

(c) Each seat exit shall be clear of obstructions.

(d) A vehicle shall not be used as a Type S school bus if the seat in front of the seat to be exited from must be folded in order for a passenger to exit the vehicle.

(e) A seat belt shall be provided for the driver and for each passenger.

(f) A child passenger restraint system or booster seat, as described in FMVSS No. 213 (49 CFR § 571.213), incorporated herein by reference, as amended and supplemented, shall be provided for each passenger under the age of eight years and weighing less than 80 pounds.

#### 13:20-51.14 Sun visor

An adjustable sun visor shall be provided.

#### 13:20-51.15 Windshield wipers

A windshield wiper(s) shall be provided so as to provide clear vision for the driver.

### SUBCHAPTER 52. INSURANCE

#### 13:20-52.1 General provisions

(a) Each contractor and district board of education shall furnish liability insurance for bodily injury and property damage in the amount of \$1,000,000 combined single limit per occurrence for all vehicles which are used for pupil transportation to and from school and school related activities.

(b) Insurance shall be obtained through a company authorized to insure in New Jersey and shall cover the district board of education as an additional named insured.

(c) Self-insured transportation contractors and district boards of education as provided in N.J.S.A. 48:4-12 and 13 shall file a certificate of self-insurance with the county superintendent of schools.

(d) Policies or certificates of insurance shall accompany all contracts or renewals when transportation contracts or renewals are submitted to the county superintendent of schools for approval.

(e) Policies or certificates of insurance shall be submitted to the county superintendent of schools for approval whenever policies are amended, revised or renewed.

(f) Transportation contractors and district boards of education shall comply with these regulations as of September 1, 1990.

### SUBCHAPTER 53. STANDARDS FOR ALTERNATIVELY FUELED SCHOOL BUSES

#### 13:20-53.1 Scope and purpose

(a) To ensure the safety of students, this subchapter shall apply to school buses originally designed by the manufacturer to carry 10 or more passengers used in the transportation of children to or from school pursuant to N.J.S.A. 39:1-1 and that operate in whole or in part on alternative fuels. Such school buses shall comply with N.J.A.C. 13:20-53A, 53B, or 53C, whichever is applicable, this subchapter including all applicable standards incorporated herein, and industry-recommended practices.

(b) This subchapter shall not apply to autobuses approved for school use and subject to inspection by the Motor Vehicle Commission's Commercial Bus Inspection and Investigation Unit unless otherwise provided.

Amended by R.2006 d.249, effective July 3, 2006.

See: 38 N.J.R. 386(b), 38 N.J.R. 2835(a).

Substituted "Motor Vehicle Commission's" for "Division's" in (b).

#### 13:20-53.2 Definitions

The following words and terms, when used in this subchapter and in N.J.A.C. 13:20-53A, 53B, and 53C, shall have the following meanings unless the context clearly indicates otherwise.

"Alteration" means any change in the construction, design, or installation of a fuel supply container or system that affects the strength or safety of the fuel system.

"Alternative fuel" means any fuel other than gasoline or diesel, excluding battery or fuel cell power systems, but including CNG, LNG, and LPG.

"ASME Code" means section VIII and IX of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, incorporated herein by reference, as amended and supplemented. Copies of the ASME Code may be obtained from the American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016, (800) THE-ASME.

"Chief Administrator" means the Chief Administrator of the New Jersey Motor Vehicle Commission.

"CNG" means compressed natural gas.

"Cradle" means a supporting and/or protective structure that surrounds a fuel system container, enclosing it as necessary to provide physical security and integrity, and that may support its weight in whole or in part.

"Dual fuel" means the simultaneous use of gasoline or diesel and an alternative fuel, but not a mixture thereof.

"FMCSR" means the Federal Motor Carrier Safety Regulations as found in the Code of Federal Regulations (49 CFR Part 393). Copies of the Federal Motor Carrier Safety Regulations as found in the Code of Federal Regulations may be purchased from the Superintendent of Documents, United States Government Printing Office, Washington, DC 20402, (202) 783-3238.

"FMVSS" means the Federal Motor Vehicle Safety Standards as found in the Code of Federal Regulations (49 CFR Part 571). Copies of the Federal Motor Vehicle Safety Standards as found in the Code of Federal Regulations may be purchased from the Superintendent of Documents, United States Government Printing Office, Washington, DC 20402, (202) 783-3238.

"Fuel supply container" or "fuel cylinder" means a container or cylinder installed on a vehicle to supply fuel for the propulsion system of the vehicle.

"Fuel system" means the fuel cylinder, supply lines, and all ancillary fuel equipment.

"LNG" means liquefied natural gas.

"LPG" means liquefied petroleum gas.

"Liquid fuel" means any fuel that is in a liquid state under normal ambient atmospheric conditions of temperature and pressure.

"Motor Vehicle Commission" or "Commission" means the New Jersey Motor Vehicle Commission established by section 4 of P.L. 2003, c. 13 (N.J.S.A. 39:2A-4).

"NFPA" means the National Fire Protection Association. Copies of the National Fire Protection Association standards may be obtained from the National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269, (617) 770-3000.

"Passenger seat" means a seat other than the driver's seat.

"SAE" means the Society of Automotive Engineers, Inc. Copies of the Standards and Recommended Practices of the Society of Automotive Engineers may be purchased from the Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096, (724) 776-4841.

"School bus" or "bus" when used in N.J.A.C. 13:20-53A, 53B, 53C, or this subchapter means every motor vehicle operated by, or under contract with, a public or governmental agency, or religious or other charitable organization or corporation, or privately operated for compensation for the transportation of children to or from school for secular or religious education, school-connected activity, day camp, summer day camp, nursery school, child-care center, preschool center or other similar places of education.

"Supply line" means the piping, tubing, or hose, including all related fittings, through which vapor or liquid passes

between the first shut-off valve at the fuel supply container and the final stage regulator or vaporizer.

"UL" means the Underwriters' Laboratories, Inc.

"Vaporizer" means a device that converts liquefied natural gas and liquefied petroleum gas to the gaseous state by means of heat.

Amended by R.2006 d.249, effective July 3, 2006.

See: 38 N.J.R. 386(b), 38 N.J.R. 2835(a).

Added definitions "Chief Administrator" and "Motor Vehicle Commission"; and deleted definitions "Director" and "Division".

### 13:20-53.3 Installation requirements

(a) The installation of LPG, CNG, or LNG fuel systems on school buses equipped with gaseous fuel carburetors shall be in accordance with the following requirements:

1. Fuel supply containers on school buses shall not be located in or above the passenger compartment; and
2. Fuel supply containers shall be installed and fitted so that no gas from fueling and gauging operations or from relief valves can be released inside the driver, passenger, or luggage compartment.

### 13:20-53.4 Fuel supply container requirements

(a) Fuel supply containers shall meet all applicable requirements of the ASME Code, 49 CFR § 393.67, incorporated herein by reference, as amended and supplemented, and the following requirements:

1. Each container and cradle shall be mounted in a protected location to minimize damage from collision. All valves and gauges shall be protected by doors or other means.
  2. To prevent damage from road hazards, slippage, loosening, or rotation, each container or cradle shall be secured to the school bus body, bed, or frame by either of the following means:
    - i. By attaching bolts not less than  $\frac{7}{16}$  inch in diameter that meet SAE Standard J429 (January 1999), incorporated herein by reference, as amended and supplemented, for grade 5 threaded fasteners and self-locking nuts to at least four securement points and, where bolts pierce body metal but not frame, by reinforcing both sides of each securement point with metal plates at least  $\frac{3}{4}$  inch thick and seven square inches in area; or
    - ii. By using other means that render the container or cradle capable of withstanding at a minimum in any direction a static force of eight times the weight of the fully-loaded container.

3. Each container shall be secured to its cradle by means capable of withstanding at a minimum in any

direction a static force of eight times the weight of the fully-loaded container.

4. No portion of the container or container valve(s) in communication with the liquid or vapor shall be located

behind the rear frame cross member of the school bus unless such container or container valve(s) is provided with protection equivalent to that provided by the rear frame cross member.

13:20-53.1 Installation requirements

(a) The installation of L.P.G., C.M.G. or L.N.G. fuel systems on school buses equipped with gaseous fuel containers shall be in accordance with the following requirements:

1. Fuel supply containers on school buses shall not be located in or above the passenger compartment, and

2. Fuel supply containers shall be installed and fixed so that no gas from leaking and gassing operations or from relief valves can be released inside the driver, passenger, or baggage compartment.

13:20-53.2 Fuel supply container requirements

(a) Fuel supply containers shall meet all applicable requirements of the ASME Code for Section VIII, Division 1, and the following requirements:

1. Each container and valve shall be mounted in a protected location to minimize damage from collision. All valves and gauges shall be protected by doors or other means.

2. To prevent damage from road hazards, slipping, poisoning or rotation, each container or valve shall be secured to the school bus body or frame by either of the following means:

1. By attaching bolts not less than 1/2 inch in diameter that meet SAE Standard J429 (January 1997), incorporated herein by reference, or attached and positioned for grade 1 threaded fasteners and self-locking nuts to at least four securement points and where bolts pierce body metal but not frame, by reinforcing both sides of each securement point with metal plates at least 1/8 inch thick and seven square inches in area; or

2. By using other means that render the container or valve capable of withstanding at a minimum in any direction a static force of eight times the weight of the fully-loaded container.

3. Each container shall be secured to its valve by means capable of withstanding at a minimum in any

13:20-53.2 Fuel supply container requirements

(a) The installation of L.P.G., C.M.G. or L.N.G. fuel systems on school buses equipped with gaseous fuel containers shall be in accordance with the following requirements:

1. Fuel supply containers on school buses shall not be located in or above the passenger compartment, and

2. Fuel supply containers shall be installed and fixed so that no gas from leaking and gassing operations or from relief valves can be released inside the driver, passenger, or baggage compartment.

13:20-53.3 Fuel supply container requirements

(a) Fuel supply containers shall meet all applicable requirements of the ASME Code for Section VIII, Division 1, and the following requirements:

1. Each container and valve shall be mounted in a protected location to minimize damage from collision. All valves and gauges shall be protected by doors or other means.

2. To prevent damage from road hazards, slipping, poisoning or rotation, each container or valve shall be secured to the school bus body or frame by either of the following means:

1. By attaching bolts not less than 1/2 inch in diameter that meet SAE Standard J429 (January 1997), incorporated herein by reference, or attached and positioned for grade 1 threaded fasteners and self-locking nuts to at least four securement points and where bolts pierce body metal but not frame, by reinforcing both sides of each securement point with metal plates at least 1/8 inch thick and seven square inches in area; or

2. By using other means that render the container or valve capable of withstanding at a minimum in any direction a static force of eight times the weight of the fully-loaded container.

3. Each container shall be secured to its valve by means capable of withstanding at a minimum in any

5. The weight of the container shall not, in any way, be supported by outlets, valves, manifold, or other fuel connections.

6. No part of the container shall be field-welded. Only saddle plates, brackets, or other non-pressure parts that were provided and installed by the manufacturer of the container may be field-welded.

7. No container shall be repaired until the method of repair has been authorized by the container manufacturer. United States Department of Transportation containers shall be repaired in accordance with applicable United States Department of Transportation regulations and shall meet the applicable standards set forth in 49 CFR § 393.67, incorporated herein by reference, as amended and supplemented. The replacement of valves, fittings, and accessories intended for the same purpose is not considered a repair.

8. Containers located less than eight inches from the engine or exhaust system shall be shielded against direct heat.

9. Filler caps shall fit snugly to prevent leakage of fuel while the school bus is standing or in motion.

#### 13:20-53.5 Markings

Markings of set-to-discharge pressure for safety relief devices and working pressure of fuel supply containers required by this subchapter shall be visible either directly or by use of a mirror after installation. All remote filling inlets shall be visibly marked with the type of fuel and the lowest working pressure of any fuel supply container in the system.

#### 13:20-53.6 Venting

(a) All safety devices that may discharge to the atmosphere shall be vented to the outside of the school bus, and all discharge lines and outlets shall be installed as follows:

1. Discharge lines shall be constructed of metal other than aluminum and shall be of a size and so located and maintained as not to restrict the maximum flow of the safety device. Flexible metallic lines shall be used when necessary.

2. The discharge line of a fuel supply container installed inside a compartment shall extend to the outside of the compartment.

3. Discharge lines shall be located as far from the exhaust outlet as is practicable and shall direct escaping gas upward within 45 degrees of vertical. Escaping gas shall not impinge upon fuel supply containers and shall not be directed into wheel wells, at other vehicles in traffic, or at engine air intake inlets.

4. The discharge line from the safety relief valve on all school buses shall be located at the rear of the school bus, directed upward, and extended to the top of the

school bus roof. Means shall be provided to verify that the discharge line is clear.

5. Outlets shall be protected by caps, covers, or other means to keep water or dirt from collecting in the discharge lines. Protective devices shall not restrict the flow of gas.

6. Each discharge line and its connectors shall withstand the pressure caused by the discharge of vapor or liquid from a safety device in the fully-open position.

7. CNG containers may be vented to the outside of the school bus with a flexible bag. Such bag shall be constructed of a material that is nonflammable or self-extinguishing. The bag and attachments shall be capable of withstanding an internal pressure produced by a flow rate of 300 cubic feet per minute with a safety factor of not less than four. The bag shall be shielded or installed in a protected location to prevent damage from unsecured objects or abrasion.

#### 13:20-53.7 Manifold shut-off valve

Manifolds connected to fuel supply containers shall be supported to minimize vibration and shall be installed in a protected location or shielded to prevent damage from unsecured objects. A normally closed automatic shut-off valve that is held open by electrical current shall be installed in the outlet of the manifold and marked with the words "AUTOMATIC SHUT-OFF VALVE." The automatic shut-off valve shall be wired so that it shuts off when the ignition switch is in the "off" or "accessory" position and when engine vacuum or oil pressure is not present.

#### 13:20-53.8 Pipes, tubing, hoses, and fittings

(a) All pipes, tubing, hoses, and fittings shall meet the following requirements:

1. All materials and assemblies shall be designed for the widest pressure and temperature ranges to which they may be subjected with a pressure safety factor of at least four.

2. All materials, including gaskets and packing materials, shall be compatible with the fuel used in the system and its service conditions. Aluminum pipe, tubing, or fittings shall not be used between the fuel supply container and first-stage regulator. When used, copper tubing shall be seamless.

3. A pipe thread sealant impervious to the action of the fuel used in the system shall be applied to all male pipe threads prior to assembly. Only tin-silver (95 percent tin, five percent silver) or silver braze alloy shall be used on sweat-type joints or fittings.

#### 13:20-53.9 Supply lines

(a) Every gasoline or diesel fuel supply line shall have the fuel supply line fitting located in the top of the tank.

(b) Supply lines passing through a panel shall be protected by grommets or similar devices, which shall snugly fit both the supply lines and the holes in the panel. Supply lines shall have a minimum clearance of eight inches from the engine exhaust system unless they are shielded from exhaust heat. Supply lines shall be supported at least every 24 inches and shall be prevented from sagging. Damaged supply lines shall be replaced, not repaired.

#### 13:20-53.10 Shut-off valve

An automatic fuel supply shut-off valve shall be installed in a protected location adjacent to the manual shut-off valve on all school buses and shall be activated by engine vacuum or oil pressure.

#### 13:20-53.11 Carburetor flows

Means shall be provided in the fuel system to prevent the flow of gaseous fuel to the carburetor when the ignition is in the "off" or "accessory" position, or from the carburetor when engine vacuum or oil pressure is not present.

#### 13:20-53.12 Dual fuel systems

A dual fuel system using liquid and gaseous fuels shall have an automatic shut-off valve installed in the liquid fuel line to the carburetor.

#### 13:20-53.13 Relief device

A by-pass relief device shall be installed in the fuel pump or between the fuel pump and the automatic shut-off valve in the liquid fuel line to the carburetor on a school bus equipped with a dual fuel system for the use of gasoline and gaseous fuels. The relief device need not be installed on a fuel pump containing a by-pass relief device as original equipment.

#### 13:20-53.14 Electrical equipment

(a) Radio transmitters, radio receivers, electric motors, or other electrical equipment (except lamps and wiring) shall not be mounted in a compartment with fuel supply containers, unless one of the following conditions is met:

1. All piping, connectors, and valves on the fuel supply containers are exterior to and sealed from the compartment containing electrical equipment;
2. All piping, connectors, and valves within the compartment are contained in a vapor tight enclosure and vented to the atmosphere outside of the school bus; or
3. The electrical equipment is contained in a vapor tight enclosure that is vented to the atmosphere outside of the school bus.

#### 13:20-53.15 Road clearance

The fuel system, including the fuel supply container, shall be installed with as much road clearance as possible. The lowest part of any component in the fuel system, including protective guards and fuel cradles, shall not be lower than the lowest edge of the vehicle differential housing under maximum spring deflection.

#### 13:20-53.16 Gasoline tank

The gasoline tank shall not be placed below the aisle to a door unless the area over such tank is adequately protected by metal shielding.

#### 13:20-53.17 Certified fuel tanks

Diesel or gasoline fuel tanks shall be certified and marked by the manufacturer to be in compliance with United States Department of Transportation requirements.

#### 13:20-53.18 Fuel system

All parts of the fuel system shall be securely installed outside of the passenger compartment and shall be located so as to prevent damage to any part of the passenger compartment.

#### 13:20-53.19 Fuel containers

(a) Fuel containers for all fuels shall conform to 49 CFR § 393.65, incorporated herein by reference, as amended and supplemented.

(b) A fuel container for liquid fuel shall, in addition to (a) above, conform to 49 CFR § 393.67, incorporated herein by reference, as amended and supplemented, and shall have:

1. Suitable baffles;
2. A supply line taken from the top of the fuel tank; and
3. All parts of the electrical system located under any part of the fuel system including the fuel tank, carburetor, gasoline pump, gasoline filter, or fuel line connections shielded from possible fuel leakage.

(c) Fuel containers for LPG shall, in addition to (a) above, conform to 49 CFR § 393.69, incorporated herein by reference, as amended and supplemented.

(d) For a fuel supply system using LPG, CNG, or LNG, such a system shall be constructed and installed in accordance with the provisions of N.J.A.C. 13:20-53A, 53B, or 53C, whichever is applicable, and this subchapter.

**SUBCHAPTER 53A. STANDARDS FOR SCHOOL BUSES HAVING FUEL SYSTEMS USING LIQUEFIED PETROLEUM GAS****13:20-53A.1 General provision**

In addition to the NFPA Standard 58A "Liquefied Petroleum Gases Engine Fuel Systems," incorporated herein by reference, as amended and supplemented, in effect at the time of installation, fuel systems using LPG shall also meet the requirements of this subchapter.

**13:20-53A.2 Fuel supply container**

(a) Each LPG fuel supply container shall be constructed, inspected, and permanently marked in accordance with 49 CFR § 393.69, incorporated herein by reference, as amended and supplemented, or the ASME Code provision.

(b) Fuel supply containers constructed to the United States Department of Transportation specifications shall have a minimum service pressure of 240 pounds per square inch.

(c) Fuel supply containers constructed to the ASME Code specifications shall have a minimum working pressure of 250 pounds per square inch.

(d) Each fuel supply container shall be equipped with an outage valve or a fixed liquid level gauge to indicate when the container is 80 percent full. A float gauge shall not be used to meet this requirement.

(e) Each fuel supply container shall have a fill valve that limits the amount of fuel that may be pumped into such container to 80 percent of the container capacity.

**13:20-53A.3 Back-flow check valve**

When two or more fuel supply containers are used, a back-flow check valve with a pressure setting not higher than 500 pounds per square inch shall be installed between the back-flow check valves and the filling operation. A hydrostatic relief valve with a pressure setting not lower than 350 pounds per square inch shall be installed in each fuel line to prevent the passage of fuel between the fuel supply containers during gaseous fuel cutoff to the carburetor.

**13:20-53A.4 Fuel supply container markings**

(a) Each LPG fuel supply container constructed in accordance with ASME specifications shall be permanently marked with the following information:

1. The official ASME Code U symbol;
2. The manufacturer's name, initials, or trademark;
3. The maximum allowable working pressure in pounds per square inch at degrees Fahrenheit;
4. The serial number; and

5. The year built.

(b) Each LPG fuel supply container constructed in accordance with United States Department of Transportation specifications shall be permanently marked with the following information:

1. The letters "USDOT" or "ICC" (referring to the former Interstate Commerce Commission) with the applicable specifications and service pressure;
2. The manufacturer's name, initials, or trademark, as registered with the United States Department of Transportation;
3. The serial number; and
4. The year tested.

(c) All fuel supply container inlets and outlets, except those for relief valves and gauging devices, shall be permanently marked to indicate whether they connect to vapor or liquid space.

**13:20-53A.5 Valves**

Each valve shall be of a type that has been tested and listed by the UL or by any other nationally recognized testing laboratory as meeting the UL requirements for LPG. Each valve shall be securely mounted and shielded or installed in a protected location to prevent damage from excessive vibration or unsecured objects.

**13:20-53A.6 Safety relief valves**

(a) One or more spring-loaded internal safety relief valves shall be installed in each fuel supply container that is connected to vapor space.

(b) The fuel supply container shall be permanently marked to indicate the "set to discharge pressure" after the safety relief valves have been installed in the container.

(c) Safety relief valves for United States Department of Transportation fuel supply containers shall be approved by the Federal Bureau of Explosives and the valve setting shall be as required by that Bureau.

(d) The safety relief valve setting for ASME fuel supply containers shall be not less than 100 percent nor more than 110 percent of the maximum allowable service pressure of the container.

**13:20-53A.7 Safety relief valve markings**

(a) Permanent markings on safety relief valves in ASME fuel supply containers shall include:

1. The manufacturer's name, initials, or trademark;
2. The manufacturer's design or type number;
3. The discharge pressure in pounds per square inch;

4. The discharge capacity in cubic feet of air per minute at 60 degrees Fahrenheit and 14.7 pounds per square inch; and

5. The ASME or UL symbol.

(b) Permanent markings on safety relief valves in United States Department of Transportation fuel supply containers shall include:

1. The manufacturer's name, initials, or trademark;
2. The catalog number;
3. The discharge pressure in pounds per square inch; and
4. The discharge capacity in cubic feet of air per minute at 60 degrees Fahrenheit and 14.7 pounds per square inch.

#### 13:20-53A.8 Excess flow valve

(a) An internal excess flow valve shall be provided that is designed to close when maximum volume escapes through the smallest connection in the supply line valve or gauging device outlets.

(b) The internal excess flow valve shall have a by-pass not to exceed a No. 60 drill size opening to allow for the equalization of pressure.

#### 13:20-53A.9 Check valves

(a) The inlet connection in the fuel supply container shall be fitted with either an internal and external check valve or an internal check valve with an adjacent or remote manual shut-off valve.

(b) The inlet of the filling system shall be capped, except when filling, to withstand the maximum service pressure of the fuel supply container.

(c) Every fuel supply container shall have an internal and an external check valve connected to the container and shall be equipped for filling outside of the school bus passenger compartment.

#### 13:20-53A.10 Vapor equalizing valve

A vapor equalizing valve may be installed in the fuel supply container. The valve shall be capped, except when filling, to withstand the maximum pressure of the container.

#### 13:20-53A.11 Shut-off valve

A manually-operated shut-off valve shall be installed in the fuel supply container outlet connection serving the supply line and shall be marked "SHUT-OFF VALVE."

#### 13:20-53A.12 Liquid volume gauge

(a) Every LPG fuel supply container shall be equipped with a liquid volume gauge, which shall be designed and installed as follows:

1. The gauging device shall be a type that has been listed by the UL or by any other nationally recognized testing laboratory as meeting the UL requirements for LPG;

2. The gauge shall be securely mounted and shielded or installed in a protected location to prevent damage from excessive vibration or unsecured objects; and

3. A gauge that requires the bleeding of the product shall be equipped with a bleeder valve and the product shall be bled to the outside of the school bus passenger compartment. A restricting orifice not larger than a No. 54 drill size shall be installed inside the fuel supply container.

#### 13:20-53A.13 Pressure reducing regulator and vaporizer regulator

An automatic pressure reducing regulator or a vaporizer regulator designed to withstand a service pressure of at least 250 pounds per square inch shall be installed between the LPG fuel supply container and the carburetor. All regulators and vaporizers shall be of a type that has been tested and listed by the UL or by any other nationally recognized testing laboratory as meeting the UL requirements for LPG. The regulator or vaporizer shall be installed so that its weight is not placed on, or supported alone by, the attached tubing or flexible lines.

#### 13:20-53A.14 Vents

Every compartment in which an LPG fuel supply container is installed shall be vented to the atmosphere unless all piping and connectors are outside of the compartment. The vent or vents shall be installed at the lowest practicable point of the compartment and shall have an open area totaling not less than three square inches.

#### 13:20-53A.15 LPG hose for high pressure liquid or vapor use

(a) All LPG hose and hose assemblies shall have a working pressure of not less than 350 pounds per square inch and a burst pressure of not less than 1,750 pounds per square inch.

(b) Each LPG hose shall be reinforced with corrosion-resistant wire braid and shall be of a type that has been tested and listed by the UL or by any other nationally recognized testing laboratory as meeting the UL requirements for LPG.

(c) Each LPG hose shall have the following permanent identification markings in letters and numerals at least 3/4 inch in height at intervals of 24 inches or less:

1. The manufacturer's name, initials, or trademark;
2. LPG or LP Gas; and
3. The working pressure.

**SUBCHAPTER 53B. STANDARDS FOR SCHOOL BUSES HAVING FUEL SYSTEMS USING COMPRESSED NATURAL GAS**

**13:20-53B.1 General provision**

In addition to the NFPA Standard 52A "Compressed Natural Gas Vehicular Fuel Systems," incorporated herein by reference, as amended and supplemented, in effect at the time of installation, fuel systems using CNG shall also meet the requirements of this subchapter.

**13:20-53B.2 Fuel supply container**

(a) Each CNG fuel supply container shall be constructed and inspected in accordance with FMVSS No. 304 (49 CFR § 571.304), incorporated herein by reference, as amended and supplemented, and shall have a rated service pressure of not less than 2250 pounds per square inch at 70 degrees Fahrenheit.

(b) The working pressure shall be stamped on the CNG fuel supply container near the filler connection.

(c) The CNG fuel supply container shall not be filled beyond the working pressure stamped thereon corrected for the ambient temperature at the time of filling as prescribed by the United States Department of Transportation.

**13:20-53B.3 Markings**

(a) Each CNG fuel supply container shall have the following identification markings:

1. The letters "USDOT" with the applicable specification and working pressure;
2. The manufacturer's name, initials, or trademark;
3. The serial number; and
4. The year tested.

**13:20-53B.4 Shut-off valve**

(a) A manually-operated shut-off valve shall be in direct contact with the CNG fuel supply container and shall be marked "SHUT-OFF VALVE."

(b) A shut-off valve shall not be used for CNG unless it has been certified for that purpose by the manufacturer.

(c) The shut-off valve shall be securely mounted and shielded or installed in a protected location to prevent damage from excessive vibration or unsecured objects.

**13:20-53B.5 Safety relief devices**

(a) One or more safety relief devices shall be installed in the CNG fuel supply container in order to vent the fuel to the outside of the school bus passenger compartment.

(b) Safety relief devices shall be approved as to type, size, quantity, and location by the Federal Bureau of Explosives and shall be permanently marked as follows:

1. The manufacturer's name, initials, or trademark;
2. The flow capacity in cubic feet per minute; and
3. The yield temperature rating in degrees Fahrenheit.

**13:20-53B.6 Gauges**

(a) Gauges used in CNG systems shall be designed and installed as follows:

1. Gauging devices shall be designed for the most severe pressure and temperature conditions to which the devices may be subjected with a pressure safety factor of not less than four; and
2. Gauges shall be securely mounted and shielded or installed in protected locations to prevent damage from excessive vibration or unsecured objects.

**13:20-53B.7 Automatic pressure reducing regulators**

(a) An automatic pressure reducing regulator or regulators shall be installed in every CNG system to reduce fuel supply container pressure to a value consistent with the working pressure required by the carburetor. Means shall be provided to prevent regulator malfunction due to refrigeration effects.

(b) Every automatic pressure reducing regulator shall be installed so that its weight is not placed on, or supported alone by, the attaching line or lines.

(c) Every automatic pressure reducing regulator shall be designed to the CNG fuel supply container's maximum working pressure and temperature with a pressure safety factor of not less than four.

**13:20-53B.8 Vents**

Every compartment in which a CNG fuel supply container is installed shall be vented to the atmosphere, unless all piping and connectors outside of the compartment are vapor-sealed and vented to the atmosphere. The vent or vents shall be installed at the highest practicable point of the compartment and shall have an open area totaling not less than three square inches.

**SUBCHAPTER 53C. STANDARDS FOR SCHOOL BUSES HAVING FUEL SYSTEMS USING LIQUEFIED NATURAL GAS**

**13:20-53C.1 General provision**

In addition to the NFPA Standard 57 "Liquefied Natural Gas Vehicular Fuel Systems," incorporated herein by reference, as amended and supplemented, in effect at the time of installation, fuel systems using LNG shall also meet the requirements of this subchapter.

**13:20-53C.2 Fuel supply container**

(a) Each LNG fuel supply container shall be constructed and inspected in accordance with 49 CFR § 178.57 (Specification 4L welded insulated cylinders), incorporated herein by reference, as amended and supplemented, with the exception of subsections 178.57-13 and 178.57-20 and the reports to the Federal Bureau of Explosives in subsection 178.57-4(d). Each LNG container shall meet the following additional requirements:

1. The unrelieved fuel pressure inside the LNG fuel supply container shall not exceed 100 pounds per square inch within a total 72-hour period consisting of 48 hours at 60 degrees Fahrenheit, 12 hours at 70 degrees Fahrenheit, and 12 hours at 90 degrees Fahrenheit ambient temperatures when the container has been filled with LNG conditioned at one atmosphere;

2. The LNG fuel supply container shall be equipped with a liquid level gauging device and a dip tube to prevent filling beyond 90 percent by volume at atmospheric pressure; and

3. Each completed LNG fuel supply container, including its supporting structure and valves, enclosures, and lines normally attached thereto, shall have structural integrity to withstand damage from deceleration and acceleration forces resulting from a 30 miles per hour front-end or rear-end collision with the type of vehicle in which the container is installed. A test of other means as established by a national standards testing institute shall demonstrate that the LNG fuel supply container and its openings do not rupture in such collisions.

**13:20-53C.3 Markings**

(a) Each LNG fuel supply container shall be permanently marked as follows:

1. The service pressure;
2. The serial number;
3. The manufacturer's name, initials, or trademark;
4. The inspector's mark; and
5. The date tested.

(b) All inlets and outlets, except relief valves and gauging devices, shall be permanently marked to designate whether they make contact with vapor or liquid space.

**13:20-53C.4 Valve certification**

Valves shall be certified for LNG use by the manufacturer or certified for cryogenic service at temperatures down to and including minus 320 degrees Fahrenheit. All valves shall be securely mounted and shielded or installed in a protected location to prevent damage from excessive vibration or unsecured objects.

**13:20-53C.5 Safety relief valves**

(a) Each LNG fuel supply container shall be equipped with one or more safety relief valves.

(b) A safety relief valve(s) shall be installed in a line that is connected to the vapor space of the container. A safety relief valve shall be installed between two shut-off valves in a supply line to prevent a buildup of pressure between the valves in the "off" position.

(c) The discharge pressure of a safety relief valve shall not exceed 125 percent of the service pressure of the LNG fuel supply container.

(d) A safety relief valve shall have sufficient capacity to meet the requirements of the NFPA Standard 59 (A)—Appendix A, incorporated herein by reference, as amended and supplemented, and be capable of preventing explosion of the normally-charged cylinder when it is placed in a fire.

(e) A safety relief valve shall be permanently marked as follows:

1. The manufacturer's name, initials, or trademark;

2. The catalog number;
3. The discharge pressure in pounds per square inch; and
4. The discharge capacity in cubic feet of air per minute at 60 degrees Fahrenheit and 14.7 pounds per square inch.

**13:20-53C.6 Shut-off valves**

(a) One manually-operated shut-off valve shall be secured directly to the tank vapor outlet with no intervening fitting other than the safety relief valve and shall be marked "VAPOR SHUT-OFF VALVE."

(b) Another manually-operated shut-off valve shall be secured directly to the tank liquid outlet and shall be marked "LIQUID SHUT-OFF VALVE."

(c) Automatic shut-off valves that are held open by electrical current may be used in lieu of manual shut-off valves at either the tank vapor port or tank liquid port, or both. An automatic shut-off valve shall be wired so that it shuts off when the ignition switch is in the "off" or "accessory" position and when engine vacuum or oil pressure is not present.

**13:20-53C.7 Control valve**

A positive shut-off valve shall be installed in the fuel supply lines as close to the LNG fuel supply containers as possible, automatically closing off and preventing the flow of fuel to the carburetor when the ignition switch is in the "off" or "accessory" position.

**13:20-53C.8 Gauges**

(a) Gauges used in LNG systems shall be designed and installed as follows:

1. Gauging devices shall be designed for the most severe pressure and temperature conditions to which the devices may be subjected with a pressure safety factor of not less than four;

2. Gauges shall be securely mounted and shielded or installed in protected locations to prevent damage from excessive vibration or unsecured objects; and

3. A gauging device that requires bleeding of the product shall be equipped with a bleeder valve and the product shall be bled to the outside of the school bus passenger compartment.

**13:20-53C.9 Pressure reducing regulators**

LNG systems shall be equipped with one or two-stage pressure reducing regulators. The regulators shall be installed so that their weight is not placed on, or supported alone by, the attached tubing or flexible lines.

**13:20-53C.10 Vents**

Every compartment in which an LNG fuel supply container is installed shall be vented to the atmosphere unless all piping and connectors are outside of the compartment. The vent or vents shall be installed at the highest practicable point of the compartment and shall have an open area totaling not less than three square inches.





