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Standard for the Storage and Handling of Liquefied Petroleum Gases, 1992 Edition—NFPA-58.

Flares for Tubing (1972)—SAE-J533b.

Chimneys, Factory-Built Residential Type and Building Heating Appliance—UL 103—Seventh Edition—1989 With Revision February 23, 1989.

Factory-Built Fireplaces—UL 127—Sixth Edition With Revisions January 4, 1989, June 10, 1991, June 29, 1992.

Room Heaters Solid-Fuel Type—UL 1482—Third Edition—1988 With Revision September 13, 1988.

Fireplace Stoves—UL 737—Sixth Edition—1988 With Revisions September 19, 1988, July 10, 1990 and June 10, 1991.

Unitary Air-Conditioning and Air-Source Heat Pump Equipment—ANSI/ARI 210/240-89.

AGA Requirements for Gas Connectors for Connection of Fixed Appliances for Outdoor Installation, Park Trailers and Manufactured (Mobile) Homes to the Gas Supply—No. 3-87.

[58 FR 55015, Oct. 25, 1993]

§ 3280.704 Fuel supply systems.

(a) *LP-Gas system design and service line pressure.* (1) Systems shall be of the vapor-withdrawal type.

(2) Gas, at a pressure not over 14 inches water column (½ psi), shall be delivered from the system into the gas supply connection.

(b) *LP-gas containers*—(1) *Maximum capacity.* No more than two containers having an individual water capacity of not more than 105 pounds (approximately 45 pounds LP-gas capacity), shall be installed on or in a compartment of any manufactured home.

(2) *Construction of containers.* Containers shall be constructed and marked in accordance with the specifications for LP-Gas Containers of the U.S. Department of Transportation (DOT) or the Rules for Construction of Pressure Vessels 1986, ASME Boiler and Pressure Vessel Code section VIII, Division 1 ASME Containers shall have a design pressure of at least 312.5 psig.

(i) Container supply systems shall be arranged for vapor withdrawal only.

(ii) Container openings for vapor withdrawal shall be located in the vapor space when the container is in service or shall be provided with a suitable internal withdrawal tube which communicates with the vapor space on or near the highest point in the container when it is mounted in service

position, with the vehicle on a level surface. Containers shall be permanently and legibly marked in a conspicuous manner on the outside to show the correct mounting position and the position of the service outlet connection. The method of mounting in place shall be such as to minimize the possibility of an incorrect positioning of the container.

(3) *Location of LP-gas containers and systems.* (i) LP-gas containers shall not be installed, nor shall provisions be made for installing or storing any LP-gas container, even temporarily, inside any manufactured home except for listed, completely self-contained hand torches, lanterns, or similar equipment with containers having a maximum water capacity of not more than 2½ pounds (approximately one pound LP-gas capacity).

(ii) Containers, control valves, and regulating equipment, when installed, shall be mounted on the “A” frame of the manufactured home, or installed in a compartment that is vaportight to the inside of the manufactured home and accessible only from the outside. The compartment shall be ventilated at top and bottom to facilitate diffusion of vapors. The compartment shall be ventilated with two vents having an aggregate area of not less than two percent of the floor area of the compartment and shall open unrestricted to the outside atmosphere. The required vents shall be equally distributed between the floor and ceiling of the compartment. If the lower vent is located in the access door or wall, the bottom edge of the vent shall be flush with the floor level of the compartment. The top vent shall be located in the access door or wall with the bottom of the vent not more than 12 inches below the ceiling level of the compartment. All vents shall have an unrestricted discharge to the outside atmosphere. Access doors or panels of compartments shall not be equipped with locks or require special tools or knowledge to open.

(iii) Permanent and removable fuel containers shall be securely mounted to prevent jarring loose, slipping or rotating and the fastenings shall be designed and constructed to withstand static loading in any direction equal to

twice the weight of the tank and attachments when filled with fuel, using a safety factor of not less than four based on the ultimate strength of the material to be used.

(4) *LP-gas container valves and accessories.* (i) Valves in the assembly of a two-cylinder system shall be arranged so that replacement of containers can be made without shutting off the flow of gas to the appliance(s). This provision is not to be construed as requiring an automatic change-over device.

(ii) Shutoff valves on the containers shall be protected as follows, in transit, in storage, and while being moved into final utilization by setting into a recess of the container to prevent possibility of their being struck if container is dropped upon a flat surface, or by ventilated cap or collar, fastened to the container, capable of withstanding a blow from any direction equivalent to that of a 30-pound weight dropped 4 feet. Construction shall be such that the blow will not be transmitted to the valve.

(iii) [Reserved]

(iv) Regulators shall be connected directly to the container shutoff valve outlets or mounted securely by means of a support bracket and connected to the container shutoff valve or valves with listed high pressure connections. If the container is permanently mounted the connector shall be as required above or with a listed semi-rigid tubing connector.

(5) *LP-gas safety devices.* (i) DOT containers shall be provided with safety relief devices as required by the regulations of the U.S. Department of Transportation. ASME containers shall be provided with relief valves in accordance with subsection 221 of the Standard for the Storage and Handling Liquefied Petroleum Gases, NFPA No. 58-1992. Safety relief valves shall have direct communication with the vapor space of the vessel.

(ii) The delivery side of the gas pressure regulator shall be equipped with a safety relief device set to discharge at a pressure not less than two times and not more than three times the delivery pressure of the regulator.

(iii) Systems mounted on the "A" frame assembly shall be so located that the discharge from the safety relief de-

vices shall be into the open air and not less than three feet horizontally from any opening into the manufactured home below the level of such discharge.

(iv) Safety relief valves located within liquefied petroleum gas container compartments may be less than three feet from openings provided the bottom vent of the compartment is at the same level or lower than the bottom of any opening into the vehicle, or the compartment is not located on the same wall plane as the opening(s) and is at least two feet horizontally from such openings.

(6) *LP-gas system enclosure and mounting.* (i) Housings and enclosures shall be designed to provide proper ventilation at least equivalent to that specified in § 3280.704(b)(3)(ii).

(ii) Doors, hoods, domes, or portions of housings and enclosures required to be removed or opened for replacement of containers shall incorporate means for clamping them firmly in place and preventing them from working loose during transit.

(iii) Provisions shall be incorporated in the assembly to hold the containers firmly in position and prevent their movement during transit.

(iv) Containers shall be mounted on a substantial support or a base secured firmly to the vehicle chassis. Neither the container nor its support shall extend below the manufactured home frame.

(c) *Oil tanks—(1) Installation.* Oil tanks and listed automatic pumps (oil lifters) installed for gravity flow of oil to heating equipment shall be installed so that the top of the tank is no higher than 8 feet above the appliance oil control and the bottom of the tank is not less than 18 inches above the appliance oil control.

(2) *Auxiliary oil storage tank.* Oil supply tanks affixed to a manufactured home shall be so located as to require filling and draining from the outside and shall be in a place readily available for inspection. If the fuel supply tank is located in a compartment of a manufactured home, the compartment shall be ventilated at the bottom to permit diffusion of vapors and shall be insulated from the structural members of the body. Tanks so installed shall be

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provided with an outside fill and vent pipe and an approved liquid level gage.

(3) *Shutoff valve.* A readily accessible, approved manual shutoff valve shall be installed at the outlet of an oil supply tank. The valve shall be installed to close against the supply.

(4) *Fuel oil filters.* All oil tanks shall be equipped with an approved oil filter or strainer located downstream from the tank shutoff valve. The fuel oil filter or strainer shall contain a sump with a drain for the entrapment of water.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979, as amended at 47 FR 49390, Nov. 1, 1982; 52 FR 4587, Feb. 12, 1987; 58 FR 55016, Oct. 25, 1993]

§ 3280.705 Gas piping systems.

(a) *General.* The requirements of this section shall govern the installation of all fuel gas piping attached to any manufactured home. The gas piping supply system shall be designed for a pressure not exceeding 14 inch water column ($\frac{1}{2}$ psi) and not less than 7 inch water column ($\frac{1}{4}$ psi). The manufacturer shall indicate in his written installation instructions the design pressure limitations for safe and effective operation of the gas piping system. None of the requirements listed in this section shall apply to the piping supplied as a part of an appliance. All exterior openings around piping, ducts, plenums or vents shall be sealed to resist the entrance of rodents.

(b) *Materials.* All materials used for the installation, extension, alteration, or repair of any gas piping system shall be new and free from defects or internal obstructions. It shall not be permissible to repair defects in gas piping or fittings. Inferior or defective materials shall be removed and replaced with acceptable material. The system shall be made of materials having a melting point of not less than 1,450 F, except as provided in § 3280.705(e). They shall consist of one or more of the materials described in § 3280.705(b) (1) through (4).

(1) Steel or wrought-iron pipe shall comply with ANSI Standard B36.10-1979, Welded and Seamless Wrought Steel Pipe. Threaded brass pipe in iron pipe sizes may be used. Threaded brass pipe shall comply with ASTM B43-91,

Standard Specification for Seamless Red Brass Pipe, Standard Sizes.

(2) Fittings for gas piping shall be wrought iron, malleable iron, steel, or brass (containing not more than 75 percent copper).

(3) Copper tubing shall be annealed type, Grade K or L, conforming to the Standard Specification for Seamless Copper Water Tube (ASTM B88-93) or shall comply with the Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service, ASTM B 280-93. Copper tubing shall be internally tinned.

(4) Steel tubing shall have a minimum wall thickness of 0.032 inch for tubing of $\frac{1}{2}$ inch diameter and smaller and 0.049 inch for diameters $\frac{1}{2}$ inch and larger. Steel tubing shall be constructed in accordance with ASTM Standard Specification for Electric-Resistance-Welded Coiled Steel Tubing for Gas and Fuel Oil Lines, ASTM A 539-83, and shall be externally corrosion protected.

(c) *Piping design.* Each manufactured home requiring fuel gas for any purpose shall be equipped with a natural gas piping system acceptable for LP-gas. Where fuel gas piping is to be installed in more than one section of an expandable or multiple unit home, the design and construction of the crossover(s) shall be as follows:

(1) All points of crossover shall be readily accessible from the exterior of the home.

(2) The connection(s) between units shall be made with a connector(s) listed for exterior use or direct plumbing sized in accordance with § 3280.705(d). A shutoff valve of the nondisplaceable rotor type conforming to ANSI Z21.15-1992 Manually Operated Gas Valves for Appliances, Appliances Connector Valves and Hose End Valves, suitable for outdoor use shall be installed at each crossover point upstream of the connection when listed connectors are used.

(3) The connection(s) may be made by a listed quick disconnect device which shall be designed to provide a positive seal of the supply side of the gas system when such device is separated.

(4) The flexible connector, direct plumbing pipe, or "quick disconnect"