U.S. Department of Homeland Security

United States Coast Guard

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CG-ENG Policy Letter
No. 01-12, CH-1

JUL 12 2017

From: B. J. Hawkins, CAPT
COMDT (CG-ENG)

To: Distribution

Subj: EQUIVALENCY DETERMINATION – DESIGN CRITERIA FOR NATURAL GAS FUEL SYSTEMS (CHANGE-1)

Ref: (a) International Code of Safety for Ships Using Gases or Other Low-Flashpoint Fuels (IGF Code), International Maritime Organization (IMO) Resolution MSC.391(95)

(b) Commandant (CG-521) Policy Letter 01-12, dated April 19, 2012

(c) Commandant (CG-OES) Policy Letter 01-15, "Guidelines for Liquefied Natural Gas Fuel Transfer Operations and Training of Personnel On Vessels Using Natural Gas as Fuel"

(d) Commandant (CG-OES) Policy Letter 02-15, "Guidance Related to Vessels and Waterfront Facilities Conducting Liquefied Natural Gas (LNG) Marine Fuel Transfer (Bunkering) Operations"

1. Purpose. This policy letter establishes design criteria for natural gas fuel systems that provide a level of safety that is at least equivalent to that provided for traditional fuel systems required by existing regulations. Change-1 to this policy reflects the January 1, 2017 effective date of the IGF Code, reference (a), as the international standard for design of gas-fueled ships. The IGF Code supersedes the IMO's Interim Guidelines, which were previously used as a baseline standard for equivalency under reference (b). The intent of this policy is to afford an avenue of compliance with regard to obtaining Coast Guard approval for the design of natural gas fuel systems. The Coast Guard fully recognizes that additional alternatives may exist that may be acceptable, and will consider them on a case-by-case basis.

2. Directives Affected. Reference (b) is hereby superseded.

3. Action. Natural gas fuel systems designed and constructed in accordance with the enclosed criteria may be accepted for use on board U.S.-flagged vessels.

4. Application. This policy provides uniform guidance for the inspection and certification of vessels that are seeking to install an LNG fuel system if there are equivalency provisions included in the regulations applicable to the vessel.

5. Background.

a. The use of natural gas as a shipboard propulsion fuel is a leading alternative to oil fuels for meeting domestic and international air emission requirements, including the limits for Emission Control Areas adopted in recent amendments to the International Convention for the Prevention of Pollution from Ships (MARPOL), Annex VI. Additionally, current pricing and availability make natural gas competitive in comparison to more traditional marine fuels. Due to these factors, a number of companies have submitted design proposals for ships utilizing natural gas as fuel. With the exception of boil-off gas used on liquefied natural gas (LNG) carriers, existing U.S. regulations do not specifically address the design and installation of natural gas fuel systems on commercial vessels.

b. International standards for the design of natural gas fueled ships contained in the IGF Code took effect as a mandatory code on January 1, 2017 for vessels that must meet requirements in the International Convention for the Safety of Life at Sea (SOLAS) that also use natural gas or other fuels with a flashpoint of less than 60°C. Reference (a) is available on the Commandant's Office of Design and Engineering Standards (CG-ENG) website at http://www.dco.uscg.mil/Our-Organization/Assistant-Commandant-for-Prevention-Policy-CG-5P/Commercial-Regulations-standards-CG-5PS/eng/, under "Additional Technical Information."

c. While the IMO's Interim Guidelines represented the best standard of safety for LNG-fueled vessel design at the time reference (b) was issued, they were adopted by IMO as a temporary standard to be used while the IGF Code was being developed. IMO has incorporated substantive improvements into the IGF Code. These include: revised terminology for clarity in fuel containment system design; a well-defined approach for considering alternatives; clarification on risk assessment requirements; new options for protective tank locations; and an expanded section on LNG fuel bunkering.

d. The improvements adopted by the IGF Code reflect a better understanding of the rapidly evolving nature of new fuel technologies. Continued reliance on what is now an outdated standard is no longer warranted. Therefore, this policy letter update uses the IGF Code as a baseline standard for vessels using gas or other low flashpoint fuels as an alternative to those fuel systems covered by current domestic regulations.

e. In the absence of this policy, U.S. inspected vessels would need to establish equivalency criteria on a case-by-case basis with the Coast Guard for the design and installation of a natural gas fuel system. By adopting the internationally recognized standards in reference (a), this policy serves to ease the burden on industry, in both time and expense, and remove the regulatory uncertainty involved in case-by-case reviews.

6. Discussion.

   a. Natural gas fuel systems designed and constructed in accordance with enclosure (1) are considered to provide a level of safety that is at least equivalent to that provided for traditional fuel systems by existing regulations. Accordingly, these systems may be accepted for use onboard U.S. flagged, certificated vessels. This policy letter is applicable to both new construction projects and modifications to existing vessels where natural gas will be used as a fuel. However, this policy is not intended for gas carriers that use their cargo as fuel and comply with the requirements of 46 CFR Part 154 or the IMO's International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code).

   b. Vessel designs which have been approved under reference (b) prior to this policy letter change coming into effect will maintain their approval status. Any alterations to systems previously approved under reference (b) may require re-approval of plans at the discretion of the OCMI.

   c. This policy letter only applies to equivalency determinations for U.S.-flagged vessels. Foreign-flagged vessels using natural gas as fuel while operating in U.S. waters will be expected to provide documentation demonstrating compliance with reference (a) in the form of an endorsement on the vessel's SOLAS Passenger Ship Safety Certificate, or Cargo Ship Safety Construction Certificate, noting compliance with Part G of Chapter II-1of the Convention as specified in the appendix to SOLAS.

   d. This policy does not provide guidance on operational aspects associated with the use of natural gas as a fuel, nor does it address crew training standards for the handling of natural gas. Questions related to operational standards should be directed to the Coast Guard's Office of Operating and Environmental Standards (CG-OES). Questions related to training standards should be directed to the Coast Guard's Office of Merchant Mariner Credentialing (CG-MMC). For more information, see references (c) and (d).

7. Disclaimer. While the guidance contained in this document may assist the industry, public, Coast Guard, and other Federal and State regulators in applying statutory and regulatory requirements, the guidance is not a substitute for applicable legal requirements nor is it a regulation itself. Thus, it is not intended to, nor does it impose legally binding requirements on, any party outside the Coast Guard.

8. Changes. This policy letter will be posted on the web at http://www.dco.uscg.mil/Our-Organization/Assistant-Commandant-for-Prevention-Policy-CG-5P/Commercial-Regulations-standards-CG-5PS/eng/. Changes to this policy will be issued as necessary. Suggestions for improvements of this policy should be submitted in writing to this office.

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Subj: EQUIVALENCY DETERMINATION – DESIGN CRITERIA FOR NATURAL GAS FUEL SYSTEMS (CHANGE-1)

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CG-ENG Policy Letter
No. 01-12, CH-1
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Enclosure: (1) Design Criteria for Natural Gas Fuel Systems

Dist: COMDT (CG-CVC)
COMDT (CG-OES)
COMDT (CG-FAC)
CG MSC
CG LGCNCOE
CG OCSNCOE
CG TVNCOE
CG Sectors

Design Criteria for Natural Gas Fuel Systems

The ***International Code of Safety for Ships Using Gases or Other Low-Flashpoint Fuels (IGF Code)***, as augmented below, demonstrates an equivalent level of safety to that of existing federal regulations for traditional fuel systems installed on board vessels subject to inspection for certification.

The sections in this document are numbered to align with corresponding sections in the IGF Code. Unless otherwise specified in the text, all references made are to the IGF Code.

CHAPTER 2 – GENERAL

2.1 – Application

U.S. vessels subject to SOLAS which are built or converted to use LNG as fuel on or after the dates specified in SOLAS II-1, Part G, are required by that part to meet the IGF Code. Meeting the criteria in CG-ENG Policy Letter 01-12, CH-1, will allow the cognizant OCMI, or recognized classification society acting under 46 CFR 8.320, to apply an endorsement on a vessel's Passenger Ship Safety Certificate or Cargo Ship Safety Construction Certificate documenting compliance with SOLAS II-1, Part G, as specified in the certificates appendix to SOLAS.

Note: This policy letter allows for application of the IGF Code as an alternative to U.S. regulatory requirements for vessels not already subject to SOLAS and seeking to use gasses or other low-flashpoint fuels. Use of the IGF Code as an alternative to U.S. regulations will not be considered as invoking other SOLAS requirements on that vessel except where explicitly required by the IGF Code.

2.2 – Definitions

2.2.4 *Certified safe type* - means electrical equipment meeting the criteria specified under 14.3.3, (a) or (b), of this document.

The following definitions are included in addition to those listed in Section 2.2 of the IGF Code:

Compressed natural gas (CNG) is natural gas (predominantly methane, CH_4) that has been compressed to a pressure typically in the range of 2900-3600 psi (200-248 bar) for ease of storage or transport.

Explosion proof means electrical equipment approved as meeting UL 1203.

Flameproof means electrical equipment approved as meeting IEC 60079-1.

IECEx System means an international certification system covering equipment that meets the provisions of the IEC 60079 series of standards. The IECEx system is comprised of an Ex Certification Body and an Ex Testing Laboratory that has been accepted into the IECEx System after satisfactory assessment of their competence to ISO/IEC Standard 17025, ISO/IEC Guide 65, IECEx rules of procedures, IECEx operational documents, and IECEx technical guidance documents as part of the IECEx assessment process.

Independent laboratory means a laboratory that is accepted by the Commandant under 46 CFR Part 159 for the testing and listing or certification of electrical equipment.

Intrinsically safe means a protection technique for electrical equipment meeting the requirements specified in 46 CFR 111.105-11.

Liquefied natural gas (LNG) is natural gas (predominantly methane, CH_4) that has been converted to liquid form by cooling to approximately -258 degrees F (-161 degrees C) for ease of storage or transport.

2.3 – Alternative Design

2.3.3 Alternative designs and arrangements are to be reviewed and approved by the Marine Safety Center in consultation with Commandant (CG-ENG). The Officer in Charge, Marine Inspection (OCMI) will provide appropriate documentation to vessels subject to SOLAS in accordance with SOLAS II-1, 55/4.1 and IMO's *Guidelines on Alternative Design and Arrangements for SOLAS II-1 and III (MSC.1/Circ.1212).* This documentation is required by SOLAS to be carried onboard the vessel.

CHAPTER 4 – GENERAL REQUIREMENTS

4.2 – Risk Assessment

4.2.3 The results of the risk assessment required in Section 4.2, along with any recommended safety measures proposed to address identified risks, should be reviewed and approved before detailed plan review is conducted. Any plans received ahead of the risk assessment may be held in abeyance until after evaluation of the risk assessment has been completed. Any mitigating safety measures imposed on the vessel based on review and approval of the risk assessment must be listed in the risk assessment's approval letter. Design requirements from the approval letter are to be entered into MISLE as a "special inspection note". Operational requirements from the approval letter will be entered by the cognizant OCMI on the vessel's COI.

CHAPTER 5 – SHIP DESIGN AND ARRANGEMENT

5.6 – Regulations for emergency shutdown (ESD)-protected machinery spaces

5.6.1 "Certified for periodically unattended operation" shall mean compliance with requirements for periodically unattended machinery plants as specified in 46 CFR 62.50-30.

5.11 – Regulations for arrangement of entrances and other openings in enclosed spaces

5.11.1 Gas Valve Unit (GVU) spaces: Entrances to GVU spaces must either lead directly to an open deck, or be equipped with an air lock that meets the requirements in Sections 5.12 and 13.3.10 of the IGF Code. Other arrangements will be considered on a case-by-case basis.

CHAPTER 6 – FUEL CONTAINMENT SYSTEM

6.4 – Regulations for liquefied gas fuel containment

6.4.1.1 Arrangements with natural gas fuel storage tanks located below or directly adjacent to accommodation spaces, service spaces, or control stations, must be specifically addressed in the risk assessment required under Section 4.2. The following are examples of safeguards and mitigation measures to be considered during the risk analysis for possible inclusion in the vessel's design:

(1) The option to reduce ventilation capacity in the tank connection space below 30 air changes per hour, as allowed in 13.4.1, should be avoided.

(2) Gas detection should be considered for the ventilation inlets to those accommodation spaces, service spaces, or control stations located adjacent to the fuel tanks.

(3) A 900 mm separation should be considered between the tank room boundary (including the outer wall of a double-wall vacuum insulated type C tank) and any adjacent accommodation space, service space, or control station, with A-60 insulation provided on the opposite side of the separation from the tank room (similar to the requirement in 11.3.3 for separation from category A machinery spaces). For type C tanks the fuel storage hold space may be considered as a cofferdam. The protective distance should be measured to the primary barrier of the tank containment system including its tank valves.

(4) Consideration should be given to restrict combustible items (e.g. independent oil tanks, storage lockers, waste bins, etc.) from within the tank hold space; or, alternately, the provision of a permanent fixed firefighting system in the tank hold space.

(5) For those areas of the vessel where fuel storage tanks are located under or directly adjacent to accommodation spaces, service spaces, or control stations, the requirements of 5.3.3.1 for determining minimum distance from the ship's side should be applied without the option to use the alternative under 5.3.4; and the passenger ship requirement in 5.3.3.4.1 should be applied in determining distance from shell plating and aft terminal of the ship regardless of ship type.

(6) Gas detection should be considered in the fuel storage hold space and/or the area where the tank connection space opening is located if adjacent to accommodation spaces, service spaces, or control stations.

6.4.1.4 Use of less demanding environmental conditions in the design of liquefied gas fuel containment systems may be approved for ships operating on restricted routes. If approved, the OCMI will note any associated route restrictions on the vessel's Certificate of Inspection (COI).

6.4.9 Design loads

6.4.9.3.3.1 Internal pressure: Use of lower values of ambient temperature for determining P_0 as noted in 6.4.9.3.3.1.2.1 may be approved for ships operating on restricted routes. Likewise, a vapor pressure P_h higher than P_0 as noted in 6.4.9.3.3.1.3 may be approved for ships operating in restricted areas. If approved, the OCMI will note any associated route restrictions on the vessel's COI.

6.4.9.4.1.1 Loads due to ship motion: Methods used to predict accelerations due to ship motion, as specified in 6.4.9.4.1.1, will be subject to approval during plan review.

6.4.13 Materials and construction

6.4.13.1.1 Materials forming ship structure: Higher values for air and sea ambient temperature may be accepted for ships operating in restricted areas, as noted in 6.4.13.1.1.1.3. If accepted, any associated route restrictions must be noted on the vessel's COI.

6.4.13.3 Thermal insulation and other materials used in liquefied gas fuel containment Systems: Recognized standards for thermal insulation materials, referred to in 6.4.13.3.4 and 6.4.13.3.5, are specified in 46 CFR 38.05-20.

6.4.14 Construction processes
6.4.14.1 Weld joint design: Acceptable welding standards for independent tanks are specified in 46 CFR 154.650.

6.4.15 Tank types
6.4.15.1 Type A independent tanks: The deep tank standards of a classification society recognized by the Coast Guard under 46 CFR Part 8, Subpart B, in effect at the time of construction, are considered acceptable for the purposes of 6.4.15.1.1.1 and 6.4.15.1.3.2.

6.4.15.3 Type C independent tanks: Independent tanks of type C must be designed either to meet the requirements under 46 CFR Part 54, except 54.01-40(b), or be approved under Section VIII of the ASME Boiler and Pressure Vessel Code. These are both considered to be recognized standards acceptable to the Coast Guard under Section 6.4.15.3.

6.6 – Regulations for CNG fuel containment
This guidance does not apply to vessels using CNG as a fuel. Such vessels must meet the requirements in 46 CFR 154 and the IMO's International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code) if a compressed gas carrier, or have their proposal submitted as an alternative design request under paragraph 2.3.3 of this letter.

6.7 – Regulations for pressure relief system
6.7.2 Pressure relief systems for liquefied gas fuel tanks
6.7.2.8 The required 32.8 ft (10 m) separation between the LNG tank pressure relief valve outlet and the nearest air intake/outlet, opening to a non hazardous space, or machinery exhaust outlet, may be waived dependent on the results of a gas dispersion analysis conducted in accordance with previously approved procedures. The results of this analysis must be submitted for evaluation using the alternative design process in Section 2.3.

6.8 – Regulations on loading limit for liquefied gas fuel tanks
6.8.2 Requests for a higher loading limit (LL) than as calculated in 6.8.1 of up to but not exceeding 95% will be evaluated within the context of the risk assessment required by 6.4.1.1. For approval, the risk assessment required under 4.2.3 must address the probability of tank contents being heated up due to an external fire and find that the probability is very small based on tank location and effectiveness of tank insulation.

6.9 – Regulations for the maintaining of fuel storage condition
6.9.1 Calculations must be prepared to determine the maximum temperature of LNG fuel that can be loaded in order to meet the 15-day requirement under 6.9.1.1. This temperature shall be reflected in the fuel handling manual required under 18.2.3, and the bunker safety check-list required under 18.4.1.1.3, as the maximum allowable temperature of LNG fuel acceptable for loading during bunkering operations.

6.9.2 Where the upper ambient design temperatures used are other than those specified for worldwide service under 6.9.2, they shall be noted on the vessel's COI.

6.9.4 – Thermal oxidation systems

6.9.4.1 Where fuel tank pressure and temperature are controlled by means of a dedicated gas combustion unit (GCU), the GCU shall meet the design requirements for thermal oxidation systems under Section 7.4 of the IGC Code. In lieu of meeting requirements in paragraph 7.4.1.2 of the IGC Code for arrangement of spaces and fuel supply system, the GCU installed on a gas-fueled vessel must be located in a machinery space meeting IGF Code requirements, with a fuel supply system meeting Chapter 9 of the IGF Code.

6.11 – Regulations on atmosphere control within fuel storage hold spaces (Fuel containment systems other than type C independent tanks)

6.11.1 The availability of make-up gas for inerting interbarrier spaces and fuel storage hold spaces may be approved for periods of shorter than 30 days depending on the vessel's route or service. If approved, the OCMI will note any associated route or service limitations on the vessel's COI.

CHAPTER 7 – MATERIAL AND GENERAL PIPE DESIGN

7.3 – Regulations for general pipe design

ASME B31.3 is considered the standard acceptable to the Administration for piping systems and components described throughout Chapter 7.

7.4 – Regulations for materials

7.4.1.3 This guidance does not apply to vessels using CNG as a fuel. Such vessels must meet the requirements in 46 CFR 154 and the IGC Code if a compressed gas carrier, or have their proposal submitted as an alternative design request under paragraph 2.3.3 of this letter.

CHAPTER 9 – FUEL SUPPLY TO CONSUMERS

9.6 – Regulations for fuel supply to consumers in gas-safe machinery spaces

9.6.1.3 If a solution is approved providing an equivalent level of safety to the options provided in 9.6.1.1 and 9.6.1.2, details of the approved arrangement's requirements are to be documented by the cognizant OCMI as a "special inspection note" for the vessel in MISLE.

CHAPTER 11 – FIRE SAFETY

11.5 – Regulations for water spray systems

The following criteria augment the requirements in Section 11.5 for water spray systems:

11.5.1 (a) Each pipe, fitting, and valve must meet 46 CFR Part 56.
(b) Each water spray system must have a means of drainage to prevent corrosion of the system and freezing of accumulated water in subfreezing temperatures.

11.5.2 The coverage of nozzles protecting valves, piping and manifolds must extend at least 19 inches (0.5 m) in each direction, past the protected fittings or to the area of the drip tray, whichever is greater.

11.5.3 On vertical surfaces credit may be taken for rundown if the nozzles are spaced no more than 12 feet (3.7 m) apart vertically.

11.5.6 The main fire pumps may be used to supply the system if their total capacity is capable of providing the required flow for both systems. The water supply for the water spray system must be adequate to supply all nozzles simultaneously.

11.5.7 Controls to remotely start pumps supplying the water spray system and operate any normally closed valves to the systems must be located outside of the protected area in a readily accessible position that is not likely to be cut off in case of fire in the protected areas.

11.5.8 Water spray nozzles are not required to be type approved, but must be listed by a nationally recognized testing laboratory, as defined in 29 CFR 1910.7.

11.6 – Requirements for dry chemical powder fire-extinguishing system

Dry chemical powder fire extinguishing systems installed under the provisions of Section 11.6 must consist of at least one hand hose line unit that:

(a) Is listed for fire service by a nationally recognized testing laboratory, as defined in 29 CFR 1910.7,
(b) Meets the requirements of 46 CFR 154.1155 and 154.1165 – 154.1170, and
(c) Meets the requirement of MSC.1/Circ.1315 (10 June 2009).

Note: There are no dry chemical powder fire extinguishing systems currently approved by the Coast Guard, therefore detailed manufacturer's data and a maintenance manual for the system to be installed must be provided for review as part of the detailed plan review package. Additionally, details must be provided to demonstrate compliance with the unit's listing limitation for nozzle placement and coverage distance of the hand hose line.

11.7 – Requirements for fire detection and alarm system

In addition to the provisions of Section 11.7, fire detection systems must:

(a) Be provided in machinery spaces containing gas-fueled engines,
(b) Be approved by the Commandant in accordance with 46 CFR 161.002 and installed in accordance with 46 CFR 76.27,
(c) Have fire detection cables routed such that fire or flooding in one space will not affect the ability to detect fire in another space or fire zone, and
(d) Use heat detection in addition to any other forms of detection used for the protected space.

CHAPTER 12 – EXPLOSION PREVENTION

12.3 Regulations – General

For a given design, the scheme of standards selected from 14.3.3 (of this document) to meet the requirements for electrical equipment in hazardous areas shall also be considered the "recognized standard" used to fulfill requirements under 12.3.1 and 12.3.2 in this chapter.

CHAPTER 13 – VENTILATION

13.3 Regulations – General

The following is considered the "recognized standard" for the purposes of requirements 13.3.9.2.2 and 13.3.10.2:

IEC 60092-502:1999 Electrical Installations in Ships – Tankers – Special Features, Table 5

CHAPTER 14 – ELECTRICAL INSTALLATIONS

14.3 Regulations – General

14.3.1 Electrical installations, unless otherwise specified here, shall meet the requirements in 46 CFR Subchapter J.

14.3.3 Hazardous locations: Electrical installations in hazardous locations may comply with either paragraph (a) or (b) listed directly below, which the Coast Guard considers to be standards at least equivalent to those acceptable to the Organization. The scheme chosen shall also constitute the "recognized standard" used to fulfill requirements under 12.3.1 and 12.3.2.

(a) NFPA 70 Article 505. Equipment required to be identified for Class I locations must meet the provisions of Sections 505.7 and 505.9 of NFPA 70 and must be tested and listed by an independent laboratory to one or more of the types of protection in ANSI/ISA Series of standards incorporated in NFPA 70. (note: See Article 505.9(c)(1) of the NFPA 70 for use of Division equipment in Zone designated spaces.)

(b) Clause 6 of IEC 60092-502. Electrical apparatus in hazardous locations must be tested to IEC 60079-1:2007, IEC 60079-2:2007, IEC 60079-5:2007, IEC 60079-6:2007, IEC 60079-7:2006, IEC 60079-11:2011, IEC 60079-13:2010, IEC 60079-15:2010, IEC 60079-18:2009 or IEC 60079-25:2010 and certified by an independent laboratory under the IECEx System.

System components that are listed or certified under (a) or (b) of this section must not be combined in a manner that would compromise system integrity or safety.

Equipment listed or certified to ANSI/ISA 60079-18 (2012) or IEC 60079-18:2009, respectively, is not permitted in Zone 0 hazardous locations unless the encapsulating compound of Ex "ma" protected equipment is not exposed to, or has been determined to be compatible with, the liquid or fuel in the storage tank.

14.3.5 Lighting Systems: Lighting circuits serving flameproof or explosion proof lighting fixtures in an enclosed hazardous space or room must:

(a) Have at least two lighting branch circuits;
(b) Be arranged so that there is light for relamping any deenergized lighting circuit;
(c) Not have the switch and overcurrent device within the space for those spaces containing explosion proof or flameproof lighting fixtures.
(d) Have a switch and overcurrent protective device that must open all ungrounded conductors of the circuit simultaneously.

14.3.8 Submerged Pumps: Submerged pump motors may be installed in tanks with flammable or combustible liquids with closed-cup flashpoints not exceeding 60 degrees C (140 degrees F) based on approved plans and installation details. Installation must include:

(a) An automatic shutdown of power to the pump if the pump loses suction due to low liquid level, low motor current, or low pump discharge pressure;
(b) An audible and visual alarm actuated by the shutdown of the motor; and,
(c) A lockable circuit breaker or lockable switch that disconnects power to the motor.

CHAPTER 15 – CONTROL, MONITORING AND SAFETY SYSTEMS

15.3 Regulations – General

Control, monitoring and safety systems addressed under Chapter 15 of the IGF Code must also meet the requirements for vital system automation under 46 CFR Part 62, and the design verification and periodic testing requirements under 46 CFR Subpart 61.40.

15.8 Regulations for gas detection

(a) General

(i) Except as modified below, fixed gas detection systems on gas-fueled vessels must meet the applicable provisions of Section 15.8.
(ii) The fixed automatic gas detection and alarm system must meet the performance requirements in IEC 60079-29-1
(iii) The installation, selection, safe use and maintenance must meet IEC 60079-29-2.

(b) Location of Detectors

Gas detectors must be permanently installed in the locations identified in Section 15.8.1. In addition, a gas detector must be permanently installed in any space containing a bolted hatch access to a tank connection space.

(c) Plan Submittal

In addition to the submission of typical new construction drawings, including such drawings reflecting the installation of an LNG fueled propulsion system, the following gas detection system plans must be submitted for review in accordance with 46 CFR 110.25-3:

(i) Elementary and isometric or deck wiring plans, a list of symbols, and manufacturer's name and identification of each item of electrical equipment.
(ii) System's instruction manual, including information concerning installation, programming, operation, and troubleshooting.
(iii) The name, model number, and function of each major component and accessory, such as the main control cabinet, remote annunciator cabinet, gas detector, zone card, isolator, central processing unit, zener or intrinsically safe safety barrier, special purpose module, or power supply.
(iv) Independent laboratory certifications and applicable test reports of the gas detection system.

(d) Gas detection system certification

(i) All fixed gas detection systems, including associated devices, and portable detectors must be listed or certified by an independent laboratory accepted by the Commandant under 46 CFR Part 159 as meeting the following standards:

(1) IEC 60079-29-1(2007). If installed in hazardous locations, the detector must be labeled and marked to comply with the requirements of IEC 60079-0.

(2) The environmental testing standards for control and monitoring equipment, in Clause 5 of IEC 60092-504.

(ii) When an approved fire detection system under the approval series 161.002 incorporates gas detectors, the manufacturer of the fire detection system must specifically list the gas detector by manufacturer's name and model identification, for compatibility with the type approved fire detection system.

(e) Additional requirements for gas detection systems

(i) Gas detection systems must be designed such that when a detector actuates, the vessel operator is able to identify the specific gas detector and its location.

(ii) Gas detection cables must be routed such that a fire or flooding in one space will not affect the ability to detect gas in another space.

(iii) Gas detection system shall be designed such that failure of one component or sub-system will not unduly affect any other system, sub-system or component and, as far as practicable, shall be detectable.

(iv) Gas detection must be continuous without delay.

(v) Simultaneous activation of gas detectors shall not impair the operation of the system.

(vi) There must be at least two independent sources of power for the fixed gas detection system. The normal source must be from the main power source. The other source must be the emergency power source or an automatically charged battery. Upon loss of normal power the system must be automatically supplied from the other source.

(vii) The automatic shutdown functions of the gas detection system must be independent from the gas detection monitoring and alarm functions of the gas detection system. Power failure must not result in activation of the gas detection system shutdown function.

(viii) Power supplies and electric circuits necessary for the operation of the system shall be supervised for loss of power and ground fault.

(ix) Each flammable gas detection system must allow calibration of the equipment with span gas.

(f) Portable Gas Detectors

Each vessel must have at least two portable gas detectors that meet the applicable standards under paragraph (4) of this section.

ANNEX TO PART A-1 – STANDARD FOR THE USE OF LIMIT STATE METHODOLOGIES IN THE DESIGN OF FUEL CONTAINMENT SYSTEMS OF NOVEL CONFIGURATION

Containment system designs making use of limit state methodologies as specified in the Annex to Part A-1 must be approved by Commandant (CG-ENG) on a case-by-case basis.

CHAPTER 16 - MANUFACTURE, WORKMANSHIP AND TESTING

16.1 General

16.1.1 In Chapter 16, where the code refers to recognized standards, unless otherwise specified those standards are Section IX of the ASME Code as limited, modified, or replaced by specific requirements in 46 CFR Subchapter F, Part 57 -- Welding and Brazing. Where requirements in this chapter refer to “the Administration”, this shall mean the OCMI.

CHAPTERS 17, 18, AND 19 – DRILLS AND EMERGENCY EXCERSIZES; OPERATONS; AND TRAINING

The contents of Chapters 17 through 19 are outside the scope of this equivalency determination. Additional or alternative operational and training provisions may be required by the Coast Guard’s Office of Operating and Environmental Standards, Commandant (CG-OES), or the cognizant OCMI. For more information in these areas refer to the following policy guidance:

- CG-OES Policy Letter 01-15, "Guidelines for Liquefied Natural Gas Fuel Transfer Operations and Training of Personnel On Vessels Using Natural Gas as Fuel"

- CG-OES Policy Letter 02-15, "Guidance Related to Vessels and Waterfront Facilities Conducting Liquefied Natural Gas (LNG) Marine Fuel Transfer (Bunkering) Operations"