1910.23(d)(1)(v) On stairways 88 or more inches wide, one handrail on each enclosed side, one stair railing on each open side, and one intermediate stair railing located approximately midway of the width.

1910.23(d)(2) Winding stairs shall be equipped with a handrail offset to prevent walking on all portions of the treads having width less than 6 inches.

1910.23(e) *Railing, toe boards, and cover specifications.*

1910.23(e)(1) A standard railing shall consist of top rail, intermediate rail, and posts, and shall have a vertical height of 42 inches nominal from upper surface of top rail to floor, platform, runway, or ramp level. The top rail shall be smooth-surfaced throughout the length of the railing. The intermediate rail shall be approximately halfway between the top rail and the floor, platform, runway, or ramp. The ends of the rails shall not overhang the terminal posts except where such overhang does not constitute a projection hazard.

1910.23(e)(2) A stair railing shall be of construction similar to a standard railing but the vertical height shall be not more than 34 inches nor less than 30 inches from upper surface of top rail to surface of tread in line with face of riser at forward edge of tread.

1910.23(e)(3)(i) For wood railings, the posts shall be of at least 2-inch by 4-inch stock spaced not to exceed 6 feet; the top and intermediate rails shall be of at least 2-inch by 4-inch stock. If top rail is made of two right-angle pieces of 1-inch by 4-inch stock, posts may be spaced on 8-foot centers, with 2-inch by 4-inch intermediate rail.

1910.23(e)(3)(ii) For pipe railings, posts and top and intermediate railings shall be at least 1 1/2 inches nominal diameter with posts spaced not more than 8 feet on centers.

1910.23(e)(3)(iii) For structural steel railings, posts and top and intermediate rails shall be of 2-inch by 2-inch by 3/8-inch angles or other metal shapes of equivalent bending strength with posts spaced not more than 8 feet on centers.

1910.23(e)(3)(iv) The anchoring of posts and framing of members for railings of all types shall be of such construction that the completed structure shall be capable of withstanding a load of at least 200 pounds applied in any direction at any point on the top rail.

1910.23(e)(3)(v) Other types, sizes, and arrangements of railing construction are acceptable provided they meet the following conditions:

1910.23(e)(3)(v)(a) A smooth-surfaced top rail at a height above floor, platform, runway, or ramp level of 42 inches nominal;

1910.23(e)(3)(v)(b) A strength to withstand at least the minimum requirement of 200 pounds top rail pressure;

1910.23(e)(3)(v)(c) Protection between top rail and floor, platform, runway, ramp, or stair treads, equivalent at least to that afforded by a standard intermediate rail;

1910.23(e)(4) A standard toeboard shall be 4 inches nominal in vertical height from its top edge to the level of the floor, platform, runway, or ramp. It shall be securely fastened in place and with not more than 1/4-inch clearance above floor level. It may be made of any substantial material either solid or with openings not over 1 inch in greatest dimension. Where material is piled to such height that a standard toeboard does not provide protection, paneling from floor to intermediate rail, or to top rail shall be provided.

1910.23(e)(5)(i) A handrail shall consist of a lengthwise member mounted directly on a wall or partition by means of brackets attached to the lower side of the handrail so as to offer no obstruction to a smooth surface along the top and both sides of the handrail. The handrail shall be of rounded or other section that will furnish an adequate handhold for anyone grasping it to avoid falling. The ends of the handrail should be turned in to the supporting wall or otherwise arranged so as not to constitute a projection hazard.

1910.23(e)(5)(ii) The height of handrails shall be not more than 34 inches nor less than 30 inches from upper surface of handrail to surface of tread in line with face of riser or to surface of ramp.

1910.23(e)(5)(iii) The size of handrails shall be: When of hardwood, at least 2 inches in diameter; when of metal pipe, at least 1 1/2 inches in diameter. The length of brackets shall be such as will give a clearance between handrail and wall or any projection thereon of at least 3 inches. The spacing of brackets shall not exceed 8 feet.

1910.23(e)(5)(iv) The mounting of handrails shall be such that the completed structure is capable of withstanding a load of at least 200 pounds applied in any direction at any point on the rail.

1910.23(e)(6) All handrails and railings shall be provided with a clearance of not less than 3 inches between the handrail or railing and any other object.

1910.23(e)(7) Floor opening covers may be of any material that meets the following strength requirements:

1910.23(e)(7)(i) Trench or conduit covers and their supports, when located in plant roadways, shall be designed to carry a truck rear-axle load of at least 20,000 pounds.

1910.23(e)(7)(ii) Manhole covers and their supports, when located in plant roadways, shall comply with local standard highway requirements if any; otherwise, they shall be designed to carry a truck rear-axle load of at least 20,000 pounds.

1910.23(e)(7)(iii) The construction of floor opening covers may be of any material that meets the strength requirements. Covers projecting not more than 1 inch above the floor level may be used providing all edges are chamfered to an angle with the horizontal of not over 30 degrees. All hinges, handles, bolts, or other parts shall set flush with the floor or cover surface.

1910.23(e)(8) Skylight screens shall be of such construction and mounting that they are capable of withstanding a load of at least 200 pounds applied perpendicularly at any one area on the screen. They shall also be of such construction and mounting that under ordinary loads or impacts, they will not deflect downward sufficiently to break the glass below them. The construction shall be of grillwork with openings not more than 4 inches long or of slatwork with openings not more than 2 inches wide with length unrestricted.

1910.23(e)(9) Wall opening barriers (rails, rollers, picket fences, and half doors) shall be of such construction and mounting that, when in place at the opening, the barrier is capable of withstanding a load of at least 200 pounds applied in any direction (except upward) at any point on the top rail or corresponding member.

1910.23(e)(10) Wall opening grab handles shall be not less than 12 inches in length and shall be so mounted as to give 3 inches clearance from the side framing of the wall opening. The size, material, and anchoring of the grab handle shall be such that the completed structure is capable of withstanding a load of at least 200 pounds applied in any direction at any point of the handle.

1910.23(e)(11) Wall opening screens shall be of such construction and mounting that they are capable of withstanding a load of at least 200 pounds applied horizontally at any point on the near side of the screen. They may be of solid construction, of grillwork with openings not more than 8 inches long, or of slatwork with openings not more than 4 inches wide with length unrestricted.

Fixed stairs (hose towers)

1910.24(a) *Application of requirements.* This section contains specifications for the safe design and construction of fixed general industrial stairs. This classification includes interior and exterior stairs around machinery, tanks, and other equipment, and stairs leading to or from floors, platforms, or pits. This section does not apply to stairs used for fire exit purposes, to construction operations to private residences, or to articulated stairs, such as may be installed on floating roof tanks or on dock facilities, the angle of which changes with the rise and fall of the base support.

1910.24(b) *Where fixed stairs are required.* Fixed stairs shall be provided for access from one structure level to another where operations necessitate regular travel between levels, and for access to operating platforms at any equipment which requires attention routinely during operations. Fixed stairs shall also be provided where access to elevations is daily or at each shift for such purposes as gauging, inspection, regular maintenance, etc., where such work may expose employees to acids, caustics, gases, or other harmful substances, or for which purposes the carrying of tools or equipment by hand is normally required. (It is not the intent of this section to preclude the use of fixed ladders for access to elevated tanks, towers, and similar structures, overhead traveling cranes, etc., where the use of fixed ladders is common practice.) Spiral stairways shall not be permitted except for special limited usage and secondary access situations where it is not practical to provide a conventional stairway. Winding stairways may be installed on tanks and similar round structures where the diameter of the structure is not less than five (5) feet.

1910.24(c) *Stair strength.* Fixed stairways shall be designed and constructed to carry a load of five times the normal live load anticipated but never of less strength than to carry safely a moving concentrated load of 1,000 pounds.

1910.24(d) *Stair width.* Fixed stairways shall have a minimum width of 22 inches.

1910.24(e) *Angle of stairway rise.* Fixed stairs shall be installed at angles to the horizontal of between 30 deg. and 50 deg. Any uniform combination of rise/tread dimensions may be used that will result in a stairway at an angle to the horizontal within the permissible range. Table D-1 gives rise/tread dimensions which will produce a stairway within the permissible range, stating the angle to the horizontal produced by each combination. However, the rise/tread combinations are not limited to those given in Table D-1.

Table D-1

Angle to horizontal	Rise (in inches)	Tread run (in inches)
30 deg. 35′	6 1/2	11
32 deg. 08′	6 3/4	10 3/4
33 deg. 41′	7	10 1/2
35 deg. 16′	7 1/4	10 1/4
36 deg. 52′	7 1/2	10
38 deg. 29′	7 3/4	9 3/4
40 deg. 08′	8	9 1/2
41 deg. 44′	8 1/4	9 1/4
43 deg. 22″	8 3/4	9
45 deg. 00′	8 3/4	8 3/4
46 deg. 38′	9	8 1/2
48 deg. 16′	9 1/4	8 1/4
49 deg. 54′	9 1/2	8

1910.24(f) *Stair treads.* All treads shall be reasonably slip-resistant and the nosings shall be of nonslip finish. Welded bar grating treads without nosings are acceptable providing the leading edge can be readily identified by personnel descending the stairway and provided the tread is serrated or is of definite nonslip design. Rise height and tread width shall be uniform throughout any flight of stairs including any foundation structure used as one or more treads of the stairs.

1910.24(g) *Stairway platforms.* Stairway platforms shall be no less than the width of a stairway and a minimum of 30 inches in length measured in the direction of travel.

1910.24(h) *Railings and handrails.* Standard railings shall be provided on the open sides of all exposed stairways and stair platforms. Handrails shall be provided on at least one side of closed stairways preferably on the right side descending. Stair railings and handrails shall be installed in accordance with the provisions of 1910.23.

1910.24(i) *Vertical clearance.* Vertical clearance above any stair tread to an overhead obstruction shall be at least 7 feet measured from the leading edge of the tread.

Fixed ladders (hose towers/mezzanines)

1910.27(a) *Design requirements.*

1910.27(a)(1) *Design considerations.* All ladders, appurtenances, and fastenings shall be designed to meet the following load requirements:

1910.27(a)(1)(i) The minimum design live load shall be a single concentrated load of 200 pounds.

1910.27(a)(1)(ii) The number and position of additional concentrated live-load units of 200 pounds each as determined from anticipated usage of the ladder shall be considered in the design.

1910.27(a)(1)(iii) The live loads imposed by persons occupying the ladder shall be considered to be concentrated at such points as will cause the maximum stress in the structural member being considered.

1910.27(a)(1)(iv) The weight of the ladder and attached appurtenances together with the live load shall be considered in the design of rails and fastenings.

1910.27(a)(2) *Design stresses.* Design stresses for wood components of ladders shall not exceed those specified in 1910.25. All wood parts of fixed ladders shall meet the requirements of 1910.25(b).

For fixed ladders consisting of wood side rails and wood rungs or cleats, used at a pitch in the range 75 degrees to 90 degrees, and intended for use by no more than one person per section, single ladders as described in 1910.25(c)(3)(ii) are acceptable.

1910.27(b) *Specific features.*

1910.27(b)(1) *Rungs and cleats.*

1910.27(b)(1)(i) All rungs shall have a minimum diameter of three-fourths inch for metal ladders, except as covered in paragraph (b)(7)(i) of this section and a minimum diameter of 1 1/8 inches for wood ladders.

1910.27(b)(1)(ii) The distance between rungs, cleats, and steps shall not exceed 12 inches and shall be uniform throughout the length of the ladder.

1910.27(b)(1)(iii) The minimum clear length of rungs or cleats shall be 16 inches.

1910.27(b)(1)(iv) Rungs, cleats, and steps shall be free of splinters, sharp edges, burrs, or projections which may be a hazard.

1910.27(b)(1)(v) The rungs of an individual-rung ladder shall be so designed that the foot cannot slide off the end.

1910.27(b)(2) *Side rails.* Side rails which might be used as a climbing aid shall be of such cross sections as to afford adequate gripping surface without sharp edges, splinters, or burrs.

1910.27(b)(3) *Fastenings.* Fastenings shall be an integral part of fixed ladder design.

1910.27(b)(4) *Splices.* All splices made by whatever means shall meet design requirements as noted in paragraph (a) of this section. All splices and connections shall have smooth transition with original members and with no sharp or extensive projections.

1910.27(b)(5) *Electrolytic action.* Adequate means shall be employed to protect dissimilar metals from electrolytic action when such metals are joined.

1910.27(b)(6) *Welding.* All welding shall be in accordance with the "Code for Welding in Building Construction" (AWSD1.0-1966).

1910.27(b)(7) *Protection from deterioration.*

1910.27(b)(7)(i) Metal ladders and appurtenances shall be painted or otherwise treated to resist corrosion and rusting when location demands. Ladders formed by individual metal rungs imbedded in concrete, which serve as access to pits and to other areas under floors, are frequently located in an atmosphere that causes corrosion and rusting. To increase rung life in such atmosphere, individual metal rungs shall have a minimum diameter of 1 inch or shall be painted or otherwise treated to resist corrosion and rusting.

1910.27(b)(7)(ii) Wood ladders, when used under conditions where decay may occur, shall be treated with a nonirritating preservative, and the details shall be such as to prevent or minimize the accumulation of water on wood parts.

1910.27(b)(7)(iii) When different types of materials are used in the construction of a ladder, the materials used shall be so treated as to have no deleterious effect one upon the other.

1910.27(c) *Clearance.*

1910.27(c)(1) *Climbing side.* On fixed ladders, the perpendicular distance from the centerline of the rungs to the nearest permanent object on the climbing side of the ladder shall be 36 inches for a pitch of 76 degrees, and 30 inches for a pitch of 90 degrees (fig. D-2 of this section), with minimum clearances for intermediate pitches varying between these two limits in proportion to the slope, except as provided in subparagraphs (3) and (5) of this paragraph.

1910.27(c)(2) *Ladders without cages or wells.* A clear width of at least 15 inches shall be provided each way from the centerline of the ladder in the climbing space, except when cages or wells are necessary.

1910.27(c)(3) *Ladders with cages or baskets.* Ladders equipped with cage or basket are excepted from the provisions of subparagraphs (1) and (2) of this paragraph, but shall conform to the provisions of paragraph (d)(1)(v) of this section. Fixed ladders in smooth-walled wells are excepted from the provisions of subparagraph (1) of this paragraph, but shall conform to the provisions of paragraph (d)(1)(vi) of this section.

1910.27(c)(4) *Clearance in back of ladder.* The distance from the centerline of rungs, cleats, or steps to the nearest permanent object in back of the ladder shall be not less than 7 inches, except that when unavoidable obstructions are encountered.

1910.27(c)(5) *Clearance in back of grab bar.* The distance from the centerline of the grab bar to the nearest permanent object in back of the grab bars shall be not less than 4 inches. Grab bars shall not protrude on the climbing side beyond the rungs of the ladder which they serve.

1910.27(c)(6) *Step-across distance.* The step-across distance from the nearest edge of ladder to the nearest edge of equipment or structure shall be not more than 12 inches, or less than 2 1/2 inches.

1910.27(c)(7) *Hatch cover.* Counterweighted hatch covers shall open a minimum of 60 degrees from the horizontal. The distance from the centerline of rungs or cleats to the edge of the hatch opening on the climbing side shall be not less than 24 inches for offset wells or 30 inches for straight wells. There shall be no protruding potential hazards within 24 inches of the centerline of rungs or cleats; any such hazards within 30 inches of the centerline of the rungs or cleats shall be fitted with deflector plates placed at an angle of 60 degrees from the horizontal.

1910.27(d) *Special requirements.*

1910.27(d)(1) *Cages or wells.*

1910.27(d)(1)(iii) Cages shall extend a minimum of 42 inches above the top of landing, unless other acceptable protection is provided.

1910.27(d)(1)(iv) Cages shall extend down the ladder to a point not less than 7 feet nor more than 8 feet above the base of the ladder, with bottom flared not less than 4 inches, or portion of cage opposite ladder shall be carried to the base.

1910.27(d)(1)(v) Cages shall not extend less than 27 nor more than 28 inches from the centerline of the rungs of the ladder. Cage shall not be less than 27 inches in width. The inside shall be clear of projections. Vertical bars shall be located at a maximum spacing of 40 degrees around the circumference of the cage; this will give a maximum spacing of approximately 9 1/2 inches, center to center.

1910.27(d)(1)(vi) Ladder wells shall have a clear width of at least 15 inches measured each way from the centerline of the ladder. Smooth-walled wells shall be a minimum of 27 inches from the centerline of rungs to the well wall on the climbing side of the ladder. Where other obstructions on the climbing side of the ladder exist, there shall be a minimum of 30 inches from the centerline of the rungs.

1910.27(d)(2) *Landing platforms.* When ladders are used to ascend to heights exceeding 20 feet (except on chimneys), landing platforms shall be provided for each 30 feet of height or fraction thereof, except that, where no cage, well, or ladder safety device is provided, landing platforms shall be provided for each 20 feet of height or fraction thereof. Each ladder section shall be offset from adjacent sections. Where installation conditions (even for a short, unbroken length) require that adjacent sections be offset, landing platforms shall be provided at each offset.

1910.27(d)(2)(i) Where a man has to step a distance greater than 12 inches from the centerline of the rung of a ladder to the nearest edge of structure or equipment, a landing platform shall be provided. The minimum step-across distance shall be 2 1/2 inches.

1910.27(d)(2)(ii) All landing platforms shall be equipped with standard railings and toeboards, so arranged as to give safe access to the ladder. Platforms shall be not less than 24 inches in width and 30 inches in length.

1910.27(d)(2)(iii) One rung of any section of ladder shall be located at the level of the landing laterally served by the ladder. Where access to the landing is through the ladder, the same rung spacing as used on the ladder shall be used from the landing platform to the first rung below the landing.

1910.27(d)(3) *Ladder extensions.* The side rails of through or side-step ladder extensions shall extend 3 1/2 feet above parapets and landings. For through ladder extensions, the rungs shall be omitted from the extension and shall have not less than 18 nor more than 24 inches clearance between rails. For side-step or offset fixed ladder sections, at landings, the side rails and rungs shall be carried to the next regular rung beyond or above the 3 1/2 feet.

1910.27(d)(4) *Grab bars.* Grab bars shall be spaced by a continuation of the rung spacing when they are located in the horizontal position. Vertical grab bars shall have the same spacing as the ladder side rails. Grab-bar diameters shall be the equivalent of the round-rung diameters.

1910.27(d)(5) *Ladder safety devices.* Ladder safety devices may be used on tower, water tank, and chimney ladders over 20 feet in unbroken length in lieu of cage protection. No landing platform is required in these cases. All ladder safety devices such as those that incorporate lifebelts, friction brakes, and sliding attachments shall meet the design requirements of the ladders which they serve.

1910.27(e) *Pitch.*

1910.27(e)(1) *Preferred pitch.* The preferred pitch of fixed ladders shall be considered to come in the range of 75 degrees and 90 degrees with the horizontal.

1910.27(e)(2) *Substandard pitch.* Fixed ladders shall be considered as substandard if they are installed within the substandard pitch range of 60 and 75 degrees with the horizontal. Substandard fixed ladders are permitted only where it is found necessary to meet conditions of installation. This substandard pitch range shall be considered as a critical range to be avoided, if possible.

1910.27(e)(3) *Scope of coverage in this section.* This section covers only fixed ladders within the pitch range of 60 degrees and 90 degrees with the horizontal.

1910.27(e)(4) *Pitch greater than 90 degrees.* Ladders having a pitch in excess of 90 degrees with the horizontal are prohibited.

Sliding Poles

1910.23(a)(8) Every floor hole into which persons can accidently walk shall be guarded by either:

(i) A standard railing with standard toeboard on all exposed sides; or
(ii) A floor hole cover of standard strength and construction. While the cover is not in place, the floor hole shall be constantly attended by someone or shall be protective by a removable standard railing.

Equipment, Tools and Maintenance

Batteries

1910.151(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.

1910.178(g)(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.

1910.178(g)(4) A conveyor, overhead hoist, or equivalent material handling equipment shall be provided for handling batteries.

1910.305(j)(7) *Storage batteries.* Provisions shall be made for sufficient diffusion and ventilation of gases from storage batteries to prevent the accumulation of explosive mixtures.

Jacks

1910.244(a)(1)(i) The operator shall make sure that the jack used has a rating sufficient to lift and sustain the load.

1910.244(a)(1)(ii) The rated load shall be legibly and permanently marked in a prominent location on the jack by casting, stamping, or other suitable means.

Servicing multi-piece and single piece wheels

1910.177(d)(3)(i) Each restraining device or barrier shall have the capacity to withstand the maximum force that would be transferred to it during a rim wheel separation occurring at 150 percent of the maximum tire specification pressure for the type of rim wheel being serviced.

1910.177(d)(5) Current charts or rim manuals containing instructions for the type of wheels being serviced shall be available in the service area.

Power tools

1910.94 *Ventilation.*

1910.94(a)(8) *Scope.* This paragraph (a) applies to all operations where an abrasive is forcibly applied to a surface by pneumatic or hydraulic pressure, or by centrifugal force. It does not apply to steam blasting, or steam cleaning, or hydraulic cleaning methods where work is done without the aid of abrasives.

1910.94(b) *Grinding, polishing, and buffing operations.*

1910.94(b)(1) *Definitions applicable to this paragraph.*

1910.94(b)(1)(i) *Abrasive cutting-off wheels.* Organic-bonded wheels, the thickness of which is not more than one forty-eighth of their diameter for those up to, and including, 20 inches in diameter, and not more than one-sixtieth of their diameter for those larger than 20 inches in diameter, used for a multitude of operations variously known as cutting, cutting off, grooving, slotting, coping, and jointing, and the like. The wheels may be "solid" consisting of organic-bonded abrasive material throughout, "steel centered" consisting of a steel disc with a rim of organic-bonded material molded around the periphery, or of the "inserted tooth" type consisting of a steel disc with organic-bonded abrasive teeth or inserts mechanically secured around the periphery.

1910.94(b)(1)(ii) *Belts.* All power-driven, flexible, coated bands used for grinding, polishing, or buffing purposes.

1910.94(b)(1)(iv) *Cradle.* A movable fixture, upon which the part to be ground or polished is placed.

1910.94(b)(1)(v) *Disc wheels.* All power-driven rotatable discs faced with abrasive materials, artificial or natural, and used for grinding or polishing on the side of the assembled disc.

1910.94(b)(1)(vi) *Entry loss.* The loss in static pressure caused by air flowing into a duct or hood. It is usually expressed in inches of water gauge.

1910.94(b)(1)(viii) *Grinding wheels.* All power-driven rotatable grinding or abrasive wheels, except disc wheels as defined in this standard, consisting of abrasive particles held together by artificial or natural bonds and used for peripheral grinding.

1910.94(b)(1)(xiii) *Polishing and buffing wheels.* All power-driven rotatable wheels composed all or in part of textile fabrics, wood, felt, leather, paper, and may be coated with abrasives on the periphery of the wheel for purposes of polishing, buffing, and light grinding.

1910.94(b)(1)(xiv) *Portable grinder.* Any power-driven rotatable grinding, polishing, or buffing wheel mounted in such manner that it may be manually manipulated.

1910.94(b)(1)(xv) *Scratch brush wheels.* All power-driven rotatable wheels made from wire or bristles, and used for scratch cleaning and brushing purposes.

1910.94(b)(2) *Application.* Wherever dry grinding, dry polishing or buffing is performed, and employee exposure, without regard to the use of respirators, exceeds the permissible exposure limits prescribed in 1910.1000 or other sections of this part, a local exhaust ventilation system shall be provided and used to maintain employee exposures within the prescribed limits.

1910.94(b)(3)(ii) Grinding wheels on floor stands, pedestals, benches, and special-purpose grinding machines and abrasive cutting-off wheels shall have not less than the minimum exhaust volumes shown in Table G-4 with a recommended minimum duct velocity of 4,500 feet per minute in the branch and 3,500 feet per minute in the main. The entry losses from all hoods except the vertical-spindle disc grinder hood, shall equal 0.65 velocity pressure for a straight takeoff and 0.45 velocity pressure for a tapered takeoff.

Table G-4 — Grinding and abrasive cutting-off wheels

Wheel diameter (inches)	Wheel width (inches)	Minimum exhaust volume (feet (3)/min.)
To 9	1 1/2	220
Over 9 to 16	2	390
Over 16 to 19	3	500
Over 19 to 24	4	610
Over 24 to 30	5	880
Over 30 to 36	6	1,200

For any wheel wider than wheel diameters shown in Table G-4, increase the exhaust volume by the ratio of the new width to the width shown.

1910.94(b)(3)(iii) Scratch-brush wheels and all buffing and polishing wheels mounted on floor stands, pedestals, benches, or special-purpose machines shall have not less than the minimum exhaust volume shown in Table G-5.

Table G-5 — Buffing and polishing wheels

Wheel diameter (inches)	Wheel width (inches)	Minimum exhaust volume (feet (3)/min.)
To 9	2	300
Over 9 to 16	3	500
Over 16 to 19	4	610
Over 19 to 24	5	740
Over 24 to 30	6	1,040
Over 30 to 36	6	1,200

1910.169 *Air receivers.*

1910.169(a) *General requirements.*

1910.169(a)(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 as 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.

1910.169(a)(2) New and existing equipment.

1910.169(a)(2)(i) 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, which is incorporated by reference as specified in Sec. 1910.6.

1910.169(a)(2)(ii) 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.

1910.169(b) *Installation and equipment requirements.*

1910.169(b)(1) *Installation.* Air receivers shall be so installed that all drains, handholes, and manholes therein are easily accessible. Under no circumstances shall an air receiver be buried underground or located in an inaccessible place.

1910.169(b)(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.

1910.169(b)(3) *Gauges and valves.*

1910.169(b)(3)(i) Every air receiver shall be equipped with an indicating pressure gauge (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.

1910.169(b)(3)(ii) No valve of any type shall be placed between the air receiver and its safety valve or valves.

1910.169(b)(3)(iii) Safety appliances, such as safety valves, indicating devices and controlling devices, shall be constructed, located, and installed so that they cannot be readily rendered inoperative by any means, including the elements.

1910.169(b)(3)(iv) All safety valves shall be tested frequently and at regular intervals to determine whether they are in good operating condition.

1910.212(a) *Machine guarding.*

1910.212(a)(1) *Types of guarding.* One or more methods of machine guarding shall be provided to protect the operator and other employees in the machine area from hazards such as those created by point of operation, ingoing nip points, rotating parts, flying chips and sparks. Examples of guarding methods are-barrier guards, two-hand tripping devices, electronic safety devices, etc.

1910.212(a)(2) *General requirements for machine guards.* Guards shall be affixed to the machine where possible and secured elsewhere if for any reason attachment to the machine is not possible. The guard shall be such that it does not offer an accident hazard in itself.

1910.212(a)(3) *Point of operation guarding.*

1910.212(a)(3)(i) Point of operation is the area on a machine where work is actually performed upon the material being processed.

1910.212(a)(3)(ii) The point of operation of machines whose operation exposes an employee to injury, shall be guarded. The guarding device shall be in conformity with any appropriate standards therefor, or, in the absence of applicable specific standards, shall be so designed and constructed as to prevent the operator from having any part of his body in the danger zone during the operating cycle.

1910.212(a)(3)(iii) Special handtools for placing and removing material shall be such as to permit easy handling of material without the operator placing a hand in the danger zone. Such tools shall not be in lieu of other guarding required by this section, but can only be used to supplement protection provided.

1910.212(a)(5) *Exposure of blades.* When the periphery of the blades of a fan is less than seven (7) feet above the floor or working level, the blades shall be guarded. The guard shall have openings no larger than one-half (1/2) inch.

1910.212(b) *Anchoring fixed machinery.* Machines designed for a fixed location shall be securely anchored to prevent walking or moving.

1910.243(a) *Portable powered tool.*

1910.243(a)(1) *Portable circular saws.*

1910.243(a)(1)(i) All portable, power-driven circular saws having a blade diameter greater than 2 in. shall be equipped with guards above and below the base plate or shoe. The upper guard shall cover the saw to the depth of the teeth, except for the minimum arc required to permit the base to be tilted for bevel cuts. The lower guard shall cover the saw to the

depth of the teeth, except for the minimum arc required to allow proper retraction and contact with the work. When the tool is withdrawn from the work, the lower guard shall automatically and instantly return to covering position.

1910.243(a)(1)(ii) Paragraph (a)(1)(i) of this section does not apply to circular saws used in the meat industry for meat cutting purposes.

1910.243(a)(2) *Switches and controls.*

1910.243(a)(2)(i) All hand-held powered circular saws having a blade diameter greater than 2 inches, electric, hydraulic or pneumatic chain saws, and percussion tools without positive accessory holding means shall be equipped with a constant pressure switch or control that will shut off the power when the pressure is released. All hand-held gasoline powered chain saws shall be equipped with a constant pressure throttle control that will shut off the power to the saw chain when the pressure is released.

1910.243(a)(2)(ii) All hand-held powered drills, tappers, fastener drivers, horizontal, vertical, and angle grinders with wheels greater than 2 inches in diameter, disc sanders with discs greater than 2 inches in diameter, belt sanders, reciprocating saws, saber, scroll, and jig saws with blade shanks greater than a nominal one-fourth inch, and other similarly operating powered tools shall be equipped with a constant pressure switch or control, and may have a lock-on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on.

1910.243(a)(2)(iii)(a) All other hand-held powered tools, such as, but not limited to, platen sanders, grinders with wheels 2 inches in diameter or less, disc sanders with discs 2 inches in diameter or less, routers, planers, laminate trimmers, nibblers, shears, saber, scroll, and jig saws with blade shanks a nominal one-fourth of an inch wide or less, may be equipped with either a positive "on-off" control, or other controls as described by paragraph (a)(2)(i) and (ii) of this section.

1910.243(a)(2)(iii)(b) Saber, scroll, and jig saws with nonstandard blade holders may use blades with shanks which are nonuniform in width, provided the narrowest portion of the blade shank is an integral part in mounting the blade.

1910.243(a)(2)(iii)(c) Blade shank width shall be measured at the narrowest portion of the blade shank when saber, scroll, and jig saws have nonstandard blade holders.

1910.243(a)(2)(iii)(d) "Nominal" in this subparagraph means + or - 0.05 inch.

1910.243(a)(2)(iv) The operating control on hand-held power tools shall be so located as to minimize the possibility of its accidental operation, if such accidental operation would constitute a hazard to employees.

1910.243(a)(2)(v) This subparagraph does not apply to concrete vibrators, concrete breakers, powered tampers, jack hammers, rock drills, garden appliances, household and kitchen appliances, personal care appliances, medical or dental equipment, or to fixed machinery.

1910.243(a)(3) Portable belt sanding machines. Belt sanding machines shall be provided with guards at each nip point where the sanding belt runs onto a pulley. These guards shall effectively prevent the hands or fingers of the operator from coming in contact with the nip points. The unused run of the sanding belt shall be guarded against accidental contact.

1910.243(a)(4) *Cracked saws.* All cracked saws shall be removed from service.

1910.243(a)(5) *Grounding.* Portable electric powered tools shall meet the electrical requirements of subpart S of this part.

1910.243(b) *Pneumatic powered tools and hose.*

1910.243(b)(1) *Tool retainer.* A tool retainer shall be installed on each piece of utilization equipment which, without such a retainer, may eject the tool.

1910.243(b)(2) *Airhose.* Hose and hose connections used for conducting compressed air to utilization equipment shall be designed for the pressure and service to which they are subjected.

1910.243(c)(5) *Mounting and inspection of abrasive wheels.*

1910.243(c)(5)(i) Immediately before mounting, all wheels shall be closely inspected and sounded by the user (ring test, see Subpart O, 1910.215(d)(1)) to make sure they have not been damaged in transit, storage, or otherwise. The spindle speed of the machine shall be checked before mounting of the wheel to be certain that it does not exceed the maximum operating speed marked on the wheel.

1910.243(c)(5)(ii) Grinding wheels shall fit freely on the spindle and remain free under all grinding conditions. A controlled clearance between the wheel hole and the machine spindle (or wheel sleeves or adaptors) is essential to avoid excessive pressure from mounting and spindle expansion. To accomplish this, the machine spindle shall be made to nominal (standard) size plus zero minus .002 inch, and the wheel hole shall be made suitably oversize to assure safety clearance under the conditions of operating heat and pressure.

1910.243(c)(5)(iii) All contact surfaces of wheels, blotters, and flangers shall be flat and free of foreign matter.

1910.243(c)(5)(iv) When a bushing is used in the wheel hole it shall not exceed the width of the wheel and shall not contact the flanges.

1910.243(c)(5)(v) Requirements for the use of flanges and blotters, see Subpart O, 1910.215(c).

1910.243(c)(6) *Excluded machinery.* Natural sandstone wheels and metal, wooden, cloth, or paper discs, having a layer of abrasive on the surface are not covered by this paragraph.

Abrasive wheel machinery

1910.215(a)(2) *Guard design.* The safety guard shall cover the spindle end, nut, and flange projections. The safety guard shall be mounted so as to maintain proper alignment with the wheel, and the strength of the fastenings shall exceed the strength of the guard.

1910.215(a)(4) *Work rests.* On offhand grinding machines, work rests shall be used to support the work. They shall be of rigid construction and designed to be adjustable to compensate for wheel wear. Work rests shall be kept adjusted closely to the wheel with a maximum opening of one-eighth inch to prevent the work from being jammed between the wheel and the rest, which may cause wheel breakage. The work rest shall be securely clamped after each adjustment. The adjustment shall not be made with the wheel in motion.

1910.215(b)(3) *Bench and floor stands.* The angular exposure of the grinding wheel periphery and sides for safety guards used on machines known as bench and floor stands should not exceed 90 deg. or one-fourth of the periphery. This exposure shall begin at a point not more than 65 deg. above the horizontal plane of the wheel spindle.

Compressed gases

1910.101(b) *Compressed gases.* The in-plant handling, storage, and utilization of all compressed gases in cylinders, portable tanks, rail tankcars, or motor vehicle cargo tanks shall be in accordance with Compressed Gas Association Pamphlet P-1-1965.

1910.101(c) *Safety relief devices for compressed gas containers.* Compressed gas cylinders, portable tanks, and cargo tanks shall have pressure relief devices installed and maintained in accordance with Compressed Gas Association Pamphlets S-l. l-1963 and 1965 addenda and S- 1.2-1963.

1910.110 Storage and handling of liquefied petroleum gases.

1910.110(a) Definitions applicable to this section. As used in this section:

1910.110(a)(3) Container assembly - An assembly consisting essentially of the container and fittings for all container openings, including shutoff valves, excess flow valves, liquid-level gaging devices, safety relief devices, and protective housing.

1910.110(a)(4) Containers - All vessels, such as tanks, cylinders, or drums, used for transportation or storing liquefied petroleum gases.

1910.110(a)(5) DOT - Department of Transportation.

1910.110(a)(6) DOT container - A container constructed in accordance with the applicable requirements of 49 CFR Chapter 1.

1910.110(a)(7) "Liquefied petroleum gases" - "LPG" and "LP-Gas" - Any material which is composed predominantly of any of the following hydrocarbons, or mixtures of them; propane, propylene, butanes (normal butane or iso-butane), and butylenes.

1910.110(a)(16) DOT Specifications - regulations of the Department of Transportation published in 49 CFR Chapter I.
DOT cylinders-cylinders meeting the requirements of 49 CFR Chapter I.

1910.110(b) Basic rules -All liquefied petroleum gases shall be effectively odorized by an approved agent of such character as to indicate positively, by distinct odor, the presence of gas down to concentration in air of not over one-fifth the lower limit of flammability. Odorization, however, is not required if harmful in the use of further processing of the liquefied petroleum gas, or if odorization will serve no useful purpose as a warning agent in such use or further processing.

1910.110(b)(2) *Approval of equipment and systems.*

1910.110(b)(2)(i) Each system utilizing DOT containers in accordance with 49 CFR Part 178 shall have its container valves, connectors, manifold valve assemblies, and regulators approved.

1910.110(b)(6) *Location of containers and regulating equipment.*

1910.110(b)(6)(i) Containers, and first stage regulating equipment if used, shall be located outside of buildings, except under one or more of the following:

1910.110(b)(6)(i)(a) In buildings used exclusively for container charging, vaporization pressure reduction, gas mixing, gas manufacturing, or distribution.

1910.110(e)(1)(ii) Fuel containers and pertinent equipment for internal combustion engines using liquefied petroleum gas where installation is of the stationary type are covered by paragraph (d) of this section. This paragraph does not apply to containers for transportation of liquefied petroleum gases nor to marine fuel use. All requirements of paragraph (b) of this section apply to this paragraph, unless otherwise noted in paragraph (b) of this section.

1910.110(e)(2) *General.*

1910.110(e)(2)(i) Fuel may be used from the cargo tank of a truck while in transit, but not from cargo tanks on trailers or semitrailers. The use of fuel from the cargo tanks to operate stationary engines is permitted providing wheels are securely blocked.

1910.110(e)(2)(ii) Passenger-carrying vehicles shall not be fueled while passengers are on board.

1910.110(e)(2)(iii) Industrial trucks (including lift trucks) equipped with permanently mounted fuel containers shall be charged outdoors. Charging equipment shall comply with the provisions of paragraph (h) of this section.

1910.110(e)(2)(iv) LP-Gas fueled industrial trucks shall comply with the Standard for Type Designations, Areas of Use, Maintenance and Operation of Powered Industrial Trucks, NFPA 505-1969, which is incorporated by reference as specified in Sec. 1910.6.

1910.110(e)(2)(v) Engines on vehicles shall be shut down while fueling if the fueling operation involves venting to the atmosphere.

Hazard materials

1910.1200(e)(1) *Hazard Communication Program.* Employers shall develop, implement, and maintain at each workplace, a written hazard communication program which at least describes how the criteria specified in paragraphs (f), (g), and (h) of this section for labels and other forms of warning, material safety data sheets, and employee information and training will be met, and which also includes the following:

1910.1200(e)(1)(i) A list of the hazardous chemicals known to be present using an identity that is referenced on the appropriate material safety data sheet (the list may be compiled for the workplace as a whole or for individual work areas); and,

1910.1200(e)(1)(ii) The methods the employer will use to inform employees of the hazards of non-routine tasks (for example, the hazards associated with chemicals contained in unlabeled pipes in their work areas.

1910.1200(f)(1) *Labelling.* The chemical manufacturer, importer, or distributor shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged or marked with the following information:

1910.1200(f)(1)(i) Product identifier;

1910.1200(f)(1)(ii) Signal word;

1910.1200(f)(1)(iii) Hazard statement(s);

1910.1200(f)(1)(iv) Pictogram(s);

1910.1200(f)(1)(v) Precautionary statement(s); and,

1910.1200(f)(1)(vi) Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party.

1910.1200(f)(8) The employer is not required to label portable containers into which hazardous chemicals are transferred from labeled containers, and which are intended only for the immediate use of the employee who performs the transfer. For purposes of this section, drugs which are dispensed by a pharmacy to a health care provider for direct administration to a patient are exempted from labeling.

1910.1200(f)(9) The employer shall not remove or deface existing labels on incoming containers of hazardous chemicals, unless the container is immediately marked with the required information.

1910.1200(f)(10) The employer shall ensure that labels or other forms of warning are legible, in English, and prominently displayed on the container, or readily available in the work area throughout each work shift. Employers having employees who speak other languages may add the information in their language to the material presented, as long as the information is presented in English as well.

1910.1200(g)(1) *Material safety data sheets.* Chemical manufactures and importers shall obtain or develop a material safety data sheet for each hazardous chemical they produce or import. Employers shall have a material safety data sheet in the workplace for each hazardous chemical which they use.

Apparatus Area

1910.22(a)(1) All places of employment, passageways, storerooms, and service rooms shall be kept clean and orderly and in a sanitary condition.

1910.22(a)(2) 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.

1910.22(b)(2) Permanent aisles and passageways shall be appropriately marked.

1910.22(d)(1) In every building or other structure, or part thereof, used for mercantile, business, industrial, or storage purposes, the loads approved by the building official shall be marked on plates of approved design which shall be supplied and securely affixed by the owner of the building, or his duly authorized agent, in a conspicuous place in each space to which they relate. Such plates shall not be removed or defaced but, if lost, removed, or defaced, shall be replaced by the owner or his agent.

1910.22(d)(2) It shall be unlawful to place, or cause, or permit to be placed, on any floor or roof of a building or other structure a load greater than that for which such floor or roof is approved by the building official.

1910.144(a)(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."

1910.1000 *Air contaminants.*

Exterior Areas

Parking areas

1910.144(a)(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."

1910.304(d) *Location of outdoor lamps.* Lamps for outdoor lighting shall be located below all live conductors, transformers, or other electric equipment, unless such equipment is controlled by a disconnecting means that can be locked in the open position or unless adequate clearances or other safeguards are provided for lamping operations.

Refueling areas

1910.106(g)(8) There shall be no smoking or open flames in the areas used for fueling, servicing fuel systems for internal combustion engines, receiving or dispensing of flammable or combustible liquids. Conspicuous and legible signs prohibiting smoking shall be posted within sight of the customer being served. The motors of all equipment being fueled shall be shut off during the fueling operation.

1910.178(f)(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).

1910.307(c) *Electrical installations.* Equipment, wiring methods, and installations of equipment in hazardous (classified) locations shall be intrinsically safe, approved for the hazardous (classified) location, or safe for the hazardous (classified) location. Requirements for each of these options are as follows:

1910.307(c)(1) *Intrinsically safe.* Equipment and associated wiring approved as intrinsically safe is permitted in any hazardous (classified) location for which it is approved;

1910.307(c)(2) *Approved for the hazardous (classified) location.*

1910.307(c)(2)(i) Equipment shall be approved not only for the class of location, but also for the ignitable or combustible properties of the specific gas, vapor, dust, or fiber that will be present.

Note to paragraph (c)(2)(i) of this section: NFPA 70, *The National Electrical Code,* lists or defines hazardous gases, vapors, and dusts by "Groups" characterized by their ignitable or combustible properties.

Marine areas

1910.106(a)(22) Marine service station shall mean that portion of a property where flammable or combustible liquids used as fuels are stored and dispensed from fixed equipment on shore, piers, wharves, or floating docks into the fuel tanks of self-propelled craft, and shall include all facilities used in connection therewith.

1910.106(g)(4)(i)(b) Dispensing shall be by approved dispensing units with or without integral pumps and may be located on open piers, wharves, or floating docks or on shore or on piers of the solid fill type.

1915.75(a) A gangway, ramp or permanent stairway of not less than 20 inches walking surface, of adequate strength, maintained in safe repair and securely fastened, shall be provided between a floating dry dock and the pier or bulkhead.

1915.75(b) Each side of such gangway, ramp or permanent stairway, including those which are used for access to wing walls from dry dock floors, shall have a railing with a midrail. Such railings on gangways or ramps shall be approximately 42 inches in height; and railings on permanent stairways shall be not less than approximately 30 or more than approximately 34 inches in height. Rails shall be of wood, pipe, chain, wire, or rope, and shall be kept taut at all times.

1915.75(c) Railings meeting the requirements of paragraph (b) of this section shall be provided on the means of access to and from the floors of graving docks.

1915.75(d) Railings approximately 42 inches in height, with a midrail, shall be provided on the edges of wing walls of floating dry docks and on edges of graving docks.

1915.75(e) When employees are working on the floor of a floating dry dock where they are exposed to the hazard of falling into the water, the end of the dry dock shall be equipped with portable stanchions and 42 inch railings with a midrail. When such a railing would be impracticable or ineffective, other effective means shall be provided to prevent employees from falling into the water.

1915.75(f) Access to wing walls from floors of dry docks shall be by ramps, permanent stairways or ladders meeting the applicable requirements of 1915.72.

1915.75(g) Catwalks on stiles of marine railways shall be no less than 20 inches wide and shall have on at least one side a guardrail and midrail meeting the requirements of 1915.71(j)(1) and (2).

Appendix E: Organizations With Related Standards

Organization	Information provided
AABC Associated Air Balance Council www.aabc.com	Ventilation and exhaust system design requirements.
AACE International Association for the Advancement of Cost Engineering www.aacei.org	Guidelines and standards for preparing cost estimates for construction projects.
AAMA American Architectural Manufacturers Association www.aamanet.org	Specifications and standard for various building products. Building products information regarding strength of materials and fire resistivity.
AAMI Association for the Advancement of Medical Instrumentation www.aami.org	Specifications for the selection, use and maintenance of emergency medical equipment that is used in hospitals and the fire service.
AASHTO American Association of State Highway and Transportation Officials www.transportation.org	Standards for road and highway design. Refer to for specifying access road design and traffic control for fire and emergency response facilities.
ABMA American Boiler Manufacturers Association www.abma.com	Standards and specifications for heating and hot water systems. High efficiency equipment designs for energy conservation.
ABYC American Boat and Yacht Council, Inc. www.abycinc.org	Standards and specifications for the design and build of emergency response vessels, such as fire boats and search and rescue equipment.
ACGIH American Conference of Governmental Industrial Hygienists www.acgih.org	National standards for employee safety, health and toxicological issues. Resource for ventilation and indoor air quality, hazardous materials communications, bloodborne pathogens, noise and hearing conservation, and ergonomics.

Organization	Information provided
ACPA American Concrete Pavement Association www.acpa.org	Specification for the design and installation of concrete roads, driveways and foundations.
ACI American Concrete Institute www.concrete.org	Testing and evaluating structural concrete mixtures. Specifications for the selection of concrete for strength, fire resistivity and seismic integrity.
ACS American Chemical Society www.acs.org	Standards and information for the development, use, and disposal of industrial chemicals. Resource for selecting building coatings and determining risks to adjacent properties, pesticides and overall environmental health and safety.
ACSM American Congress on Surveying and Mapping http://landsurveyorsunited.com/acsm	Standards for the surveying and mapping of project sites, environmental issues, geological topography, and cartography.
AEIC Association of Edison Illuminating Companies www.aeic.org	Standards for power generation, lighting, heat and other uses of electrical power.
AEMA Asphalt Emulsion Manufacturers Association www.aema.org	Standards for roadway, driveway, foundation and roof sealing products. Beneficial in the reduction of damage due to flooding, freezing and chemical agents.
AGA American Gas Association www.aga.org	Testing and certification of natural gas, propane and other hydrocarbon-gas fired equipment. Boilers, furnaces and dryers are influenced by this association.
AHA American Heart Association www.heart.org	Guidelines for minimizing the risk of heart disease. Guidelines for establishing exercise programs and facilities, emergency services, CPR, and walk-in services.
AHAM Association of Home Appliance Manufacturers www.aham.org	Develops standards for the home appliance industry, and advocates for appliance safety and energy efficiency.

Organization	Information provided
AHRI Air Conditioning, Heating and Refrigeration Institute www.ahrinet.org	Develops standards and guidelines for the production of HVAC and refrigeration products. Also, has a certification program.
AIA American Institute of Architects www.aia.org	Standards for the design and building of facilities and structures. Important resource for new construction and renovating historical buildings.
AIChE American Institute of Chemical Engineers www.aiche.org	Standards and technical manuals for the production and use of chemical products.
AIHA American Industrial Hygiene Association www.aiha.org	Guidelines for employee safety, health and toxicological issues. Resource for ventilation and indoor air quality, hazardous materials communications, bloodborne pathogens, noise and hearing conservation, and ergonomics.
AISC American Institute of Steel Construction www.aisc.org	Standards and specifications for the fabrication and use of steel products, and design standards for steel construction.
AISI American Iron & Steel Institute www.steel.org	Design standards and documents for the use of steel and iron products in the construction industry.
AITC American Institute of Timber Construction www.aitc-glulam.org	Technical information on the design and use of timber products in the construction industry. Standards for structural integrity, fire resistivity, and preservation.
ALA American Lighting Association www.americanlightingassoc.com	Guidelines and standards for the manufacturing and installation of lighting equipment. Useful for the design and installation of general, emergency and security lighting systems.
ALSC American Lumber Standard Committee www.alsc.org	Standards for the manufacture and use of lumber and wood products in construction.

Organization	Information provided
AMCA Air Movement and Control Association International, Inc. www.amca.org	Standards for the application and certification of ventilation and exhaust systems. Guidelines for indoor air quality and vehicle exhaust control.
ANSI American National Standards Institute www.ansi.org	National consensus safety standards for design, installation and use of various types of equipment. Recognized as one of the major safety standard organizations.
APA The Engineered Wood Association www.apawood.org	Provides field, quality, and technical services for plywood, oriented strand board, glued-laminated timber (glulam), wood I-joists and structural composite lumber.
APHA American Public Health Association www.apha.org	Standards for minimizing health risk when working with the public. A source of information for emergency medical providers.
API American Petroleum Institute www.api.org	Standards for fuel processing, storage and handling. Useful in design in fuel dispensing at fire and emergency services facilities.
APWA American Public Works Association www.apwa.net	Standard for public and private water supplies and sewer systems. Quality control and certification of water supply pipes, valves and other appurtenances.
ARM Asphalt Roofing Manufacturers Association www.asphaltroofing.org	Quality control standards and product certification of roofing systems and materials.
ASCE American Society of Civil Engineers www.asce.org	Standards, manuals, reports on engineering practices relating to structures, concrete, steel and design practices.
ASHRAE American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. www.ashrae.org	Standards and certification of heating, cooling, exhaust and ventilation systems and equipment.
ASME American Society of Mechanical Engineers www.asme.org	Standards, certification of boilers, pressure vessels, welding and other mechanical systems.

Organization	Information provided
ASNT American Society for Nondestructive Testing, Inc. www.asnt.org	Testing standards for metal fatigue, concrete strength and other material assemblies. Listing of qualified testing agencies and vendors.
ASSE American Society of Safety Engineers www.asse.org	Society of engineers, technicians and consultants specializing in the field of safety engineering. Publications and interpretation of safety laws, ordinances and standards.
ASSE International American Society of Sanitary Engineering www.asse-plumbing.org	Standards and guidelines for the management of solid waste and hazardous materials.
ASTM American Society for Testing and Materials www.astm.org	Certification of testing and materials laboratories. Standards and guidelines on a variety of building supplies and other products.
AWCI Association of The Wall and Ceiling Industry www.awci.org	Standards for wall and ceiling assemblies and materials.
AWI Architectural Woodwork Institute www.awinet.org	Standards for use, function and selection of wood products.
AWPA American Wood Protection Association www.awpa.com	Standards for the preservation of wood products. Fire-resistive, moisture, and insect decay are key elements.
AWS American Welding Society www.aws.org	Standards, codes and specifications for the safety, health and quality assurance of welding operations.
AWWA American Water Works Association www.awwa.org	Standard for public and private water supplies and sewage systems. Quality control and certification of water supply pipes, valves, etc.
BCI Battery Council International www.batterycouncil.org	Standards for the design of electrical storage batteries, safe handling and storage, and emergency power systems.

Organization	Information provided
BIA Brick Industry Association www.gobrick.com	Technical notes on the application of clay bricks in the construction industry.
BIFMA Business & Industrial Furniture Manufacturers Association www.bifma.org	Standards for the design and manufacturing of furniture. Key elements include ergonomics, fire resistant and functionality.
BSSC Building Seismic Safety Council (A division of the National Institute of Building Sciences) www.nibs.org	Deals with the complex technical, regulatory, social and economic issues involved in developing and promulgating building earthquake risk mitigation.
CAGI Compressed Air & Gas Institute www.cagi.org	Standards for compressed air and gas cylinders used in cascade systems.
CGA Compressed Gas Association www.cganet.com/	Standards for the storage and handling of compressed gases. Safety standards for cylinder storage, pressure relief valve and piping systems.
CISCA Ceilings & Interior Systems Construction Association www.cisca.org	Guidelines and development of ceilings and interior finish systems.
CISPI Cast Iron Soil Pipe Institute www.cispi.org	Standards for the manufacture and installation of cast iron piping systems.
CLFMI Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	Standards for the design and installation of chain link fencing.
CPB Contractors Pump Bureau (Division of the Association of Equipment Manufacturers) www.aem.org	Develops and publishes industry consensus standards for contractor pumps and auxiliary equipment.
CRSI Concrete Reinforcing Steel Institute www.crsi.org	Standards, guidelines and testing information about structural concrete assemblies.

Organization	Information provided
CSI Construction Specifications Institute www.csinet.org	Standard specifications for construction project design documents.
DHI Door and Hardware Institute www.dhi.org	Standards and specifications for door hardware, as well as fire ratings, ADA compliance and product test information.
EGSA Electrical Generating Systems Association www.egsa.org	Information about emergency power generators.
EIMA Exterior Insulation Manufacturers Association www.eima.com	Standard for insulation as a building material. Key elements include: energy conservation, moisture control, durability and design.
EJMA Expansion Joint Manufacturers Association www.ejma.org	Standards and information for expansion joint products. Key elements are seismic and structural strain relief.
F.I.E.R.O. Fire Industry Education Resource Organization www.fierofirestation.com	Annual symposium on the design of fire stations. Subject matter experts cover a wide array of topics. Event includes design award competition and exhibits.
GA Gypsum Association www.gypsum.org	Standards for gypsum use. Key elements are fire rating and structural test information.
HEI Heat Exchange Institute www.heatexchange.org	Standards and information for heating and cooling equipment.
HFES Human Factors and Ergonomics Society www.hfes.org	Standards and information for the study and prevention of injuries caused by poorly designed work spaces.
IAFC International Association of Fire Chiefs www.iafc.org	Information about fire and emergency services health and safety.

Organization	Information provided
IAFF International Association of Fire Fighters www.iaff.org	Multiple reports and resources about the health and safety of emergency responders.
IAPMO International Association of Plumbing and Mechanical Officials www.iapmo.org	Standards, materials, installation and product materials on plumbing fixtures and piping.
ICAC Institute of Clean Air Companies www.icac.com	Standards and information on electrostatic, fabric and charcoal air filtering systems.
ICC International Code Council www.iccsafe.org	Model codes and standards used in the design, build and compliance process to construct safe, sustainable, affordable and resilient structures. Adopted by many jurisdictions.
IEEE Institute of Electrical and Electronics Engineers www.ieee.org	Standards for the electrical and electronics industry.
IES Illuminating Engineering Society www.ies.org	Lighting energy management, design guides, technical memos, education and publications.
IMSA International Municipal Signal Association www.imsasafety.org	Information on the design of traffic control systems.
KCMA Kitchen Cabinet Manufacturers Association www.kcma.org	Standards and products for kitchens and cafeterias; certification program.
LPI Lightning Protection Institute www.lightning.org	Educational information on minimizing the risks to life, structures and equipment from lightning.
MBMA Metal Building Manufacturers Association www.mbma.com	Standards and product information on metal building construction techniques.

Organization	Information provided
NCMA National Concrete and Masonry Association www.ncma.org	Standards and product information on concrete foundations, walls and other structures.
National Drinking Water Alliance http://www.drinkingwateralliance.com	Nationwide clearinghouse for essential drinking water research and resources.
NEII National Elevator Industry, Inc. www.neii.org	Standards and information on the design and installation of elevators.
NEMA National Electrical Manufacturers Association www.nema.org	Standards and product information on electrical wiring installation and repair.
NETA InterNational Electrical Testing Association www.netaworld.org	Standards for testing electrical circuits and appliances.
NFPA National Fire Protection Association www.nfpa.org	Multiple standards related to fire protection and life safety, as well as multiple standards related to emergency responder health and safety.
NFP(A) National Fluid Power Association www.nfpa.com	Standard practices and information for estimating building water flow requirements.
NFSA National Fire Sprinkler Association www.nfsa.org	Technical assistance and educational material on the benefits of fire sprinkler systems.
NIA National Insulation Association www.insulation.org	Technical bulletins and guides on insulation.
NPGA National Propane Gas Association www.npga.org	Standards and product information on the installation and use of propane gas.
NRCA National Roofing Contractors Association www.nrca.net	Guidelines for roof materials and construction.

Organization	Information provided
NSC National Safety Council www.nsc.org	Multiple publications on a wide array of safety areas, including ergonomics, electrical, air quality, fall protection, and industrial hygiene.
NSF National Sanitation Foundation http://www.nsf.org	Develops public health standards and certifications that help protect food, water, consumer products and the environment.
NTMA National Terrazzo and Mosaic Association, Inc. www.ntma.com	Specifications and design tools for the installation of terrazzo and mosaic floors.
NVFC National Volunteer Fire Council www.nvfc.org	Publications and information about the health and safety of emergency responders.
PCI Precast/Prestressed Concrete Institute www.pci.org	Standards and product information on precast concrete use in building construction.
PDI Plumbing and Drainage Institute www.pdionline.org	Standards and product information on plumbing and drain fixtures.
PPI Plastic Pipe Institute www.plasticpipe.org	Product information on the selection and installation of plastic piping.
PTI Post-Tensioning Institute www.post-tensioning.org	Code development, education and research related to the use and installation of building posts.
SDI Steel Deck Institute www.sdi.org	Standards and product information on steel decks and platforms.
SJI Steel Joist Institute www.steeljoist.org	Publications and design tools for steel joists.
SSPC Steel Structures Painting Council www.sspc.org	Recommend practices for the painting of steel structures.

Organization	Information provided
STI/SPFA Steel Tank Institute/Steel Plate Fabricators Association www.steeltank.com	Standards and product information on specification and use of steel tanks for above- and below-ground applications.
SWI Steel Windows Institute www.steelwindows.com	Standards and product information on steel windows.
UL Underwriters' Laboratories www.ul.com	Standards and product information. Listed products catalogue of electrical, fire and safety equipment.
USGBC U.S. Green Building Council (A division of the EPA) www.usgbc.org	Resources for green buildings, including Leadership in Energy and Environmental Design (LEED).
VFIS Volunteer Firemen's Insurance Service, Inc. www.vfis.com	Information on property risk management, injury prevention tips, and safety tools that are specific to fire and emergency facilities.
WQA Water Quality Association www.wqa.org	Standards and test methods for water quality.
WRI Wire Reinforcement Institute www.wirereinforcementinstitute.org	Technical documents to assist the concrete industry with the use of welded wire as a reinforcement material.

Appendix F: Sample Monthly Safety Inspection Checklist

✓ = okay X = needs attention n/a = not applicable

Fire protection

____ Fire alarm/detectors functional.

____ Sprinkler system in state of readiness.

____ Fire extinguishers not blocked or obscured.

____ Fire extinguishers checked (tag marked) monthly.

____ Exit doors not blocked.

____ Exit signs properly placed; illumination (if applicable) working.

____ Emergency evacuation lights tested.

Fall protection

____ Stair handrails and treads in place and secure.

____ Exterior walkways well-illuminated without trip hazards.

____ Floor tiles and carpet secure and not loose.

____ "Pole hole" guard in place when not in use.

____ "Pole hole" landing area free of obstructions, with safety landing pad in place.

____ Apparatus floor free of standing water or lubricants.

____ Roof access ladder secure and unobstructed (if equipped).

Hazardous materials

____ Compressed gas cylinders chained or in a rack.

____ Flammable liquids labeled and stored away from building.

____ Oily/Greasy rags in a closed, metal container.

____ Hazard communication program and MSDS sheets in order.

____ UST permit posted and current.

____ Bio-hazard room free of unauthorized items.

____ All chemical containers labeled with manufacturer's label.

____ Emergency eyewash station tested and functional.

____ No contaminated PPE in living areas.

____ Diesel exhaust system in use and in proper working order.

Electrical hazards

____ Electrical panel boxes covered and not obstructed within 3 feet.

____ All circuit breakers/disconnects labeled.

____ No knockouts missing from electrical boxes.

____ All outlet and switch cover plates are in place.

____ No lightweight, ungrounded extension cords in use.

____ No electrical cords fixed to building surface or run through ceiling/wall.

____ No frayed, cut or damaged electrical cords.

____ No missing or burned-out light bulbs.

Maintenance areas

____ Floor free of trip hazards.

____ All power tools properly grounded.

____ Grinding wheels properly guarded.

____ Work rests on grinding wheels 1/8 inch from wheel.

____ All tools and supplies safely stored, except when in use.

____ All machine pulleys, chains and sprockets properly guarded.

____ No broken handles and grips.

____ All work areas clean and well-illuminated.

Exterior

____ Public entrance clearly marked and illuminated.

____ No trip hazards on walkways, driveways and parking lot.

____ Security lighting functional.

____ Parking areas and parking lines clearly visible.

____ Security fence not compromised.

____ Fuel pumps properly guarded.

____ Underground fuel storage tank permit up-to-date and visibly posted.

____ All garbage cans and dumpsters emptied on regular basis.

____ Back-up generator operational.

Signs present

____ OSHA notice properly posted on bulletin board.

____ Handicapped parking, safe place, no dangerous weapons, and emergency first-aid signs posted on exterior of building.

____ All washers/extractors and dryers clearly marked for their dedicated use (separate equipment for PPE only).

____ Clear instructions posted on proper use of washing and drying equipment.

Miscellaneous

____ Exhaust system functional; water drained from compressor.

____ Fitness equipment in proper working order.

____ Clothing dryer exhaust free of lint build-up.

____ No combustibles stored within 3 feet of gas appliances.

____ Carbon monoxide detector present and operational.

____ Door bell operating and entrances illuminated.

____ Citizen call-box (with instructions) at public entrance, in case station is empty.

____ Active test of citizen call-box function.

____ Fuel tanks adequately filled.

____ No broken glass in doors or windows.

____ Breathing air compressor in operational order with log book (per OSHA 29 CFR 1910.134), to include date bottle filled, hydrostatic test date, identification number, and person filling cylinder.

____ Phase 1 and 2 keyed elevator switch cycle test.

____ Elevator inspection up to date and notice posted in elevator.

In addition, NFPA 1500, ***Standard on Fire Department Occupational Safety and Health Program,*** has a stand-alone annex with similar information.

Appendix G: Sample Safety and Health Design, Construction and Acceptance Check-Off List

Site layout

No.	Item	Yes	No	N/A	Action taken
1	Phase 1 environmental site assessment conducted.				
2	Station with "one-way" circulation drive, if possible.				
3	Adjacent street traffic areas equipped with traffic signal lights controlled by the crew or station alerting system.				
4	Turns less than 90 degrees to enter public street.				

General site construction

No.	Item	Yes	No	N/A	Action taken
1	Fire resistance ratings for structure meet local building codes.				
2	Active soil depressurization system installed or similar technique used for areas where radon hazard exists.				
3	Structural design consistent with earthquake resistance (seismic performance) as appropriate for area.				
4	Storm water mitigation addressed.				

All areas

No.	Item	Yes	No	N/A	Action taken
1	Electrical outlets grounded and connected to electrical panel with appropriate sized circuit breaker.				
2	Circuit breakers clearly identified.				
3	Electrical panel area clear and free of storage.				
4	Electrical panel provided with cover.				
5	All electrical receptacles and junction boxes covered with appropriate plates.				
6	Ground fault interrupt circuits installed in wet areas (including bathrooms, apparatus bays, boiler rooms, rooms, outside areas, and kitchens).				
7	Sufficient receptacles in each space.				
8	All electrical appliances grounded.				
9	All electrical motors adequately ventilated.				
10	Cage or other protection provided for lights within 7 feet of floor.				
11	Smoke alarms installed into main electrical system in each area.				
12	Carbon monoxide sensors installed in each living space.				

No.	Item	Yes	No	N/A	Action taken
13	Portable fire extinguishers provided as required by code.				
14	Automatic sprinkler system installed.				
15	Number of exits consistent with size of structure and expected maximum occupancy.				
16	Exits located remotely from each other.				
17	Exits conspicuously marked with illuminated "Exit" sign.				
18	Exit doors a minimum of 28-inches wide and 7-feet 6-inches high.				
19	Clear, full length glass doors and windows properly marked.				
20	Alarm/Security system installed.				
21	Alarm/Security system contacts and sensors well-hidden.				
22	Control system for alarm/ security system in locked room or closet away from high traffic areas.				
23	Receptacle for combustible waste provided.				
24	ADA compliant.				

Station grounds

No.	Item	Yes	No	N/A	Action taken
1	Utility poles space 10 to 15 feet from vehicle maneuvering areas.				
2	Ground mounted transformers protected from impact when 10 feet from driveways or parking lots (a one-hour rated fire wall is recommended).				
3	Ground fault interrupt circuits installed.				
4	Driveways (circulation pathways, training areas, and vehicle aprons), level, well-drained and use nonslip surfaces rated for weight of apparatus.				
5	Nonslip texture applied to concrete walkways and other surfaces.				
6	Painting minimized for asphalt surfaces.				
7	Checked metal plate or other nonslip surface covering for underground vaults, test pits, or transition surfaces.				
8	Exterior lighting adequate in all areas.				
9	Nonslip surfaces applied for drill towers and other heavy traffic areas.				
10	Run-off basins with oily-water separators provided for apparatus washing areas.				
11	Aboveground storage tanks chosen before underground tanks.				

No.	Item	Yes	No	N/A	Action taken
12	Secondary containment for aboveground storage tank equals volume of primary storage tank.				
13	System in place to prevent backflow and cross-contamination.				
14	Noise or sound control breaks (buffer zone) placed on sides of station property.				
15	Pedestrian warning signs posted next to station.				
16	Sufficient parking provided, which is secure and well-lit.				
17	Visitor parking designated and clearly marked.				
18	Handicapped parking designated and designed per code.				
19	Sign stating no tobacco or e-cigarette use on property.				
20	Dumpster/Trash containers located at least 25 feet from building.				
21	Heating provided under sidewalks and other areas prone to freezing.				
22	Doorbell for main public entrance.				
23	Emergency call feature to communications center when station is unoccupied.				
24	Vandalism and violence proof windows installed.				

Apparatus bay

No.	Item	Yes	No	N/A	Action taken
1	Ground fault circuit interrupters installed.				
2	Provide at least 4 feet of clearance around each vehicle in the apparatus bay.				
3	Nonslip surface on apparatus bay floor.				
4	Bay doors obstruction feature installed.				
5	Painted lines on apparatus bay floor for guiding vehicle.				
6	Source capture diesel exhaust removal system.				
7	Ventilation system installed to remove off-gassing of contaminated equipment.				

General station interior

No.	Item	Yes	No	N/A	Action taken
1	Access from quarters to apparatus bays in straight line (hallways and crossing areas avoided).				
2	Access ways to the apparatus bay at front or rear of apparatus bay.				
3	Ventilation in interior living spaces at a positive pressure relative to apparatus.				
4	Halls and corridors a minimum of 5 feet wide.				

Heating, ventilating and air conditioning

No.	Item	Yes	No	N/A	Action taken
1	Heating equipment sized appropriately for structure.				
2	Heating equipment properly insulated from combustible materials.				
3	Heating and air conditioning equipment spaces are restricted areas.				
4	Heating and air conditioning equipment spaces free of storage.				

Bedroom(s)

No.	Item	Yes	No	N/A	Action taken
1	Acoustically designed and furnished for sleeping.				
2	Has "ramped up" lighting tied to station alerting system.				
3	Separated from noisy areas of the station.				
4	Individual lockers provided for all personnel (with lock).				

Watch/Dispatch area

No.	Item	Yes	No	N/A	Action taken
1	Controls for traffic lights, alarms.				
2	Switches for fuel pumps.				
3	Slip-resistance floor surface.				
4	Proper lighting.				

Offices

No.	Item	Yes	No	N/A	Action taken
1	Vertical files with interlock allowing only one drawer open at a time.				
2	Has proper lighting.				
3	Separated from noisy areas of the station.				
4	Ergonomically designed chairs furnished.				
5	Information technology infrastructure in place.				

Class/Meeting room

No.	Item	Yes	No	N/A	Action taken
1	Separated from noisy areas of the station.				
2	Controlled lighting.				
3	Audio/Visual equipment installed.				
4	Information technology infrastructure in place.				

Kitchen

No.	Item	Yes	No	N/A	Action taken
1	Ground fault circuit interrupters installed.				
2	Alarm-activated service disconnect of all fixed cooking devices installed.				
3	Range top protected with automatic fire extinguishing system.				
4	Hood and duct system installed properly.				
5	Grease filters UL listed for grease extraction and installed properly.				
6	Commercial grade cook-top installed.				
7	Double sinks with heavy duty garbage disposals provided.				
8	Separate storage cabinets for food storage.				
9	Stainless steel appliances throughout.				
10	Designated area for trash can.				

Bathrooms

No.	Item	Yes	No	N/A	Action taken
1	Separate gender-specific facilities.				
2	Separate toilet facilities for public.				
3	Ground fault circuit interrupters installed.				
4	Nonslip shower floors.				
5	Nonporous, easily cleaned surfaces for shower stalls.				
6	System in place to prevent back flow and cross-contamination.				
7	Hands-free sink faucets.				
8	Hands-free flushing toilets.				
9	Hands-free flushing urinals.				
10	Hands-free paper towel dispensers or hand dryers.				

Support areas

No.	Item	Yes	No	N/A	Action taken
1	All electrical powered tools or equipment insulated.				
2	All electrical outlets have ground wire.				
3	Work areas well-lit.				
4	Machine guards properly installed.				

Disinfecting room

No.	Item	Yes	No	N/A	Action taken
1	Separate space provided for disinfection.				
2	Ventilation to outside.				
3	Proper lighting.				
4	Drains connected to a sanitary sewer system.				
5	Disinfection area has minimum of two sinks with hot and cold water faucets and sprayer attachment.				
6	Sink faucets designed for hands-free operation; foot pedals recommended.				
7	Sink and adjacent surfaces made of stainless-steel.				
8	Equipped with rack shelving of nonporous material for drip-drying equipment.				
9	Drainage from rack goes into sink or sanitary sewer system.				

Cleaning room

No.	Item	Yes	No	N/A	Action taken
1	Separate space provided for cleaning of PPE.				
2	Has ventilation to outside.				
3	Has proper lighting.				
4	Drains connected to a sanitary sewage system.				
5	Area physically separate from food preparation, kitchen, sleeping, living and disinfection areas.				
6	Commercial-grade washer/ extractor installed for cleaning of protective clothing (if performed in-house).				

Personal protective equipment storage room

No.	Item	Yes	No	N/A	Action taken
1	Dedicated room for PPE storage located just off the bay floor.				
2	No natural light; artificial light controlled by motion sensor (to prevent UV degradation).				
3	Separate ventilation to the exterior of the building.				
4	Locker large enough to allow space for plenty of ventilation to assist with off-gassing.				

Fitness room

No.	Item	Yes	No	N/A	Action taken
1	Rubberized flooring for equipment.				
2	Only department approved fitness equipment in place.				
3	Room equipped with large glass in walls, so if a member is down, it is visible from the outside.				
4	Hand disinfectant dispensers or wipes installed near each piece of fitness equipment.				

Stairways

No.	Item	Yes	No	N/A	Action taken
1	Guardrails placed on open side of stairways where there are more than four rises.				
2	Stairway rail height between 30 and 34 inches (measured from forward edge of tread to upper surface of top rail).				
3	Handrails no more than 2 inches in diameter.				
4	Handrails height between 34 and 38 inches.				
5	Handrails continuous and extend beyond the last step.				
6	Guardrails with top rails 42 inches high.				
7	Guardrails with midrails 21 inches high.				
8	Nonslip finishes or tread on stair treads and tread nosing.				
9	Tread color contrasts with rest of step.				

Slide poles

No.	Item	Yes	No	N/A	Action taken
1	Guard provided around pole hole to prevent falling through.				
2	Three-foot diameter cushioned mate at bottom of slide pole.				
3	Sign posted that pole is used only by one person at a time.				
4	Sign posted that slide pole is to only be used by authorized and trained personnel.				

Hose towers and other elevated platforms

No.	Item	Yes	No	N/A	Action taken
1	Guardrail capable of withstanding a force of 250 pounds applied in any direction at any point on the top rail.				
2	Toe guards equipped on each platform.				
3	Offset platforms and cage guards equipped on platforms when access ladders extend beyond 20 feet (permanently fixed ladders on outside of drill towers and buildings are exempt).				
4	Rung clearance of at least 7 inches behind hose tower ladder.				
5	Step-across distances not greater than 12 inches.				
6	Side rails greater than 16 inches wide.				
7	Ladder rung spacing less than 12 inches.				
8	Ladder cases between 7 and 8 feet above landing.				
9	Ladder pitch between 75 and 90 degrees.				

General storage areas

No.	Item	Yes	No	N/A	Action taken
1	Located on same level as living and working spaces.				
2	Pressurized cylinders secured to prevent overturning.				
3	Emergency medical supplies and equipment stored in dedicated space.				
4	Secure spaces provided for storage of sensitive medical supplies (e.g., drugs).				
5	Refrigeration provided for applicable drugs.				
6	Wall or rails on all mezzanine storage areas 42 inches high.				
7	Access to mezzanine areas by 4-foot wide sliding or rolling gate.				
8	Walled off loft spaces with access gate or door that has three restraining cables, chains or bars.				
9	Toe boards on all elevated storage areas.				
10	Chemicals in original, labelled containers and segregated by hazard.				
11	Materials Safety Data Sheets (MSDS) provided on each chemical at station and kept in central location.				
12	Location of MSDS posted.				
13	Sufficient storage space for all supplies.				

Refueling areas

No.	Item	Yes	No	N/A	Action taken
1	Refueling pumps installed in accordance with local requirements.				
2	"No Smoking" and "Stop Your Motor" signs posted.				
3	Refueling pump shut-off switch placed a minimum of 50 to 60 linear feet away with sign, "Fuel Pump Shut-Off."				

Pressurized cylinders

No.	Item	Yes	No	N/A	Action taken
1	Pressure vessels (e.g., boilers, large air-tanks) inspected and certified.				
2	Pressurized cylinders secured to prevent overturning.				

Marine areas

No.	Item	Yes	No	N/A	Action taken
1	Dock or pier constructed of nonslip materials.				
2	Nonslip finish applied to concrete areas along water.				
3	Tie-off points, hose bibs, and electrical outlets located away from walkways.				
4	Gangways designed for multiple angles of use with nonslip surfaces.				
5	Area well-lit.				

Acronyms

AABC	Associated Air Balance Council
ACGIH	American Conference of Governmental Industrial Hygienists
ACI	American Concrete Institute
ACPA	American Concrete Pavement Association
ACS	American Chemical Society
ADA	Americans with Disabilities Act
AED	automatic external defibrillator
AIA	American Institute of Architects
AIHA	American Industrial Hygiene Association
AISC	American Institute of Steel Construction
AITC	American Institute of Timber Construction
ANSI	American National Standards Institute
APHA	American Public Health Association
API	American Petroleum Institute
ASCE	American Society of Civil Engineers
ASD	active soil depressurization
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
ASSE	American Society of Safety Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
B/N	Bid/Negotiation
CA	Construction Administration
CD	Construction Design
CDC	Centers for Disease Control and Prevention
CFR	Code of Federal Regulations
CGA	Compressed Gas Association
CPR	cardiopulmonary resuscitation
CSI	Construction Specifications Institute

DD	Design Development
DLIR	Department of Labor and Industrial Relations
DLLR	Department of Labor, Licensing and Regulation
DOSH	Division of Occupational Safety and Health
EFIS	Exterior Finish and Insulation Systems
EMS	Emergency Medical Services
EPA	Environmental Protection Agency
F.I.E.R.O.	Fire Industry Education Resource Organization
FEMA	Federal Emergency Management Agency
GFICs	ground fault interrupter circuits
GISs	Geographic Information Systems
GMPs	Guaranteed Maximum Prices
HSO	Health and Safety Officer
HVAC	heating, ventilating, and air conditioning
IARC	International Agency for Research on Cancer
ICAC	Institute of Clean Air Companies
IFSTA	International Fire Service Training Association
ISO	Insurance Services Office
ISP	Independent Service Provider
LEED	Leadership in Energy and Environmental Design
LODDs	line-of-duty deaths
MEP	Mechanical, electrical and plumbing engineers
MMA	methyl methacrylate
MOSH	Maryland Occupational Safety and Health
MRSA	Methicillin-resistant Staphylococcus aureus
MSDS	Material Safety Data Sheets
NEHRP	National Earthquake Hazard Reduction Program
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
NPGA	National Propane Gas Association

NSC	National Safety Council
NSF	National Sanitation Foundation
NTMA	National Terrazzo and Mosaic Association, Inc.
OSHA	Occupational Safety and Health Administration
OSU	Oklahoma State University
PAHs	polycyclic aromatic hydrocarbons
pCi/L	picocuries per liter of air
PESH	Public Employee Safety and Health
PNAs	Polyaromatic Nuclear Aromatics
PPC	Public Protection Classification™
PPE	personal protective equipment
RFIs	Requests for Information
RFQ	Request for Qualifications
rpm	revolutions per minute
SCBA	self-contained breathing apparatus
SD	Schematic Design
UBC	Uniform Building Code
UL	Underwriters Laboratories
USFA	U.S. Fire Administration
USGBC	U.S. Green Building Council
UV	ultraviolet
VFIS	Volunteer Firemen's Insurance Services, Inc.
VOCs	Volatile Organic Compounds
WQA	Water Quality Association

U.S. Fire Administration
Working for a fire-safe America

16825 South Seton Ave.
Emmitsburg, MD 21727
www.usfa.fema.gov

May 2018