FIRE DETECTION, FIRE FIGHTING AND CONTAINERISED DANGEROUS GOODS: REGULATIONS AND REALITIES

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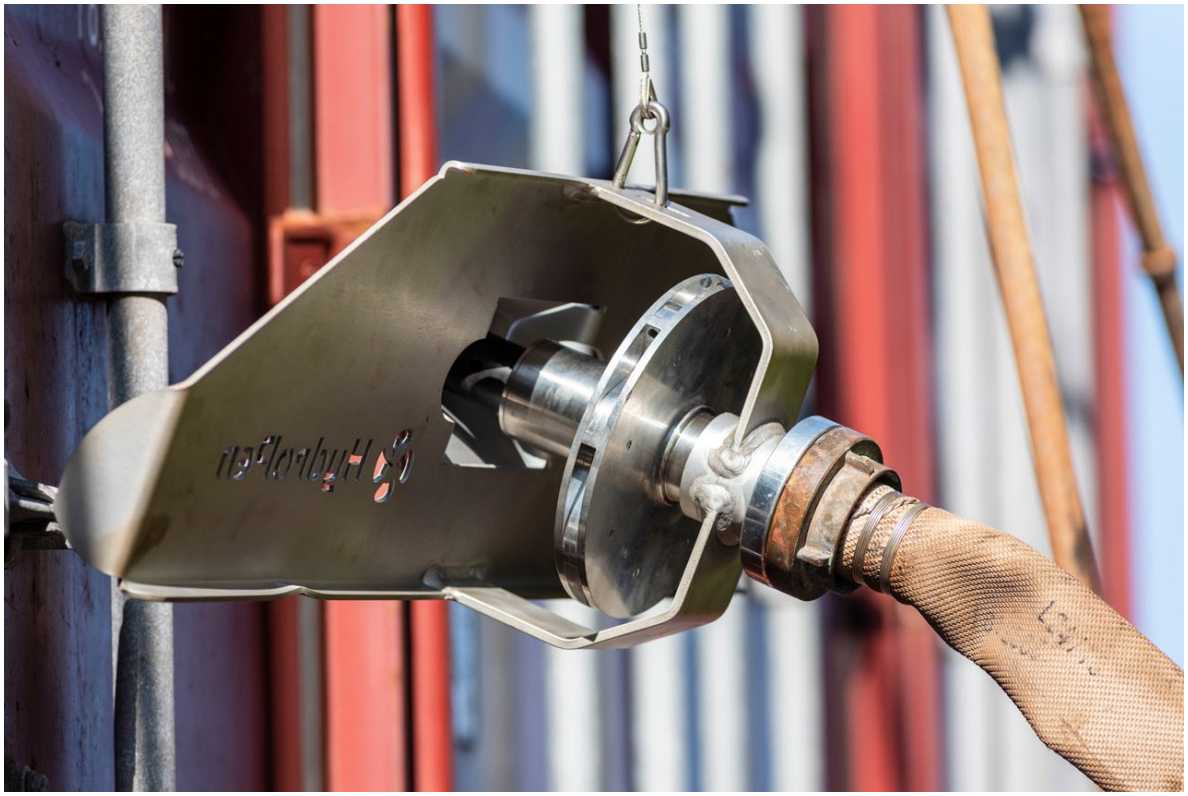

Self-penetrating water drill lance being hoisted into position on a container

INTRODUCTION

Shipboard container cargo fires with severe losses are regrettably common. The first line of defence (as discussed in Risk Bulletin No 86) must always be pro-active fire risk identification and avoidance. This Risk Bulletin focuses on the second and third lines of defence of fire detection and firefighting. The associated IMO regulation and industry concerns as to its insufficiency are also considered.

BACKGROUND

The serious hazards presented by the on-going misdeclaration of containerised dangerous cargo – both deliberate and otherwise – are considered in Risk Bulletin No. 86. These misdeclarations include the misuse of IMDG Code Special Provisions (SPs) which, subject to the provision of test certification and packaging requirements, permit dangerous goods to be shipped without declaration to the carrier.

NOTE: The misuse of SPs by shippers is a major concern to the shipping industry. It is voiced in the ICS/BIMCO/ICHCA recommendations to the IMO of 2019.

Misdeclared dangerous goods always present an unacceptable risk. By comparison, dangerous goods that are properly documented and declared present a significant risk but one which – through prudent implementation of the IMDG Code during the stowage planning and loading processes – can be reduced to manageable risk levels.

NOTE: Key risk reduction actions include ensuring containerised dangerous goods are stowed on deck, a safe distance from potentially reactionary containers, well away from crew accommodation and positioned to facilitate ready firefighting access.

The critical issue then becomes the adequacy of the container fire detection and firefighting systems on board. SOLAS and Fire Safety System (FSS) Code current containership requirements, industry concerns as to regulatory sufficiency and 'lessons learned' are discussed below.

REGULATORY REQUIREMENTS – SOLAS CHAPTER II-2

The IMO's webpage Summary of SOLAS Chapter II-2 provides a useful outline and starting point for understanding the SOLAS Rules for all ship types under the title 'Construction: Fire Protection, Fire Detection and Fire Extinction'.

NOTE: Members who operate vessels in domestic trade and are not governed by SOLAS should confer directly with their flag state authority and/or its appointed RO to ascertain the equivalent or similar NCVS regulations which apply.

The full and updated text of SOLAS Chapter II-2 is provided by the latest SOLAS Consolidated Edition 2024. It must be available in hard copy or be e-book accessible on board all SOLAS regulated vessels.

SOLAS Chapter II-2 contains seven subject Parts A through D which contain Regulations 1 through 23. Except for the Regulations relating to passenger ships (i.e. ships certified to carry more than 12 passengers) and 'special measures' for Ro-Ro vessels, Chapter II-2 applies mandatorily to all SOLAS defined 'cargo ships', inclusive of containerships.

Regarding containerships and other ships carrying containers, Chapter II-2, Part C, and its numbered Regulations require special attention and application:

SOLAS CHAPTER II-2, PART C – SUPPRESSION OF FIRE

Reg. 7, Detection and Alarm

Para. 4 requires cargo/container ships to be fitted with fixed fire detection and automatic alarm systems in machinery spaces and fire detection, alarms and sprinkler systems in accommodation spaces. As to cargo/container holds, Reg. 7 provides no specific detection and alarm requirements. However, if dangerous goods are carrier in a cargo hold then fire detection and alarming is required by Reg. 19, Para. 3.3, as explained further below.

Reg. 10, Fire Suppression/Extinguishment

Para. 7.2 requires that containerships and all ships carrying dangerous cargo in 'cargo spaces' (i.e. cargo holds) must be fitted with a fixed CO2 or an inert gas fire-extinguishing system which complies with the IMO's Fire Safety Systems (FSS) Code or with a fixed fire-extinguishing system which – in flag state opinion – provides equivalent protection.

NOTE: The FSS Code latest 2015 edition is available from nautical booksellers Witherby or from the IMO website. It details the international standards and engineering specifications for the fire safety systems required by SOLAS Chapter II-2. The IMO's 2019 FSS Code Supplement web page provides free updates to current requirements.

Para. 7.3 is a new section specifically for containerships added by IMO Res. MSC.365(93). It applies to containerships "*...constructed on or after 1 January 2016 designed to carry containers on or above the weather deck.*"

NOTE: As advised further below, Members should consider the safety benefits of compliance with the above IMO Resolution for containership additional firefighting equipment regardless of the year of vessel construction.

Para. 7.3.1 requires that all such ships (whether cellular containerships or other ships carrying containers) must – in addition to the basic firefighting equipment for all ships specified in Paras, 1 and 2 of Part C – carry the following special equipment:

- At least one water mist lance (see the photo illustration) with a self-piercing nozzle capable of penetrating a steel container wall and then injecting a water mist inside the container.

Para 7.3.2 requires that ships carrying five of more tiers of containers on or above the weather deck must carry mobile water monitors with two such units required for ships of less than 30 m. breadth and four units for ships of 30 m. or more.

NOTE: Mobile water monitors are designed to improve the usually lengthy boundary cooling process and reduce crew fatigue.

Paras. 7.3.2.1 through 7.3.2.4 detail requirements for monitor storage and readiness, securing, water pressure required, testing and the requirement for the water monitor jets to reach the top tier of containers with all required monitors and water jets from fire hoses operating simultaneously.

NOTE: Water pressure requirements for ships carrying containerised dangerous goods must also meet the requirements of Reg. 19, Para. 3.1, as referred to below.

SOLAS CHAPTER II-2, PART G – SPECIAL REQUIREMENTS

Reg. 19, Carriage of Dangerous Goods

Para. 1 explains the purpose of Reg. 19 in providing additional safety requirements for the carriage of dangerous goods.

Para. 2 clarifies the application of Reg. 19 to all vessels carrying containerised dangerous goods – whether 'on deck' or 'under deck' – inclusive of purpose built/cellular containerships and other ships carrying containers.

Para 3.1 details the provision of firefighting water supply with reference to both volume and pressure as well as drainage and sufficient bilge pumping capacity to avoid free surface effect.

Para. 3.3 details the requirement that *"...cargo spaces shall be fitted with either a fixed fire detection and fire alarm system or a sample extraction smoke detection system complying with the requirements of the FSS Code*".

Para. 3.4.1 provides that "*Adequate power ventilation shall be provided in enclosed spaces."* The word "adequate" meaning at least six air changes per hour for the removal of any dangerous cargo vapours from both the upper and lower hold levels.

NOTE: Industry concerns are that the fire detection function of sample extraction smoke detection systems is compromised by the simultaneous operation of the power ventilation systems. The reported problem being that a cargo hold must be filled with smoke from an already well-developed fire before the extraction system can sample sufficient smoke to trigger a bridge alarm.

Para. 3.6.1 provides that in addition to the Reg. 10 fire-fighter's outfits required for all ships (whether carrying dangerous goods or not), four sets of clothing resistant to chemical attack (HAZMAT suits) which meet the requirements of the current Supplement to the IMDG Code must also be carried

NOTE: Members are directed to Risk Bulletin No. 86 which refers to the three volume IMDG Code publication, inclusive of the Supplement volume which provides DG safety advice to ship crews.

Para. 3.62 requires that in addition to the Reg. 10 requirement for Self Contained Breathing Apparatus (SCBA) units, that at least two more SCBA units be provided on board together with two spare charges for each additional unit.

Para. 3.7 provides that portable dry powder extinguishers with a total capacity of not less than 12 kg.

NOTE: MSC.1/Circ.1275/Corr. 1, advises that 2 extinguishers of 6 kg each should be carried on board specifically for dangerous cargo extinguishment and additional to all other SOLAS prescribed extinguishers.

TABLE 19.1 – APPLICATION OF THE REG. 19 REGULATIONS TO DIFFERENT MODES OF CARRIAGE.

Table 19.1, placed at the end of Chap. II-2, Reg. 19, provides a helpful checklist on the applicability of the Reg. 19 additional regulations for containerised dangerous cargo when stowed on top of weather decks and underdeck. Members should also note that there are some differences between the requirements for both containerships and for other ships which carry containers.

ADEQUACY OF IMO REGULATIONS AND CODES

The carriage of containerised dangerous goods requirements of SOLAS Chapter II-2 and the FSS Code must both be applied in conjunction with the obligations imposed by the IMDG Code inclusive of its 'Special Provisions' and 'Limited Quantities' exceptions. This appears to create a complex regulatory regime with the resulting potential for shipper errors and deliberate misapplication.

Additionally, and as noted above, there are container shipping industry concerns as to the adequacy of the current IMO Regulations and Codes governing the shipment of dangerous goods. These concerns are expressed by the Container Ship Safety Forum (CSSF) in their paper Industry Position on Addressing Containership Fires .

The CSSF website advises that their members – which include Maersk, Seaspan, PIL, Wilhelmsen and Wan Hai – represent 45% of global container TEU capacity. The CSSF recommends the voluntary enhancement of containership fire prevention, firefighting equipment and training to standards which currently exceed the existing IMO Regulations and Codes.

NOTE: Class ABS, NKK and DNV have produced upgraded and optional Class rules and notations for containership voluntary fire control enhancement. As an example, the Class ABS webpage Firefighting on Containerships explains the upgrading and the Class notations available. These include Container Carrier House (CCH) which features external water curtains, Fire Fighting On Deck (FOC) which features increased water volume and pressure, Fire Fighting Below Deck (FBC) which features thermal fire detection and sprinkler extinction and Cargo Hold Flooding (CHF).

LESSONS LEARNED – 'GAPS' IN THE IMDG CODE AND SOLAS CHAP. II-2

A notable example of IMO regulatory 'gaps' is provided by a fire which took place on board the feeder containership X-PRESS GODAVARI (capacity 917 TEU) in Sept 2020 at Sandheads Anchorage, India. The full report is available on the Malta flag state webpage.

The vessel was anchored and awaiting a berth after a five day voyage from Port Kelang, Malaysia. During the 0400-0800 morning watch, smoke was seen to be coming from a container stowed on deck, outboard on the port side, and in the second tier of a three tier deck stack.

The general alarm was sounded, and fire hoses were used to provide container boundary cooling. At this time the crew were unaware of the container's contents as it was not listed as dangerous cargo. Urgent enquiries by the master then provided a cargo manifest showing the stated contents was 500 cartons of lithium-ion batteries (7,450 Kg) together with rechargeable torches and spares (9,311 Kg).

Subsequent enquiries revealed the container contents had not been declared as dangerous goods because the shipment was within the IMDG Code exemption requirements of SP 188. As such, it was shipped as 'general cargo' and without provision of any of the supporting documentation required for Dangerous Goods (DG). This would have included a copy of the Materials Safety Data Sheet (MSDS) with (for lithium-ion batteries) instructions to store the DG in a cool, dry, well-ventilated place, at temperatures between 20 C to 30°C and without exposure to direct sunlight for prolonged periods.

NOTE: SP 188 permits lithium-ion batteries to be shipped without a shipper DG declaration subject to specified requirements. This includes testing and issue of a Safe Transport Certificate which limits each package to 30 kg. However, SP188 sets no limit on the number and total weight of exempted packages within a single container. As noted above, the ICS and other shipping industry organisations are pressing the IMO to review and amend the IMDG Code SP exemption process.

In the event, the investigation's conclusion was that the container had overheated, and its contents had reacted and then ignited. The fire hose boundary cooling then provided by the crew to the outside of the container assisted fire containment. However, as the vessel was not equipped with a self-penetrating water drill lance, it had not been possible to inject water into the container to extinguish the fire.

NOTE: As referred to above, SOLAS Chap. II-2, Reg. 10, Para. 7.3, applies mandatorily only to containerships built after 1 Jan 2016. However, as the X-PRESS GODAVARI had been built in 2008, this SOLAS firefighting equipment requirement was not mandatory.

The vessel was ultimately berthed and – utilising essential shore support – the fire was extinguished, and the container removed. The investigation's assessment was that if the vessel had been at sea with no shore assistance available, the outcome could have been disastrous.

NOTE: Malta's maritime authority subsequently issued Information Notice No. 41 which requires that all Maltese flag SOLAS regulated vessels which carry containers must now carry a SOLAS approved water mist lance regardless of year of build.

CONCLUSION AND TAKEAWAY

The interconnected complexity of the SOLAS Chap. II-2, FSS Code and IMDG Code requirements in relation to containership fire detection and extinguishment systems requires careful attention to ensure both full regulatory compliance and optimal utilisation by ship crews. MM's recommendations to Members include the following:

1. Confer with your flag state authorities to confirm that annual flag state/RO revalidation inspections for both vessel Safety Construction and Safety Equipment Certificates are consistent with updated and current SOLAS or equivalent NCVS standards for fire detection and firefighting systems for containerships and other vessels carrying containers.
2. Confer with your ship managers, DPAs and masters to conduct a comprehensive assessment of vessel ISM Code or NCVS equivalent SMS Manuals and both Operational and Emergency Procedures to ensure they incorporate the updated and applicable standards as referred to above.
3. Consider the 'lessons learned' from the X-PRESS GODAVARI containership fire and:
    - Regardless of containership 'built age', upgrade your fleet's container firefighting equipment to not less than the SOLAS Chap. II-2, Reg. 10, requirements for the provision of a self-penetrating water mist lance and mobile water monitors.
    - Ensure fleet awareness of the potential dangers of the IMDG Code's 'Special Provisions' which may permit dangerous goods to be shipped in containers as 'general cargo'.

- Require that for all containers shipped on board, whether declared as 'dangerous goods' or 'general cargo', the master is provided with documentation which details their content and potential hazards.

4. Review the concerns expressed by shipping industry organisations such as the ICS and CSSF regarding the apparent insufficiencies of current SOLAS Chap. II-2 regulations, the FSS Code and the IMDG Code and consider supporting and investing in the CSSF's goal of upgrading containership fire detection and extinguishment systems to industry and Class standards which currently exceed existing IMO or NCVS equivalent minimums.