Safety Standards for LNG Fueled Vessels

Transportation Research Board
Marine Board Fall Meeting
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CAPT John W. Mauger
Office of Design & Engineering Standards
U.S. Coast Guard Headquarters

United States Coast Guard
Marine Safety, Security, and Stewardship
How to Proceed With Gas Fueled Vessel Design?

- Federal Regulations do not specifically address natural gas as fuel
- Need to establish equivalency to Title 46 CFR
- Vessel-specific concept review
- Design Basis – framework of standards and requirements
Typical LNG Fuel System Components
Leveraging International, Industry and Classification Society Standards

- United States Coast Guard
- Marine Safety, Security, and Stewardship

International Regulations

Industry Standards

Class Rules

CG Policy

CG Regs

To be developed

CG-ENG 01-12
CG-OES 01-14
CG-OES 02-14

ABS

DNV-GL

ISO

NFPA

IMO

United States Coast Guard
Marine Safety, Security, and Stewardship
IMO Standards

- IMO Resolution MSC 285 (86)
  - “Interim Guidelines on Safety for Natural Gas-fuelled Engine Installations in Ships”
  - Adopted 1 June 2009

- International Gas Fueled Ships Code (IGF Code)
  - Draft completed - September 2014
  - Anticipated implementation - 2017
From: J. P. Nallan, CDPT
CONMDT (CG-521)

To: Distribution

Subj: EQUIVALENCE DETERMINATION – DESIGN CRITERIA FOR NATURAL GAS FUEL SYSTEMS


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 by existing regulations.


3. Action. Natural gas fuel systems designed and constructed in accordance with the enclosed criteria may be accepted by the Coast Guard Marine Safety Center and Officers in Charge. Marine Safety (CG-521) for use in brand-new vessels. Other designs will continue to be considered by Commandant (CG-521) on a “case-by-case” basis.

4. Background.

a. The use of natural gas as a shipboard propulsion fuel is a leading alternative to oil fuels for marine domestic and international air emissions requirements, including the limits for Emission Control Areas adopted in recent amendments to MARPOL Annex VI. Additionally, current pricing and availability makes 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 feed-off gas used on liquefied natural gas (LNG) carriers, existing U.S. regulations do not address the design and installation of natural gas fuel systems on commercial vessels.

b. International standards for the design of natural gas-fueled ships are currently being developed by the International Maritime Organization (IMO). In June of 2009, the IMO published interim guidelines in reference (a), which is available on the CG-521 website at http://www.uscg.mil/hq/gsc521/docs/mmc_285_86.pdf.

U.S. Review of Gas-Fueled Vessels

Policy Letter 01-12

- streamlined review process
- provides “equivalent level of safety” to 46 CFR
- Baseline: IMO Interim Guidelines
- add’l requirements & modifications
- designs outside policy can still apply for Concept Review
Safety Considerations

- **Fuel System**
  - Machinery space configuration
  - Tank placement
  - Tank & piping requirements

- **Gas Detection**
  - System certification

- **Hazardous Locations**
  - Classification of areas
  - Electrical equipment

- **Fire Protection**
  - Installed firefighting systems
  - Fire detection
Policy Letter 01-12 – Limitations

Policy does not address the following:

- fuel stored as compressed natural gas (CNG)
- single-wall gas piping in engine room (ESD-concept)
- fuel tanks below accommodation spaces
- Portable fuel tanks, or “tank-tainers”

Limited Scope:

- vessel & system design, not operational requirements
Regulation of Fueling Infrastructure

- Shore to Ship
- Tank Truck to Ship
- Ship to Ship
U.S. Coast Guard Policy Letters

Short Term Solution to Bridge Gaps:

- Policy letters drafted to bridge gaps in regulations
- Policy letters based on existing regulations applicable to LNG cargo operations scaling down to fit needs and accomplish safety mission.
- Aligned with ongoing work of leading international organizations (e.g. IMO, ISO, SIGTTO, etc.).
- Utilize existing USCG OCMI/COTP authorities to implement existing regs & evaluate safe alternatives.
Next Steps?

- Continue development of national/international standards
  - Domestic bunkering, training, risk assessment policies
  - Design policy for LNG bunker barge
- Continue discussions with broader stakeholder to address ‘System’ issues associated with:
  - Maintenance and repair, drydock, hotwork, salvage and emergency response
Thank You

CAPT John Mauger
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U.S. Coast Guard Headquarters, Washington, DC

www.uscg.mil/hq/cg5/cg521