with NFPA Storage and Handling of Liquefied Petroleum Gases (NFPA No. 58-1969).

re of respirators shall be adjusted to the type of plant, working conditions, and hazards involved, and shall include the following basic services:

- (i) Inspection for defects (including a leak check).
- (ii) Cleaning and disinfecting,
- (iii) Repair,
- (iv) Storage

Equipment shall be properly maintained to retain its original effectiveness.

(2) (i) All respirators shall be inspected routinely before and after each use. A respirator that is not routinely used but is kept ready for emergency use shall be inspected after each use and at least monthly to assure that it is in satisfactory working condition.

(ii) Self-contained breathing apparatus shall be inspected monthly. Air and oxygen cylinders shall be fully charged according to the manufacturer's instructions. It shall be determined that the regulator and warning devices function properly.

(iii) Respirator inspection shall include a check of the tightness of connections and the condition of the facepiece, headbands, valves, connecting tube, and canisters. Rubber or elastomer parts shall be inspected for pliability and signs of deterioration. Stretching and manipulating rubber or elastomer parts with a massaging action will keep them pliable and flexible and prevent them from taking a set during storage.

(iv) A record shall be kept of inspection dates and findings for respirators maintained for emergency use.

(3) Routinely used respirators shall be collected, cleaned, and disinfected as frequently as necessary to insure that proper protection is provided for the wearer. Each worker should be briefed on the cleaning procedure and be assured that he will always receive a clean and disinfected respirator. Such assurances are of greatest significance when respirators are not individually assigned to workers. Respirators maintained for emergency use shall be cleaned and disinfected after each use.

(4) Replacement or repairs shall be done only by experienced persons with parts designed for the respirator. No attempt shall be made to replace components or to make adjustment or repairs beyond the manufacturer's recommendations. Reducing or admission valves or regulators shall be returned to the manufacturer or to a trained technician for adjustment or repair.

(5) (i) After inspection, cleaning, and necessary repair, respirators shall be stored to protect against dust, sunlight, heat, extreme cold, excessive moisture, or damaging chemicals. Respirators placed at stations and work areas for emergency use should be quickly accessible at all times and should be stored in compartments built for the purpose. The compartments should be clearly marked. Routinely

used respirators, such as dust respirators, may be placed in plastic bags. Respirators should not be stored in such places as lockers or tool boxes unless they are in carrying cases or cartons.

(ii) Respirators should be packed or stored so that the facepiece and exhalation valve will rest in a normal position and function will not be impaired by the elastomer setting in an abnormal position.

(iii) Instructions for proper storage of emergency respirators, such as gas masks and self-contained breathing apparatus, are found in "use and care" instructions usually mounted inside the carrying case lid.

(g) *Identification of gas mask canisters.* (1) The primary means of identifying a gas mask canister shall be by means of properly worded labels. The secondary means of identifying a gas mask canister shall be by a color code.

(2) All who issue or use gas masks falling within the scope of this section shall see that all gas mask canisters purchased or used by them are properly labeled and colored in accordance with these requirements before they are placed in service and that the labels and colors are properly maintained at all times thereafter until the canisters have completely served their purpose.

(3) On each canister shall appear in bold letters the following:

(i) Canister for _____
(Name for atmospheric contaminant)

Type N Gas Mask Canister

(ii) In addition, essentially the following wording shall appear beneath the appropriate phrase on the canister

TABLE I-1

Atmospheric contaminants to be protected against	Colors assigned*
Acid gases.....	White.
Hydrocyanic acid gas.....	White with 1/4-inch green stripe completely around the canister near the bottom.
Chlorine gas.....	White with 1/4-inch yellow stripe completely around the canister near the bottom.
Organic vapors.....	Black.
Ammonia gas.....	Green.
Acid gases and ammonia gas.....	Green with 1/4-inch white stripe completely around the canister near the bottom.
Carbon monoxide.....	Blue.
Acid gases and organic vapors.....	Yellow.
Hydrocyanic acid gas and chloroform vapor.....	Yellow with 1/4-inch blue stripe completely around the canister near the bottom.
Acid gases, organic vapors, and ammonia gases.....	Brown.
Radioactive materials, excepting tritium and noble gases.....	Purple (Magenta).
Particulates (dusts, fumes, mists, fogs, or smokes) in combination with any of the above gases or vapors.....	Canister color for contaminant, as designated above, with 1/4-inch gray stripe completely around the canister near the top.
All of the above atmospheric contaminants.....	Red with 1/4-inch gray stripe completely around the canister near the top.

*Gray shall not be assigned as the main color for a canister designed to remove acids or vapors.

Note: Orange shall be used as a complete body, or stripe color to represent gases included in this table. The user will need to refer to the canister label to determine degree of protection the canister will afford.

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RULES AND REGULATIONS

§ 1910.135 Occupational head protection.

Helmets for the protection of heads of occupational workers from impact and penetration from falling and flying objects and from limited electric shock and burn shall meet the requirements and specifications established in American National Standard Safety Requirements for Industrial Head Protection, Z89.1-1969.

§ 1910.136 Occupational foot protection.

Safety-toe footwear for employees shall meet the requirements and specifications in American National Standard for Men's Safety-Toe Footwear, Z41.1-1967.

§ 1910.137 Electrical protective devices.

Rubber protective equipment for electrical workers shall conform to the requirements established in the American National Standards Institute Standards as specified in the following list:

Item	Standard
Rubber insulating gloves.	J6.6-1967.
Rubber matting for use around electric apparatus.	J6.7-1965 (R1962).
Rubber insulating blankets.	J6.4-1970.
Rubber insulating hoods.	J6.2-1960 (R1962).
Rubber insulating line hose.	J6.1-1960 (R1962).
Rubber insulating sleeves.	J6.5-1962.

§ 1910.138 Effective dates.

(a) The provisions of this Subpart I shall become effective on August 27, 1971, except that:

(1) Any provision in any other section of this subpart which contains in itself a specific effective date or time limitation shall become effective on such date or shall apply in accordance with such limitation; and

(2) If any standard in 41 CFR Part 50-204, other than a national consensus standard incorporated by reference in § 50-204.2(a)(1), is or becomes applicable at any time to any employment and place of employment, by virtue of the Walsh-Healey Public Contracts Act, or the Service Contract Act of 1965, or the National Foundation on Arts and Humanities Act of 1965, any corresponding established Federal standard in this Subpart I which is derived from 41 CFR Part 50-204 shall also become effective, and shall be applicable to such employment and place of employment, on the same date.

§ 1910.139 Sources of standards.

Sec.	Source
1910.132	41 CFR 50-204.7.
1910.133(a)	ANSI Z41.1-1967, Eye and Face Protection.
1910.134	ANSI Z89.2-1969, Standard Practice for Respiratory Protection.
1910.134 Table I-1.	ANSI Z41.1-1967, Identification of Gas Mask Canister.
1910.135	ASNI Z89.1-1969, Safety Requirements for Industrial Head Protection.

Sec.	Source
1910.136	ANSI Z41.1-1967, Men's Safety-Toe Footwear.
1910.137	ANSI Z89.2-1969, Ventilation and Safe Practices of Abrasive Blasting Operations.

§ 1910.140 Standards organizations.

Specific standards of the following organization have been referenced in this part. Copies of the referenced materials may be obtained from the issuing organization.

American National Standards Institute, 1430 Broadway, New York, NY 10018.

Subpart J—General Environmental Controls

§ 1910.141 Sanitation.

(a) *General requirements*—(1) *Housekeeping*. (i) All places of employment, passageways, storerooms, and service rooms shall be kept clean and orderly and in a sanitary condition.

(ii) The floor of every workroom shall be maintained in a clean and, so far as possible, a dry condition. Where wet processes are used, drainage shall be maintained and false floors, platforms, mats, or other dry standing places should be provided where practicable.

(iii) Cleaning and sweeping shall be done in such a manner as to minimize the contamination of the air with dust and, so far as is practicable, shall be done outside of working hours.

(iv) To facilitate cleaning, every floor, working place, and passageway shall be kept free from protruding nails, splinters, holes, or loose boards.

(2) *Expectorating*. (i) Expectorating upon the walls, floors, work places, or stairs of any establishment shall not be permitted.

(ii) Cuspidors are considered undesirable, but, if used, they shall be of such construction that they are cleanable. They shall be cleaned at least daily when in use.

(3) *Waste disposal*. (i) Any receptacle used for putrescible solid or liquid waste or refuse shall be so constructed that it does not leak and may be conveniently and thoroughly cleaned, and it shall be maintained in a sanitary condition. Such a receptacle shall be equipped with a tight-fitting cover.

(ii) All sweepings, solid or liquid wastes, refuse, and garbage shall be removed in such a manner as to avoid creating a nuisance or menace to health and as often as necessary to maintain the place of employment in a sanitary condition.

(4) *Rodent, insect, and vermin control*. Every enclosed work place and personal service room shall be constructed, equipped, and maintained, so far as reasonably practicable, in such a manner as to prevent the entrance or harborage of rodents, insects, and vermin of any kind.

(b) *Water supply*—(1) *Potable water*.

(i) An adequate supply of potable water shall be provided for drinking, ablutionary, and culinary purposes in all places of employment. Drinking water should be made available within 200 feet of any

location at which employees are regularly engaged in work.

(ii) Sanitary drinking fountains shall be of a type and construction in accordance with the Standard Specification for Drinking Fountains, ANSI Z4.2-1943.

(iii) In all instances where water is cooled by ice, the construction of the container shall be such that the ice does not come in direct contact with the water.

(iv) Open containers such as barrels, pails, or tanks for drinking water from which the water must be dipped or poured, whether or not they are fitted with a cover, are prohibited.

(v) The common drinking cup is prohibited.

(vi) Where single service cups (to be used but once) are supplied, both a sanitary container for the unused cups and a receptacle for disposing of the used cups shall be provided.

(2) *Nonpotable water*. (i) Outlets for nonpotable water, such as water for industrial or firefighting purposes only, shall be posted to indicate clearly that the water is unsafe and is not to be used for drinking, washing, or cooking purposes.

(ii) There shall be no cross-connection, open or potential, between a system furnishing potable water and system furnishing nonpotable water.

(iii) Construction shall be such as to prevent backflow of contaminated water into a potable water system.

(iv) Nonpotable water shall not be used for bathing or for washing any portion of the person, clothing, dishes, or premises.

(c) *Toilet facilities*—(1) *General*. (i) Every place of employment shall be provided with adequate toilet facilities which are separate for each sex. The sewage disposal method shall comply with requirements of the health or other authorities having jurisdiction.

(ii) Toilet facilities shall be provided so as to be readily accessible to all employees. Toilet facilities so located that employees must use more than one floor-to-floor flight of stairs to or from them are not considered as readily accessible. As far as is practicable, toilet facilities should be located within 200 feet of all locations at which workers are regularly employed.

(iii) Water closets shall be provided for each sex according to the following table. The number to be provided for each sex shall in every case be based on the maximum number of persons of that sex employed at any one time at work on the premises for which the facilities are furnished. When persons other than employees are permitted the use of toilet facilities on the premises, a reasonable allowance shall be made for such other persons in estimating the minimum number of toilet facilities required.

Number of persons	Minimum number of facilities
1 to 9	1
10 to 24	2
25 to 49	3
50 to 74	4
75 to 100	5
over 100	1 for each additional 30 persons.

ditional safeguards to the exhaust, fuel or critical systems. They may be used in locations where a D unit may not be considered suitable.

(3) The DY designated units are diesel powered units that have all the safeguards of the DS units and in addition do not have any electrical equipment including the ignition and are equipped with temperature limitation features.

(4) The E designated units are electrically powered units that have minimum acceptable safeguards against inherent fire hazards.

(5) The ES designated units are electrically powered units that, in addition to all of the requirements for the E units, are provided with additional safeguards to the electrical system to prevent emission of hazardous sparks and to limit surface temperatures. They may be used in some locations where the use of an E unit may not be considered suitable.

(6) The EE designated units are electrically powered units that have, in addition to all of the requirements for the E and ES units, the electric motors and all other electrical equipment completely

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enclosed. In certain locations the EE unit may be used where the use of an E and ES unit may not be considered suitable.

(7) The EX designated units are electrically powered units that differ from the E, ES, or EE units in that the electrical fittings and equipment are so designed, constructed and assembled that the units may be used in certain atmospheres containing flammable vapors or dusts.

(8) The G designated units are gasoline powered units having minimum acceptable safeguards against inherent fire hazards.

(9) The GS designated units are gasoline powered units that are provided with additional safeguards to the exhaust, fuel, and electrical systems. They may be used in some locations where the use of a G unit may not be considered suitable.

(10) The LP designated unit is similar to the G unit except that liquefied petroleum gas is used for fuel instead of gasoline.

(11) The LPS designated units are liquefied petroleum gas powered units that

are provided with additional safeguards to the exhaust, fuel, and electrical systems. They may be used in some locations where the use of an LP unit may not be considered suitable.

(12) The atmosphere or location shall have been classified as to whether it is hazardous or nonhazardous prior to the consideration of industrial trucks being used therein and the type of industrial truck required shall be as provided in paragraph (d) of this section for such location.

(c) *Designated locations*. (1) The industrial trucks specified under subparagraph (2) of this paragraph are the minimum types required but industrial trucks having greater safeguards may be used if desired.

(2) For specific areas of use see Table N-1 which tabulates the information contained in this section. References in parentheses are to the corresponding classification as used in the National Electrical Code, NFPA 70-1971; ANSI C1-1971 (Rev. of 1968) for the convenience of persons familiar with those classifications.

TABLE N-1
SUMMARY TABLE ON USE OF INDUSTRIAL TRUCKS IN VARIOUS LOCATIONS

Classes	Unclassified	Class I locations				Class II locations				Class III locations	
Description of classes	Locations not possessing atmosphere as described in other columns.	Locations in which flammable gases or vapors are, or may be, present in the air in quantities sufficient to produce explosive or ignitable mixtures.				Locations which are hazardous because of the presence of combustible dust.				Locations where easily ignitable fibers or flyings are present but not likely to be in suspension in quantities sufficient to produce ignitable mixtures.	
Groups in classes	None	A	B	C	D	E	F	G		None	
Examples of locations or atmospheres in classes and groups	Piers and Wharves in general storage General industrial or commercial properties	Acetylene	Hydrogen	Ether	Gasoline Naphtha Alcohol Acetone Lacquer solvent Benzene	Metal dust	Carbon black Coal dust Coke dust	Grain dust Flour dust Starch dust Organic dust		Baled waste, cocoa fiber, cotton, excelsior, hemp, jute, kapok, oakum, sisal, Spanish moss, synthetic fibers, tow.	
		1	2			1	2	1	2	1	2
Divisions (Nature of Hazardous Conditions)	None	Above condition exists continuously, intermittently, or periodically under normal operating conditions.	Above condition may occur accidentally as due to a puncture of a storage drum.	Above condition may be present under normal operating conditions, or where failure of equipment may cause the condition to exist simultaneously with arcing or sparking of electrical equipment, or where dusts of an electrically conducting nature may be present.	Explosive mixture may be present under normal operating conditions, or where failure of equipment may cause the condition to exist simultaneously with arcing or sparking of electrical equipment, or where dusts of an electrically conducting nature may be present.	Explosive mixture not normally present, but where deposits of dust may cause heat rise in electrical equipment, or where such deposits may be ignited by arc or sparks from electrical equipment.	Locations in which easily ignitable fibers or materials producing combustible flyings are handled, manufactured, or used.	Locations in which easily ignitable fibers are stored or handled (except in the process of manufacture).			
Authorized uses of trucks by types in groups of classes and divisions											
Groups in classes	None	A	B	C	D	E	F	G	F	G	None
Types of trucks authorized:											
Diesel:											
Type D.....	D**										
Type DS.....					DS						DS
Type DY.....					DY			DY			DY
Electric:											
Type E.....	E**										
Type ES.....					ES			ES			ES
Type EE.....					EE			EE			EE
Type EX.....				EX	EX	EX	EX	EX	EX		EX
Gasoline:											
Type G.....	G**										
Type GS.....					GS			GS			GS
Type LP.....	LP**										
Type LPS.....					LPS			LPS			LPS
Paragraph Ref. in No. 505		210.211	201 (a)	203 (a)	200 (a)	204 (a), (b)	202 (a)	205 (a)	209 (a)	207 (a)	208 (a)

**Trucks conforming to these Types may also be used—see subdivision (c)(3)(i) and (c)(2)(ii) of this section

or contain only a small concentration of combustibles which are incapable of producing a fire that would cause appreciable damage to the commodities stored or to noncombustible wall, floor or roof construction. Ordinary combustible commodities in completely sealed noncombustible containers may qualify in this classification. General commodity storage that is subject to frequent changing and storage of combustible packaging and storage aids is excluded from this category.

(13) "Approved" means listed or approved by at least one of the following nationally recognized testing laboratories: Underwriters Laboratories, Inc.; Factory Mutual Engineering Corp.

(b) *General requirements*—(1) *Application*. This standard applies to storage, 21 feet or less in height, of commodities which with their packaging and storage aids would classify as ordinary combustibles. This standard also applies to storage of commodities which with their packaging and storage aids would classify as noncombustibles regardless of storage height. This standard does not cover unpackaged bulk storage such as grain, coal, or similar commodities. The provisions contained in this standard apply to new buildings. Certain specific commodities introduce hazards different from those contemplated by this standard. Examples are rubber tires, roll paper, and wax-coated cartons.

(2) *Exemptions*. (i) Ordinary combustibles piled higher than 21 feet introduce serious fire protection problems which are not within the scope of this standard.

(ii) The provisions of this standard do not apply to Refrigerated Warehouses.

(3) *Portable fire extinguishers*. Portable fire extinguishers shall be provided at convenient conspicuously accessible locations. In locations where small hose is provided, portable fire extinguishers for Class A fires may be omitted.

(4) *Alarm service*. Storage facilities shall be provided with alarm service. (It may be in the form of central station supervision of automatic fire detection or sprinkler waterflow alarms or watchman making recorded rounds during unattended periods.)

(c) *Piling procedures and precautions*. (1) All commodities shall be stored, handled and piled with due regard to their fire characteristics.

(2) Significant quantities of commodities with fire hazards greater than ordinary combustible commodities as contemplated by this standard, shall be separated from the main bulk of storage by firewalls.

(3) Any commodities which may be hazardous in combination with each other shall be stored so that they cannot come in contact with each other.

(4) Safe floor loads shall not be exceeded.

(d) *Fire protection requirements*—(1) *Sprinkler systems*. All warehouses having combustible roof or floor construction and all warehouses containing Type I or Type II storage shall be protected with a system of automatic sprinklers designed and installed in accordance with the Standard for the Installation of Sprinkler Systems, NFPA No. 13-1969.

(2) *Hose system water supply*. (i) Water supplies for hose streams shall be provided to supplement that required for automatic sprinklers.

(ii) Where private underground supply mains are necessary, they shall be installed in accordance with Standard for Outside Protection, NFPA No. 24-1970.

(3) *Hose systems*. (i) Small hose (1½ inch) where required by this standard shall be installed in accordance with Standard for the Installation of Sprinkler Systems, NFPA No. 13-1969 and Standard for the Installation of Standpipe and Hose Systems, NFPA No. 14-1970.

(ii) In Type I and Type II storage, sufficient small hose (1½ inch) shall be provided so that one hose stream can reach any portion of the storage area. In buildings three stories or less high, small hose (1½ inch) may be supplied from the sprinkler system in accordance with limitations outlined in Standard for the Installation of Sprinkler Systems, NFPA No. 13-1969.

(iii) Standpipe and hose systems conforming to the requirements of Standard for the Installation of Standpipe and Hose Systems, NFPA No. 14-1970, shall be provided for buildings over three stories in height or having a floor level 75 feet or more above grade. Standpipes shall be fully equipped for fire department operations including fire department connections.

(iv) Large hose (2½ inch) and related equipment shall be provided unless the public fire department will provide such equipment promptly.

(e) *Mechanical handling equipment*. (1) Power-operated industrial trucks shall be of type designated in Standard for the Use, Maintenance and Operation of Powered Industrial Trucks, NFPA No. 505-1969, Part A, in accordance with the hazards of the location in which they are used.

(2) Maintenance and operation of electric, liquid, and gaseous fueled industrial trucks shall be in accordance with Standard for the Use, Maintenance and Operation of Powered Industrial Trucks, NFPA No. 505-1969, Parts B and C.

(f) *Building service equipment*. (1) Heating, lighting, and service equipment shall be of approved types, installed, maintained and operated in accordance with good practice.

(2) Steam lines and other heating equipment and machinery shall be installed or protected so that the stored commodities cannot come in contact with the heating elements.

(3) Electrical equipment shall be installed in accordance with the provisions of the National Electrical Code, NFPA 70-1971; ANSI C1-1971 (Rev. of 1968).

(4) Refrigeration systems, if used, shall conform to the recommendations of Safety Code for Mechanical Refrigeration, American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc. (ASHRE) 15-63, ANSI B9.1-1964.

(5) Stored commodities shall not be located under liquid fuel heating equipment.

(g) *Smoking*. Smoking shall be strictly prohibited, except in locations prominently designated as smoking areas, and "No Smoking" signs shall be posted in prohibited areas.

§ 1910.178 Powered industrial trucks.

(a) *General requirements*. (1) The requirements of this section apply to fire protection for fork trucks, tractors, platform lift trucks, motorized hand trucks and other specialized industrial trucks powered by electric motors or internal combustion engines. These fire protection requirements do not apply to compressed air or nonflammable compressed gas-operated industrial trucks, nor to farm vehicles, nor automotive vehicles for highway use.

(2) All new powered industrial trucks acquired and used by an employer after the effective date specified in paragraph (b) of § 1910.182 shall meet the design and construction requirements for powered industrial trucks established in the "American National Standard for Powered Industrial Trucks, Part II, ANSI B56.1-1969", except for vehicles intended primarily for earth moving or over-the-road hauling.

(3) Approved trucks shall bear a label or some other identifying mark indicating approval by the testing laboratory. See subparagraph (7) of this paragraph and paragraph 405 of "American National Standard for Powered Industrial Trucks, Part II, ANSI B56.1-1969", which is incorporated by reference in subparagraph (2) of this paragraph and which provides that if the powered industrial truck is accepted by a nationally recognized testing laboratory it should be so marked.

(4) Modifications and additions which affect capacity and safe operation shall not be performed by the customer or user without manufacturers prior written approval. Capacity, operation, and maintenance instruction plates, tags, or decals shall be changed accordingly.

(5) If the truck is equipped with front-end attachments other than factory installed attachments, the user shall request that the truck be marked to identify the attachments and show the approximate weight of the truck and attachment combination at maximum elevation with load laterally centered.

(6) The user shall see that all nameplates and markings are in place and are maintained in a legible condition.

(7) *Definition*: As used in this section, "approved" means labeled by a nationally recognized testing laboratory; i.e., a laboratory qualified and equipped to conduct the necessary tests required under "American National Standard for Powered Industrial Trucks, Part II, ANSI B56.1-1969", in accordance with the requirements of section 405 thereof.

(b) *Designations*. For the purpose of this standard there are eleven different designations of industrial trucks or tractors as follows: D, DS, DY, E, ES, EE, EX, G, GS, LP, and LPS.

(1) The D designated units are units similar to the G units except that they are diesel engine powered instead of gasoline engine powered.

(2) The DS designated units are diesel powered units that are provided with ad-

verse 10 or more are employed, urinals may be provided. One water closet less than the number specified in the foregoing may be provided for each urinal, except that the number of water closets in such cases may not be reduced to less than two-thirds of the number specified in the foregoing. Two feet of trough urinal shall be considered as equivalent to one individual urinal.

(iv) An adequate supply of toilet paper with holder shall be provided for every water closet.

(v) Covered receptacles shall be kept in all toilet rooms used by women.

(vi) Adequate washing facilities shall be provided in every toilet room or be adjacent thereto.

(2) *Construction of toilet rooms*. (i) Each toilet facility (closet) shall occupy a separate compartment, which should be equipped with a door, latch, and clothes hanger.

(ii) The walls of compartments or partitions between fixtures may be less than the height of room walls, but the top shall be sufficiently high to assure privacy.

(iii) The door to every toilet room shall be fitted with an effective self-closing device, and the entrance to the toilet room shall be so screened that the interior of the toilet room is not visible from the workroom.

(iv) In all toilet rooms installed on or after August 31, 1971, the floors and side walls, to a height of at least 6 inches, including the angle formed by the floor and side walls, shall be of watertight construction.

(v) The floors, walls, ceilings, partitions, and doors of all toilet rooms shall be of a finish that can be easily cleaned. In installations made on or after August 31, 1971, cove bases shall be provided to facilitate cleaning.

(vi) Toilet rooms, except those in work places accessible to men only, shall be completely enclosed with solid material that is nontransparent from the outside.

(3) *Construction and installation of toilet facilities*. (i) Every water closet bowl shall be set entirely free and open from all enclosing structures and shall be so installed that the space around the fixture can be easily cleaned. This provision does not prohibit the use of wall-hung type water closets.

(ii) Every water closet shall have a hinged openfront seat made of substantial material having a nonabsorbent finish.

(4) *Chemical closets and privies*. Chemical closets and privies shall be constructed and maintained in accordance with § 1910.143.

(5) *Washing facilities*—(1) *General*. Adequate facilities for maintaining personal cleanliness shall be provided in every place of employment. These shall be convenient for the employees for whom they are provided and shall be maintained in a sanitary condition.

(2) *Lavatories*. At least one lavatory shall provide hot and cold water, preferably from a combination supply fixture, shall be provided for every 10 employees (men or women) or portion thereof, up to 100 persons; and over 100 persons one

lavatory for each additional 15 persons or portion thereof. Twenty-four inches of sink with individual faucet shall be considered as equal to one lavatory. In all instances, a suitable cleansing agent shall be provided at each wash place.

(3) *Towels*. Individual hand towels, or sections thereof, of cloth or paper, shall be provided and proper receptacles or other sanitary means maintained for the disposal of used towels. The provision of a towel for general or common use is prohibited.

(e) *Change rooms*—(1) *Separate facilities*. Separate change or dressing rooms equipped with individual clothes facilities shall be provided for each sex wherever it is the practice to change from street clothes or wherever it is necessary to change because the work performed involves exposure to excessive dirt, heat, fumes, vapor, or moisture. In the event that change rooms are not provided, facilities shall be furnished for hanging outer garments.

(2) *Drying facilities*. Where the process in which the worker is engaged is such that his working clothes become wet or have to be washed between shifts, provision shall be made to insure that such clothing is dry before reuse.

(f) *Retiring rooms for women*. Where 10 or more women are employed at any one time, at least one retiring room shall be provided for rest and emergencies. Where fewer than 10 women are employed and a restroom is not furnished, some equivalent space shall be provided which can be properly screened for privacy and made suitable for the use of women employees. At least one couch or bed shall be provided in every place where more than 10 women are employed. The required number of such beds or couches follows:

10 to 100	1 bed
100 to 250	2 beds
1 additional bed for each additional 250 women employees. A minimum of 60 square feet of floor space per bed or couch shall be provided.	

(g) *Lunchrooms*—(1) *General*. In all places of employment where employees are permitted to lunch on the premises, an adequate space suitable for that purpose shall be provided for the maximum number of employees who may use such space at one time. Such space shall be physically separate from any location where there is exposure to toxic materials.

(2) *Waste disposal containers*. An adequate number of covered receptacles constructed of a smooth, corrosion-resistant, easily cleanable, or disposable material, shall be provided by the employer and used by the employees for the disposal of all waste food. Such receptacles shall be emptied not less than once daily and shall be maintained in a clean and sanitary manner.

(3) *Location*. (i) No food shall be stored or eaten where there are present any toxic materials or substances that may be injurious to health.

(ii) No food shall be stored or eaten in any toilet room.

(iii) In every establishment where there is exposure to injurious dusts or

other toxic materials, a separate lunchroom shall be maintained unless it is convenient for the employees to lunch away from the premises. The following number of square feet per person, based on the maximum number of persons using the room at one time, shall be required:

Number of persons	Square feet per person
25 and less	13
26-74	12
75-149	11
150 and over	10

(h) *Food handling*. All employee food service facilities and operations shall meet the requirements of "Food Service Sanitation Ordinance and Code," Part V, "Food Service Sanitation Manual," U.S. Public Health Service Publication No. 934 (1965). In all places of employment where all or part of the food service is provided by vending machines, the food dispensed shall be prepared, and the machine operated in accordance with the requirements of "Vending of Foods and Beverages, A Sanitation Ordinance and Code," U.S. Public Health Service Publication No. 546 (1965).

(i) *Scope*. This section applies to all permanent places of employment except where domestic, mining, or agricultural work only is performed. Measures for the control of toxic materials are considered to be outside the scope of this section.

§ 1910.142 Temporary labor camps.

(a) *Site*. (1) All sites used for camps shall be adequately drained. They shall not be subject to periodic flooding, nor located within 200 feet of swamps, pools, sink holes, or other surface collections of water unless such quiescent water surfaces can be subjected to mosquito control measures. The camp shall be located so the drainage from and through the camp will not endanger any domestic or public water supply. All sites shall be graded, ditched, and rendered free from depressions in which water may become a nuisance.

(2) All sites shall be adequate in size to prevent overcrowding of necessary structures. The principal camp area in which food is prepared and served and where sleeping quarters are located shall be at least 500 feet from any area in which livestock is kept.

(3) The grounds and open areas surrounding the shelters shall be maintained in a clean and sanitary condition free from rubbish, debris, waste paper, garbage, or other refuse.

(4) Whenever the camp is closed for the season or permanently, all garbage, manure, and other refuse shall be collected and so disposed of as to prevent nuisance. All abandoned privy pits shall be filled with earth and the grounds and buildings left in a clean and sanitary condition. If privy buildings remain, they shall be locked or otherwise secured to prevent entrance.

(5) *Shelter*. (i) Every shelter in the camp shall be constructed in a manner which will provide protection against the elements.

(2) Each room used for sleeping purposes shall contain at least 50 square feet

of floor space for each occupant. At least a 7-foot ceiling shall be provided.

(3) Beds, cots, or bunks, and suitable storage facilities such as wall lockers shall be provided in every room used for sleeping purposes. Such beds or similar facilities shall be spaced not less than 36 inches both laterally and end to end, and shall be elevated at least 12 inches from the floor. If double-deck bunks are used, they shall be spaced not less than 48 inches both laterally and end to end. The minimum clear space between the lower and upper bunk shall be not less than 27 inches. Triple-deck bunks are prohibited.

(4) The floors of each shelter shall be constructed of wood, asphalt, or concrete. Wooden floors shall be of smooth and tight construction. The floors shall be kept in good repair.

(5) All wooden floors shall be elevated not less than 1 foot above the ground level at all points to prevent dampness and to permit free circulation of air beneath.

(6) Nothing in this section shall be construed to prohibit "banking" with earth or other suitable material around the outside walls in areas subject to extreme low temperatures.

(7) All living quarters shall be provided with windows the total of which shall be not less than one-tenth of the floor area. At least one-half of each window shall be so constructed that it can be opened for purposes of ventilation.

(8) All exterior openings shall be effectively screened with 16-mesh material. All screen doors shall be equipped with self-closing devices.

(9) In a room where workers cook, live, and sleep a minimum of 100 square feet per person shall be provided. Sanitary facilities shall be provided for storing and preparing food.

(10) In camps where cooking facilities are used in common, stoves (in ratio of one stove to 10 persons or one stove to two families) shall be provided in an enclosed and screened shelter. Sanitary facilities shall be provided for storing and preparing food.

(11) All heating, cooking, and water heating equipment shall be installed in accordance with State and local ordinances, codes, and regulations governing such installations. If a camp is used during cold weather, adequate heating equipment shall be provided.

(c) **Water supply.** (1) An adequate and convenient water supply, approved by the appropriate health authority, shall be provided in each camp for drinking, cooking, bathing, and laundry purposes.

(2) A water supply shall be deemed adequate if it is capable of delivering 35 gallons per person per day to the campsite at a peak rate of 3½ times the average hourly demand.

(3) The distribution lines shall be capable of supplying water at normal operating pressures to all fixtures for simultaneous operation. Water outlets shall be distributed throughout the camp in such a manner that no shelter is more than 100 feet from a yard hydrant if water is not piped to the shelters.

(4) Where water under pressure is available, one or more drinking fountains shall be provided for each 100 occupants or fraction thereof. The construction of drinking fountains shall comply with ANSI Standard Specifications for Drinking Fountains, Z4.2-1942. Common drinking cups are prohibited.

(d) **Toilet facilities.** (1) Toilet facilities adequate for the capacity of the camp shall be provided.

(2) Each toilet room shall be located so as to be accessible without any individual passing through any sleeping room. Toilet rooms shall have a window not less than 6 square feet in area opening directly to the outside area or otherwise be satisfactorily ventilated. All outside openings shall be screened with 16-mesh material. No fixture, water closet, chemical toilet, or urinal shall be located in a room used for other than toilet purposes.

(3) A toilet room shall be located within 200 feet of the door of each sleeping room. No privy shall be closer than 100 feet to any sleeping room, dining room, lunch area, or kitchen.

(4) Where the toilet rooms are shared, such as in multifamily shelters and in barracks type facilities, separate toilet rooms shall be provided for each sex. These rooms shall be distinctly marked "for men" and "for women" by signs posted in English and in the native language of the persons occupying the camp, or marked with easily understood pictures or symbols. If the facilities for each sex are in the same building, they shall be separated by solid walls or partitions extending from the floor to the roof or ceiling.

(5) Where toilet facilities are shared, the number of water closets or privy seats provided for each sex shall be based on the maximum number of persons of that sex which the camp is designed to house at any one time, in the ratio of one sex unit to each 15 persons, with a minimum of two units for any shared facility.

(6) Urinals shall be provided on the basis of one unit or 2 linear feet of urinal trough for each 25 men. The floor from the wall and for a distance not less than 15 inches measured from the outside edge of the urinals shall be constructed of materials impervious to moisture. Where water under pressure is available, urinals shall be provided with an adequate water flush. Urinal troughs in privies shall drain freely into the pit or vault and the construction of this drain shall be such as to exclude flies and rodents from the pit.

(7) Every water closet installed on or after August 31, 1971, shall be located in a toilet room.

(8) Each toilet room shall be lighted naturally, or artificially by a safe type of lighting at all hours of the day and night.

(9) An adequate supply of toilet paper shall be provided in each privy, water closet, or chemical toilet compartment.

(10) Privies and toilet rooms shall be kept in a sanitary condition. They shall be cleaned at least daily.

(e) **Sewage disposal facilities.** In camps where public sewers are available, all sewer lines and floor drains from buildings shall be connected thereto.

(f) **Laundry, handwashing, and bathing facilities.** (1) Laundry, handwashing, and bathing facilities shall be provided in the following ratio:

(i) Handwash basin per family shelter or per six persons in shared facilities.

(ii) Shower head for every 10 persons.

(iii) Laundry tray or tub for every 30 persons.

(iv) Slop sink in each building used for laundry, hand washing, and bathing.

(2) Floors shall be of smooth finish but not slippery materials; they shall be impervious to moisture. Floor drains shall be provided in all shower baths, shower rooms, or laundry rooms to remove waste water and facilitate cleaning. All junctions of the curbing and the floor shall be coved. The walls and partitions of shower rooms shall be smooth and impervious to the height of splash.

(3) An adequate supply of hot and cold running water shall be provided for bathing and laundry purposes. Facilities for heating water shall be provided.

(4) Every service building shall be provided with equipment capable of maintaining a temperature of at least 70° F. during cold weather.

(5) Facilities for drying clothes shall be provided.

(6) All service buildings shall be kept clean.

(g) **Lighting.** Where electric service is available, each habitable room in a camp shall be provided with at least one ceiling-type light fixture and at least one separate floor- or wall-type convenience outlet. Laundry and toilet rooms and rooms where people congregate shall contain at least one ceiling- or wall-type fixture. Light levels in toilet and storage rooms shall be at least 20 foot-candles 30 inches from the floor. Other rooms, including kitchens and living quarters, shall be at least 30 foot-candles 30 inches from the floor.

(h) **Refuse disposal.** (1) Fly-tight, rodent-tight, impervious, cleanable or single service containers, approved by the appropriate health authority shall be provided for the storage of garbage. At least one such container shall be provided for each family shelter and shall be located within 100 feet of each shelter on a wooden, metal, or concrete stand.

(2) Garbage containers shall be kept clean.

(3) Garbage containers shall be emptied when full, but not less than twice a week.

(i) **Construction and operation of kitchens, dining hall, and feeding facilities.** (1) In all camps where central dining or multiple family feeding operations are permitted or provided, the food handling facilities shall comply with the requirements of the "Food Service Sanitation Ordinance and Code," Part V of the "Food Service Sanitation Manual," U.S. Public Health Service Publication 934 (1965).

defects such as leakage or extrusion of metal. Valves equipped with secondary resilient seals shall have the seals inspected periodically. If there is any doubt regarding the suitability of the safety relief device for service the container shall not be filled until it is equipped with a suitable safety relief device.

§ 1910.169 Air receivers.

(a) **General requirements.**—(1) **Application.** This section applies to compressed air receivers, and other equipment used in providing and utilizing compressed air for performing operations such as cleaning, drilling, hoisting, and chipping. On the other hand, however, this section does not deal with the special problems created by using compressed air to convey materials nor the problems created when men work in compressed air in tunnels and caissons. This section is not intended to apply to compressed air machinery and equipment used on transportation vehicles such as steam railroad cars, electric railway cars, and automotive equipment.

(2) **New and existing equipment.** (1) All new air receivers installed after the effective date of these regulations shall be constructed in accordance with the 1968 edition of the A.S.M.E. Boiler and Pressure Vessel Code Section VIII.

(2) All safety valves used shall be constructed, installed, and maintained in accordance with the A.S.M.E. Boiler and Pressure Vessel Code, Section VIII Edition 1968.

(b) **Installation and equipment requirements.**—(1) **Installation.** Air receivers shall be so installed that all drains, handholes, and manholes therein are easily accessible. Air receivers should be supported with sufficient clearance to permit a complete external inspection and to avoid corrosion of external surfaces. Under no circumstances shall an air receiver be buried underground or located in an inaccessible place. The receiver should be located as close to the compressor or aftercooler as is possible in order to keep the discharge pipe short.

(2) **Drains and traps.** A drain pipe and valve shall be installed at the lowest point of every air receiver to provide for the removal of accumulated oil and water. Adequate automatic traps may be installed in addition to drain valves. The drain valve on the air receiver shall be opened and the receiver completely drained frequently and at such intervals as to prevent the accumulation of excessive amounts of liquid in the receiver.

(3) **Gages and valves.** (1) Every air receiver shall be equipped with an indicating pressure gage (so located as to be readily visible) and with one or more spring-loaded safety valves. The total relieving capacity of such safety valves shall be such as to prevent pressure in the receiver from exceeding the maximum allowable working pressure of the receiver by more than 10 percent.

(2) No valve of any type shall be placed between the air receiver and its safety valve or valves.

(iii) Safety appliances, such as safety valves, indicating devices and control-

ling devices, shall be constructed, located, and installed so that they cannot be readily rendered inoperative by any means, including the elements.

(iv) All safety valves shall be tested frequently and at regular intervals to determine whether they are in good operating condition.

§ 1910.170 Sources of standards.

Sec.	Source
1910.166	41 CFR 50-204.65 referencing CGA C-6-1968, Standards for Visual Inspection of Compressed Gas Cylinders.
1910.167	41 CFR 50-204.71 and CGA Pamphlets S-1-1-1963 and 1965 addenda and S-1-2-1963 and 1965 addenda and S-1-3-1963 and 1965 addenda.
1910.169	ANSI B-19, 1939 Safety Code for Compressed Air Machinery.

§ 1910.171 Standards organizations.

Specific standards of the following organizations have been referenced in this part. Copies of the referenced materials may be obtained from the issuing organizations.

Compressed Gas Association, Inc., 500 Fifth Avenue, New York, NY 10036.
American Society of Mechanical Engineers, Inc., United Engineering Center, 345 East 47th Street, New York, NY 10017.
National Fire Protection Association, 60 Battery March Street, Boston, MA 02110.
American National Standards Institute, 1430 Broadway, New York, NY 10018.

Support N—Materials Handling and Storage

§ 1910.176 Handling materials—general.

(a) **Use of mechanical equipment.** Where mechanical handling equipment is used, sufficient safe clearances shall be allowed for aisles, at loading docks, through doorways and wherever turns or passage must be made. Aisles and passageways shall be kept clear and in good repair, with no obstruction across or in aisles that could create a hazard. Permanent aisles and passageways shall be appropriately marked.

(b) **Secure storage.** Storage of material shall not create a hazard. Bags, containers, bundles, etc., stored in tiers shall be stacked, blocked, interlocked and limited in height so that they are stable and secure against sliding or collapse.

(c) **Housekeeping.** Storage areas shall be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage. Vegetation control will be exercised when necessary.

(d) **Drainage.** Proper drainage shall be provided.

(e) **Clearance limits.** Clearance signs to warn of clearance limits shall be provided.

(f) **Rolling railroad cars.** Derail or bumper blocks shall be provided on spur railroad tracks where a rolling car could contact other cars being worked, enter a building, work or traffic area.

(g) **Guarding.** Covers and/or guardrails shall be provided to protect per-

sonnel from the hazards of open pits, tanks, vats, ditches, etc.

§ 1910.177 Indoor general storage.

(a) **Definitions applicable to this section.** (1) "Available height for storage" means the maximum height at which commodities can be stored above the floor and still maintain adequate clearance from structural members and the required clearance below sprinklers.

(2) "Ordinary combustibles" designates commodities packaging or storage aids which have heats of combustion (British thermal units per pound) similar to wood, cloth, or paper and which produce fires that may normally be extinguished by the quenching and cooling effect of water. This type of fire is defined as a Class A fire in the Standard for the Installation of Portable Fire Extinguishers, NFPA No. 10-1970.

(3) "Exposure" means the exterior presence of combustibles which, if ignited, could cause damage to the storage building or its contents.

(4) A "firewall" is a wall designed to prevent the spread of fire, having a fire resistance rating of not less than 4 hours and having sufficient structural stability under fire conditions to allow collapse of construction on either side without collapse of wall.

(5) "Horizontal channel" means any uninterrupted space in excess of 5 feet in length between horizontal layers of stored commodities. Such channels may be formed by pallets, shelving, racks, or other storage arrangements.

(6) "Noncombustible" designates commodities, packaging, or storage aids which will not ignite, burn or liberate flammable gases when heated to a temperature of 1,380° Fahrenheit for 5 minutes.

(7) "Packaging" designates any commodity wrapping, cushioning, or container.

(8) "Storage aids" means commodity storage devices such as shelves, pallets, dunnage, decks, platforms, trays, bins, separators, and skids.

(9) A "warehouse" is any building or area within a building used principally for the storage of commodities.

(10) "Type I storage" is that in which combustible commodities or noncombustible commodities involving combustible packaging or storage aids are stored over 15 feet but not more than 21 feet high in solid piles or over 12 feet but not more than 21 feet high in piles that contain horizontal channels. Minor quantities of commodities of hazard greater than ordinary combustibles may be included without affecting this general classification.

(11) "Type II storage" is that in which combustible commodities or noncombustible commodities involving combustible packaging or storage aids are stored not over 15 feet high in solid piles or not over 12 feet high in piles that contain horizontal channels. Minor quantities of commodities of hazard greater than ordinary combustibles may be included without affecting this general classification.

(12) "Type III storage" is that in which the stored commodities, packaging and storage aids are noncombustible

(10) *Free air or free gas.* "Free air" or "free gas" means air or gas measured at a pressure of 14.7 pounds per square inch absolute and a temperature of 60° F.

(11) *Frangible disc.* A "frangible disc" means a safety relief device in the form of a disc, usually of metal, which is so held as to close the safety relief device channel under normal conditions. The disc is intended to burst at a predetermined pressure to permit the escape of gas.

(12) *Fusible plug.* A "fusible plug" means a safety relief device in the form of a plug of suitable low-melting material, usually a metal alloy, which closes the safety relief device channel under normal conditions and is intended to yield or melt at a predetermined temperature to permit the escape of gas.

(13) *DOT design pressure.* The "DOT design pressure" is identical to the term "maximum allowable working pressure" as used in the "Code" and is the maximum gage pressure at the top of the tank in its operating position. To determine the minimum permissible thickness of physical characteristics of the different parts of the vessel, the static head of the lading shall be added to the DOT design pressure to determine the thickness of any specific part of the vessel. If vacuum insulation is used, the liquid container shall be designed for a pressure of 15 p.s.i. more than DOT design pressure, plus static head of the lading.

EXCEPTION: For containers constructed in accordance with paragraph U-68 or U-69 of section VIII of the ASME Boiler and Pressure Vessel Code, 1949 Edition, the maximum allowable working pressure for the purpose of these standards is considered to be 125 percent of the design pressure as provided in 49 CFR 173.116 of DOT Regulations.

(14) *Code.* "Code" is defined as paragraph U-68, U-69, U-200 or U-201 of section VIII of the Boiler and Pressure Vessel Code of the American Society of Mechanical Engineers, 1949 Edition; or section VIII of the Boiler and Pressure Vessel Code of the American Society of Mechanical Engineers, 1950, 1952, 1956, 1959, and 1962 Editions; or The Code for Unfired Pressure Vessels for Petroleum Liquids and Gases of the American Petroleum Institute and the American Society of Mechanical Engineers (API-ASME), 1951 Edition.

(15) *DOT regulations.* The "DOT regulations" refers to Department of Transportation Regulations for Transportation of Explosives and Other Dangerous Articles by Land and Water in Rail Freight, Express and Baggage Services and by Motor Vehicle (Highway) and Water, including Specifications for Shipping Containers, Code of Federal Regulations, Title 49, Parts 171 to 178.

(16) *General requirements.* (1) *Application.* See § 1910.167(b)(1).

(2) *Specifications and tests.* All safety relief devices covered by this section shall meet the design, construction, marking, and test specifications of the "Compressed Gas Associations Safety Relief Device" Standards Part 2—Cargo and Portable Tanks for Compressed Gases: S-1.2-1963."

(3) *Specific requirements for safety relief devices.* (i) Each container shall be provided with one or more safety relief devices which, unless otherwise specified, shall be safety relief valves of the spring-loaded type.

(ii) Safety relief valves shall be set to start-to-discharge at a pressure not in excess of 110 percent of the DOT design pressure of the container nor less than the DOT design pressure of the container except as follows:

(a) If an overdesigned container is used, the set pressure of the safety relief valve may be between the minimum required DOT design pressure for the lading and 110 percent of the DOT design pressure of the container used.

(b) For sulfur dioxide containers, a minimum set pressure of 120 and 110 p.s.i.g. is permitted for the 150 and 125 p.s.i.g. DOT design pressure containers, respectively.

(c) For carbon dioxide (refrigerated), nitrous oxide (refrigerated), and pressurized liquid argon, nitrogen and oxygen, there shall be no minimum set pressure.

(d) For butadiene, inhibited, and liquefied petroleum gas containers, a minimum set pressure of 90 percent of the minimum DOT design pressure permitted for these ladings may be used.

(e) For containers constructed in accordance with paragraph U-68 or U-69 of the Code 1949 Edition, the set pressure marked on the safety relief valve may be 125 percent of the original DOT design pressure of the container.

(ii) Only replacement parts or assemblies provided by the manufacturer of the device shall be used unless the suitability of interchange is proved by adequate tests.

(iv) Safety relief valves shall have direct communication with the vapor space of the container.

(v) Any portion of liquid piping or hose which at any time may be closed at each end must be provided with a safety relief device to prevent excessive pressure.

(vi) The additional restrictions of this subdivision apply to safety relief devices on containers for carbon dioxide or nitrous oxide which are shipped in refrigerated and insulated containers. The maximum operating pressure in the container may be regulated by the use of one or more pressure controlling devices, which devices shall not be in lieu of the safety relief valve required in subdivision (i) of this subparagraph.

(vii) All safety relief devices shall be so installed and located that the cooling effect of the contents will not prevent the effective operation of the device.

(viii) In addition to the safety relief valves required by subdivision (i) of this subparagraph each container for carbon dioxide may be equipped with one or more frangible disc safety relief devices of suitable design set to function at a pressure not exceeding two times the DOT design pressure of the container.

(ix) Subject to conditions of 49 CFR 173.315(a)(1) (DOT Regulations) for methyl chloride and sulfur dioxide optional portable tanks of 225 p.s.i.g. mini-

um DOT design pressure, one or more fusible plugs approved by the Bureau of Explosives, 63 Vesey Street, New York, NY 10007, may be used in lieu of safety relief valves of the spring-loaded type. If the container is over 30 inches long a safety relief device having the total required flow capacity must be at both ends.

(x) When storage containers for liquefied petroleum gas are permitted to be shipped in accordance with 49 CFR 173.315(j) (DOT Regulations), they must be equipped with safety relief devices in compliance with the requirements for safety relief devices on above-ground containers as specified in the National Fire Protection Association Pamphlet No. 58-1969 "Standard for the Storage and Handling of Liquefied Petroleum Gases."

(xi) When containers are filled by pumping equipment which has a discharge capacity in excess of the capacity of the container safety relief devices, and which is capable of producing pressures in excess of DOT design pressure of the container, precautions should be taken to prevent the development of pressures in the container in excess of 120 percent of its DOT design pressure. This may be done by providing additional capacity of the safety relief valves on the container, by providing a bypass on the pump discharge, or by any other suitable method.

(xii) This additional requirement applies to safety relief devices on containers for liquefied hydrogen and pressurized liquid argon, nitrogen, and oxygen. The liquid container shall be protected by one or more safety relief valves and one or more frangible discs.

(xiii) Safety relief devices shall be arranged to discharge unobstructed to the open air in such a manner as to prevent any impingement of escaping gas upon the container. Safety relief devices shall be arranged to discharge upward except this is not required for carbon dioxide, nitrous oxide and pressurized liquid argon, nitrogen, and oxygen.

(xiv) No shutoff valves shall be installed between the safety relief devices and the container except, in cases where two or more safety relief devices are installed on the same container, a shutoff valve may be used where the arrangement of the shutoff valve or valves is such as always to insure full required capacity flow through at least one safety relief device.

(4) *Maintenance requirements for safety relief devices.* (i) Care shall be exercised to avoid damage to safety relief devices. Care shall also be exercised to avoid plugging by paint or other dirt accumulation of safety relief device channels or other parts which could interfere with the functioning of the device.

(ii) Only qualified personnel shall be allowed to service safety relief devices. Any servicing or repairs which require resetting of safety relief valves shall be done only by or after consultation with the valve manufacturer.

(iii) Safety relief devices periodically shall be examined externally for corrosion, damage, plugging or external safety relief device channels, and mechanical

) A properly constructed kitchen and dining hall adequate in size, separate from the sleeping quarters of any of the workers or their families, shall be provided in connection with all food handling facilities. There shall be no direct opening from living or sleeping quarters into a kitchen or dining hall.

(3) No person with any communicable disease shall be employed or permitted to work in the preparation, cooking, serving, or other handling of food, foodstuffs, or materials used therein, in any kitchen or dining room operated in connection with a camp or regularly used by persons living in a camp.

(j) *Insect and rodent control.* Effective measures shall be taken to prevent infestation by and harborage of animal or insect vectors or pests.

(k) *First aid.* (1) Adequate first aid facilities approved by a health authority shall be maintained and made available in every labor camp for the emergency treatment of injured persons.

(2) Such facilities shall be in charge of a person trained to administer first aid and shall be readily accessible for use at all times.

(l) *Reporting communicable disease.* (1) It shall be the duty of the camp superintendent to report immediately to the local health officer the name and address of any individual in the camp known to have or suspected of having a communicable disease.

(2) Whenever there shall occur in any camp a case of suspected food poisoning or an unusual prevalence of any illness in which fever, diarrhea, sore throat, vomiting, or jaundice is a prominent symptom, it shall be the duty of the camp superintendent to report immediately the existence of the outbreak to the health authority by telegram or telephone.

§ 1910.143. Nonwater carriage disposal systems.

(a) *Acceptable industrial disposal systems.* (1) The waste disposal systems described in subparagraphs (2), (3), (4), (5), (6), or (7) of this paragraph, may be used only where not prohibited by codes and regulations of local authorities, and where water closets are not feasible due either to the lack of an adequate water supply or to the location or temporary nature of the operation requiring the facility. The number of units required for a place of employment shall be as specified in §§ 1910.141 and 1910.142.

(2) Privies constructed in conformity with paragraph (b) of this section may be used for the disposal of human excreta where their use will not contaminate ground or surface water because of privy location, type of soil, or ground-water table.

(3) Chemical toilets constructed in conformity with paragraph (c) of this section may be used in place of privies where a privy is not permitted due to possible contamination of ground and surface water.

(4) Recirculating toilets constructed in conformity with paragraph (f) of this

section may be used in place of privies or chemical toilets.

(5) Combustion toilets constructed in conformity with paragraph (e) of this section may be used in place of privies, chemical toilets, or recirculating toilets.

(6) Portable toilets constructed in conformity with paragraph (g) of this section may be used for temporary or mobile installations. Such temporary units may be:

(i) Chemical, recirculating, or combustion toilets designed for installation in or as an integral part of a skid mounted portable privy building, or in a separate toilet room, or

(ii) Portable privies designed for installation over a manhole of a sanitary or a combined waste water sewer system.

(7) A seepage pit constructed in conformity with paragraph (d) of this section may be used for the disposal of waste water from culinary activity, temporary bathing facilities, and clothes washing facilities where there is no available piped water supply. Human excreta shall not be discharged into a seepage pit. All units described in this paragraph shall comply with applicable codes and regulations of local authorities.

(b) *Privy specifications.* (1) A privy pit shall be separated by a minimum distance of 100 feet between the privy and a well, spring, or other source of water supply for drinking, bathing, or culinary purposes.

(2) At no time shall the pit bottom of a privy extend into ground water, nor shall it be constructed within 100 feet of the shoreline of any open body of water. Phreatic water, such as may be found in surface soil at depths of 10 feet or less, shall not be interpreted as ground water unless there is evidence of positive directional flow through the pit.

(3) The privy shall be so located and so constructed that no surface water may enter into the pit either as runoff or as flood water.

(4) The pit shall be constructed of such material and in such a manner as to prevent rapid deterioration, provide adequate capacity, and facilitate maintenance in a satisfactory manner under ordinary conditions of usage.

(5) The pit and seat area shall be vented by a flue or vent pipe having not less than 7 square inches cross-sectional area, so as to provide a continuous escape of odors.

(6) The pit shall provide a capacity of 50 cubic feet for each seat installed in the privy building. The vault within 16 inches of the surface grade shall not be counted as part of the 50-cubic-foot capacity.

(7) Pit cribbing shall fit firmly and be in uniform contact with the earth walls on all sides, and shall rise at least 6 inches above the original ground line and descend to the full depth of the pit. However, pit cribbing below the soil line may be omitted in rock formations.

(8) An earth plateau shall be constructed level with the top of the pit cribbing, and extend horizontally for a distance of at least 18 inches before sloping to the original ground level.

(9) Privy building shall be firmly anchored, rigidly constructed, and free from hostile surface features, such as exposed nail points, sharp edges, rough or broken boards, etc., and shall provide privacy and protection from the elements. It shall be ventilated by leaving a 4-inch opening at the top of all the walls just beneath the roof.

(10) The building shall be of fly-tight construction, doors shall be self-closing, and vent and building openings shall be screened with 16-mesh screen of durable material. The vent shall extend 12 inches above the roof.

(11) The seat shall be so spaced as to provide a minimum clear space of 24 inches between each seat in multiple unit installations, and shall provide 12 inches clear space from the seat opening to the side wall in single and multiple units.

(12) The seat riser shall have an inside clearance of not less than 21 inches from the front wall and not less than 24 inches from the rear wall of the privy building.

(13) The seat top shall be not less than 12 inches nor more than 16 inches above the floor.

(14) The seat opening shall be covered with an attached, movable toilet seat and lid, so constructed and installed that when closed it will limit access of insects, and which can be raised to allow sanitary use as a urinal.

(15) The floor and riser shall be built of impervious material or tongue and groove lumber, and in a manner to deny access of insects.

(16) Where electricity is available, lighting shall be provided with an intensity of not less than 10 foot-candles 30 inches above the floor.

(17) A conveniently located receptacle or dispenser containing an adequate supply of toilet paper shall be provided for each seat in each privy building.

(c) *Chemical toilet specifications.* (1) Rooms, buildings, or shelters housing chemical toilets shall be of sound construction and easy to clean, and shall provide shelter and privacy. The toilet rooms shall be ventilated to the outside and adequately lighted, and all openings into the toilet room shall be covered with 16-mesh screen. The minimum requirements given in subparagraphs (2) through (7) of this paragraph shall apply.

(2) Caustic receptacles shall be durable and corrosion proof, and provide a minimum capacity of 100 gallons per seat.

(3) The caustic receptacle charge per seat shall be a minimum of 25 pounds of caustic dissolved in 10 gallons of water.

(4) The chemical shall be drained and receptacle recharged every 6 months of continuous use, or at the beginning of each season of operation when in intermittent use, or when three-fourths full, whichever occurs first.

(5) Each seat in the building shall be provided with a conveniently located agitator.

(6) Receptacles shall be vented as prescribed in paragraph (b) (1) (iv) of this section.

(7) The receptacle shall be equipped with a manhole external to the privy building for cleaning and caustic removal purposes. The manhole shall be covered so as to prevent the escape of gases and odors.

(d) *Seepage pit construction.* (1) Seepage pit construction shall conform with requirements for privy pit construction in paragraph (b) (1) (i), (ii), (iii), (vi) and (vii) of this section. The seepage pit may be filled with stone or rubble of not less than nominal 1 inch diameter.

(2) Seepage pits shall be of such dimensions as to provide side wall area equal to at least 10 square feet per person served by the facility, or such greater area as may be required by the health agency having jurisdiction.

(3) Temporary piping connections from sinks or shower platforms may be discharged beneath the floor if they have traps in accordance with the provisions of American National Standard National Plumbing Code, A 40.8-1955.

(4) The platform covering the seepage pits shall be built of impervious material and in a manner to exclude insects.

(5) The platform shall be provided with an opening at least 1 foot in each dimension and have a rim at least 1 inch above the floor to prevent precipitation from accumulating on the platform floor.

(6) The platform opening shall be covered with a self-closing lid, so constructed that it can be easily opened by foot or hand, and so installed that when closed it will exclude insects and fit closely over the raised rim of the opening.

(e) *Combustion toilet.* (1) Combustion toilets and combustion toilet buildings, rooms, or shelters shall conform to the applicable specifications given for chemical toilets in paragraph (c) of this section.

(2) All external surfaces, including bowl and hopper, shall be easy to clean.

(3) The residue must be sterile and inert.

(4) The flue effluents must be free of bacteria.

(5) The combustion system and all fuel and electrical parts shall be safe and in compliance with applicable gas and electrical codes of local authorities. Where such codes do not exist, the installations shall comply with the National Electrical Code, NFPA 70-1971; ANSI C1-1971 (Rev. of 1968).

(f) *Recirculating toilet specifications.*

(1) Recirculating toilet buildings, rooms, or shelters shall conform to the applicable specifications given for chemical toilets in paragraph (c) of this section.

(2) All materials, bowl, piping, and fittings shall be corrosion resistant.

(3) Waste passages shall have smooth surfaces and be free of obstructions, recesses, or chambers that would permit fouling.

(4) Flushing shall be accomplished by a single control so arranged as to be operated without special knowledge or effort.

(5) Recirculating toilets shall conform to "Self-Contained, Electrically Operated Recirculating, Chemically Con-

trolled Toilet." International Association of Plumbing and Mechanical Officials Trailer Standard TSC 12-65.

(6) The unit shall be maintained and cleaned; and water, filter, and odor-controlling chemical shall be replaced in accordance with the instructions of the manufacturer.

(g) *Portable toilet construction.* (1) A portable toilet may comprise the seat and its treatment unit to be installed in a structure, or it may comprise an entire prefabricated, skid mounted, or otherwise portable structure containing a seat or treatment units with seat.

(2) No pit, tank, or other subsurface structure shall be construed as part of a portable toilet.

(i) Portable privies must be installed over a pit conforming to paragraph (b) (1) of this section, or a manhole that is part of a sanitary or combined waste water disposal system.

(ii) No portable toilet shall discharge into a storm sewer.

(3) A portable building shall be rigidly constructed, ventilated by a screened opening or a vent having a cross-sectional area of at least 1 square foot per seat, and equipped with a floor, riser, and seat meeting the requirements of paragraph (b) (2) of this section or an equivalent individual stool and seat in prefabricated metal, fiber glass, plastic, or ceramic material.

(i) The structure shall provide privacy and protection from the elements.

(ii) An airtight seal shall be provided between the structure base and any pit, receptacle, or manhole over which it is placed.

(iii) Ventilation of the pit, receptacle, or manhole shall conform to paragraph (b) (1) (iv) of this section.

(4) A portable toilet shall be provided with facilities, requisite to its construction, for the removal of chemicals, ash, or residue. All surfaces subject to soiling shall be readily accessible and easily cleaned.

§ 1910.144 Safety color code for marking physical hazards.

(a) *Color identification.*—(1) Red. Red shall be the basic color for the identification of:

(a) Fire protection equipment and apparatus. (a) Fire alarm boxes (pull boxes).

(b) Fire blanket boxes.

(c) Fire buckets or pails.

(d) Fire exit signs.

(e) Fire extinguishers (if painting the able, color should be used on the housing, wall, or support to identify the location).

(f) Fire hose locations (color should be used on the reel, supports, or housing but not on the hose).

(g) Fire hydrants (industrial).

(h) Fire pumps.

(i) Fire sirens.

(f) Post indicator valves for sprinkler system (it is suggested that if a traffic hazard is involved, the top should be colored red, and the barrel or post yellow and black stripes).

(k) Sprinkler piping. (See ANSI Standard Scheme for the Identification of Piping Systems, A13.1-1956.)

(ii) *Danger.* Safety cans or other portable containers of flammable liquids having a flashpoint at or below 80° F. table containers of flammable liquids (open cup tester), excluding shipping containers, shall be painted red with some additional clearly visible identification either in the form of a yellow band around the can or the name of the contents conspicuously stenciled or painted on the can in yellow. Red lights shall be provided at barricades and at temporary obstructions, as specified in ANSI Safety Code for Building Construction, A10.2-1944. Danger signs shall be painted red.

(iii) *Stop.* Emergency stop bars on hazardous machines such as rubber mills, wire blocks, flat work ironers, etc., shall be red. Stop buttons or electrical switches used for emergency stopping of machinery shall be red.

(2) *Orange.* Orange shall be used as the basic color for designating dangerous parts of machines or energized equipment which may cut, crush, shock, or otherwise injure and to emphasize such hazards when enclosure doors are open or when gear belt, or other guards around moving equipment are open or removed, exposing unguarded hazards.

(3) *Yellow.* Yellow shall be the basic color for designating caution and for marking physical hazards such as: Striking against, stumbling, falling, tripping, and "caught in between." Solid yellow, yellow and black stripes, yellow and black checkers (or yellow with suitable contrasting background) should be used interchangeably, using the combination which will attract the most attention in the particular environment.

(4) *Green.* Green shall be used as the basic color for designating "Safety" and the location of first aid equipment (other than firefighting equipment).

(5) *Blue.* Blue shall be the basic color for designating caution, limited to warning against the starting, the use of, or the movement of equipment under repair or being worked upon.

(6) *Purple.* Purple shall be the basic color for designating radiation hazards. "Radiation" as used in this subparagraph refers to radiation types such as X-ray, alpha, beta, gamma, neutron, proton, deuteron, and meson. Yellow should be used in combination with purple for markers such as tags, labels, signs, and floor markers.

(7) *Black, white, or combinations of black and white.* Black, white, or a combination of these two, shall be the basic colors for the designation of traffic and housekeeping markings. Solid white, solid black, single color striping, alternate stripes of black and white, or black and white checkers should be used in accordance with local conditions.

(b) *Color specifications.* Colors shall meet the tests specified in section 3, Color Definitions, of ANSI Z53.1-1967, Safety Color Code for Marking Physical Hazards.

9) *Nonliquefied compressed gas.* A "liquefied compressed gas" is a gas, other than a gas in solution which under the charging pressure, is entirely gaseous at a temperature of 70° F.

(20) *Liquefied compressed gas.* A "liquefied compressed gas" is a gas which, under the charging pressure, is partially liquid at a temperature of 70° F. A flammable compressed gas which is normally nonliquefied at 70° F. but which is partially liquid under the charging pressure and temperature, shall follow the requirements for liquefied compressed gases.

(21) *Compressed gas in solution.* A "compressed gas in solution" (Acetylene) is a nonliquefied gas which is dissolved in a solvent.

(22) *Pressurized liquid compressed gas.* A "pressurized liquid compressed gas" is a compressed gas other than a compressed gas in solution, which cannot be liquefied at a temperature of 70° F. and which is maintained in the liquid state at a pressure not less than 40 p.s.i.a. by maintaining the gas at a temperature less than 70° F.

(23) *Test pressure of the cylinder.* The "test pressure of the cylinder" is the minimum pressure at which a cylinder must be tested as prescribed in DOT specifications for compressed gas cylinders 41 CFR Ch. I.

(24) *Free air or free gas.* "Free air" or "free gas" is air or gas measured at a sure of 14.7 pounds per square inch (absolute) and a temperature of 60° F.

(25) *DOT regulations.* As used in this section "DOT regulations" refers to the U.S. Department of Transportation Regulations for Transportation of Explosives and Other Dangerous Articles by Land and Water in Rail Freight, Express and Baggage Services and by Motor Vehicle (Highway) and Water, including Specifications for Shipping Containers, Code of Federal Regulations, Title 49, Parts 171 to 178.

(b) *General requirements.*—(1) Application. Compressed gas cylinder, portable tanks, and cargo tanks shall have pressure relief devices installed and maintained in accordance with Compressed Gas Association Pamphlets 8-1.1-1963 and 1965 addenda and 8-1.2-1963.

(2) *Types of safety relief devices.* Types of safety relief devices as covered by this section are designated as follows:

(i) Type CG-1: Frangible disc.

(ii) Type CG-2: Fusible plug or reinforced fusible plug utilizing a fusible alloy with yield temperature not over 170° F., nor less than 157° F. (165° F. nominal).

(iii) Type CG-3: Fusible plug or reinforced fusible plug utilizing a fusible alloy with yield temperature not over 220° F., nor less than 208° F. (212° F. nominal).

(iv) Type CG-4: Combination frangible disc-fusible plug, utilizing a fusible alloy with yield temperature not over 170° F., nor less than 157° F. (165° F. nominal).

(v) Type CG-5: Combination frangible disc-fusible plug, utilizing a fusible alloy with yield temperature not over

220° F., nor less than 208° F. (212° F. nominal).

(vi) Type CG-7: Safety relief valve.

(vii) Type CG-8: Combination safety relief valve and fusible plug.

(3) *Specifications and tests.* All safety relief devices covered by this section shall meet the design, construction, marking and test specification of the "Compressed Gas Association Safety Relief Device Standards Part 1—Cylinders for Compressed Gases: 8.1.1-1963."

(4) *Specific requirements for safety relief devices.* (i) Compressed gas cylinders, which under the Regulations of the Department of Transportation must be equipped with safety relief devices, shall be considered acceptable when equipped with devices of proper construction, location, and discharge capacity under the conditions prescribed in Table 1 of the Compressed Gas Association Standard 8-1.1-1963.

(ii) Only replacement parts or assemblies provided by the manufacturer shall be used unless the advisability of interchange is proved by adequate tests.

(iii) When a frangible disc is used with a compressed gas cylinder, the rated bursting pressure of the disc shall not exceed the minimum required test pressure of the cylinder with which the device is used, except for DOT-3E cylinders (49 CFR Ch. I) the rated bursting pressure of the device shall not exceed 4,500 pounds per square inch gage (p.s.i.g.).

(iv) When a safety relief valve is used on a compressed gas cylinder, the flow rating pressure shall not exceed the minimum required test pressure of the cylinder on which the safety relief valve is installed and the resealing pressure shall not be less than the pressure in a normally charged cylinder at 130° F.

(v) When fittings and piping are used on either the upstream or downstream side or both of a safety relief device or devices, the passages shall be so designed that the flow capacity of the safety relief device will not be reduced below the capacity required for the container on which the safety relief device assembly is installed, nor to the extent that the operation of the device could be impaired. Fittings, piping, and method of attachment shall be designed to withstand normal handling and the pressures developed when the device or devices function.

(vi) No shutoff valve shall be installed between the safety relief devices and the cylinder.

(5) *Maintenance requirements for safety relief devices.* (i) As a precaution to keep cylinder safety relief devices in reliable operating condition, care shall be taken in the handling or storing of compressed gas cylinders to avoid damage. Care shall also be exercised to avoid plugging by paint or other dirt accumulation of safety relief device channels or other parts which could interfere with the functioning of the device. Only qualified personnel shall be allowed to service safety relief devices.

(ii) Each time a compressed gas cylinder is received at a point for refilling,

all safety relief devices shall be examined externally for corrosion, damage, plugging of external safety relief device channels, and mechanical defects such as leakage or extrusion of fusible metal. If there is any doubt regarding the suitability of the safety relief device for service the cylinder shall not be filled until it is equipped with a suitable device.

§ 1910.168 Safety relief devices for cargo and portable tanks storing compressed gases.

(a) *Definitions applicable to this section.*—(1) *Cargo tank.* A "cargo tank" means any container designed to be permanently attached to any motor vehicle or other highway vehicle and in which is to be transported any compressed gas. The term "cargo tank" shall not be construed to include any tank used solely for the purpose of supplying fuel for the propulsion of the vehicle or containers fabricated under specifications for cylinders.

(2) *Portable tank.* A "portable tank" means any container designed primarily to be temporarily attached to a motor vehicle, other vehicle, railroad car other than tank car, or marine vessel, and equipped with skids, mountings, or accessories to facilitate handling of the container by mechanical means, in which is to be transported any compressed gas. The term "portable tank" shall not be construed to include any cargo tank, any tank car tank, or any tank of the DOT-106A and DOT-110A-W type.

(3) *Safety relief device.* A "safety relief device" means a device intended to prevent rupture of a container under certain conditions of exposure.

(4) *Safety relief valve.* A "safety relief valve" means a safety relief device containing an operating part that is held normally in a position closing the safety relief device channel by spring force and is intended to open and to close at predetermined pressures.

(5) *Set pressure.* The "set pressure" of a safety relief valve is the pressure marked on the valve and at which the valve is set to start-to-discharge.

(6) *Start-to-discharge pressure.* The "start-to-discharge pressure" of a safety relief valve is the pressure at which the first bubble appears through a water seal of not over 4 inches on the outlet of the valve.

Note: When the nature of the service requires the use of a metal-to-metal seal safety relief valve, with or without secondary sealing means, the start-to-discharge pressure may be considered the pressure at which an audible discharge occurs.

(7) *Resealing pressure.* The "resealing pressure" of a safety relief valve is the pressure at which leakage ceases through a water seal of not over 4 inches on the outlet of the valve.

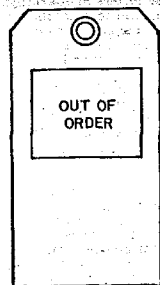
(8) *Flow capacity.* The "flow capacity" of a safety relief device is the capacity in cubic feet per minute of free air discharged at the required flow rating pressure.

(9) *Flow rating pressure.* The "flow rating pressure" means the pressure at which a safety relief device is rated for capacity.

(one blade pointed downward and centered on the vertical axis) shall be executed as illustrated in Figure J-14. The symbol shall be prominently displayed and of a size consistent with the size

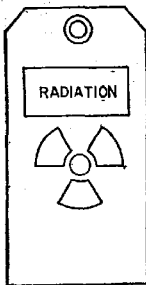
of the equipment or area in which it is to be used.

(3) **Biological hazard tags.** (1) The standard background color for the Biological Hazard symbol is optional as long



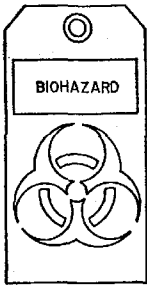
White tag
white letters on
black background

Fig. J-13
Out of Order Tag



Yellow tag
yellow letters in
reddish-purple panel
(Added wording in black
on yellow background)

Fig. J-14
Radiation Tag



White tag
black letters on
fluorescent-orange
background and
symbol

Fig. J-15
Biological Hazard Tag

as there is sufficient contrast for the symbol to be clearly defined. The symbol design (see Fig. J-15) shall be a fluorescent orange or orange-red color.

(ii) The biological hazard tag shall be used to signify the actual or potential presence of a biohazard, to identify equipment, containers, rooms, materials, experimental animals, or combinations thereof, which contain or are contaminated with viable hazardous agents.

(iii) For the purpose of this subpart, the term "biological hazard" shall include only those infectious agents presenting a risk or potential risk to the well-being of man.

§ 1910.146 [Reserved]

§ 1910.147 Sources of standards.

The standards in this Subpart J are derived from the following sources:

Sec.	Source
1910.141 -----	ANSI Z41-1968, Minimum Requirements for Sanitation in Places of Employment.
1910.142 -----	ANSI Z44-1968, Minimum Requirements for Sanitation in Temporary Labor Camps.
1910.143 -----	ANSI Z43-1970, Minimum requirements for Non-water Carriage Disposal Systems.
1910.144 -----	ANSI Z53.1-1987, Safety Color Code for Marking Physical Hazards.
1910.145 -----	ANSI Z35.1-1969, Specifications for Accident Prevention Signs, and ANSI Z114.1-1971, Slow-Moving Vehicle Identification Emblem.
1910.145(f) ---	ANSI Z35.2-1968, Specifications for Accident Prevention Tags.

§ 1910.148 Standards organizations.

Standard and specifications of the following organizations have been referenced in this Subpart J:

American National Standards Institute, 1430 Broadway, New York, NY 10018.
National Association of Plumbing and Mechanical Officials, 5039 Alhambra Avenue, Los Angeles, CA 90032.
American Society of Agricultural Engineers, 2850 Niles Road, Post Office Box 229, St. Joseph, MI 49085.

§ 1910.149 Effective dates.

(a) The provisions of this Subpart J shall become effective on August 27, 1971, except as provided in the remaining paragraphs of this section.

(b) The following provisions shall become effective on February 15, 1972:

§ 1910.142(b) (2), (b) (5), (b) (7), (d) (6), (f), (g), (i) (1) and (2).

(c) Notwithstanding anything in paragraph (a), (b), or (d) of this section, any provision in any other section of this subpart which contains in itself a specific effective date or time limitation shall apply in accordance with such limitation.

(d) Notwithstanding anything in paragraph (a) of this section, if any standard in 41 CFR Part 50-204, other than a national consensus standard incorporated by reference in 50-204.2 (a) (1), is or becomes applicable at any time to any employment and place of employment, by virtue of the Walsh-Healey Public Contracts Act, or the Service Contract Act of 1965, or the National Foundation on Arts and Humanities Act of 1965, any corresponding established Federal standard in this Subpart J which is derived from 41 CFR Part 50-204 shall

also become effective, and shall be applicable to such employment and place of employment, on the same date.

[38 F.R. 15105, Aug. 13, 1971]

Subpart K—Medical and First Aid

§ 1910.151 Medical services and first aid.

(a) The employer shall ensure the ready availability of medical personnel for advice and consultation on matters of plant health.

(b) In the absence of an infirmary, clinic, or hospital in near proximity to the workplace which is used for the treatment of all injured employees, a person or persons shall be adequately trained to render first aid. First aid supplies approved by the consulting physician shall be readily available.

(c) Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use.

§ 1910.152 [Reserved]

§ 1910.153 Sources of standards.

The standard in § 1910.151 is derived from 41 CFR 50-204.6.

Subpart L—Fire Protection

§ 1910.156 Definitions applicable to this subpart.

(a) "Class A fires" are fires in ordinary combustible materials, such as wood, cloth, paper, and rubber.

(b) "Class B fires" are fires in flammable liquids, gases, and greases.

(c) "Class C fires" are fires which involve energized electrical equipment where the electrical nonconductivity of the extinguishing media is of importance. (When electrical equipment is deenergized, extinguishers for Class A or B fires may be used safely.)

(d) "Class D fires" are fires in combustible metals, such as magnesium, titanium, zirconium, sodium, and potassium.

(e) Classification of portable fire extinguishers: "Portable fire extinguishers" are classified for use on certain classes of fires and rated for relative extinguishing effectiveness at a temperature of plus 70° F. by nationally recognized testing laboratories. This is based upon the preceding classification of fires and the fire extinguishing potentials as determined by fire tests.

Note: The classification and rating system described in this section is that used by Underwriters' Laboratories, Inc. and Underwriters Laboratories of Canada and is based on extinguishing preplanned fires of determined size and description as follows:

(i) Class A rating—Wood and excelsior fire excluding deep-seated conditions.

(ii) Class B rating—Two-inch depth gasoline fires in square pans.

(iii) Class C rating—No fire test. Agent must be a nonconductor of electricity.

(iv) Class D rating—Special tests on specific combustible metal fires.

(f) A "light hazard" is a situation where the amount of combustibles or flammable liquids present is such that

removal at domestic connections or elsewhere with the sprinkler drains wide open and under pressure.

(d) **Maintenance of sprinkler system.** A sprinkler system installed under this Standard must be properly maintained for efficient service. The employer is responsible for the condition of his sprinkler system and must use due diligence in keeping the system in good operating condition.

(e) **Sprinkler head clearance.** (1) **Type I storage.** Clearance of at least 36 inches shall be maintained between sprinkler deflectors and top of storage to reduce the possibility of obstruction to the distribution of water.

(2) **Type II storage.** Clearance of at least 18 inches shall be maintained between sprinkler deflectors and top of storage to reduce the possibility of obstruction to the distribution of water.

(3) **Type III storage.** In sprinklered buildings, at least 18 inches clearance between sprinkler deflectors and top of storage shall be maintained.

§ 1910.160 Fixed dry chemical extinguishing systems.

(a) **General requirements.** (1) **Design.** When dry chemical extinguishing systems are provided they shall meet the design requirements of the National Fire Protection Association's "Standard for Dry Chemical Extinguishing Systems" NFPA No. 17-1969 and the requirements of this section.

(2) **Safety requirements.** Where there is possibility that personnel may be exposed to a dry chemical discharge, suitable safeguards shall be provided to insure prompt evacuation of such locations, and also to provide means for prompt rescue of any trapped personnel.

(b) **Alarms and indicators.** (1) **General.** Alarms and/or indicators are used to indicate the operation of the system, hazard to personnel, or failure of any supervised device or equipment. The devices may be audible or visual. The type, number, and location of the devices shall be such that their purpose is satisfactorily accomplished. The extent and type of alarm and/or indicator equipment shall be approved.

(2) **Operation alarm.** (i) An alarm or indicator shall be provided to show that the system has operated, that personnel response may be needed, and that the system should be charged.

(ii) Alarms indicating failure of supervised devices or equipment shall give prompt and positive indication of any failure and shall be distinctive from alarms indicating operation or hazardous conditions.

(c) **Inspection and maintenance.** (1) **Inspection and tests.** (i) At least annually, all dry chemical systems including alarms, shutdowns, and other associated equipment, shall be thoroughly inspected and checked for proper operation by a competent inspector.

(ii) The purpose of the inspection and testing shall be not only to insure that the system is in full operating condition but also to indicate the probable continuance of that condition until the

next inspection. Attention at this inspection shall be given to any extension of the hazard protected by the system.

(iii) The inspector's report, with recommendations, if any, shall be filed with the employer or with whomever is designated by the employer.

(iv) Between the regular service contract inspection or tests, the system shall be inspected visually or otherwise by competent personnel, following an approved schedule.

(v) At least semiannually, all expellant gas containers shall be checked by pressure or weight against the required minimums.

(vi) At least semiannually, all stored pressure dry chemical containers shall be checked by pressure and weight against the required minimums.

(vii) Except for stored pressure systems, at least annually the dry chemical in the system storage container shall be sampled from the top center and also near the wall to determine the existence of lumps harder than will be friable when dropped from a height of 4 inches.

(2) **Maintenance.** (i) These fixed dry chemical systems shall be maintained in full operating condition at all times. Use, impairment, and restoration of this protection shall be reported promptly to the employer.

(ii) Any troubles or impairments shall be corrected at once by competent personnel.

§ 1910.161 Carbon dioxide extinguishing systems.

(a) **General requirements.** (1) **Design.** When carbon dioxide extinguishing systems are provided they shall meet the design requirements of the National Fire Protection Association's "Standard on Carbon Dioxide Extinguishing Systems" NFPA No. 12-1968 and the requirements of this section.

(2) **Safety requirements.** In any use of carbon dioxide where there is a possibility that employees may be trapped in, or enter into atmospheres made hazardous by a carbon dioxide discharge, suitable safeguards shall be provided to insure prompt evacuation of and to prevent entry into such atmospheres and also to provide means for prompt rescue of any trapped personnel. Such safety items as personnel training, warning signs, discharge alarms, predischARGE alarms, and breathing apparatus shall be considered.

(b) **Inspection and maintenance.** (1) **Inspection and tests.** (i) At least annually, all carbon dioxide systems shall be thoroughly inspected and tested for proper operation by a competent engineer or inspector.

(ii) The goal of this inspection and testing shall be not only to insure that the system is in full operating condition but shall indicate the probable continuance of that condition until the next inspection.

(iii) Suitable discharge tests shall be made when any inspection indicates their advisability.

(iv) Between the regular service contract inspection or tests, the system shall be inspected visually or otherwise by

competent personnel, following a schedule.

(v) At least semiannually, all high pressure cylinders shall be weighed. If, at any time, a container shows a loss in net content of more than 10 percent, it shall be refilled or replaced.

(vi) If, at any time, a low pressure container shows a loss of more than 10 percent, it shall be refilled, unless the minimum gas requirements are still provided.

(2) **Maintenance.** (i) These carbon dioxide systems shall be maintained in full operating condition at all times.

(ii) Any troubles or impairments shall be corrected at once by competent personnel.

§ 1910.162 Other special fixed extinguishing systems. [Reserved]

OTHER FIRE PROTECTION SYSTEMS

§ 1910.163 Local fire alarm signaling systems.

(a) **General requirements.** Where local fire alarm signaling systems are provided they shall meet the design requirements of the National Fire Protection Association's "Standard for the Installation, Maintenance, and Use of Local Protective Signaling Systems for Watchman, Fire Alarm and Supervisory Service," NFPA No. 72A-1967 and the requirements of this section.

(b) **Fire alarm boxes.** (1) **General.** Manual fire alarm boxes shall be approved for the particular application and shall be used only for fire protective signaling purposes. Combined fire alarm and watchman's signaling boxes are acceptable.

(2) **Mounting.** Each box shall be securely mounted.

(3) **Distribution.** Manual fire alarm boxes shall be distributed throughout the protected area so that they are unobstructed, readily accessible, and located in the normal path of exit from the area. Additional boxes shall be provided on each floor to obtain a maximum horizontal travel distance of 200 feet to the nearest box.

(c) **Maintenance.** All systems shall be under the supervision of qualified persons. These persons shall cause tests and inspections to be made at weekly intervals, and shall have general charge of all alterations and additions to the systems under their supervision.

§ 1910.164 Fire brigades. [Reserved]

§ 1910.165 Effective dates.

(a) The provisions of this Subpart L shall become effective on August 27, 1971, except as provided in the remaining paragraphs of this section.

(b) The following provisions shall become effective on February 15, 1972:

§ 1910.157(c),
§ 1910.158 (b) and (c),
§ 1910.159 (a), (b), and (c),
§ 1910.160(a),
§ 1910.161(a).

(c) Notwithstanding anything in paragraph (a), (b), or (d) of this section, any provision in any other section of this subpart which contains in itself a specific effective date or time limitation

(iii) National (American) Standard Fire Hose Coupling Screw Threads shall be used whenever they will fit existing equipment; see Standard for Screw Threads Gaskets for Fire Hose Couplings, NFPA No. 194-1968.

(6) Nozzles. Nozzles shall be of an approved type. Size of nozzles for small hose shall be not larger than one-half inch.

(7) Dry standpipe identification. Each hose connection on dry standpipes shall be provided with a conspicuous, durable, and permanently legible sign reading "Dry Standpipe for Fire Department Use Only."

(c) Water supplies—(1) Minimum supply for Class I service. (i) The minimum supply for Class I service shall be sufficient to provide 500 gallons per minute for a period of at least thirty (30) minutes.

(ii) Where more than one standpipe is required, the minimum supply shall be 500 gallons per minute for the first standpipe and 250 gallons per minute for each additional standpipe, the total supply not to exceed 2,500 gallons a minute, for a period of at least thirty (30) minutes.

(iii) The supply shall be sufficient to maintain a residual pressure of 65 pounds per square inch at the topmost outlet of each standpipe (including the roof outlet) with 500 gallons per minute flowing.

(2) Minimum supply for Class II service. The minimum supply for Class II service shall be sufficient to provide 100 gallons per minute for a period of at least thirty (30) minutes. The supply shall be sufficient to maintain a residual pressure of 65 pounds per square inch at the topmost outlet of each standpipe (including the roof outlet) with 100 gallons per minute flowing.

(3) Minimum supply for Class III service. The minimum supply for Class III service shall be the same as for Class I service.

(4) Fire department connections. (i) One or more fire department connections shall be provided for each Class I or Class III standpipe system.

(ii) In high-rise buildings having two or more zones, a fire department connection shall be provided for each zone.

(iii) Fire department connections shall be properly supported.

(iv) There shall be no shutoff valve in the fire department connection.

(v) An approved straightway check valve shall be installed in each fire department connection, located as near as practicable to the point where it joins the system.

(vi) The pipe between the check valve and the outside hose coupling shall be equipped with an approved automatic drip, arranged to discharge to a proper place.

(vii) Hose connections shall be approved type and shall be equipped with standard caps, properly secured and arranged for easy removal by fire departments.

(viii) Hose coupling threads shall conform to those used by the local fire department. (American) National Standard Fire-Hose Coupling Screw Threads shall

be used whenever they will fit the local fire department hose threads; see standard for Screw Threads and Gaskets for Fire Hose Couplings, NFPA No. 194-1968.

(ix) Hose connections should be on the street side of buildings and shall be located and arranged so that hose lines can be readily and conveniently attached to the inlets without interference from any nearby objects including buildings, fences, posts, or other fire department connections.

(x) Hose connections shall be designated by a sign having raised letters at least one inch in size cast on a plate or fitting, reading "Standpipe."

(xi) If hose connection does not serve all of the building an appropriate and durable sign shall be attached indicating the portions of the building served.

(d) Tests and maintenance—(1) Tests. All new systems including yard piping shall be tested hydrostatically at not less than 200 pounds per square inch pressure for 2 hours, or at 50 pounds per square inch in excess of the normal pressure when the normal pressure is in excess of 150 pounds per square inch.

(2) Periodic inspection. (i) The tanks shall be kept properly filled, and where pressure tanks are employed, a pressure of at least 75 pounds per square inch shall be maintained at all times.

Note: For further details, see Standard for Water Tanks for Private Fire Protection, NFPA No. 22-1970.

(ii) The valves in the main connection to the automatic sources of water supply shall be open at all times. The hose valves should be frequently examined to see that they are tight.

Note: For further details, see Care of Fire Hose, NFPA No. 198-1969.

FIXED FIRE SUPPRESSION EQUIPMENT

§ 1910.159 Automatic sprinkler systems.

(a) General requirements—(1) Design. When automatic sprinkler systems are provided they shall meet design requirements of the National Fire Protection Association's Standard for the Installation of Sprinkler Systems NFPA No. 13-1969 and the requirements of this section.

(2) Water supply. Every automatic sprinkler system shall have at least one automatic water supply of adequate pressure, capacity and reliability.

(3) Fire department connection. A connection through which a fire department can pump water into the sprinkler system makes a desirable auxiliary supply. For this purpose, one or more fire department connections shall be provided in all cases.

(b) Fire department connections—(1) Size. Pipe size shall not be less than 4 inches for fire engine connections and not less than 6 inches for fireboat connections, except that 3-inch pipe may be used to connect a single hose connection to a 3-inch or smaller riser.

(2) Valves. (i) An approved straightway check valve shall be installed in each fire department connection, located as near as practicable to the point where it joins the system.

(ii) There shall be no shutoff valve in the fire department connection.

(3) Support. Fire department connections shall be properly supported.

(4) Hose connections. (i) Hose connections shall be of approved type.

(ii) Hose coupling threads shall conform to those used by the local fire department. National (American) Standard Fire Hose Coupling Screw Threads shall be used whenever they will fit the local fire department hose.

(iii) Hose connections shall be equipped with caps, properly secured and arranged for easy removal by fire departments.

(iv) Hose connections shall be located and arranged so that hose lines can be readily and conveniently attached to the inlets without interference from any nearby objects including buildings, fences, posts, or other fire department connections.

(v) Hose connections shall be designated by a sign having raised letters at least 1 inch in size cast on a plate or fitting, reading for service designated: "VIZ.—"AUTO-SPKR." or "OPEN SPKR."

(c) Sprinkler alarms—(1) General. (i) Waterflow alarms shall be provided on all sprinkler installations.

(ii) An alarm unit shall include an approved mechanical alarm, horn, or siren, or an approved weatherproof electric gong, bell, horn, or siren on the outside of the building or approved electric gongs, bells, horns, or sirens inside the building, or a combination of such devices.

(iii) All alarm apparatus shall be so located and installed that all parts are readily accessible for inspection, removal, and repair, and shall be substantially supported. Outdoor mechanical or electrically operated bells shall be of weatherproof and guarded type. On each alarm check valve used under conditions of variable water pressure, a retarding device shall be installed. Suitable valves shall be provided in the connections to retarding chambers, to permit repair or removal without shutting off sprinklers; these valves shall be so arranged that they may be locked or sealed in the open position.

(2) Waterflow detecting devices. (i) The alarm apparatus for a wet-pipe system shall consist of an approved alarm check valve or other approved water flow detecting alarm device with the necessary attachments required to give an alarm.

(ii) The alarm apparatus for a dry-pipe system shall consist of approved alarm attachments to the dry-pipe valve. When a dry-pipe valve is located on the system side of an alarm valve, the actuating device of the alarms for the dry-pipe valve may be connected to the alarms on the wet-pipe system.

(iii) The alarm apparatus for preaction and deluge systems shall consist of approved electric alarm attachments, actuated by a thermostatic system independently of flow of water in the system.

(3) Drains. Drains from alarm devices shall be so arranged that there will be no danger of freezing, and so that there will be no overflowing at the alarm apparatus.

(f) Small size may be expected. These may include offices, schoolrooms, churches, assembly halls, telephone exchanges, etc.

(g) An "ordinary hazard" is a situation where the amount of combustibles or flammable liquids present is such that fires of moderate size may be expected. These may include mercantile storage and display, auto showrooms, parking garages, light manufacturing, warehouses not classified as extra hazard, school shop areas, etc.

(h) An "extra hazard" is a situation where the amount of combustible or flammable liquids present is such that fires of severe magnitude may be expected. These may include woodworking, auto repair, aircraft servicing, warehouses with high-piled (14 feet or higher) combustibles, and processes such as flammable liquid handling, painting, dipping, etc.

(i) Sprinkler system: A "sprinkler system," for fire protection purposes, is an integrated system of underground and overhead piping designed in accordance with fire protection engineering standards. The system includes a suitable water supply, such as a gravity tank, fire pump, reservoir, or pressure tank and/or connection by underground piping to a city main. The portion of the sprinkler system above ground is a network of specially sized or hydraulically designed piping installed in a building, fire area, or area, generally overhead, at which sprinklers are connected in a systematic pattern. The system includes a controlling valve and a device for actuating an alarm when the system is in operation. The system is usually activated by heat from a fire and discharges water over the fire area.

Note: The design and installation of water supply facilities such as gravity tanks, fire pumps, reservoirs, or pressure tanks, and underground piping are covered by NFPA Standards No. 22-1970, Water Tanks for Private Fire Protection; No. 20-1970, Installation of Centrifugal Fire Pumps and No. 24-1970, Outside Protection.

(j) Sprinkler alarms: A "sprinkler alarm" unit is an assembly of apparatus approved for the service and so constructed and installed that any flow of water from a sprinkler system equal to or greater than that from a single automatic sprinkler will result in an audible alarm signal on the premises.

(k) Class of service—standpipe systems: "Standpipe systems" are grouped into three general classes of service for the intended use in the extinguishment of fire.

(1) Class I: For use by fire departments and those trained in handling heavy fire streams (2½-inch hose).

(2) Class II: For use primarily by the building occupants until the arrival of the fire department (small hose).

(3) Class III: For use by either fire departments and those trained in handling heavy fire streams or by the building occupants.

(l) Class I service: "Class I service" is a standpipe system capable of furnishing the effective fire streams required during the more advanced stages of fire on the inside of buildings or for exposure fire.

(m) Class II service: "Class II service" is a standpipe system which affords a ready means for the control of incipient fires by the occupants of buildings during working hours and by watchmen and those present during the night time and holidays.

(n) Class III service: "Class III service" is a standpipe system capable of furnishing the effective fire streams required during the more advanced stages of fire on the inside of buildings as well as providing a ready means for the control of fires by the occupants of the building.

(o) Standpipe systems: "Standpipe systems" are usually of the following types:

(1) A wet standpipe system having a supply valve open and water pressure maintained at all times.

(2) A standpipe system so arranged through the use of approved devices as to admit water to the system automatically by opening a hose valve.

(3) A standpipe system arranged to admit water to the system through manual operation of approved remote control devices located at each hose station.

(4) Dry standpipe having no permanent water supply.

See also paragraph (k) of this section. (p) Type I storage: "Type I storage" is that in which combustible commodities or noncombustible commodities involving combustible packaging or storage aids are stored over 15 feet but not more than 21 feet high in solid piles or over 12 feet but not more than 21 feet high in piles that contain horizontal channels. Minor quantities of commodities of hazard greater than ordinary combustibles may be included without affecting this general classification.

(q) Type II storage: "Type II storage" is that in which combustible commodities or noncombustible commodities involving combustible packaging or storage aids are stored not over 15 feet high in solid piles or not over 12 feet high in piles that contain horizontal channels. Minor quantities of commodities of hazard greater than ordinary combustibles may be included without affecting this general classification.

(r) Type III storage: "Type III storage" is that in which the stored commodities, packaging, and storage aids are noncombustible or contain only a small concentration of combustibles which are incapable of producing a fire that would cause appreciable damage to the commodities stored or to noncombustible wall, floor or roof construction. Ordinary combustible commodities in completely sealed noncombustible containers may qualify in this classification. General commodity storage that is subject to frequent changing and storage of combustible packaging and storage aids is excluded from this category.

(s) "Approved": "Approved" means listed or approved by: (1) At least one of the following nationally recognized testing laboratories: Factory Mutual Engineering Corp.; Underwriters' Laboratories, Inc. or (2) Federal agencies such as Bureau of Mines, Department of the Interior, Department of Transportation, or U.S. Coast Guard, which issue approvals for such equipment.

(t) Selection of extinguishers—(1) General. The selection of extinguishers for a given situation will depend upon the character of the fires anticipated, the

engineering Corp.; Underwriters' Laboratories, Inc. or (2) Federal agencies such as Bureau of Mines, Department of the Interior, Department of Transportation, or U.S. Coast Guard, which issue approvals for such equipment.

PORTABLE FIRE SUPPRESSION EQUIPMENT

§ 1910.157 Portable fire extinguishers.

(a) General requirements—(1) Operable condition. Portable extinguishers shall be maintained in a fully charged and operable condition, and kept in their designated places at all times when they are not being used.

(2) Location. Extinguishers shall be conspicuously located where they will be readily accessible and immediately available in the event of fire. They shall be located along normal paths of travel.

(3) Marking of location. Extinguishers shall not be obstructed or obscured from view. In large rooms, and in certain locations where visual obstruction cannot be completely avoided, means shall be provided to indicate the location and intended use of extinguishers conspicuously.

(4) Marking of extinguishers. If extinguishers intended for different classes of fire are grouped, their intended use shall be marked conspicuously to insure choice of the proper extinguisher at the time of a fire.

(5) Mounting of extinguishers. Extinguishers shall be installed on the hangers or in the brackets supplied, mounted in cabinets, or set on shelves unless the extinguishers are of the wheeled type.

(6) Height of mounting. Extinguishers having a gross weight not exceeding 40 pounds shall be installed so that the top of the extinguisher is not more than 5 feet above the floor. Extinguishers having a gross weight greater than 40 pounds (except wheeled types) shall be so installed that the top of the extinguisher is not more than 3½ feet above the floor.

(7) Cabinet mounting. Extinguisher mounted in cabinets or wall recesses or set on shelves shall be placed in a manner such that the extinguisher operating instructions face outward. The location of such extinguishers shall be marked conspicuously.

(8) Vibrating locations. Extinguishers installed under conditions where they are subject to severe vibration shall be installed in brackets specifically designed to cope with this vibration.

(9) Temperature range. Extinguishers shall be suitable for use within a temperature range of at least plus 40° to 120° Fahrenheit.

(10) Extreme temperature exposure. When extinguishers are installed in locations subjected to temperatures outside the range prescribed in this subparagraph, they shall be of a type approved or listed for the temperature to which they will be exposed, or placed in an enclosure capable of maintaining the temperature within the range prescribed in this subparagraph.

(11) Selection of extinguishers—(1) General. The selection of extinguishers for a given situation will depend upon the character of the fires anticipated, the

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construction and occupancy of the individual property, the vehicle or hazard to be protected, ambient-temperature conditions, and other factors. The number of extinguishers required shall be determined by reference to paragraph (c) of this section.

(2) *Selection by hazard.* (i) Extinguishers shall be selected for the specific class or classes of hazards to be protected in accordance with the following paragraphs.

(ii) Extinguishers for protecting Class A hazards shall be selected from among the following: foam, loaded stream, multipurpose dry chemical, and water types. Certain smaller extinguishers which are charged with multipurpose dry chemical are rated on Class B and Class C fires, but have insufficient effectiveness to earn the minimum 1-A rating even though they have value in extinguishing smaller Class A fires.

Such smaller extinguishers shall not be used to meet the requirements of paragraph (c) (2) (i) of this section.

(iii) Extinguishers for protection of Class B hazards shall be selected from the following: bromotrifluoromethane, carbon dioxide, dry chemical, foam, loaded stream, and multipurpose dry chemical. Extinguishers with ratings less than 1-B shall not be considered in determining suitability.

(iv) Extinguishers for protection of Class C hazards shall be selected from the following: bromotrifluoromethane, carbon dioxide, dry chemical, and multipurpose dry chemical.

Note: Carbon dioxide extinguishers equipped with metal horns are not considered safe for use on fires in energized electrical equipment and, therefore, are not classified for use on Class C hazards.

(v) Extinguishers and extinguishing agents for the protection of Class D hazards shall be of types approved for use on the specific combustible-metal hazard.

(c) *Distribution of portable fire extinguishers.* (1) *General.* (i) The number of fire extinguishers needed to protect a property shall be determined as prescribed herein, considering the area and arrangement of the building or occupancy, the severity of the hazard, the anticipated classes of fires, and the distances to be traveled to reach extinguishers.

(ii) Fire extinguishers shall be provided for the protection of both the building structure, if combustible and the occupancy hazards contained therein.

(iii) Required building protection shall be provided by fire extinguishers suitable for Class A fires.

(iv) Occupancy hazard protection shall be provided by fire extinguishers suitable for such Class A, B, C, or D fire potentials as may be present.

(v) Extinguishers provided for building protection may be considered also for the protection of occupancies having a Class A fire potential.

(vi) Combustible buildings having an occupancy hazard subject to Class B, and/or Class C fires, shall have a standard complement of Class A fire extinguishers as required by Table L-1

for building protection, plus additional Class B and/or Class C extinguishers. Where fire extinguishers have more than one letter classification (such as 2-A: 20-B:C), they may be considered to satisfy the requirements of each letter class.

(vii) Rooms or areas shall be graded generally as light hazard, ordinary hazard, or extra hazard. Limited areas of greater or lesser hazard shall be protected as required.

(2) *Fire extinguisher size and placement for Class A hazards.* (i) Minimal sizes of fire extinguishers for the listed grades of hazard shall be provided on the basis of Table L-1. Extinguishers shall be located so that the maximum travel distances shall not exceed those specified in Table L-1.

TABLE L-1

Basic minimum extinguisher rating for area specified	Maximum travel distance to extinguisher (feet)	Areas to be protected per extinguisher		
		Light hazard (occupancy occupancy occupancy)	Ordinary hazard (occupancy occupancy occupancy)	Extra hazard (occupancy occupancy occupancy)
1A.....	75	3,000	Note 1	Note 1
2A.....	75	6,000	3,000	Note 1
3A.....	75	9,000	4,500	3,000
4A.....	75	11,250	6,000	4,000
6A.....	75	11,250	9,000	6,000

Note 1: Not permitted except as specified in subdivision (ii) of this subparagraph.

(ii) The protection requirements specified in Table L-1 may be fulfilled by several extinguishers of lower ratings for ordinary or extrahazard occupancies.

(iii) Where the floor area of a building is less than that specified in Table L-1, at least one extinguisher of the minimum size recommended shall be provided.

(iv) The protection requirements may be fulfilled with extinguishers of higher rating provided the travel distance to such larger extinguishers shall not exceed 75 feet.

(3) *Fire extinguisher size and placement for Class B fires other than for fires in flammable liquids of appreciable depth.* (i) Minimal sizes of fire extinguishers for the listed grades of hazard shall be provided on the basis of Table L-2. Extinguishers shall be located so that the maximum travel distances shall not exceed those specified in Table L-2.

TABLE L-2

Type of hazard	Basic minimum extinguisher rating	Maximum travel distance to extinguishers (feet)
Light.....	4B	50
Ordinary.....	8B	50
Extra.....	12B	50

Note: Where this section calls for minimum extinguisher ratings of 4-B, 8-B, or 12-B, the requirements may be met by existing extinguishers of multiple foam extinguishers as allowed by paragraph (c)(3)(ii) of this section. However, if a single extinguisher must be purchased to fulfill such requirements, the next higher rating shall be used.

(ii) Two or more extinguishers of lower rating, except for foam extinguishers, shall not be used to fulfill the protection requirements of Table L-2. Up

to three foam extinguishers may be used to fulfill these requirements.

(iii) The protection requirements may be fulfilled with extinguishers of higher ratings provided the travel distance to such larger extinguishers shall not exceed 50 feet.

(4) *Fire extinguisher size and placement for Class B fires in flammable liquids of appreciable depth.* (i) For flammable liquid hazards of appreciable depth (Class B), such as in dip or quench tanks, Class B fire extinguishers shall be provided on the basis of one numerical unit of Class B extinguishing potential per square foot of flammable liquid surface of the largest tank hazard within the area.

Note: Appreciable depth is defined as a depth of a liquid greater than one-quarter inch.

(ii) Two or more extinguishers of lower ratings except for foam extinguishers, shall not be used in lieu of the extinguisher required for the largest tank. Up to three foam extinguishers may be used to fulfill these requirements.

(iii) Scattered or widely separated hazards shall be individually protected if the specified travel distances in subdivisions (i) and (iii) of subparagraph (5) of this paragraph (c) are exceeded. Likewise, extinguishers in the proximity of a hazard shall be carefully located so as to be accessible in the presence of a fire without undue danger to the operator.

(5) *Fire extinguisher size and placement for Class C hazards.* (i) Extinguishers with Class C ratings shall be required where energized electrical equipment may be encountered which would require a nonconducting extinguishing media. This will include fire either directly involving or surrounding electrical equipment. Since the fire itself is a Class A or Class B hazard the extinguishers are sized and located on the basis of the anticipated Class A or B hazard.

(d) *Inspection, maintenance, and hydrostatic tests.* (1) *General.* (i) The employer shall be responsible for such inspection, maintenance, and testing.

(ii) For details of conducting needed inspections, proper maintenance operations, and required tests, see NFPA No. 10A-1970, Maintenance and Use of Portable Fire Extinguishers.

(2) *Inspection.* (i) Extinguishers shall be inspected monthly, or at more frequent intervals when circumstances require, to insure they are in their designated places, to insure they have not been actuated or tampered with, and to detect any obvious physical damage, corrosion, or other impairments.

(ii) Any extinguishers showing defects shall be given a complete maintenance check.

(3) *Maintenance.* (i) At regular intervals, not more than 1 year apart, or when specifically indicated by an inspection, extinguishers shall be thoroughly examined and/or recharged or repaired to insure operability and safety; or replaced as needed.

(ii) Extinguishers removed from the premises to be recharged shall be re-

placed by spare extinguishers during the time they are gone.

(ii) Pails or drums of powder-extinguishing agents for scoop or shovel application to metal fires shall be kept full at all times.

(iv) Each extinguisher shall have a durable tag securely attached to show the maintenance or recharge date and the initials or signature of the person who performs this service.

(4) *Hydrostatic tests.* (i) If, at any time an extinguisher shows evidence of corrosion or mechanical injury, it shall be subjected to a hydrostatic pressure test, or replaced.

(ii) For evaluating the condition of extinguisher cylinders made to Department of Transportation specifications (cf. 49 CFR Chapter I, see the Standard for Visual Inspection of Compressed Gas Cylinders (CGA C-6), published by the Compressed Gas Association, 500 Fifth Avenue, New York, NY 10036.

(iii) At intervals not exceeding those specified in Table L-3 and subdivision (iv) of this subparagraph, extinguishers shall be hydrostatically tested. The first hydrostatic test may be conducted between the fifth and sixth years for those with a designated test interval of 5 years.

TABLE L-3

HYDROSTATIC TEST INTERVAL FOR EXTINGUISHERS	
Extinguisher type:	Test interval year
Water-acid.....	5
Cartridge-operated water and/or anti-freeze.....	5

TABLE L-3—Continued
HYDROSTATIC TEST INTERVAL FOR EXTINGUISHERS

Extinguisher type:	Test interval year
Storage-pressure water and/or anti-freeze.....	5
Wetting agent.....	5
Foam.....	5
Loaded stream.....	5
Dry chemical extinguishers with stainless steel shells, aluminum shells, or soldered-brass shells.....	5
Carbon dioxide extinguishers.....	5
Dry chemical extinguishers with brazed-brass shells, or mild-steel shell.....	12
Bromotrifluoromethane.....	12
Dry powder extinguishers for metal fires.....	12

Note: Cylinders under jurisdiction of the U.S. Department of Transportation (formerly Interstate Commerce Commission) may require hydrostatic testing at more frequent periods.

(iv) Nitrogen cylinders (or other cylinders used for inert-gas storage), such as found on wheeled extinguishers, shall be tested at a 5-year interval.

(v) On those extinguishers which are equipped with a shutoff nozzle at the outlet end of the hose, a hydrostatic test shall be performed on the hose with its couplings (but without the discharge

nozzle) at the test interval specified for unit on which the hose is installed.

(vi) The test pressure for dry chemical and dry powder hose assemblies requir-

ing a hydrostatic test shall be at a test pressure of 300 pounds per square inch for a 1-minute period. Carbon dioxide hose assemblies requiring a hydrostatic test shall be at test pressure of 1,250 p.s.i. for a 1-minute period.

(vii) Hydrostatic tests are not required on fire pails, pump-type water and/or antifreeze extinguishers, and factory-sealed disposable (nonrefillable) containers. If such an extinguisher or water pail shows evidence of corrosion or mechanical injury, it may be unsafe or unsuitable for further use and shall be replaced with a new unit.

(viii) The hydrostatic test date shall be recorded on a record tag of metal or equally durable material, or a suitable metallized decal which shall be affixed (by a heatless process) to the shell of an extinguisher which favorably passes the hydrostatic test. The record tag shall contain the following information: Date of test, test pressure, and name or initials of person or agency making the test.

(ix) For extinguishers subjected to an original factory test pressure of 350 p.s.i. or greater, the test pressure shall be 75 percent of the factory test pressure (as noted on the extinguisher nameplate), but in no case less than 300 p.s.i., see Table L-4. For extinguishers subjected to an original factory test pressure of less than 350 p.s.i., the test pressure shall be 75 percent of the factory test pressure; see Table L-4. Pressure shall be applied at a rate of rise to reach the test pressure in approximately 1 minute, and the pressure shall be held for 1 minute, after which it shall be released.

TABLE L-4

HYDROSTATIC TEST PRESSURE REQUIREMENTS—NON-IC SHELLS, SHELLS NOT SPECIFIED IN U.S. DEPARTMENT OF TRANSPORTATION REGULATIONS, (FORMERLY INTERSTATE COMMERCE COMMISSION)

Extinguisher type	Original factory test pressure	Requires hydrostatic test pressure
4B-dry chemical and dry powder.....	400 p.s.i. or greater.	75% of factory test pressure.
	350-399 p.s.i.	300 p.s.i.
	Below 350 p.s.i.	75% of factory test pressure.
Foam—500 p.s.i. factory test.....	500.....	375.
Foam—350 p.s.i. factory test.....	350.....	300.
Soda-acid—500 p.s.i. factory test.....	500.....	375.
Soda-acid—350 p.s.i. factory test.....	350.....	300.
Stored-pressure or cartridge-operated water-type (including antifoam and loaded stream).....	400 p.s.i. or greater.	75% of factory test pressure.
	350-399 p.s.i.	300 p.s.i.
	Below 350 p.s.i.	75% of factory test pressure.

(x) Carbon dioxide extinguishers, nitrogen cylinders, and other cylinders or cartridges used for the storage of inert, compressed gases shall be hydrostatically tested in accordance with the requirements of the U.S. Department of Transportation (formerly Interstate Commerce Commission); see 49 CFR Parts 171-190.

(xi) Extinguisher shells, cartridges, or cylinders which show leakage or permanent distortion in excess of specified limits, or which rupture, shall be removed from service.

§ 1910.158 Standpipe and hose systems.

(a) *General requirements.*—(1) *Application.* Where standpipe and hose systems are provided they shall meet the design requirements of the National Fire Protection Association's Standard for the Installation of Standpipe and Hose Systems NFPA 14-1970 and the requirements of this section.

(2) *Closets and cabinets.* Closets and cabinets used to contain fire hose shall be of sufficient size to permit the installation of the necessary equipment at hose stations, and so designed as not to interfere with the prompt handling of the hose and equipment at time of fire. They shall be used for fire equipment only.

(3) *Protection of standpipes.* Standpipes shall be so located that they are protected against mechanical and fire damage.

(b) *Hose outlets.*—(1) *Location of hose.* (i) Hose outlets shall be within easy reach of a person standing on the floor and in no case shall be over 6 feet from 2d floor. Hose stations shall be located conspicuously within the immediate area and where not likely to be obstructed. Hose may be located at one side of the standpipe and supplied by short lateral connections to the standpipe where necessary to avoid obstructions. (ii) For Class III service, the outlets for large hose shall be located in a stairway enclosure, and for small hose the outlets shall be located in the corridor or space adjacent to the stairway enclosure.

(2) *Hose connections.* (i) Standpipes for Class I service shall be provided with 2½-inch hose connections on each floor. (ii) Standpipes for Class II service shall be provided with 1½-inch hose connections on each floor.

(iii) Standpipes for Class III service shall be provided with both a 2½-inch and 1½-inch hose connection on each floor. The hose connections may be through one 2½-inch hose valve and an easily removable 2½-inch by 1½-inch adapter.

(3) *Hose.* Each hose outlet provided for the use of building occupants (Class II and III services) shall be equipped with not more than 75 feet and preferably not more than 50 feet of approved small fire hose attached and ready for use.

(4) *Hose racks.* Each station provided with small hose shall be equipped with an approved rack securely fastened in position.

(5) *Hose valves.* (i) An approved hose valve shall be provided at each outlet for attachment of hose.

(ii) Where the static pressure at any standpipe outlet for small hose exceeds 100 pounds per square inch, an approved device shall be installed at the outlet to reduce the pressure so that the nozzle pressure will be approximately 80 pounds per square inch.

Note: Pressure reducers are not required on standpipe outlets for 2½-inch hose because it is assumed 2½-inch hose will be attached only when the persons likely to use it are trained in handling large streams.