IACS: Updated draft response to IUMI

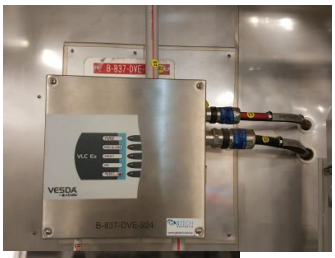
1. What can be done to improve the fire detection in a container cargo under deck?

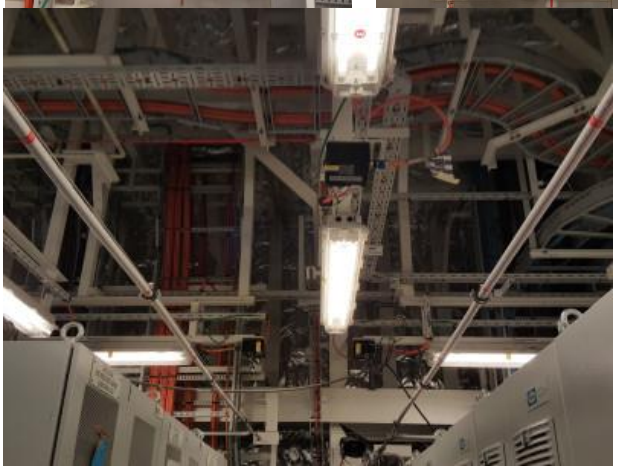
1.1 Heat detectors and/or other linear detection systems can be fitted in cargo holds, e.g. fibre optics, thermal imaging cameras, video-based fire detection systems, laser beam detection capable of continuously monitoring and detecting both smoke as well as elevated levels of heat within the container holds.

1.2 Fire/Smoke/heat detectors can be fitted inside each container which give an alarm at the bridge; this option requires further maturity.

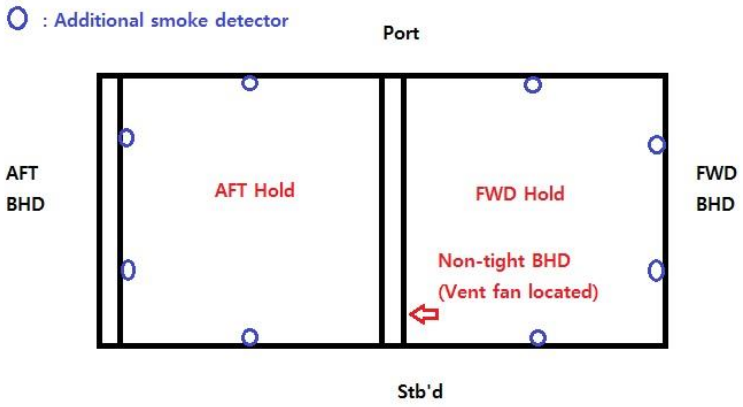
1.3 Enhanced smoke detection systems can also be considered:

1.3.1. Installation of aspirating smoke detection system (e.g. Very Early Stage Detection Apparatus) underneath of hatch covers





1.3.2. Increasing the number of smoke detectors on the FWD and AFT bulkheads, P&S longitudinal bulkheads of the cargo hold



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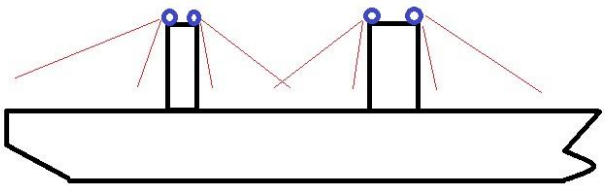
2. What can be done to improve the fire detection in a container cargo on deck?

2.1 Heat or linear/beam smoke detectors can be fitted on deck.

2.2 Fire/Smoke/heat detectors can be fitted inside each container which give an alarm at the bridge; this option requires further maturity.

2.3 Continuous surveillance by TIC (Thermal Imaging Camera) with image analysis which are installed on ship's top area (ship's bridge above (compass deck), and funnel casing top in case of 2 islands type container vessel). TIC should be operated by optimized programming like a zig-zag pattern for full coverage (as per cargo loading condition).

(ex.)



3. What can be done to enable a more precise and quick fire localisation?

3.1 Reduce the detection time of sample smoke detection systems, or augment with other fire detection systems.

3.2 Cutting the air supply is the most efficient way for under deck fire.

3.3 Increase number of detectors/locate them considering the natural/forces air movement

3.4 For holds fitted with forced ventilation, initiate ventilation shutdown upon detection of fire, this could be automatic when fire is confirmed.

3.5 For holds using natural ventilation, initiate closure of the ventilation openings upon detection of fire

3.6 To keep fire in a localized area (in the cargo hold) install underdeck sprinklers

3.7 In case of on-deck fire, it is a big challenge to isolate burning container(s) from others. In addition, open atmosphere condition makes firefighting more difficult (cannot isolating from air supply). A foam application system can be helpful to cut air supply, so installation (adoption of new system especially for on-deck fire) of deck foam firefighting system can be considered. It would be an engineering challenge due to the need for sea water & foam supply, boost pumps, foam tanks and spaces in the lashing bridges, etc..

3.8 Suitable fire detectors installed INSIDE the containers, these detectors are addressable, which will be linked to stowage position on board. When there is a fire inside a container, alarm (as well as the position signal) will be given out at very early stage of ignition. This option requires further development.

4. What can be done to compensate the deficiencies of CO_2 with regard to smothering a fire in a container stow under deck?

4.1 Main engine's exhaust gases can be utilized as an inert gas for the purpose of supplementary use only. This could be an easy option for ship owners in the aspect of budget and its efficiency. Minimizing air leaks through the non-weathertight hatch covers would be essential.

4.2 Provide an option for cargo hold flooding, as a last resort; this requires stability and structural aspects to be considered as well as ensuring pumping arrangements to drain the cargo hold to prevent developing a list.

4.3 Suitable self-contained fire fighting equipment is to be arranged inside containers or fire fighting piping (including nozzles and other fitting) connected from the ship's relating fire fighting systems is be led inside containers. This option requires further development.

5. What can be done to improve the confinement of a fire in containers under deck to the particular cargo hold?

5.1 Hatch cover mounted water spray systems could be a viable option, for container ships fitted with hatch covers.

5.2 Provide a water spray system on bulkheads and water spray curtains between container bays.

5.3 Additional structural fire insulation requirements for bulkheads between cargo holds could offer protection for shorter periods of time.

5.4 Other PFP (passive fire protection) for all boundaries (fwd, aft, port, starboard, underside of hatch/deck, tank top) similar to that used for offshore facilities. NB this could be expensive and what would be sufficient will require further research. (see also 8.4)

5.5 Consideration of whether the fire is within a cargo hold having boundaries with heated fuel tanks (or even above LNG fuel tanks) is also important.

5.6 Increase survey attendance to verify integrity of bulkheads

5.7 Suitable self-contained fire fighting equipment is to be arranged inside containers or fire fighting piping (including nozzles and other fitting) connected from the ship's relating fire fighting systems is be led inside containers. These equipment/arrangement can extinguish a fire at very early stage of ignition and limit the fire and damage within the container of the origin. This option requires further development.

6. What can be done to improve the confinement of a fire in containers on deck to the particular bay or section thereof?

6.1 Water spray systems that create spray ‘curtains’ between container bays.

6.2 Provide water deluge systems with suitable structural and stability aspects accounted for.

6.3 Attaching portable temperature monitoring sensors on the FWD and AFT wall (for easy installation and maintenance) and checking temperature rise during the voyage. They can be grouped and systemized for early stage fire detection in the container boxes. Measuring devices transmitting temperature information to the receiver periodically then the internal temperature of container laid under supervision.

The receiving device activates an alarm to the officer in charge when the temperature rise is acknowledged.

6.4 Suitable self-contained fire fighting equipment is to be arranged inside containers or fire fighting piping (including nozzles and other fitting) connected from the ship’s fire fighting systems is be led inside containers. The equipment/arrangements can extinguish a fire at very early stage of ignition and limit the fire and damage within the container of the origin. This option requires further development.

7. What can be done to improve active firefighting on deck bearing in mind reduced crew and local conditions?

7.1 Additional requirements for water monitors, which could be remotely controlled, mounted on top of the accommodation (or engine casing for large twin island container ships).

7.2 Make SOLAS reg. II-2/10.7.3.1 applicable to vessels carrying less than five tiers of containers.

7.3 Suitable self-contained fire fighting equipment is to be arranged inside containers or fire fighting piping (including nozzles and other fitting) connected from the ship’s relating fire fighting systems is be led inside containers. This option requires further development.

7.4 Several accidents have taken place in the night or the early hours of morning. Fire Drills during night time may help crew and company identify more effective options.

7.5 Remote mechanism for automatically closing the forced and natural ventilation flaps for cargo holds.

7.6 Another aspect is the small distance between the containers. It is very difficult for crew to approach site of fire considering heat, toxic gases, reduced visibility while being donned with firefighters suits and BA. There is always possibility of container exploding depending upon the nature of cargo which may be a threat to crew. Also keep the human element in mind. These are not trained firefighters.

7.7 Equipment needs to be reviewed with regards to replenishment of the BA sets. The location and accessibility to such sets should also be improved.

7.8 Access to shore support and technical experts may also help in helping Master with strategy for firefighting.

7.9 Improved means of access (physical access as well as visual access considering smoke and light conditions) to the cargo holds and container stacks to control fire at the fire source containers, considering crew equipped with firefighters suits and BA sets. Better equipment and fittings require to quickly penetrate a container and cool it.

Consideration that access routes to the concerned holds may be blocked due to fallen containers or exploded containers or debris.

7.10 Providing sufficient number of hoses (with adequate lengths) which are compatible with the hydrants.

8. What can be done to protect vital ship structures under deck and on deck from excessive heat?

8.1 Additional structural fire insulation requirements for ship structures under deck would be effective protection for short periods of time. Flooding the holds may help in controlling the temperatures but there are strength and stability issues which need to be considered. For containers on deck, boundary cooling may be helpful. Though it should be kept in mind that some nearby containers may contain cargo which may be reactive to water. This should be taken into account.

8.2 Provide fire protection coatings on key structure

8.3 Suitable water spray system is to be provided.

8.4 Application of Passive Fire Protection (see also 5.4) could be a solution. There is some limit to apply A-60 insulation for hold and on-deck. For example, Insulation affected on the cargo hold inside are easily damaged by water/cargo/weather and maintaining original condition is not easy also. But PFP is strong against mechanical damages and moisture. And maintenance is not required unless it affected by deep impact damages such as falling objects.

9. What can be done to improve the protection of deck house and life-saving appliances?

9.1 Protection of LSA.

9.1.1 Adding structure to shield the lifeboats and liferafts adjacent to the accommodation.

9.1.2 Adding water spray systems covering that area (e.g. similar to requirements of IGC Code reg. 11.3).

9.1.3 An MES can be required in order to increase the possibility to evacuate the vessel.

9.2 Deckhouse protection:

9.2.1 Adoption of tanker-like structural fire insulation requirements for the accommodation (e.g. SOLAS reg. II-2/9.2.4.2.5) would be effective for short periods of time. PFP methods can also be used (see also 5.4)

9.2.2 Provide enhanced structural fire protection (including windows)

9.2.3 Provide water spray system

9.2.4 Provide auto closure of ventilation openings

9.2.4 Provide a water monitor to cover on-deck area close to the accommodation block can be fitted.

General comments:

GC1: The objective of the firefighting has to be clarified for containerships. It may not be possible to extinguish the fire by the crew themselves. Rather they could keep it under control until external assistance arrives.

GC2: Also the misdeclaration, improper stowage of cargo within containers, mis-stowage of containers, deficient containers (e.g. DG containers with clogged ventilation openings) etc. are the fundamental problems industry has to address. Improving traceability using blockchain might be an option.

GC3: There are of course complexities with the technical nature of the cargo which are beyond the Crew's training, e.g. MSC Flaminia accident, cargo may be appropriate to transport on land but marine transportation would require some additional considerations which are not taken into account when shipping. Industry has to ponder over the need to limit number and quantity of dangerous goods or cargo carried onboard.