(2) Operate nailers in a way that minimizes the danger to others and the operator from ricochets, air-firing, and firing through materials being fastened.

(a) Except when used for attaching sheet goods (for example, sheathing, sub-flooring, plywood) or roofing products, only operate nailers with a sequential trigger system that requires that the surface contact trip device be depressed before the firing trigger can be activated and that limits ejection to one nail per trigger pull before resetting.

(b) When used for sheet goods and roofing materials, nailers may be operated in the contact trip mode (that is, bump or bounce-nailing) only as allowed by the manufacturer. This mode may only be used when the operator has secure footing, such as on a work platform, floor, or deck, and may not be used when the operator is on a ladder, beam, or similar situations where the operator's balance or reach may be unstable.

(3) When clearing a nail jam or performing maintenance on the nailer, disconnect the power source (for example, air hose, plug, battery).

l. Jacks - Lever and Ratchet, Screw, and Hydraulic. (13-8.l)

(1) Legibly mark the manufacturer's rated capacity on all jacks and do not exceed.

(2) All jacks must have a positive stop to prevent over-travel.

(3) After the load has been raised, immediately crib, block, or otherwise secure.

(4) Tag jacks which are out of order and do not use until repairs are made.

(5) For additional requirement specific to jacks, see 29 CFR 1926.305 (29 CFR 1926 Subpart I).

13-9. Figures and Tables.
Not Applicable.

13-10. Checklists and Forms.
Not Applicable.

Chapter 14
Material Handling, Storage, Disposal, and Conveyors

14-1. References.

a. ANSI/ASSP A10.5, Safety Requirements for Material Hoists (https://webstore.ansi.org) (14-1.a)

b. ANSI/UL 1313, Standard for Nonmetallic Safety Cans for Petroleum Products (https://www.shopulstandards.com/Default.aspx) (14-1.b)

c. ASME B20.1, Safety Standards for Conveyors and Related Equipment (https://www.asme.org/) (14-1.c)

d. ASTM F852/F852M, Standard Specification for Portable Gasoline, Kerosene, and Diesel Containers for Consumer Use (https://www.astm.org/Standard/standards-and-publications.html) (14-1.d)

e. National Motor Freight Traffic Association (NMFTA)/National Motor Freight Classification (NMFC) Item 296 (https://nmfta.org/) (14-1.e)

f. NIOSH 81-122, Work Practices Guide for Manual Lifting (https://www.cdc.gov/niosh/docs/81-122/default.html) (14-1.f)

g. NFPA 30, Flammable and Combustible Liquids Code (https://www.nfpa.org/Codes-and-Standards) (14-1.g)

h. NFPA 30A, Code for Motor Fuel Dispensing Facilities and Repair Garages (https://www.nfpa.org/Codes-and-Standards) (14-1.h)

i. NFPA 58, Liquefied Petroleum Gas Code (https://www.nfpa.org/Codes-and-Standards) (14-1.i)

j. NFPA 70, National Electrical Code https://www.nfpa.org/Codes-and-Standards) (14-1.j)

k. UFC 6000-M, National Railroad Freight Committee, Agent (https://public.railinc.com/resources/national-tariffs/ufc-6000-m) (14-1.k)

l. United Nations Recommendations on the Transport of Dangerous Goods: Model Regulations - Twenty-Second Revised Edition, Chapter 9 (https://shop.un.org) (14-1.l)

m. 29 CFR 1910.106, Flammable Liquids (https://www.govinfo.gov/content/pkg/CFR-2020-title29-vol5/pdf/CFR-2020-title29-vol5-sec1910-106.pdf) (14-1.m)

n. 29 CFR 1910.110, Storage and Handling of Liquefied Petroleum Gases (https://www.govinfo.gov/content/pkg/CFR-2019-title29-vol5/pdf/CFR-2019-title29-vol5-sec1910-110.pdf) (14-1.n)

o. 29 CFR 1926.152, Flammable Liquids (https://www.govinfo.gov/content/pkg/CFR-2020-title29-vol8/pdf/CFR-2020-title29-vol8-sec1926-152.pdf) (14-1.o)

p. 29 CFR 1926.153, Liquefied Petroleum Gas (https://www.govinfo.gov/content/pkg/CFR-2020-title29-vol8/pdf/CFR-2020-title29-vol8-sec1926-153.pdf) (14-1.p)

q. 29 CFR 1926.555, Conveyors (https://www.govinfo.gov/content/pkg/CFR-2020-title29-vol8/pdf/CFR-2020-title29-vol8-sec1926-555.pdf) (14-1.q)

r. 40 CFR 112, Oil Pollution Prevention (https://www.govinfo.gov/content/pkg/CFR-2019-title40-vol24/pdf/CFR-2019-title40-vol24-part112.pdf) (14-1.r)

s. 46 CFR 92.05-10, Lamp Room Construction (https://www.govinfo.gov/content/pkg/CFR-2019-title46-vol4/pdf/CFR-2019-title46-vol4-sec92-05-10.pdf) (14-1.s)

t. 46 CFR 147, Hazardous Ships' Stores (https://www.govinfo.gov/content/pkg/CFR-2019-title46-vol5/pdf/CFR-2019-title46-vol5-part147.pdf) (14-1.t)

u. 49 CFR Chapter I, Pipeline and Hazardous Materials Safety Administration, Department of Transportation (https://www.govinfo.gov/app/collection/cfr/2019/title49/subtitleB/chapterI) (14-1.u)

14-2. Definitions.

a. Competent Person (CP). See paragraphs 1-2 or 2-2, as applicable. (14-2.a)

b. Contaminant. Any material, that, by nature of its composition or reaction with other materials, is potentially capable of causing injury, death, illness, damage, loss, or pain. (14-2.b)

c. Debris Net. A net designed to catch only debris. It must be used in conjunction with a personnel net if there is any possibility for personnel to fall. (14-2.c)

d. Flammable Liquid. Any liquid having a flashpoint at or below 199.4°F (93°C). Flammable liquids are divided into four categories as follows: (14-2.d)

(1) Category 1 includes liquids having flashpoints below 73.4°F (23°C) and having a boiling point at or below 95°F (35°C).

(2) Category 2 includes liquids having flashpoints below 73.4°F (23°C) and having a boiling point above 95°F (35°C).

(3) Category 3 includes liquids having flashpoints at or above 73.4°F (23°C) and at or below 140°F (60°C).

(4) Category 4 includes liquids having flashpoints above 140°F (60°C) and at or below 199.4°F (93°C).

e. Hoist. A machinery unit that is used for lifting or lowering a freely suspended (unguided) load. (14-2.e)

f. Identified (as applied to equipment, for example, containers, portable fire extinguishers). Recognizable as suitable for the specific purpose, function, use, environment, application, etc., where described in a particular code requirement. Suitability of equipment for a specific purpose, environment, or application may be decided by a qualified testing laboratory, inspection agency, or other organization concerned with product evaluation. Such identification may include labeling or listing. See definitions of Labeled and Listed. (14-2.f)

g. Labeled. Equipment or material that has an attached label, symbol, or other identifying mark of an organization that is acceptable to the AHJ and concerned with the product evaluation that maintains periodic inspection of production of labeled equipment or materials and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner. (14-2.g)

h. Liquefied Petroleum Gas (LP-Gas). Any material that is composed predominantly of any of the following hydrocarbons or mixtures of them: propane, propylene, butanes, or butylenes. (14-2.h)

i. Listed. Equipment, materials, or services included in a list published by an organization acceptable to the AHJ and concerned with the evaluation of products or services that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services and whose listing states either that the equipment, material, or service meets identified standards or has been tested and found suitable for a specified purpose. (14-2.i)

j. Qualified Person (QP). See paragraphs 1-2 or 2-2, as applicable. (14-2.j)

k. Safety Can. An approved container, of not more than 5-gal (18.9 L) capacity, having a spring-closing lid and spout cover and designed to safety relieve internal pressures under fire exposure. An approved container is one that has been listed or approved by a NRTL such as Factory Mutual Engineering Corp., or.UL, or federal agencies such as Bureau of Mines or USCG, which issue approvals for such equipment. (14-2.k)

l. Storage Tank. Any vessel having a liquid capacity that exceeds 60 gal (227.1 L), is intended for fixed installation, and is not used for processing. (14-2.l)

14-3. Personnel Required Qualification/Training.

a. Safe Lifting. Train employees on safe lifting techniques (see para 6-8.o). (14-3.a)

b. Conveyors. Train personnel that perform adjustments, maintenance, or lubrication on conveyors that are operating and in motion on the hazards associated with the conveyor. (14-3.b)

14-4. Roles and Responsibilities.

a. Registered Professional Engineer (RPE). An RPE (see paras 1-2 or 2-2, as applicable) must design material hoist towers, masts, guy or braces, counterweights, drive machinery supports, sheave supports, platforms, supporting structures, and accessories. (14-4.a)

b. Hoist Operator. While hoisting equipment is in operation, the operator may not perform any other work and must constantly tend the controls until the load has been safely landed or returned to ground level. (14-4.b)

c. Competent Person (CP). A CP must determine and document the size, weight, and height of fall or potential falling debris, and select debris netting with mesh of the size and strength sufficient to contain the expected debris without penetration when properly supported. (14-4.c)

d. Qualified Person (QP). (14-4.d)

(1) A QP must perform inspections of material hoists according to paragraph 14-5.b.

(2) A QP must supervise all storage, handling, and use of flammable liquids to ensure conformance to 29 CFR 1910.106, 29 CFR 1926.152, NFPA 30, and NFPA 30A (see para 14-8.b).

(3) A QP must supervise the erection and dismantling of all hoist towers.

14-5. Inspection Requirements.

a. General. Inspect storage systems (for example, racking, shelving, blocking), packaging (for example, containers, pallets, boxes), and their components (for example, hoses, couplings) according to the manufacturer's instructions to ensure they are in serviceable condition and capable of supporting the capacity and/or containing the material being stored. Remove from service and repair or discard any system and/or its components showing material deteriorations, signs of leakage, or weakness. (14-5.a)

b. Material Hoists. (14-5.b)

(1) Inspect and test material hoists and hoist tower systems according to the manufacturer's instructions and ANSI/ASSP A10.5.

(2) Prior to initial use and each time after the tower is extended or modified, a QP must perform a functionality test and inspect all parts of the tower or mast, cage, bucket, boom, platform, hoisting machine, guy, and other associated equipment, to ensure compliance with the manufacturer's inspection guidelines and ANSI/ASSP A10.5.

(3) A QP must perform monthly inspections. Maintain records of monthly inspection onsite and make them available upon request of the local SOHO/USACE supervisor/KO or COR.

(4) The operator must conduct pre-operational inspections (for example, start-up procedures) prior to every operation (for example, shift, relocation) of the hoist.

(5) The local SOHO/USACE supervisor/KO or COR must be notified at least 24 hours prior to any of the above inspections.

c. Housekeeping. Inspect work areas daily for adequate housekeeping and record the findings in daily inspection reports. (14-5.c)

d. Flammable Liquids. (14-5.d)

(1) Inspect dispensing hoses according to the manufacturer's instructions. At a minimum, hoses that display any of the following are an indication of permanent damage and must be replaced immediately:

(a) Cuts, abrasions, or cracks in the cover that penetrates to the reinforcement.

(b) Blistering or loose cover.

(c) Soft spots, particularly adjacent to the coupling.

(d) Indication of coupling slippage or irregular coupling alignment.

(e) Flattening or kinking resulting in permanent deformation.

(2) Inspect storage tanks containing flammable liquids according to NFPA 30.

14-6. Activity Hazard Analysis (AHA) Requirements.
Develop AHAs according to paragraphs 1-6 or 2-6, as applicable.

14-7. Minimum Plan Requirements.
Not Applicable.

14-8. General Requirements.

a. Material Handling. (14-8.a)

(1) See chapter 5 for PPE requirements.

(2) Make available and use, according to the manufacturer's instructions, material handling devices (for example, lift truck, overhead crane, conveyor, jacks) for the material handling needs of an activity.

(3) Evaluate material handling needs in terms of weight, size, distance, and path of movement whenever heavy or bulky material is to be moved. Use the following hierarchy, starting with the most preferred, when selecting a means for material handling:

(a) Use engineering solutions to eliminate material handling needs.

(b) Use mechanical devices.

(c) Use manual means with handling aid (for example, dolly, cart).

(d) Use safe lifting techniques (see para 6-8.o and NIOSH 81-122).

(4) Do not move materials over or suspend them above personnel unless positive precautions have been taken to protect the personnel from falling objects.

(5) Use taglines or other devices to control the load when the movement of hoisted materials may be hazardous to persons. Use only nonconductive devices near energized lines.

(6) Do not use banding or strapping as a means of rigging to hoist loads of bundled materials.

(7) Ensure that all persons are in a safe position while materials are being loaded or unloaded from railroad cars, trucks, or barges.

(8) Material Hoists.

(a) Design, construct, and install material hoists to raise and lower materials during construction, alteration, or demolition according to ANSI A10.5.

Note. ANSI A10.5 is not applicable to the temporary use of permanently installed elevators used as material hoists.

(b) Make available a copy of the hoist operating manual for each onsite hoist.

(c) Maintenance and Repairs.

(c-1) Replacement parts for load bearing or critical components must be obtained from or certified by the equipment manufacturer.

(c-2) Conduct maintenance and repairs according to the manufacturer's instructions.

(d) Landings and Runways.

(d-1) Landing platforms and runways that connect the hoist way or tower to a structure must be designed and constructed to sustain the maximum intended load without failure.

(d-2) Floors or platforms that may become slippery must have slip-resistant surfaces.

(d-3) Provide overhead protection, composed of 2 inches (5 cm) planking or equivalent, when workers may be exposed to falling objects.

(d-4) Provide a barricade at the open ends of each landing. The barricade must extend a minimum distance of 6 feet (1.8 m) laterally along the outer edge of the landing from each side of the hoist way and extend from the floor a distance of at least 3 feet (0.9 m). It must be constructed of #19 US gauge wire or the equivalent, with openings not exceeding one-half (½) inch (1.3 cm).

(d-5) Protect hoist way entrances by substantial gates or bars that guard the full width of the landing entrance. Gates must be no less than 66 inches (167.6 cm) in height, have a maximum under clearance of 2 inches (5.1 cm), and be located no more than 4 inches (10.2 cm) from the hoist way line. Gates composed of grille, lattice, or other open work must not have openings of more than 2 inches (5 cm).

(d-6) Do not store material on landing platforms or runways.

(e) Whenever a slack line condition occurs, check the proper seating of the rope in the sheaves and on the drum prior to further operations.

(f) Do not ride on material hoists or other hoisting equipment not meant for personnel handling.

(g) Do not operate more than one cage or bucket at the same time by any one hoisting machine or operator.

(h) Establish operating rules and post them at the operator's station of the hoist. Rules must include signal system and allowable line speed for various loads.

(i) Post rules and notices on the car frame or crosshead in a conspicuous location and include the statement "NO RIDERS ALLOWED."

(j) Connect air-powered hoists to an air supply of sufficient capacity and pressure to safely operate the hoist. Secure pneumatic hoses by some positive means to prevent accidental disconnection.

(9) Conveyors.

(a) Construct and install conveyor and hauling systems according to the manufacturer's instructions.

(b) Provide safe access to permit inspection, lubrication, repair, and maintenance activities.

(c) Properly ground conveyors before use. All connections, switches, and cables must conform to NFPA 70.

(d) Do not perform maintenance while a conveyor is in operation unless personnel are trained on the associated hazards (see para 14-3.b).

(e) Use HEC procedures for maintenance and servicing activities other than routine lubrication which is done without removing guards (see chapter 12).

(f) Safety Devices.

(f-1) Install anti-runaway devices, brakes, backstops, or other safeguards on all conveyors where reversing or runaway are potential hazards, or the effects of gravity create a potential for hazardous uncontrolled lowering.

(f-2) Design safety devices to prevent the conveyor from automatically restarting until the safety device has been manually reset.

(f-3) Arrange safety devices to operate in such a manner that if power failure or a mechanical failure of the device occurs a hazardous condition will not result.

(f-4) Equip conveyor systems with a time-delay audible and visual warning signal to be sounded immediately before starting of the conveyor.

(f-5) Warning devices must be clearly audible at all points along the conveyor where personnel may be present.

(f-6) Warning devices must be activated by the controller device that starts the conveyor and must continue for a period before the conveyor starts.

(f-7) For overland conveyor systems, warning devices are required only at the transfer, loading, and discharge points and those points where personnel are normally stationed.

(f-8) In areas not exposed to the public, provide clear, concise, and legible warning signs that indicate the conveyor system may start at any time if the function of the system would be seriously hindered or adversely affected by the required time delay, or if the intent of the warning may be misinterpreted. These warning signs must say that danger exists, the conveyor may start without warning and personnel must keep clear. Post warnings signs along the conveyor in all areas that are not guarded or otherwise protected by their location.

(g) Mechanically guard or guard by location all exposed moving machinery parts that present a hazard.

(g-1) Guard all nip and shear points.

(g-2) Provide guards at points where personnel could contact cables, chains, belts, and runaways of exposed bucket conveyors.

(g-3) When lubricating while the conveyor is in motion, lubrication points must be accessible through guard openings that prevent fingers or other small tools from reaching the hazardous locations.

(g-4) If guards need to be removed for adjustment or maintenance of the conveyor, use HEC procedures prior to removing the guards according to chapter 12.

(g-5) In lieu of guarding individual nip and shear points, take-up mechanisms may be guarded by placing standard railings, or fencing and warning signs, around the area.

(g-6) In the case of a trolley conveyor when mechanical or electrical guarding would render the conveyor unusable, conspicuously post prominent, and legible warnings in the area or on the equipment. Additionally, where feasible, place barricades or mark lines on the ground to indicate the hazard area.

(g-7) Unless guarded by location, provide sections of chain conveyors that cannot be enclosed without impairing the function with warning signs or personnel barriers.

(g-8) Provide conveyors with spill guards, pan guards, or the equivalent if there is a potential for material to fall off the conveyor and endanger personnel or equipment.

(g-9) At transfer, loading, and discharge points, prevent unconfined and uncontrolled free fall of material if the material would create a hazard to personnel.

Free fall of material can result from flooding, ricocheting, overloading, trajectory, leakage, or a combination thereof.

(g-10) In the absence of a guard specifically erected to protect personnel, provide warnings to restrict unauthorized personnel from entering such hazardous areas.

(g-11) At all points along the conveyor, except where loads are removed from or placed on a conveyor or where a conveyor discharges to or receives material from another conveyor, make provisions to eliminate the possibility of loads or material being dislodged from the conveyor.

(g-12) Remove build-up of excess material from all points along the conveyor.

(h) Access.

(h-1) Provide crossovers or underpasses with safeguards for passage over or under all conveyors. Do not cross over or under conveyors except where safe passageways are provided.

(h-2) Install protective guards whenever conveyors pass next to, or over, work areas, roadways, highways, railroads, or other public passageways. The guards must be designed to catch and hold any load or material that may fall off or become dislodged from the system.

(h-3) Where conveyors are operated in tunnels, pits, and similar enclosures, provide ample room for safe access and operating space for all personnel.

(i) Operating Controls.

(i-1) Provide emergency stop buttons, pull cords, limit switches, or similar emergency devices at the following locations unless the design, construction, and operation of a conveyor is determined to be non-hazardous to personnel: operator stations, loading arms, transfer points, and other potentially hazardous locations on the conveyor path not otherwise protected.

(i-2) Emergency stop buttons must be RED in color, easily identifiable, and readily accessible. Do not protect them with collars or other devices that could affect their operation during an emergency.

(i-3) Emergency stop devices must act directly on the control of the conveyor concerned and may not depend on the stopping of any other equipment. For a multi-conveyor system, the emergency stop must stop all conveyors that are tied together.

(i-4) Install emergency stop devices so that they cannot be overridden from other locations.

(i-5) Starting controls must be GREEN in color and be protected from accidental activation.

(i-6) Clearly label all controls to identify their function.

(i-7) Arrange conveyor controls so that in case of an emergency stop the conveyor operations will not resume until the operator has manually reset or restarted the conveyor at the location where the emergency stop was initiated.

(i-8) Arrange and locate control stations so that the operation of the equipment is visible from them.

(j) Gates and Switches.

(j-1) Provide power-positioned gate and switch sections with devices that will prevent these sections from falling in case of power failure.

(j-2) Provide means on all gates and switch sections to prevent conveyed material from discharging into the open area created when lifting the gate or switch.

(k) Counterweights.

(k-1) Confine counterweights supported by belts, cables, chains, or similar means, inside an enclosure to prevent injury to personnel or include an arrangement that will restrain the falling weight in case of failure of the normal counterweight support.

(k-2) Securely fasten counterweights attached to lever arms.

(l) When two or more conveying systems are interfaced, the interfaced areas must contain adequate guarding and safety devices.

(m) Hoppers and Chutes.

(m-1) Guard all openings to the hopper and chutes to prevent persons from accidentally stepping into them. If guards are not practical, conspicuously post warning signs.

(m-2) Equip dump hoppers that have a hopper flush with the floor and cannot be guarded with grating having a maximum opening of 4 inches (10.2 cm) and heavy enough to withstand any load imposed on it. If the openings in the grating are larger or if no grating is provided, place temporary railing around ground level hoppers when dumping operation are not in progress. During dumping operation, place warning signs in conspicuous locations warning personnel of an open pit.

(n) Mobile Conveyors.

(n-1) Provide mobile conveyors with brakes or other position locking devices where movement would present a hazard.

(n-2) Design mobile conveyors to prevent runaway and remain stable against overturning under normal conditions of operation.

(n-3) When an operator is required on a mobile conveyor, provide a platform or cab for their protection.

(o) Portable Conveyors.

(o-1) Provide portable conveyors with a safety device on the raising and lowering mechanism of the boom to hold the boom at any rated angle of inclination.

(o-2) Portable conveyors must be stable so that the conveyor will not topple when used within the manufacturer's rating and in a manner in which it was intended or when being moved.

(p) Screw Conveyors.

(p-1) Do not operate the screw conveyor unless the conveyor housing completely encloses the conveyor’s moving elements and the power transmission guards are in place. If the conveyor must have an open housing as a condition of use, then guard the entire conveyor by railing, fence, or by location.

(p-2) Construct feed openings for shovel, front-end loader, or other manual or mechanical equipment so that the conveyor screw is always covered by grating. If grating cannot be used, guard the exposed section of the conveyor by a railing and conspicuously post warning signs.

(q) Operation.

(q-1) Use conveyors only for materials for which it was designed and within the rated capacities and speeds.

(q-2) At installation of flight and apron conveyors, “jog” or hand run through at least one complete revolution to check design clearances prior to running under automatic power.

(q-3) Before restarting a conveyor that has been stopped because of an emergency, conduct an inspection of the conveyor, determine the cause of the emergency stop, and make corrections.

(q-4) Keep the area around loading and unloading points clear of obstructions that could create a hazard.

(q-5) Maintain rotating drive pulleys and conveyor belts according to the manufacturer's instructions.

(q-6) Clean the conveyors as often as required to ensure safe operation.

b. Material Storage. (14-8.b)

(1) Stack, block, interlock, and limit in height all material in bags, containers, bundles, or stored in tiers so that it is stable and secured against sliding or collapse.

(a) Stack material as low as practical and in no case higher than 20 feet (6.1 m) unless otherwise specified in this chapter.

(b) Store hazardous and toxic agents according to chapter 6.

(c) Store compressed gas cylinders according to chapter 20.

(2) Adequately cover or store indoors material that could become damaged or affected by exposure to the elements.

(3) Do not store materials in areas that would interfere with other normal operations.

(4) Do not store materials directly under power lines unless safe clearance or distance from all materials to the power line is achieved. Document this situation in an AHA. (See chapter 11)

(5) Store materials according to the manufacturer's recommended method of storage.

(6) Do not place materials stored inside buildings under construction within 6 feet (1.8 m) of any hoist-way or floor opening, or within 10 feet (3 m) of an exterior wall that does not extend above the materials stored.

(7) Keep all stairways, passageways, gangways, and accessways free of materials, supplies, and obstructions at all times.

(8) Unauthorized persons are not permitted to enter storage areas. Ensure that everyone is in a safe position while materials are being loaded or unloaded from railroad cars, trucks, or barges.

(9) Do not store material on scaffolds, work platforms, or runways in excess of the load limits (see chapters 24 and 22).

(10) Evaluate the containers, bins, or hoppers used for material storage to ensure that they comply with the confined space requirements of chapter 34.

(11) Segregate noncompatible stored materials.

(12) Do not store flammable or combustible materials in areas where there is danger of underground fire.

(13) When not in use, store paint-soiled clothing and drop cloths in well-ventilated steel cabinets or containers.

(14) Cover temporary enclosures with flame-resistant tarpaulins or material of equivalent fire-resistant characteristics.

(15) Storage of Lumber.

(a) During construction, store lumber in sections that contain no more than one million board feet and locate them at least 10 feet (3 m) away from buildings.

(b) Support lumber on stable sills and stack it level, stable, and self-supporting.

(c) Remove all nails from reusable lumber before stacking it for storage.

(d) Do not pile lumber more than 20 feet (6.1 m) in height. Do not stack manually handled lumber more than 16 feet (4.9 m) high.

(16) Storage of Bagged Materials.

(a) Stack bagged materials by stepping back the layers and cross keying the bags at least every 10 bags high.

(b) Do not stack bags of cement or lime more than 10 high without setback, except when restrained by walls of appropriate strength.

(c) Place bags around the outside of the stack with their openings facing the center of the stack.

(d) During unstacking, keep the top of the stack nearly level and maintain the necessary setback.

(17) Storage of Brick.

(a) Stack bricks on an even, solid surface.

(b) Do not stack bricks more than 7 feet (2.1 m) high. When stacked loose brick reaches a height of 4 feet (1.2 m), taper it back 2 inches (5.1 cm) for every 1-foot (0.3 m) of height above the 4 feet (1.2 m) level.

(c) Do not stack unitized brick (that is, brick securely gathered into large standard packages and fastened with straps) more than three units high.

(18) Storage of Floor, Wall, and Partition Block.

(a) Stack blocks in tiers on solid, level surfaces.

(b) When masonry blocks are stacked higher than 6 feet (1.8 m), taper back the one-half block per tier above the 6 feet (1.8 m) level.

(19) Storage of Reinforcing and Structural Steel.

(a) Store reinforcing steel in orderly piles away from walkways and roadways.

(b) Securely pile structural steel to prevent members sliding off or the pile toppling over.

(20) Storage of Cylindrical Material.

(a) Stack and block structural steel, poles, pipe, bar stock, and other cylindrical materials, unless racked, to prevent spreading or tilting.

(b) Do not stack pipe, unless racked, higher than 5 feet (1.5 m).

(c) Use either a pyramid or battened stack. Where a battened stack is used, securely chock the outside pile or pole. Taper back battened stacks at least one pile or pole in each tier.

(d) Unload round material using a method that does not require anyone to be on the unloading side of the carrier after the tie wires have been cut or during the unlocking of the stakes.

(21) Storage of Flammable Liquids.

(a) A QP must supervise all storage, handling, and use of flammable liquids to ensure conformance to 29 CFR 1910.106, 29 CFR 1926.152, NFPA 30, NFPA 30A.

(b) Fire Protection Requirements. See chapter 9 for additional fire protection requirements.

(b-1) Provide at least one portable fire extinguisher rated 20-B:C on all tank trucks or other vehicles used for transporting and/or dispensing flammable liquids.

(b-2) Provide each service or refueling area with at least one fire extinguisher rated not less than 40-B:C and located so that an extinguisher is within 100 feet (30.5 m) of each pump, dispenser, underground fill pipe opening, and lubrication or service area.

(c) When not in use, store Category 1 or 2 flammable liquids or Category 3 flammable liquids with a flashpoint below 100°F (37.8°C) in closed containers or tanks.

(d) Take protective measures to prevent any part of clothing from becoming contaminated with flammable fluids. Do not continue work if clothing becomes contaminated; remove or wet down the clothing as soon as possible.

(e) Do not use any flammable liquid with a flash point (closed cup test) below 100°F (37.8°C) for cleaning purposes or to start or rekindle fires.

(f) Provide ventilation adequate to prevent the accumulation of flammable vapors to hazardous levels according to this manual, applicable federal, state, and local requirements in all areas where flammable liquids are handled or used.

(g) Separate all sources of ignition, including smoking, at least 50 feet (15.2 m) from areas where flammable liquids are stored, handled, and processed. Conspicuously post with legible signs stating, “NO SMOKING, MATCHES, or OPEN FLAME.”

(h) Use only approved and labeled or listed containers and portable tanks to store flammable liquids.

(h-1) Acceptable metal containers and portable tanks are those having less than 660 gal (2.5 m^3) individual capacity and that meet the requirements of and contain products authorized according to 49 CFR Chapter I and United Nations Recommendations on the Transport of Dangerous Goods: Model Regulations - Twenty-Second Revised Edition, Chapter 9.

(h-2) Plastic containers used for the storage of petroleum products must meet the requirements of one or more of the following specifications: ASTM F852/F852M or ANSI/UL 1313.

(h-3) Acceptable plastic drums are those meeting the requirements of and containing products authorized according to United Nations Recommendations on the Transport of Dangerous Goods: Model Regulations - Twenty-Second Revised Edition, Chapter 9 .

(h-4) Acceptable fiber drums are those that meet the requirements according to paragraphs NMFTA/NMFC Item 296 or UFC 6000-M (see UFC Rule 51 for Types 2A, 3A, 3B-H, 3B-L, or 4A), and that meet the requirements of and contain liquid products authorized either according to paragraph 49 CFR Chapter I or by DOT exemption.

(i) Design, construct, use, and inspect of storage tanks containing flammable liquids according to NFPA 30.

(j) Tanks greater than 660-gal (2.5 m^3) capacity must comply with NFPA 30 and NFPA 30A.

(k) The maximum allowable size for a container or portable metal tank less than 660 gal (2.5 m^3) individual capacities must not exceed those shown in table 14-1.

(l) Design, construct, and use storage cabinets, indoor storage areas, outdoor storage areas, HAZMAT storage lockers, and other occupancies according to NFPA 30. For marine applications, 46 CFR 147 covers use of cabinets (that is, paint lockers) and 46 CFR 92.05-10 specifies design and construction.

(m) Do not store flammable liquids in quantities greater than that required for one day's use in buildings under construction. Do not store more than a two-day supply on paint barges.

(n) Do not store flammable liquids in areas used for exits, stairways, or passageways.

(o) Keep unopened containers of flammable liquids, such as paints, varnishes, lacquers, thinners, and solvents, in a well-ventilated location, free of excessive heat, smoke, sparks, flame, or direct rays of the sun.

(p) Provide and maintain a listed, self-closing, metal refuse can in good condition in areas where flammable liquids are handled or stored.

(q) Safety cans and other portable containers for flammable liquids having a flash point at or below 73°F (23°C) must be approved and labeled or listed, painted red, have a yellow band around the can, and include the name of the contents legibly indicated on the container.

(r) Surround storage areas and tanks with a curb, earthen dike, or other equivalent means of containment of at least 6 inches (15.2 cm) in height, and higher as needed, to contain the contents in the event of a leak.

(r-1) Other EPA or USCG approved secondary containment methods may be used in lieu of curbs or dikes (for example, double-walled tanks).

(r-2) When dikes or curbs are used, make provisions for draining accumulations of ground or rainwater or spills of flammable liquids.

(r-3) Terminate drains at a safe location. The drains must be accessible and operable in the event of a fire. Fuel and oil storage areas are subject to Oil Pollution Prevention requirements will use the provisions of 40 CFR 112 as well.

(s) Provide portable tanks less than 660-gal (2.5 m^3) individual capacity with one or more devices, installed in the top, with sufficient emergency venting capacity to limit internal pressure under fire exposure conditions to 10 psi (68.9 kPa) gauge or 30% of the bursting pressure of the portable tank, whichever is greater.

(s-1) Use at least one pressure-actuated vent having a minimum capacity of 6,000 ft^3 (170 m^3) of free air per hour. It must be set to open at not more than 5 psi (34.5 kPa) gauge.

(s-2) If fusible vents are used, they must be actuated by elements that operate at a temperature not exceeding 300°F (148.9°C).

(s-3) Where plugging of a pressure-actuated vent can occur, fusible plugs or venting devices that soften to failure at a maximum of 300°F (148.9°C) under fire exposure may be used for the entire emergency venting requirement.

(t) Where liquids are used or handled, provisions must be made to dispose of leakage or spills quickly and safely.

(u) Flashlights and electric lanterns used while handling flammable liquids must be listed by a NRTL for the intended use.

(v) Dispensing Flammable Liquids.

(v-1) All pumping equipment used for the transfer of Category 1 or 2 flammable liquids or Category 3 flammable liquids with a flashpoint below 100°F (37.8°C) must either be listed by a NRTL or approved by and labeled or tagged according to the federal AHJ (for example, DOT).

(v-2) Dispensing systems for Category 1 or 2 flammable liquids or Category 3 flammable liquids with a flashpoint below 100°F (37.8°C) must be electrically bonded and grounded. All fuel tanks, hoses, and containers of 5 gal (18.9 L) or less must be kept in metallic contact while flammable liquids are being transferred; transfer of flammable liquids to containers in excess of 5 gal (18.9 L) will be done only when the containers are electrically bonded.

(v-3) Flammable liquids drawn from, or transferred into, vessels, containers, or tanks within a building or outside must be done only through a closed piping system, from safety cans, by means of a device drawing through the top, or from a container, or portable tanks, by gravity or pump, through an approved self-closing valve. Do not transfer by means of air pressure on the container or portable tank.

(v-4) Separate areas in which flammable liquids are transferred in quantities greater than 5 gal (18.9 L) from one tank or container to another from other operations by at least 25 feet (7.6 m) or a barrier having a fire resistance of at least one hour. Provide drainage or other means to control spills. Use natural or mechanical ventilation

to maintain the concentration of flammable vapor at or below 10% of the lower flammable limit.

(v-5) Protect dispensing units against collision damage by suitable means and securely bolt in place permanent dispensing units.

(v-6) Dispensing nozzles and devices for Category 1 or 2 flammable liquids or Category 3 flammable liquids with a flashpoint below 100°F (37.8°C) must be listed.

(v-7) Do not fill lamps, lanterns, heating devices, small engines, and similar equipment while hot. Fill these devices only in well-ventilated rooms free of open flames or in open air. Do not fill in storage buildings.

(v-8) Separate dispensing devices at least 20 feet (6.1 m) from any activity involving fixed sources of ignition.

(w) Service and Refueling Areas.

(w-1) Fuel dispensing hoses must be listed, designed, and used for their intended purpose. Dispensing nozzles must be an approved automatic-closing type without a latch-open device.

(w-2) Shut down equipment using flammable liquids as fuel during refueling, servicing, or maintenance, except for emergency generators. Waiver requests may be reviewed and granted by the local SOHO for operations in remote sites or regions where cold weather conditions pose a significant risk when equipment fails to restart. A copy must be provided to HQUSACE-SO.

(w-3) Use a listed pumping arrangement for dispensing of Category 1 or 2 flammable liquids or Category 3 flammable liquids with a flashpoint below 100°F (37.8°C) from tanks of 55-gal (0.21 m^3) capacity or more. Do not transfer by air pressure on the container or portable tank.

(w-4) Provide clearly identified and easily accessible switch(es) at a location remote from dispensing devices to shut off the power to all dispensing devices in an emergency.

(w-5) Install a listed emergency breakaway device designed to retain liquid on both sides of the breakaway point on each hose dispensing Category 1 or 2 flammable liquids or Category 3 flammable liquids with a flashpoint below 100°F (37.8°C) liquids.

(x) Tank Cars/Trucks.

(x-1) Use a ground guide to spot tank cars/trucks during movement in congested and confined areas.

(x-2) Attend tank cars/trucks for the entire time they are being loaded or unloaded. Do not load or unload until brakes have been set and wheels chocked.

(x-3) Take precautions to prevent fire or other hazards. Properly bond and ground tank cars/trucks while being loaded or unloaded. Make bonding and grounding connections before dome covers are removed on tank cars/trucks and do not disconnect until such covers have been replaced. Relive internal vapor pressure before dome covers are opened.

(22) LP-Gas.

(a) Store, handle, install, and use LP-Gas and systems according to 29 CFR 1926.153, 29 CFR 1910.110, NFPA 58, and USCG regulations, as applicable.

(b) LP-Gas containers, valves, connectors, manifold valve assemblies, regulators, and appliances must be of an approved type.

(c) Any appliance that was originally manufactured for operation with a gaseous fuel other than LP-Gas and is in good condition may be used with LP-Gas only after it is properly converted, adapted, and tested for performance with LP-Gas.

(d) Do not use polyvinyl chloride and aluminum tubing in LP-Gas systems.

(e) Where damage to LP-Gas systems from vehicular or equipment traffic could occur, protect against damage (for example, crash barriers, bollards).

(f) Safety Devices.

(f-1) Every container and vaporizer must be provided with one or more safety relief valves or devices. Arrange these valves and devices to afford free vent to the outside air and discharge at a point not less than 5 feet (1.5 m) horizontally from any building opening that is below the discharge point.

(f-2) Container safety relief devices and regulator relief vents must be located not less than 5 feet (1.5 m) in any direction from air openings into sealed combustion system appliances or mechanical ventilation air intakes.

(f-3) Do not install shut-off valves between the safety relief device and the container, or the equipment or piping to which the safety relief device is connected, except that a shut-off valve may be used where the arrangement of the valve is such that full required capacity-flow through the safety relief device is always afforded.

(g) Container Valves and Accessories.

(g-1) Valves, fittings, and accessories connected directly to the container, including primary shut off valves, must have a rated working pressure of at least 250 psi (1723.7 kPa) gauge and must be of material and design suitable for LP-Gas service.

(g-2) Connections to containers (except safety relief connections, liquid level gauging devices, and plugged openings) must have shutoff valves located as close to the container as practical.

(g-3) Regulators and low-pressure relief devices must be rigidly attached to the cylinder valves, cylinders, supporting standards, building walls, or otherwise rigidly secured and installed or protected from the elements.

(h) Arrange valves in the assembly of multiple container systems so that replacement of containers can be made without shutting off the flow of gas in the system (this is not to be construed as requiring an automatic changeover device).

(i) Do not use LP-Gas containers and equipment in unventilated spaces below grade in pits, below-decks, or other spaces where dangerous accumulations of heavier than-air gas may accumulate due to leaks or equipment failure.

(j) Do not perform welding on LP-Gas containers.

(k) Dispensing.

(k-1) Shut down equipment using LP-Gas during refueling operations.

(k-2) Perform filling of fuel containers for motor vehicles from bulk storage containers at least 10 feet (3 m) from the nearest masonry-walled building, at least 25 feet (7.6 m) from the nearest building of other construction, and, in any event, at least 25 feet (7.6 m) from any building opening.

(k-3) Perform filling from storage containers, of portable containers, or containers mounted on skids at least 50 feet (15.2 m) from the nearest building.

(l) Installation, Use, and Storage Outside of Buildings.

(l-1) Containers must be upright upon firm foundations or otherwise firmly positioned. Provide flexible connections (or other special fixtures) to protect against the possibility of the effect of settlement on the outlet piping.

(l-2) Store containers in a suitable ventilated enclosure or otherwise protect against tampering.

(l-3) When storing containers awaiting use outside of buildings, locate them away from the nearest building or group of buildings according to table 14-2.

(l-4) Provide storage areas with at least one approved portable fire extinguisher rated no less than 20-B:C. See chapter 9 for additional portable fire extinguisher requirements.

(m) Installation, Use, and Storage Inside of Buildings.

(m-1) In industrial buildings not normally frequented by the public, store only the number of containers that, in total, can hold no more than 300 lb. (2,623.8 ft^3) of LP-Gas.

Note. When stored inside, empty containers which have been in LP-Gas service must be considered as full containers for the purpose of figuring out the maximum quantity of LP-Gas permitted.

(m-2) Do not place containers stored inside near exits, stairways, or in areas normally used for the safe exit of people.

(m-3) Protect container valves while in storage. Either set them into the recess of a container to prevent the possibility of it becoming struck if the container is dropped or fasten a ventilated cap or collar to the container. The cap or collar must be capable of withstanding a blow from any direction equivalent to that of a 30 lb. (13.6 kg) weight dropped 4 feet (1.2 m).

(m-4) Close all outlet valves on stored containers.

(m-5) Equip storage locations with at least one approved portable fire extinguisher having a minimum rating of 8-B:C. See chapter 9 for additional portable fire extinguisher requirements.

(m-6) Locate containers, regulating equipment, manifolds, pipe, tubing, and hose as to minimize exposure to high temperatures or physical damage.

(m-7) Do not exceed the maximum water capacity of individual containers of 245 lb. (111.1 kg) (that is, nominal 100 lb. (45.3 kg) LP-Gas capacity).

(m-8) Containers having a water capacity greater than 2.5 lb. (1.1 kg) (that is, (nominal 1 lb. (0.5 kg) LP-Gas capacity) must stand on a firm and level surface and, when necessary, secured in an upright position. Equip systems using containers having a water capacity greater than 2.5 lb. (1.1 kg) with excess flow valves, either within the container valves or in the connections to the container valve outlets.

(m-9) Connect regulators directly to the container valves or to manifolds that are connected to the container valves. The regulator must be suitable for use with LP-Gas.

Design manifolds and fittings connecting containers to pressure regulator inlets for at least 250 psi (1723.7 kPa) gauge service pressure.

(m-10) Protect valves on containers having water capacity greater than 50 lb. (22.7 kg) (nominal 20 lb. (9 kg) LP-Gas capacity) from damage while in use or storage.

(m-11) Design hoses for working pressure of at least 250 psi (1723.7 kPa) gauge. All hoses and connections must be listed for the intended application in relation to design, construction, and performance. Hoses must be as short as possible, but long enough to permit compliance with spacing requirements without kinking, straining, or damaging them by heat.

c. Material Disposal. (14-8.c)

(1) Place waste material and rubbish in containers or, if appropriate, in piles.

(a) Label as waste all containers holding waste material and piles or stacks of waste.

(b) Place waste material away from any traffic areas or walkways and pile or stack it in such a manner as to prevent engulfment or material avalanche.

(2) Do not drop waste materials or rubbish down from a height of more than 6 feet (1.8 m) unless the following are complied with:

(a) The materials or rubbish are dropped through an enclosed chute constructed of wood or equivalent material. Enclose debris chutes, except for openings equipped with closures at or about floor level for the insertion of materials. The openings must not exceed 4 feet (1.2 m) in height measured along the wall of the chute. Keep openings closed when not in use.

(b) When debris cannot be handled by chutes, enclose the area into which the material is dropped with barricades not less than 42 inches (106.7 cm) in height. Position barricades to keep personnel from all debris landing areas. Post signs warning of the hazard of falling material at all debris landing areas and at each level exposed to falling debris.

(3) Perform burning operations according to chapter 9.

(4) Provide covered, self-closing, nonflammable, and non-reactive containers for the collection of garbage and oily, flammable, and dangerous wastes.

(a) Label each container with a description of the contents.

(b) Properly dispose the contents daily.

(5) Collect, store, and dispose of hazardous material waste (for example, vehicle and equipment oils and lubricants, containers and drums for solvents, adhesives) according to chapter 6, applicable federal, state, and local requirements.

(6) Dispose of combustible waste materials according to all applicable fire and environmental laws and regulations.

(7) Housekeeping.

(a) Maintain work areas and means of access as safe and orderly.

(b) Provide sufficient personnel and equipment to ensure compliance with all housekeeping requirements.

(c) Do not perform work in those areas that do not comply with the requirements of this chapter.

(d) Do not store or leave on roofs any loose or light material that is not enclosed or secured.

(e) Tools, materials, extension cords, hoses, or debris must not cause tripping or other hazards.

(f) Secure tools, materials, and equipment that are subject to displacement or falling.

(g) Periodically remove empty bags having contained lime, cement, and other dust-producing material.

(h) Clear formwork and scrap lumber and debris from work areas and accessways in and around building storage yards and other structures.

(i) During disassembly, render protruding nails in scrap boards, planks, and timbers safe by removing them, hammering them in, or bending them flush with the wood.

(j) Keep storage and construction sites free from the accumulation of combustible materials.

(j-1) Keep down weeds and grass.

(j-2) Establish a regular cleanup procedure.

(j-3) Keep rubbish, brush, long grass, or other combustible material away from areas where flammable and combustible liquids are stored, handled, or processed.

(k) Do not allow liquids, particularly flammable and combustible liquids, to accumulate on work area surfaces (for example, floors, walls). Immediately clean up all spills of flammable and combustible liquids.

14-9. Figures and Tables.

Table 14-1
Maximum Allowable Size of Portable Container and Tanks for Flammable Liquids

Container Type	Flammable Liquids Categories 1	Flammable Liquids Categories 2	Flammable Liquids Categories 3	Flammable Liquids Categories 4
Glass	16 oz (473 ml)	32 oz (946 ml)	1 gal (3.8 L)	1 gal (3.8 L)
Metal (other than DOT drums or approved plastic)	1 gal (3.8 L)	5 gal (19 L)	5 gal (19 L)	5 gal (19 L)
Safety cans	2 gal (7.6 L)	5 gal (19 L)	5 gal (19 L)	5 gal (19 L)
Metal drum (DOT) specifications	60 gal ($8ft^3$) ($0.23\ m^3$)	60 gal ($8ft^3$) ($0.23\ m^3$)	60 gal ($8ft^3$) ($0.23\ m^3$)	60 gal ($8ft^3$) ($0.23\ m^3$)
Approved portable tanks	660 gal ($88.3\ ft^3$) ($2.5\ m^3$)	660 gal ($88.3\ ft^3$) ($2.5\ m^3$)	660 gal ($88.3\ ft^3$) ($2.5\ m^3$)	660 gal ($88.3\ ft^3$) ($2.5\ m^3$)

Note:

[1] Flammable liquid means any liquid having a flashpoint at or below 199.4°F (93°C). Flammable liquids are divided into four categories as follows:

[2] Category 1 includes liquids having flashpoints below 73.4°F (23°C) and having a boiling point at or below 95°F (35°C).

[3] Category 2 includes liquids having flashpoints below 73.4°F (23°C) and having a boiling point above 95°F (35°C).

[4] Category 3 includes liquids having flashpoints at or above 73.4°F (23°C) and at or below 140°F (60°C). When a Category 3 liquid with a flashpoint at or above 100°F (37.8°C) is heated for use to within 30°F (-1.1°C) of its flashpoint, it must be handled according to the requirements for a Category 3 liquid with a flashpoint below 100°F (37.8°C).

[5] Category 4 includes liquids having flashpoints above 140°F (60°C) and at or below 199.4°F (93°C). When a Category 4 flammable liquid is heated for use to within 30°F (-1.1°C) of its flashpoint, it must be handled according to the requirements for a Category 3 liquid with a flashpoint at or above 100°F (37.8°C).