Report of the Committee on

Vehicular Alternative Fuel Systems

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Committee Scope: This Committee shall have primary responsibility for documents on fire and explosion hazards associated with compressed natural gas (CNG) and liquefied natural gas (LNG) engine fuel systems on vehicles of all types and for refueling stations and associated storage.

The Committee shall coordinate its documents with the Committee on the National Fuel Gas Code with respect to natural gas piping within the scope of that Committee, with the Committees on Industrial Trucks, Fire Safety for Recreational Vehicles, and Marine Fire Protection with respect to engine fuel systems and refueling stations within their scopes, and with the Liquefied Natural Gas Committee with respect to storage of LNG within its scope.

This list represents the membership at the time the Committee was balloted on the text of this edition. Since that time, changes in the membership may have occurred. A key to classifications is found at the front of this book.

The Report of the Technical Committee on Vehicular Alternative Fuel Systems is presented for adoption.


This Report has been submitted to letter ballot of the Technical Committee on Vehicular Alternative Fuel Systems, which consists of 27 voting members. The results of the balloting, after circulation of any negative votes, can be found in the report.
Containers on the weather deck shall be protected with a housing to prevent damage that can occur due to loading, unloading, direct sunlight, and the general use of the vessel. The housing shall be installed to prevent contact of the housing with the container(s) and entrapment of materials that could damage the container(s) or its coating. The shelter(s) for storing the containers on the weather deck shall be an enclosure constructed of non-combustible or limited-combustible materials that has at least one side predominantly open, facing outboard, and a roof designed for ventilation and dispersal of escaped gas.

6-2.2.2 Each fuel supply container shall be mounted in a location to minimize damage from collision. No part of a container or its appurtenances on the weather deck shall protrude beyond the sides or top of the vessel at the point where it is installed.

6-2.2.3 No portion of a fuel supply container or container appurtenances shall protrude beyond the bow or the stern of the vessel. Container valves shall be protected from physical damage using the vessel structure, valve protectors, or a suitable metal shield.

6-2.2.4 Each container cradle shall be secured to the vessel frame, either above or below or both, to prevent damage from sippage, loosening, or rotation using a method capable of withstanding a static force in the six principle directions (see Figure 3-5.3) of at least four (4) times the weight of the fully pressurized container(s). Other means may be appropriate for the vessel.

6-2.2.5 Each fuel supply container shall be secured to its cradle or to the vessel frame in such a manner that it is capable of withstanding a static force applied in the six principle directions (see Figure 3-5.3) of at least four (4) times the weight of the fully pressurized container or greater as may be appropriate for the vessel.

6-2.2.6 The container weight shall not be supported by outlet valves, manifolds, or other fuel connections.

6-2.2.7 Fuel supply containers located less than 8 in. (203 mm) from the exhaust system shall be shielded against direct heat.

6-2.2.8 The mounting system shall minimize fretting corrosion between the container and the mounting system.

6-2.2.9 Fuel supply containers shall not be installed so as to adversely affect the balance of the marine vessel.

6-2.2.10 A container, located in a below deck tank room or tank compartment capable of accumulating natural gas shall be installed so that the pressure relief device for the protection of the container is installed in the same space as the container and the discharge from the pressure relief device is:

- (a) vented to the outside through a metallic tube (vent mast) or hose no smaller than the outlet diameter of the relief device, secured at 12 in. (300 mm) intervals where the tube exceeds 24 in. (610 mm) in length and having a minimum burst pressure of at least one and one-half times the service pressure of the container at 400°F (204°C).

(b) located so that the vent opening is not blocked by debris or otherwise affected by the elements.

6-2.2.11 A container located in a below deck tank room or compartment must be enclosed in a space constructed of materials approved for cryogenic service. The enclosure must be capable of containing leakage from the fuel tank.

6-3 Installation of Pressure Gauges.

6-2.5.1 A pressure gauge located within the wheelhouse (bridge) or accommodation or service space shall be installed in such a manner that no gas flows through the gauge in the event of failure.

6-2.5.2 A pressure gauge installed in the engine room/compartment, fuel tank room/compartment, or other gas-dangerous space shall be equipped with a limiting orifice, a shatter proof dial lens, and a body relief.

6-2.5.3 An engine vessel or pleasure craft shall be identified with weather resistant, diamond-shaped labels located on an exterior vertical surface or near-vertical surface, at a location, as near to eye level as possible, where the vessel is routinely boarded, both port and starboard. Depending on the size of the vessel, other labels should be placed at logical locations to alert persons not familiar with the vessel, such as firefighters or service personnel, as to the nature of the vessel. The label shall be a minimum of 4 5/8" (122mm) long by 3 3/4" (83mm) high. The marking shall consist of a border and the letters "LNG" [1] (25mm) minimum height centered in the diamond] of silver or white reflective luminous material on a blue background.

6-2.5.4 Operation.

6-2.5.1 Where LNG is being transferred to or from a marine vessel, the engines shall be turned off.

Exceptions: It shall be permitted to operate the engine when it is necessary to hold the vessel in position while refueling or when, in the opinion of the master, that the safety of the vessel is at issue. The master may also elect to operate generators during refueling.
accordance with NFPA 30A

storage tanks shall be in accordance with the provisions of NFPA

the fuelling station.

accomplished in accordance with NFPA 302, Fire Protection Standard for Pleasure and Commercial Motorcraft. The following paragraphs of NFPA 302 shall be revised as follows when used for LNG fuel systems.

6-3.2 Paragraph 2.5.3.4(b) Located in the upper one-third of the compartment:

6-3.3 Paragraph 4.1.1 Exception: Engine-cooling water or exhaust cooling water.

6-4 Modifications to NFPA 303.

6-4.1 NFPA 303, Fire Protection Standard for Marinas and Boatyards, shall be consulted relative to the placing of LNG fueling systems for marine vessels and pleasure craft. The following are modifications that relate directly to the use of LNG as the primary fuel for the engines or generators:

6-4.2 Paragraph 6-3.2 All boat fueling operations shall be carefully accomplished in accordance with NFPA 303, Fire Protection Standard for Pleasure and Commercial Motorcraft and NFPA 57 Standard for Liquefied Natural Gas (LNG) Vehicular Fuel Systems, at the fuelling station.

6-4.3 Paragraph 6-3.4 Fuel storage tanks shall be installed in accordance with NFPA 30A, Automotive and Marine Service Station Code and NFPA 57, Standard for Liquefied Natural Gas (LNG) Vehicular Fuel Systems, and in accordance with all state and local codes and ordinances.

6-4.4 Paragraph 6-3.9 Dispensing units for transferring fuel from storage tanks shall be in accordance with the provisions of NFPA 30A, Automotive and Marine Service Station Code and NFPA 57, Standard for Liquefied Natural Gas (LNG) Vehicular Fuel Systems. (The rest of the paragraph is unmodified.)

6-5 Modification to NFPA 30A.

In establishing a marine service station for fueling LNG powered marine vessels, NFPA 30A, Automotive and Marine Service Station Code, applies with the following modification:

Paragraph 3-1 General: The design, fabrication, assembly, test, and inspection of the piping system shall be in accordance with NFPA 30A, Flammable and Combustible Liquids Code, Chapter 3, and NFPA 57, Standard for Liquefied Natural Gas (LNG) Vehicular Fuel Systems.

6-6 Engine Rooms or Compartments.

6-6.1 In engine rooms and engine compartments, all fuel lines shall be mounted in the overhead to provide the shortest route for leaking gas to flow to the exterior.

6-6.2 The pressure in the fuel lines passing through the engine room or engine compartment shall not exceed the pressure required to operate the engines.

6-6.3 All pressure regulators, except those mounted on the engine(s), shall be located in a tank room or tank compartment.

6-6.4 Ventilation.

6-6.4.1 Engine rooms or compartments shall be provided with positive pressure and passive ventilation. Positive pressure ventilation shall provide a minimum of thirty (30) volumetric exchanges per hour.

6-6.4.2 The ventilation system shall be capable of handling a combustible mixture if necessary. The ventilation fans shall take air from the weather deck and discharge it to the weather deck through ducts which shall have a maximum separation from the fans. Multiple discharge ducts shall be used if practical to enhance ventilation.

6-6.4.3 If engine combustion air is taken from the engine room (compartment), the thirty (30) air exchanges per hour shall be in excess of the maximum air volume per hour required by the engines.

6-6.5 Engines.

6-6.5.1 Since LNG engines have a natural gas atmosphere in the crankcase, they shall be provided with blowout plugs to relieve pressure in the event of a crankcase explosion. Blowout plugs shall be located so as to limit risk to the crew.

6-6.5.2 Engines shall be permitted to be located on the weather deck.

6-6.5.3 Engines on the weather deck shall be protected with a housing to prevent damage that can occur due to loading, unloading or the general use of the vessel.

6-6.5.4 Shelters for engines installed on the weather deck shall be an enclosure constructed of noncombustible or limited-combustible materials that have at least one side predominantly open, facing outboard, and a roof designed for dispersal of escaped gas.

6-6.5.5 An engine or engines on the weather deck shall be provided in a location to minimize damage from collision. No part of an engine or its appurtenances shall protrude beyond the sides or top of the vessel at the point where it is installed.

6-6.6 Natural Gas Monitoring.

6-6.6.1 Engine Rooms.

6-6.6.1.1 Engine rooms shall have at least two natural gas detectors placed in the overhead at the fore and aft locations.

6-6.6.1.2 Monitoring stations shall be located in the engine room, in the wheelhouse (bridge), and in an accommodation or service space, such as a galley, where crew are likely to congregate.

6-6.6.1.3 When no gas is detected, the monitoring stations shall show a green light.

6-6.6.1.4 At one-tenth of the lower flammability level (LFL) of the concentration, power ventilation shall activate simultaneously along with a flashing yellow light at each monitoring station accompanied by a klaxon.

6-6.6.1.5 Should the monitoring system detect a concentration, one-fifth of the LFL, a flashing red light shall activate at each monitoring station accompanied by a siren. When the one-fifth LFL is detected and the alarm system activated, an emergency fuel shutoff shall be activated simultaneously terminating the flow of fuel to the engine room.

6-6.6.1.6 A manual override switch shall be mounted in the engine room so that the crew can turn off the alarm and restore fuel to the engines in the event of a false alarm or other contingency.

6-6.6.1.7 When the LNG fuel supply is shut down due to loss of ventilation or detection of gas, the master shall ensure that the LNG fuel supply is not used until the leak or other cause of the shut-down is found and corrected.

6-6.6.2 Engine Compartments. Engine compartments shall be equipped with natural gas detection and intervention equipment in a fashion similar to engine rooms except that a monitoring station shall be placed only at the wheelhouse (bridge) but shall also be placed in accommodation or service space if the vessel is large enough to prevent hearing the alarm if no one is manning the wheelhouse (bridge).

6-6.7 Fire Equipment and Systems.

6-6.7.1 LNG powered marine vessels of all sizes shall carry fire-fighting equipment and systems normally required by U.S. Coast Guard.

6-6.7.2 In addition, engine rooms and engine compartments shall have a 150°F thermal switch which shall activate fire fighting equipment. When the thermal switch is activated, a flashing red light and an audible alarm in the engine room wheelhouse (bridge) and other accommodation space or service space where crew are likely to congregate, such as a galley, shall activate, signaling the possible presence of a fire.

6-6.7.3 There shall be one-minute time delay, after which the engine or compartment shall be flooded with CO₂ (or other USCG approved inert gas) for two minutes. Simultaneously, the ventilation fans shall be cut off for two minutes and then reactivate. Sufficient CO₂ (or other USCG approved inert gas) should be provided for two (2) cycles.

6-6.7.4 A manual override switch shall be provided in the engine room or near the engine compartment to allow terminating the response in the event of false alarm or other contingency.

6-6.7.5 Controls shall be provided to allow manual activation of the CO₂ (or other USCG approved inert gas) system without a delay.

6-7 Tank Rooms or Compartments.

6-7.1 Tank rooms and tank compartments shall be airtight as well as watertight with appropriate fittings used to seal penetrations through the bulkheads for wire or pipes passing through the tank rooms.

6-7.2 The tank rooms shall be provided with positive pressure and passive ventilation.

6-7.3 Ventilation of the tank rooms (compartment) shall be provided at thirty (30) exchanges per hour minimum.

6-7.4 Air shall be taken from the weather deck and discharged to the weather deck through ducts which have a maximum separation from the fans.

6-7.5 The fans shall be capable of handling a combustible mixture if necessary.

6-7.6 Multiple discharge ducts shall be used if practical to enhance ventilation.

6-7.7 Natural Gas Monitoring.

6-7.7.1 Tank rooms or compartments shall have at least two natural gas sensors placed at or near the ceiling at fore and aft locations.
6-7.7.2 When no gas is detected, the monitoring stations shall show a green light.
6-7.7.3 Two levels of alarm shall be used for signaling the need for intervention.
6-7.7.4 An alarm shall activate when one-tenth of the LFL is reached.
6-7.7.5 At one-fifth of LFL, a second alarm shall activate utilizing a flashing yellow light and an audible signal.
6-7.7.6 A tank compartment may not have a deluge system if a second warning station shall activate in an accommodation or service space where crew are likely to congregate.
6-7.7.7 When the LNG fuel supply is shut down due to loss of ventilation or detection of gas, the master shall ensure that the LNG fuel supply is not used until the leak or other cause of the shut-down is found and corrected.
6-7.7.8 Tank rooms and compartments shall have manual drains to remove the water produced by the deluge system.
6-7.7.9 A labeled override switch shall be available in a readily accessible location to turn off the tank room or compartment warning system in the event of a false alarm or other contingency and to shut down the CO₂ (or other USCG approved inert gas) and deluge system.
6-7.10 Fire Fighting Equipment.
6-7.10.1 Tank rooms and compartments shall have a 150 psi thermal switch which will activate automatic fire fighting equipment.
6-7.10.2 When the switch is activated, a red flashing light and an audible alarm shall activate on a fire alarm panel in the wheelhouse (bridge) and in an accommodation or service area (such as a galley) where crew are likely to congregate.
6-7.10.3 Since the tank rooms or compartments are unmanned spaces, alarms shall not be required in those spaces.
6-7.10.4 Ventilation in the tank rooms or compartments shall be regulated simultaneously with the activation of the fire alarm. One minute after the fire alarm is activated, the tank room or compartment shall be flooded with CO₂ (or other USCG approved inert gas) and a deluge system shall activate to keep the LNG tanks cool and assist in extinguishing fire.
6-7.10.5 The tank room or compartment shall be provided with a readily accessible override switch which will allow the crew to terminate the fire fighting system in the event of a false alarm or other contingency.
6-7.10.6 A deluge system may be omitted from tank compartments on vessels too small to accommodate them. This determination shall be made by the authority having jurisdiction.
6-7.11 Lighting.
6-7.11.1 Tank rooms shall have at least two explosion-proof lighting fixtures.
6-7.11.2 Switches and overcurrent protective devices for lighting in the tank room(s) must be in a gas-safe space.
6-8. Vent Masts.
6-8.1 All crankcases on natural gas powered engines shall be vented to a vent mast. Vessels having more than one engine may utilize a manifold.
6-8.2 Relief valves or common vent headers from relief valves must terminate in a gas-safe space.
6-8.3 Relief valves shall be provided to aid in evaluating alarms and for making a survey of the vessel. These instruments will allow locating specific leaks at very low levels of detection and can be carried by personnel working in a compartment containing gas storage or transmission equipment. A vessel with a tank room should have at least two of these sensors.
6-11 Safety Equipment.
6-11.1 Marine vessels with tank rooms and engine rooms shall have:
1. Three self-contained, pressure demand type, air breathing apparatus approved by the Mine Safety and Health Administration (MSHA) or the National Institute for Occupational Safety and Health (NIOSH), each having at least a 30 minute capacity.
2. Three spare bottles of air for the self-contained air breathing apparatus each having at least a 30 minute capacity.
3. Three explosion proof flashlights.
6. An air compressor to recharge the bottles for the air breathing apparatus.
7. Portable handheld natural gas detectors which shall be provided to aid in evaluating alarms and for making a survey of the vessel. These instruments will allow locating specific leaks at very low levels of detection and can be carried by personnel working in a compartment containing gas storage or transmission equipment. A vessel with a tank room should have at least two of these sensors.
6-11.2 Vessels having engine rooms and tank rooms shall have a portable analyzer that measures oxygen levels in an inert atmosphere.
6-11.3 Before allowing anyone to enter a space that has had a gas leak and repair, the master shall ensure that the space has an oxygen concentration of at least 19.5% oxygen by volume and is free of natural gas.
6-11.4 The master shall ensure that the compressed air breathing equipment is inspected at least once a month by a licensed officer and that the date of inspection and condition of the equipment be placed in the vessels log.
6-12 Safety Training.
6-12.1 A written safety guide for the vessel and for the safety equipment and procedures shall be provided. The manual shall outline all safety systems, and equipment, and their operation.
6-12.2 Crews shall be trained to operate the LNG powered vessel and perform repairs.
6-12.3 Training drills shall be conducted monthly.

References:
NAPA 30A Automotive and Marine Service Station Code, 1996 edition
NAPA 302 Fire Protection Standard for Pleasure and Commercial Motorcraft

SUBSTANTIATION: A new chapter is proposed to cover LNG engine fuel systems on commercial vessels and pleasure craft. The text is based on requirements for LNG engine fuel systems for
6.2.4 Each container cradle shall be secured to the vessel frame, either above or below or both, to prevent damage from slippage, loosening, or method capable of withstanding a static force in the six principle directions (see Figure 3-3.3) of at least four times the weight of the fully pressurized container(s), or greater as is appropriate for the vessel.

6.2.5 Each fuel supply container shall be secured to its cradle or to the vessel frame in such a manner that it is capable of withstanding a static force applied in the six principle directions (see Figure 3-3.3) of at least four times the weight of the fully pressurized container(s) or greater as is appropriate for the vessel.

6.2.6 The container weight shall not be supported by outlet valves, manifolds, or other fuel connections.

6.2.7 Fuel supply containers located less than 8 in. (200 mm) from the exhaust system shall be shielded against direct heat.

6.2.8 The mounting system shall minimize fretting corrosion between the container and the mounting system.

6.2.9 Fuel supply containers shall not be installed so as to adversely affect the balance of the marine vessel.

6.2.10 A container, where located in a below deck tank room or compartment that is capable of accumulating natural gas, shall be installed so that the pressure relief device for the protection of the container is installed in the same space as the container and the discharge from the pressure relief device shall follow:

(a) Vented to the outside through a metallic tube (vent mast) or hose smaller than or equal in diameter to the relief device, or secured at 12 in. (300 mm) intervals where the tube exceeds 24 in. (610 mm) in length and having a minimum burst pressure of at least one and one-half times the service pressure of the container at 40°F (904°C).

(b) Located so that the vent opening is not blocked by debris or otherwise affected by the elements.

6.2.11 A container located in a below deck tank room or compartment shall be enclosed in a space constructed of materials approved for cryogenic service. The enclosure shall be capable of containing leakage from the fuel tank.

6.2.12 Installation of Pressure Gauges.

6.2.13 A pressure gauge located within the wheelhouse (bridge) or accommodation space, or shall be installed in such a manner that no gas flows through the gauge in the event of failure.

6.2.14 A pressure gauge installed in the engine room/compartment, fuel tank room/compartment, or other dangerous space shall be equipped with a limiting orifice, a shatterproof dial lens, and a body relief.

6.2.15 Labeling. Each marine vessel or pleasure craft shall be identified with weather resistant, diamond-shaped labels located on an exterior vertical surface or near-vertical surface, at a location, as near to eye level as possible, where the vessel is routinely boarded, both port and starboard. Depending on the size of the vessel, other labels should be located at logical locations to alert persons not familiar with the vessel, such as firefighters or service personnel, as to the nature of the vessel. The label shall be a minimum of 4 inches (120 mm) long by 3 inches (85 mm) high. The label shall consist of the following words: "No Smoking," "Flammable Gas." The location of signs shall be determined by local conditions, but the lettering shall be large enough to be visible and legible from each point of transfer.

6.2.16 Fire Protection for Vessels.

6.2.17 Fire protection for vessels shall be in accordance with NFPA 302, Fire Protection Standard for Pleasure and Commercial Motorcraft. In addition, the following paragraphs of NFPA 57 shall be revised as follows when used for LNG fuel systems.

(a) Paragraph 2.5.3.4 covering blower intake duct openings shall have (b) revised to change the blower intake duct opening from the lower one-third of the compartment to the upper one-third of the compartment.

(b) Paragraph 4.1.1 General requirements for engine exhaust systems shall be revised by expanding the exception to make the
paragraph not applicable to exhaust cooling water in addition to engine-cooling water.

6-4 LNG Fueling Systems

6-4.1 LNG fueling systems shall be in accordance with NFPA 303, Standard for Liquefied Natural Gas (LNG) Vehicular Fuel Systems.

6-4.2 Paragraph 6-3.4 covering all boat fueling operations shall be revised by adding reference to NFPA 57, Standard for Liquefied Natural Gas (LNG) Vehicular Fuel Systems.

6-4.3 Paragraph 6-5.9 covering dispensing of fuels shall be revised by adding reference to NFPA 57, Standard for Liquefied Natural Gas (LNG) Vehicular Fuel Systems.

6-5 Marine Service Stations

Marine service station for fueling LNG powered marine vessels shall be in accordance with NFPA 30A Automotive and Marine Service Station Code. In addition, the following paragraph of NFPA 30A shall be revised as follows when paragraph 5-1 covering general requirements for the installation of piping systems shall be revised by adding reference to NFPA 57, Standard for Liquefied Natural Gas (LNG) Vehicular Fuel Systems.

6-6 Engine Rooms or Compartments

6-6.1 In engine rooms and engine compartments, all fuel lines shall be mounted in the overhead to provide the shortest route for escaping gas to the exterior.

6-6.2 The pressure in the fuel lines passing through the engine room or engine compartment shall not exceed the pressure required to operate the engines.

6-6.3 All pressure monitoring stations, except those mounted on the engine(s), shall be located in a tank room or tank compartment.

6-6.4 Ventilation

6-6.4.1 Engine rooms or compartments shall be provided with positive pressure ventilation. Positive pressure ventilation shall provide a minimum of 30 volumetric exchanges per hour.

6-6.4.2 The ventilation system shall be capable of handling a combustible mixture, if necessary. The ventilation fans shall take air from the weather deck and discharge it to the weather deck through ducts that shall have a maximum separation from the fans.

6-6.5 Engines

6-6.5.1 Since LNG engines have a natural gas atmosphere in the crankcase, they shall be provided with blowout plugs to relieve pressure in the event of a crankcase explosion. Blowout plugs shall be located so as to limit risk to the crew.

6-6.5.2 Vessels having the capability shall be permitted switch to another fuel to maintain power.

6-6.5.3 Engines shall be permitted to be located on the weather deck.

6-6.5.4 Engines on the weather deck shall be protected with a housing to prevent damage that can occur due to loading, unloading or the general use of the vessel.

6-6.5.5 Shelters for engines installed on the weather deck shall be enclosed with non-combustible or limited-combustible materials that have at least one side predominantly open, facing outboard, and roofs designed for dispersal of escaped gas.

6-6.5.6 An engine or engines on the weather deck shall be mounted in a location to minimize damage from collision. No part of an engine or its appurtenances shall protrude beyond the sides or top of the vessel at the point where it is installed.

6-6.5.7 No portion of an engine on the weather deck shall protrude beyond the bow or stern of the vessel.

6-6.6 Natural Gas Monitoring

6-6.6.1 Engine Rooms. Engine rooms shall have at least two natural gas detectors placed in the overhead at the fore and aft locations.

6-6.6.2 Monitoring stations shall be located in the engine room, in the wheelhouse (bridge), and in an accommodation or service space, such as a galley, where crew are likely to congregate.

6-6.6.3 When no gas is detected, the monitoring stations shall show a green light.

6-6.6.4 At one-tenth of the lower flammability level (LFL) of the concentration, power ventilation shall activate simultaneously along with a flashing yellow light at each monitoring station accompanied by a klaxon.

6-6.6.5 Should the monitoring system detect a concentration, one-fifth of the LFL, a flashing red light shall activate at each monitoring station accompanied by a siren. When the one-fifth LFL is detected and the alarm system activated, an emergency fuel shutoff shall be activated simultaneously terminating the flow of fuel to the engine room. Vessels having the capability may switch to another fuel.

6-6.6.6 A manual override switch shall be mounted in the engine room so that the crew can turn off the alarm and restore fuel to the engines in the event of an alarm or other contingency.

6-6.6.7 When the LNG fuel supply is shut down due to loss of ventilation or detection of gas, the master shall ensure that the LNG fuel supply is not used until the leak or other cause of the shut-down is found and corrected.

6-6.7 Engine Compartments. Engine compartments shall be equipped with natural gas detection and intervention equipment in a fashion similar to engine rooms except that a monitoring station shall be placed only at the wheelhouse (bridge). If the vessel is large enough to make a fuel alarm inaudible if no one is manning the wheelhouse (bridge), a monitoring station shall also be placed in the accommodation or service space.

6-6.8 Fire Equipment and Systems. LNG powered marine vessels of all sizes shall carry fire equipment and systems normally required by U.S. Coast Guard.

6-6.9 In addition, engine rooms and engine compartments shall have a 150°F (65°C) thermal switch, which shall activate fire-fighting equipment. When the thermal switch is activated, a flashing red light and an audible alarm in the engine room or near the engine compartment shall be activated, signaling the possible presence of a fire.

6-6.10 There shall be a 1 minute time delay, after which the engine room or compartment shall be flooded with CO₂ (or other USCG-approved inert gas) for 2 minutes. Sixty-two percent of the ventilation fans shall be cut off for 2 minutes and then reactivate. Sufficient CO₂ (or other USCG-approved inert gas) should be provided for two cycles.

6-6.11 A manual override switch shall be provided in the engine room or near the engine compartment to allow the response to be terminated in the event of false alarm or other contingency.

6-6.12 Controls shall be provided to allow manual activation of the CO₂ (or other USCG-approved inert gas) system without a delay.

6-7 Tank Rooms or Compartments

6-7.1 Tank rooms and tank compartments shall be airtight as well as watertight with appropriate fittings used to seal penetrations through the bulkheads for wire or pipes passing through the tank rooms.

6-7.2 The tank rooms shall be provided with positive pressure and passive ventilation.

6-7.3 Ventilation of the tank rooms (compartments) shall be provided at 30 volumetric exchanges per hour minimum.

6-7.4 Air shall be taken from the weather deck and discharged to the weather deck through ducts that have a maximum separation from the fans.

6-7.5 The fans shall be capable of handling a combustible mixture, if necessary.

6-7.6 Multiple discharge ducts shall be used, if practical, to enhance ventilation.

6-7.7 Natural Gas Monitoring

6-7.7.1 Tank rooms or compartments shall have at least two natural gas sensors placed at or near the ceiling at fore and aft locations.

6-7.7.2 When no gas is detected, the monitoring stations shall show a green light.

6-7.7.3 Two levels of alarm shall be used for signaling the need for intervention.

6-7.7.4 An alarm shall activate when one-tenth of the LFL is detected by a monitor. A flashing yellow light and a klaxon shall be activated in the engine room and in the wheelhouse (bridge), as well as in an accommodation or service space (such as a galley) where crew are likely to congregate. Simultaneously, power ventilation shall activate. On vessels with a tank compartment, a flashing yellow light and an audible signal shall activate in the wheelhouse (bridge). If the vessel is large enough to cause the alarm to be inaudible if no one is manning the wheelhouse (bridge), a second warning station shall activate in an accommodation or service space where crew are likely to congregate.

6-7.7.5 At one-fifth of LFL, a second alarm shall activate utilizing a flashing red light and a siren. These monitoring stations shall be located as are the monitoring stations for the one-tenth LFL. When the one-fifth LFL warning is activated, an automatic fuel shutoff valve will terminate flow of natural gas from the tank room or compartment, ventilation shall terminate, CO₂ (or other USCG-approved inert gas) shall flood the tank room, and a water deluge
system shall be activated. Vessels having the capability may switch to another fuel.

6-7.6 A tank compartment shall be permitted to omit a deluge system if a vessel is too small to accommodate the equipment, the judgement shall be made by the authority having jurisdiction.

6-7.7 When the LNG fuel supply is shut down due to loss of ventilation or detection of gas, the master shall ensure that the LNG fuel supply is not used until the leak or other cause of the shut down is found and corrected.

6-7.8 Tank rooms and compartments shall have manual drains to remove the water produced by the deluge system.

6-7.9 A labeled override switch shall be available in a readily accessible location to turn off the tank room or compartment warning system in the event of a false alarm or other contingency and to shut down the CO₂ (or other USCG approved inert gas) and deluge.

6-7.10 Fire Fighting Equipment.

6-7.10.1 Tank rooms and compartments shall have a 15°F (60°C) thermal switch, which will activate automatic fire-fighting equipment.

6-7.10.2 When the switch is activated, a red flashing light and an audible alarm shall activate on a fire alarm panel in the wheelhouse (bridge) and in an accommodation or service space (such as a galley) where crew are likely to congregate.

6-7.10.3 Since the tank rooms or compartments are unmanned spaces, alarms shall not be required in these spaces.

6-7.10.4 Ventilation in the tank rooms or compartments shall be maintained simultaneously with the activation of the fire alarm. One minute after the fire alarm is activated, the tank room or compartment shall be flooded with CO₂ (or other USCG approved inert gas) and a deluge system shall activate to keep the LNG tanks cool and assist in terminating fire.

6-7.10.5 The tank room or compartment shall be provided with a readily accessible override switch which will allow the crew to terminate the fire fighting system in the event of a false alarm or other contingency.

6-7.10.6 A deluge system shall be permitted to be omitted from tank compartments on vessels too small to accommodate them. This determination shall be made by the authority having jurisdiction.

6-7.11 Lighting.

6-7.11.1 Tank rooms shall have at least two explosion proof lighting fixtures.

6-7.11.2 Switches and overcurrent protective devices for lighting in the tank room(s) must be in a gas-safe space.

6-8 Vent Masts.

6-8.1 All crankcases on natural gas powered engines shall be vented to a vent mast. Vessels having more than one engine shall be permitted to utilize a manifold.

6-8.2 Relief valves or common vent headers from relief valves shall not be connected, but may terminate at the same location.

6-8.3 Vent masts shall have the following features:

(a) discharge vertically upward
(b) have a rain cap or other means of preventing the entrance of rain or snow
(c) extend to at least a height of 10 ft (3 m) above the highest working level on the vessel

6-8.4 Relief valve vent masts and engine ventilation vent masts shall not be connected, but may terminate at the same location.

6-9 Deluge Systems.

6-9.1 Each deluge system that protects more than one area shall have at least one isolation valve downstream from each branch connection to isolate damaged sections.

6-9.2 Each valve cross connection from the deluge system to the fire main shall be outside of the tank room or compartment.

6-9.3 Each pipe, fitting, and valve for the deluge system shall be made of fire resistant and corrosion resistant materials such as galvanized steel or galvanized iron pipe.

6-9.4 Each deluge system shall have a means of drainage to prevent corrosion of the system and freezing of the accumulated water in subfreezing temperatures.

6-9.5 Each deluge system shall have a dirt strainer that is located at the deluge system manifold or pump.

6-9.6 Water to the deluge system shall be supplied by a pump that is only for the use of the system.

6-10 Alarm Systems.

6-10.1 Alarm systems shall have a means of indicating which natural gas sensor has been activated.

6-10.2 The fire alarm systems shall have a means of indicating which thermal switch has been activated.

6-10.3 Each audible alarm shall have an arrangement that allows it to be turned off after sounding. For remote group alarms, this arrangement shall not interrupt the alarms actuation by other faults.

6-10.4 Each visual alarm shall be of the type that can be turned off only after the actuating is corrected.

6-10.5 Each vessel shall have means for testing each alarm.

6-10.6 Gas spaces adjacent to gas-dangerous spaces such as engine rooms and tank compartments shall have positive pressure ventilation systems capable of 30 volumetric exchanges an hour. Their ventilation shall activate whenever an alarm is activated.

6-11 Safety Equipment.

6-11.1 Marine vessels with tank rooms and engine rooms shall have the following:

(a) Three self-contained, pressure demand type, air breathing apparatus approved by the Mining Enforcement and Safety Administration (MESA) or the National Institute for Occupational Safety and Health (NIOSH), each having at least a 30 minute capacity.

(b) Three spare bottles of air for the self-contained air breathing apparatus each having at least a 30 minute capacity.

(c) Three explosion proof flashlights.

(d) Three helmets that meet ANSI safety requirements for industrial head protection, Z89.1 (1969).

(e) Three sets of goggles that meet the specification ANSI practice for Occupational and Educational Eye and Face Protection, Z87.1 (1979).

(f) An air compressor to recharge the bottles for the air breathing apparatus.

(g) Portable handheld natural gas detectors that shall be a vessel with a tank room shall have at least two of these sensors.

A-6.11.4 Handheld natural gas detectors aid in evaluating alarms and are making a survey of the vessel. They shall allow locating specific leaks at very low levels of detection and can be carried by personnel working in a compartment containing gas storage or transmission equipment.

6-11.2.1.2 Vessels having engine rooms and tank rooms shall have a portable analyzer that measures oxygen levels in an inert atmosphere.

6-11.3 Before allowing anyone to enter a space that has had a gas leak and repair, the master shall ensure that the space has an oxygen concentration of at least 19.5 percent oxygen by volume and is free of natural gas.

6-11.4 The master shall ensure that the compressed air breathing equipment is inspected at least once a month by licensed officer and that the date of inspection and condition of the equipment be placed in the vessel log.

6-12 Safety Training.

6-12.1 A written safety guide for the vessel and for the safety equipment and procedures shall be provided. The safety guide shall outline all safety systems and equipment, and their operation.

6-12.2 Crews shall be trained to operate the LNG powered vessel and perform repairs.

6-12.5 Training drills shall be conducted monthly.

COMMITTEE STATEMENT: 1. The proposed definitions are accepted.

2. The proposal is accepted with editorial revisions and provision to change to diesel or other fuel as an option to engine shutdown in the event of emergency shutdown. Shutdown could produce severe operating problems for ships in harbors.

3. Appendix items are added for clarification of some of the new requirements.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 27

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 21

NOT RETURNED: 6 Brock, Clasen, Dimmick, Honse, Issen, Lewis

PETSINGER: I support the same Comment on Affirmative as Boone.

BOONE: Within the Proposal 57-2 section 6-2.2 the phrase, "or a suitable metal shield", why not say a metal shield. Also in 6-2.2.4 the phrase, "or greater as may be appropriate for the vessel" substitute or may be greater in size. Again in 6-2.2.5 the term "may be appropriate for the vessel", and 6-7.1 the term appropriate is used. The terms "suitable and appropriate" are terms which are ambiguous and are not terms which are standard enforceable and should be replaced with enforce standard language.

In addition 2-2(a) uses the term suitable which is ambiguous and needs to be replaced with language what is enforceable.

I also suggest the information in Section 6-11 Safety Equipment is information that is better placed in the appendix versus the standard.

PETSINGER: I support the same Comment on Affirmative as Boone.

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I RECOMMENDATION: REVISE TEXT TO READ AS FOLLOWS:

2-3.4 Container Shutoff Valves. The container shall be equipped with shutoff valves that allow for its complete isolation from the rest of the vehicle fuel system. Container shutoff valves shall be labeled as to their function. (Decals or stencils are acceptable) Normally closed automatic shutoff valves that are held open by electric current, pneumatic or hydraulic pressure, or a combination thereof, or manually operated shutoff valves shall be permitted to be used to meet this requirement.

SUBSTANTIATION: Section 2-3.4 Requires “VAPOR SHUTOFF VALVE” and “LIQUID SHUTOFF VALVE” labels and allows manual or automatic valves. But Section 2-12.1.12 appears to require manual valves and an exterior label “MANUAL SHUTOFF VALVE”

Both sections are causing confusion and dysfuntional behavior on the part of regulators. First none of our vehicle tanks have a separate vapor line to the engine, hence no “VAPOR SHUTOFF VALVE” but the standard says that we need the label so in some places our fuel supply valve has both “LIQUID SHUTOFF VALVE” and “VAPOR SHUTOFF VALVE” labels on it. In some locations our vent valve, a normally closed service valve is labeled “VAPOR SHUTOFF VALVE” which could lead to someone opening it in an emergency rather than leaving it alone. Although 2-12.1.12 doesn’t actually require a manual shutoff valve it appears to and is widely interpreted as such. Most installations have automatic fuel shutoff valves but because of this section any are adding manual shutoff valves operable from the vehicles exterior into their piping. This is causing safety hazards. The main fuel line normally is protected by the chassis and shut off by an automatic valve. This valve, in addition to being closed by the ignition key, is normally activated by safety systems such as crash sensors, and leak detectors. By requiring an externally operable manual valve you cause the vehicles to route their fuel lines to the outside of the vehicle where they are vulnerable in a crash. They typically also now remove the automatic valve since having the two valves in series complicates the plumbing by having to install a relief valve between them.

Rewriting 2-3.4 and 2-12.1.2 are proposed to correct this.

COMMITTEE ACTION: Accept.

SUBMITTER: Technical Committee on Vehicular Alternative Fuel Systems

RECOMMENDATION: Revise 2-3.8 to read:

(b) A label or labels shall be placed in a visible location near the vehicle Fill connection identifying it as an LNG connection, indicating the maximum allowable working pressure of the LNG tank, and stating the LNG fuel composition limits if any apply.

SUBSTANTIATION: Section 2-3.8 (b) requires that the container be labeled with i.e. minimum letters “FOR LNG ONLY”. This label serves absolutely no purpose other than advertising. Almost all of the containers are hidden from sight when installed so nobody sees the label. The containers themselves have unique fill connectors and can’t be filled with anything but LNG. Finally the containers wouldn’t be harmed if they were filed with something else.

Just as silly as this label is we don’t require any label at the fill port itself. We need to warn the filler, at the point of connection not just the tank, of the maximum allowable working pressure of the tank itself so that the tank won’t over pressurized during the filling process. Also many engine manufacturers have minimum Methane, and maximum Propane/Ethane/Ethylene limits on their fuel composition. So just like the “Min. 91 Octane, Unleaded Fuel Only” stickers on cars we need a fuel door label.

COMMITTEE ACTION: Accept.

SUBMITTER: Technical Committee on Vehicular Alternative Fuel Systems

RECOMMENDATION: 2-4.3 (a) to read:

(a) Pressure relief discharge lines shall be suitable for the pressure and temperature of the discharged fluid.

(b) Secondary relief devices designed to prevent rupture of the cylinder upon failure of the primary relief device shall not be required to be piped away from the tank.

SUBSTANTIATION: Several comments. First, MVE equips all of its LNG tanks with dual relief and dual relief paths, this is for safety. There is wording in the standard that compromises this level of safety. Section 2-4.3 requires that discharge lines be metallic and implies (2-4.3(i)) that all relief valves have discharge lines. The biggest problem with metallic relief discharge lines is that they fill with water from car washes and freeze shut when it gets below 32°F outside. This disables the relief valve. If both relief valves are so disabled the tank will eventually pressure rupture if left to stand. The force of this type of rupture is equivalent to 1 pound of TNT per 10 gallons of tank. On a typical transit bus this would blast the entire bus 55 ft into the air. MVE views this as a very serious potential hazard and takes all steps to prevent it. MVE never pipes away the secondary relief valve. we cap it with a vinyl cap to prevent the entrance of dirt and debris. We discourage the use of rigid metallic piping for the vent lines and encourage the use of lines that would rupture before the tank does. We would like to see wording in the standard that allows this.

COMMITTEE ACTION: Accept.

AFFIRMATIVE: 19
NEGATIVE: 2
NOT RETURNED: 6 Brock, Clasen, Dimmick, House, Issen, Lewis

EXPLANATION OF NEGATIVE: MARSHALL: Concur with the bulk of substantiation offered by original submitter. However, discouraging the use of metallic vent piping and encouraging the use of lines materials that would rupture before the tank could is not what the new language in (b) does.

The language accepted by the Committee for (b) specifically allows tank venting right at the tank area via secondary relief devices. Do not consider such to be safe or acceptable since tendency toward tank over-pressurization may be the result of a vehicle or pool fire. Believe all relief devices should be piped away from potentially hazardous areas (or areas containing potentially hazardous components) using piping materials that are:

1. designed to withstand anticipated line pressures normally encountered during venting but rupture at pressures below which the tank could fail,
2. properly protected form water/ice intrusion or other means of plugging.
3. adequately protected against excessive heat and impact damage as may be appropriate,
4. properly supported and/or restrained to avoid inadvertent line damage over time or personal injuries after line rupture.

PETSINGER: I support the same Explanation of Negative as Marshall.

COMMENT ON AFFIRMATIVE: BOONE: See my Comment on Affirmative on Proposal 57-2 (Log #4).

PETSINGER: I support the same Comment on Affirmative as Boone.

COMMITTEE ACTION: Accept.

SUBMITTER: Technical Committee on Vehicular Alternative Fuel Systems

RECOMMENDATION: Delete Section 2-4.10.

SUBSTANTIATION: It does not make sense. There is no need to require such a massive relief valve on the vaporizer. The committee can foresee no circumstance where it would likely to vent 5000 scf of natural gas. In addition, the relief valve has to be sized above the rated flow of the vaporizer if it opened it would vent liquid at this rate. In 2-12.3.6 we require pressure relief valves to be placed in any line capable of having trapped liquid in it, the vaporizer will be covered by this paragraph.

COMMITTEE ACTION: Accept.

AFFIRMATIVE: 27

NOT RETURNED: 6 Brock, Clasen, Dimmick, House, Issen, Lewis

EXPLANATION OF NEGATIVE: BOONE: See my Comment on Affirmative on Proposal 57-2 (Log #4).

PETSINGER: I support the same Comment on Affirmative as Boone.

COMMITTEE ACTION: Accept.

AFFIRMATIVE: 27

NOT RETURNED: 6 Brock, Clasen, Dimmick, House, Issen, Lewis

EXPLANATION OF NEGATIVE: BOONE: See my Comment on Affirmative on Proposal 57-2 (Log #4).

PETSINGER: I support the same Comment on Affirmative as Boone.
VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 19
NEGATIVE: 2
NOT RETURNED: 6 Brock, Clasen, Dimmick, House, Issen, Lewis

EXPLANATION OF NEGATIVE:

COEBS: Paragraph 2-10.4 should remain as written. If the outlet valve on a vaporizer is closed, liquid in the vaporizer will continue to vaporize increasing the pressure. A relief valve sized for the heat input of the vaporizer is needed to stop over pressure.

It is unlikely liquid will be vented because the valve will close when the pressure drops.

PETSINGER: I support the same Explanation of Negative as Goers.

57-7 - (2-12.1.3): Accept

SUBMITTER: Technical Committee on Vehicular Alternative Fuel Systems

RECOMMENDATION: Revise 2-12.1.3 to read:

2-12.1.3 A container shall be located in a place and in a manner to minimize the possibility of damage to the container and its appurtenances. Containers located in the rear of the vehicles, where protected by bumpers or vehicle structure, shall be considered to be in conformance with this requirement. If fuel containing piping is installed within 8 in. (20 cm) of engine or exhaust system components that exceed 250°F, it shall be shielded against direct heating.

SUBSTANTIATION: Three changes here. First the container itself is a heat shield, that's how the LNG stays liquid. Heating the steel exterior vacuum casing of the tank won't bother it a bit. The components that exceed 250°F, it shall be shielded against direct heating.

COMMITTEE ACTION: Accept

AFFIRMATIVE: 21
NOT RETURNED: 6 Brock, Clasen, Dimmick, House, Issen, Lewis

57-8 - (2-12.1.2): Accept

SUBMITTER: Technical Committee on Vehicular Alternative Fuel Systems

RECOMMENDATION: Revise 2-12.1.2 to read:

2-12.1.2 Vehicle fuel systems shall be equipped with at least one manual or automatic fuel shut off valve. Manual valves shall be readily accessible, operable without tools and labeled as to their function.

SUBSTANTIATION: Section 2-3.4 requires "VAPOR SHUTOFF VALVE" and "LIQUID SHUTOFF VALVE" labels and allows manual or automatic valves. But Section 2-12.1.2 appears to require manual valves and an exterior label "MANUAL SHUTOFF VALVE".

Both sections are causing confusion and dysfunctional behavior on the part of regulators. First none of our vehicle tanks a separate vapor line to the engine, hence no "VAPOR SHUTOFF VALVE" but the standard says that we need the label so in some places our fuel supply valve has both "LIQUID SHUTOFF VALVE" and "VAPOR SHUTOFF VALVE" labels on it. In some locations our vent valve, a normally closed service valve is labeled "VAPOR SHUTOFF VALVE" which could lead to someone opening it in an emergency rather than leaving it alone. Although 2-12.1.2 doesn't actually require a manual shutoff valve it appears to and is widely interpreted as saying such. Most installations have automatic fuel shutoff valves, but because of this section many are adding manual shutoff valves operable from the vehicles exterior into their piping. This is causing safety hazards. The main fuel line normally is protected by the chassis and shut off by an automatic valve. This valve, in addition to being closed by the ignition key, is normally activated by safety systems such as crash sensors, and leak detectors. By requiring an externally operable manual valve you cause the vehicles to route their fuel lines to the outside of the vehicle where they are vulnerable in a crash. They typically also now remove the automatic valve since having the two valves in series complicates the plumbing by having to install a relief valve between them.

Rewriting 2-3.4 and 2-12.1.2 are proposed to correct this.

AFFIRMATIVE: 21
NOT RETURNED: 6 Brock, Clasen, Dimmick, House, Issen, Lewis

57-9 - (2-12.2.1): Accept

SUBMITTER: Technical Committee on Vehicular Alternative Fuel Systems

RECOMMENDATION: Revise 2-12.2.1 to read:

2-12.2.1 Containers mounted in the interior of vehicles in an area communicating directly with the driver or passenger compartments shall be installed so that any fuel released from the container shall be vented to the outside of the vehicle. This shall be permitted to be accomplished as follows.

(a) By locating the container, including its appurtenances, in an enclosure that is mounted securely to the vehicle, is gasketed with respect to the driver or passenger compartment, and is vented to the outside of the vehicle.

(b) By enclosing the container appurtenances and their connections in a structure that is mounted securely on the container, is gasketed with respect to the driver or passenger compartment, and is vented to the outside of the vehicle.

(c) The enclosures shall not contain any sources of ignition capable of igniting natural gas.

SUBSTANTIATION: The section as written has caused a great deal of confusion, particularly on buses, as to what is the interior of the vehicle and the intent of the paragraph. Three cases have come up. The first involved a tank located in the baggage compartment on an over the road coach. Although this compartment didn't connect with the passenger carrying portion of the bus and was well ventilated it had a wheel chair lift hydraulic drive in one end and was interpreted as being the "interior" of the vehicle with a potential ignition source and had to have the tanks enclosed. The second was a transit bus with the tanks mounted above the rear engine compartment. Again this was an extremely well ventilated space, not in communication with the driver or passenger compartment, but was ruled to be the "interior" of the vehicle and had to have the plumbing end of the tanks completely sealed into an enclosure due to the source of ignition presented by the engine. This is despite the fact that there is just as much plumbing attached to the engine as there is on the tank. The third is a roof mount installation that is enclosed by a lowered top. Once again we were asked to completely enclose the plumbing end of the tanks since they were on the "interior" of the vehicle, even though there were no sources of ignition anywhere in the compartment.

The original intent of this paragraph was to keep any potential leaks that could occur from accumulating to combustible levels inside of a vehicle. The specific problem were tanks installed in the trunks of cars. The paragraph was included in the standard to both discourage the practice of having tanks located in enclosed spaces, particularly where people are, and to make these types of installation safer. The problem that is being perceived is that the tanks can't be near potential ignition sources and need to be sealed inside of something to be safe.

The safest mounting location is one that is well ventilated. The types of leaks that develop on LNG vehicles are frizzling leaks. These are small, and gaseous. Before they are even capable of being ignited the methane sensor will pick them up. Bus properties view them as maintenance items, not hazards since the gas harmlessly dissipates into the air. When the tank or plumbing is enclosed in a gasketed space there is a much greater potential for a leak to accumulate to a flammable level. An enclosed space is more hazardous than an open one, hence the need to keep ignition sources out of the enclosure. We should seek to encourage ventilating, not enclosing potential sources of leaks, and I think this section now more clearly defines the special case of a tank being mounted inside with the people.

COMMITTEE ACTION: Accept

AFFIRMATIVE: 21
NOT RETURNED: 6 Brock, Clasen, Dimmick, House, Issen, Lewis

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 27
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 21
NEGATIVE: 3
NOT RETURNED: 6 Brock, Clasen, Dimmick, Honse, Issen, Lewis

57.10 - (2-13.2): Accept
SUBMITTER: Western Regional Fire Code Dev. Committee
RECOMMENDATION: Revise to read:
2-13.2 When a vehicle is involved in an accident or fire causing
damage to the LNG fuel system or container, or after the operation
of any pressure relief device, the system or container shall be
inspected, repaired, or removed, and retested before being
returned to service.
SUBSTANTIATION: The current wording clarifies the language
and also correlates with proposed wording in NFPA 52 Section 3-
12.4.
COMMITTEE ACTION: Accept.

VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 21
NEGATIVE: 3
NOT RETURNED: 6 Brock, Clasen, Dimmick, Honse, Issen, Lewis

EXPLANATION OF NEGATIVE:
COORS: Section 2-13.2 is okay as written. There is no reason
that a tank or system needs to be inspected after because of a
pressure relief device operation.
GUSTAFSON: I have to strongly vote not to accept. Unlike CNG
cylinders, relief valves on LNG equipment are designed to open
and reset. This is a completely normal operation if the cylinder
is allowed to sit unused with product in it. Operation of a relief
valve is no reason to inspect, repair, remove or retest the cylinder
and certainly no reason to remove it from service. In fact many
annual maintenance programs require that the tank be pressurized
to relief pressure to assure that the relief valve opens. Paragraph 2-
13.2 was put into the code to assure that after an accident cylinders
with unseen damage to the vessel supports or insulation system
aren't inadvertently placed back into service. We have in fact
inspected about half a dozen such cylinders and two had to be
rebuilt before being returned to service. I'd like the committee to
reconsider its acceptance of this docket.
PETSINGER: I support the same Explanation of Negative as
Gustafson.

57.13 - (Chapter 5): Reject
SUBMITTER: Western Regional Fire Code Dev. Committee
RECOMMENDATION: Revise to read:
5-1 General. This chapter covers fire protection, personnel safety
and training, and security, for LNG vehicles, fueling facilities,
parking, and maintenance garages.
5-2.1 Fire protection shall be provided for all LNG fueling
facilities, parking and maintenance garages. The extent of such
protection shall be determined by an evaluation based upon sound
fire protection engineering principles, analysis of local conditions,
vehicle operations, hazards within the facility, exposure to or from
other property, and the size of the LNG containers. Guidance
factors for making such an evaluation include:
(a) The type, quantity, and location of equipment necessary for
the detection and control of fires, leaks, and spills of LNG,
flammable refrigerants, and flammable gases or liquids.
(b) The methods necessary for the protection of vehicles,
equipment, and structures from the effects of fire exposure.
(c) The equipment and processes to be incorporated within the
Emergency Shutdown Device (ESD) system.
(d) The type, quantity, and location of sensors necessary to
initiate automatic operation of the Emergency Shutdown Device
(ESD) system.
(e) The availability and duties of individual facility personnel and
the availability of external response personnel during an
emergency.
(f) The protective equipment and special training required by
personnel for emergency duties.
5-3.1 Smoking and ignition sources shall be prohibited within 25
ft, except in accordance with 5-3.2.
5-4.5 Hazard Detection-Coil break detection and fire detection shall
be installed based on the evaluation required in 5-2.1.
SUBSTANTIATION: The current wording does not clearly define
the scope of this chapter and is confusing to the enforce.
The new proposed wording breaks out the 3 types of facilities, adds
those facilities to certain provisions of the code where we feel
certain requirements should be used and provided some
consistency within this chapter. The deletion of 5-6 is due to
adding that an analysis be conducted for all facilities and (a)
already addresses hazard detection. Overall this proposal should
clarify the intent of this chapter and make it easier for the user of
the document to interpret.
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: The proposal is rejected because
parking and maintenance garages are not in the scope of NFPA 57.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 27
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 21
NEGATIVE: 3
NOT RETURNED: 6 Brock, Clasen, Dimmick, Honse, Issen, Lewis
NFPA 57 — A99 ROP

57-14 - (5-1): Accept
SUBMITTER: Technical Committee on Vehicular Alternative Fuel Systems
RECOMMENDATION: Revise text to read as follows:
5-1 General. This chapter covers fire protection, personnel safety, and training for LNG vehicles, security, LNG fueling facility parking/maintenance garages for LNG vehicles, and warning signs.
SUBSTANTIATION: Parking and vehicle maintenance garages are not in the scope of NFPA 57.
COMMITTEE ACTION: Accept.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 27
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 27
NOT RETURNED: 0

57-15 - (A-3-13 (New)): Accept
SUBMITTER: John L. Ritzmann, Washington Gas
RECOMMENDATION: Add a new section as follows:
A-3-13 For more information on maintenance of LNG equipment see AGA Publication "LNG Preventive Maintenance Guide." AGA Catalog Number X01084.
SUBSTANTIATION: This AGA publication offers additional information gathered from the members of the AGA Supplemental Gas Committee.
COMMITTEE ACTION: Accept.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 27
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 21
ABSTENTION: 1
NOT RETURNED: 6 Brock, Clasen, Dimmick, Honse, Issen, Lewis
EXPLANATION OF ABSTENTION:
GUSTAFSON: I have to abstain as I haven't read any of the documents referenced.

57-16 - (A-5-4 (New)): Accept
SUBMITTER: John L. Ritzmann, Washington Gas
RECOMMENDATION: Add a new section as follows:
A-5-4 For more information on Personnel Safety, see AGA Publication "Introduction to LNG for Personnel Safety." AGA Catalog Number X08614.
SUBSTANTIATION: This AGA Publication offers additional information gathered from the members of the AGA Supplemental Gas Committee.
COMMITTEE ACTION: Accept.