

SEPTEMBER 2013

MARITIME REPORTER AND ENGINEERING NEWS

MARINELINK.COM

The Kirby Way

Joseph Pyne, Kirby & 30 Years of Growth

MLC 2006
Proving Compliance

\$228B
LNG Capital Expenditure

Floating Production
Huge Opportunity for Shipyards

Training & Education
Poland's Maritime "U"

Fire Protection for LNG-fueled Ships

There are roughly 30 liquified natural gas (LNG)-powered marine vessels currently active in today's global seas, with some estimates showing approximately 30 new builds expected by 2014. With new commitments and orders for LNG-powered ships taking place every month, the potential that LNG-powered vessels will play an important part in shaping the future of the maritime industry is no longer speculation – it is now a fact. Helping to drive the switch from diesel, steam and even coal-powered ships to LNG is the need for shipowners to be compliant with new standards that require vessels to limit harmful emissions. To meet the International Convention for the Prevention of Pollution From Ships' (MARPOL) Tier 2 and Tier 3 requirements set forth by the amendment to the air pollution annex – Annex VI – ships must gradually reduce nitrogen oxide (NOx) and sulfur oxide (SOx) emissions. The goal is for these ships to achieve an 80 percent reduction of NOx and .05 percent SOx emissions by 2020. The United States Coast Guard (USCG), and Environmental Protection Agency adopted the standards of MARPOL Annex VI in 2011.

The adoption of this regulation by the U.S. demonstrates the need for the maritime industry to develop new, cleaner ways of transporting fuel and goods. One way some companies are meeting these requirements is by building or retrofitting LNG-fueled vessels to realize efficiencies.

Due to the rapid expansion and growth of this market, it is imperative for the industry to ensure that fire protection safety and training for LNG-powered vessels is taking place. Navigating the breadth of studies, standards and organizations governing LNG safety offerings and requirements can be tricky, but with a basic understanding of marine fire protection and safety, ship owners and builders can maintain a safe and compliant environment for people and cargo.

History of Marine Fire Protection

The first fire protection requirements for international shipping were included in the International Convention for the Safety of Life at Sea (SOLAS) treaty in 1914, which was enacted in response to the sinking of the Titanic in 1912. Not long after the treaty went into effect, the efforts to implement the agreed upon standards were hampered by World War I; however, the basic guidelines were adopted into the second version, which rolled out in 1929.

Tyco – Marine became a partner in upholding and maintaining fire protection standards for marine vessels in 1933. Since that time, the company has continued to implement those fire protection regulations, and the various iterations that have evolved over the past eight decades.

Fire protection and safety guidelines for marine vessels has come a long way since 1933, and with the current movement to LNG power, those guidelines will continue to change and progress as the technology is further tested and developed.

The LNG Difference

LNG-powered ships offer a number of advantages over hydrocarbon-fueled ships but the safety concerns they pose are unique and, currently, largely unregulated. U.S.-based vessels follow the fire safety direction of the USCG, which has adopted the International Maritime Organization (IMO) Resolution MSC 285(86) – a set of interim guidelines for ship design and arrangement. This Resolution offers basic guidelines for fire safety and detection, but owners can benefit from working with a marine fire protection specialist to help design a fire suppression system exclusive to a particular ship.

Advantages of LNG-fueled ships include:

- LNG is more economical.
- LNG burns cleaner, reducing harmful emissions substantially.
- Self-ignition temperature is high: 595°C, compared to diesel: ~210°C.

The challenges that exist with LNG-powered vessels include:

- Limited LNG infrastructure.
- High cost to retrofit or build.
- The temperature required to maintain LNG in a liquid state (-163°C) can make ship steel brittle over time.

There is also the unknown element. As the industry reacts to this growing trend and settles into this new normal, there are many variables that cannot be predicted, such as the fluctuating cost of fuel, or ever changing build designs and standards.

LNG: Fire Protection Game Changer

While LNG has historically been safer to manage than hydrocarbon fuels, it is important to recognize that the rapid growth of the industry requires a shared commitment to maintain that track record with proper fire safety planning and training.

The layout of an LNG-powered ship can vary considerably and identifying the right fire suppression system depends on whether a ship is a new build or a retrofit job. The engine, machinery and mechanisms involved in powering an LNG ship use more valuable floor space than hydrocarbon-fueled ships. With square footage at a premium, it is critical that deck and floor space be used well.

Working with a distributor early in the build or retrofit pro-

cess to help customize a fire suppression system that is best for your individual ship will save time and money, while maximizing space allocation.

Vessels fueled by LNG require engineered fire protection systems that are flexible and customizable to fit the differentiated spaces inherent to these ships, including the engine room, machinery spaces and bunkering system areas. Each area requires a fire suppression system that dispenses the correct agent for the potential hazards of each. Typically, the fire protection systems required in these scenarios cover more vessel floor space because LNG holding tanks have a much larger footprint than holding tanks of traditional fuels.

When choosing fire suppression solutions for engine rooms and machinery spaces, it is important to consider clean agents that provide total flooding capabilities, while still offering total suppression for valuable equipment. The following agents are waterless gases with limited ozone depletion potential. Each requires very little cleanup post-discharge, providing minimum downtime for operators.

- **High pressure carbon dioxide** – This agent displaces combustion supporting oxygen by flooding the protected area. Stored in individual cylinders, the system can be discharged automatically or manually.
- **FM-200** – Recommended as a Halon alternative, this agent is safe for areas where people may be present and works by removing heat from fire hazards.
- **Novec 1230** – Offering similar advantages as FM-200, Novec 1230 has the added benefits of a high life safety factor, zero ozone depletion and an atmospheric lifetime of five days.
- **Inert Gases** – Made of naturally occurring gases, this non-synthetic agent is safe for people and does not produce a fog, ensuring escape routes to remain visible.

Bunkering stations require the benefits of dry chemical powder agents to suppress fire incidents. The following two agents should never be used together, as it will result in efficiencies of the chemical compounds.

- **ABC multipurpose agent** – Comprised of a mix of mono-ammonium phosphate and ammonium sulfate, this agent interferes with the chain reaction of Class A, B and C fires.
- **Purple K (PKP)** – Developed to suppress Class B fires from two fronts, PKP smothers fires in addition to breaking the chemical reaction of the source.

Implementing change

The increasing demand for LNG as a fuel source for ships brings with it countless regulations that ship owners and operators must stay ahead of. It is vital that shipbuilders, owners and converters understand the governing organizations and standards that apply to fire safety systems for LNG-powered ships in order to stay compliant and protect their investments.

Much of what has been learned and adopted in regards to these standards and regulations has come from Norway, which has been utilizing LNG-fueled ships since 2001. Based on their experience, the country helped develop Resolution MSC

285(86). But as the market for these vessels grows, so does the need for national and international agencies worldwide to weigh in on appropriate guidelines, enabling fleet development and inspections to meet all safety and environmental requirements.

Currently, the IMO subcommittee on Bulk and Liquid Gases (BLG) is working on an International Code of Safety for Gas Fueled Ships (IGF Code). This policy will help fill gaps in the current interim guidelines and define outstanding questions in regards to procedures and process definitions.

Safety for the Long Haul

While there is still some ambiguity on regulations for LNG-fueled ships, the market continues moving forward with new builds and retrofits. As these fleets continue to grow globally, ship owners must be proactive in ensuring fire suppression systems address their specific needs. Identifying and investing in the right system with the right agents in a customized way, will ensure a more complete level of protection in this rapidly changing industry.



Steve Pelletier, business development manager, Tyco Marine Services, is a former member of the United States Coast Guard, Steve holds associate degrees in science and electronics engineering. He has worked in the fire protection industry since 1996.