

Containership Fire Safety

Tripartite 2019

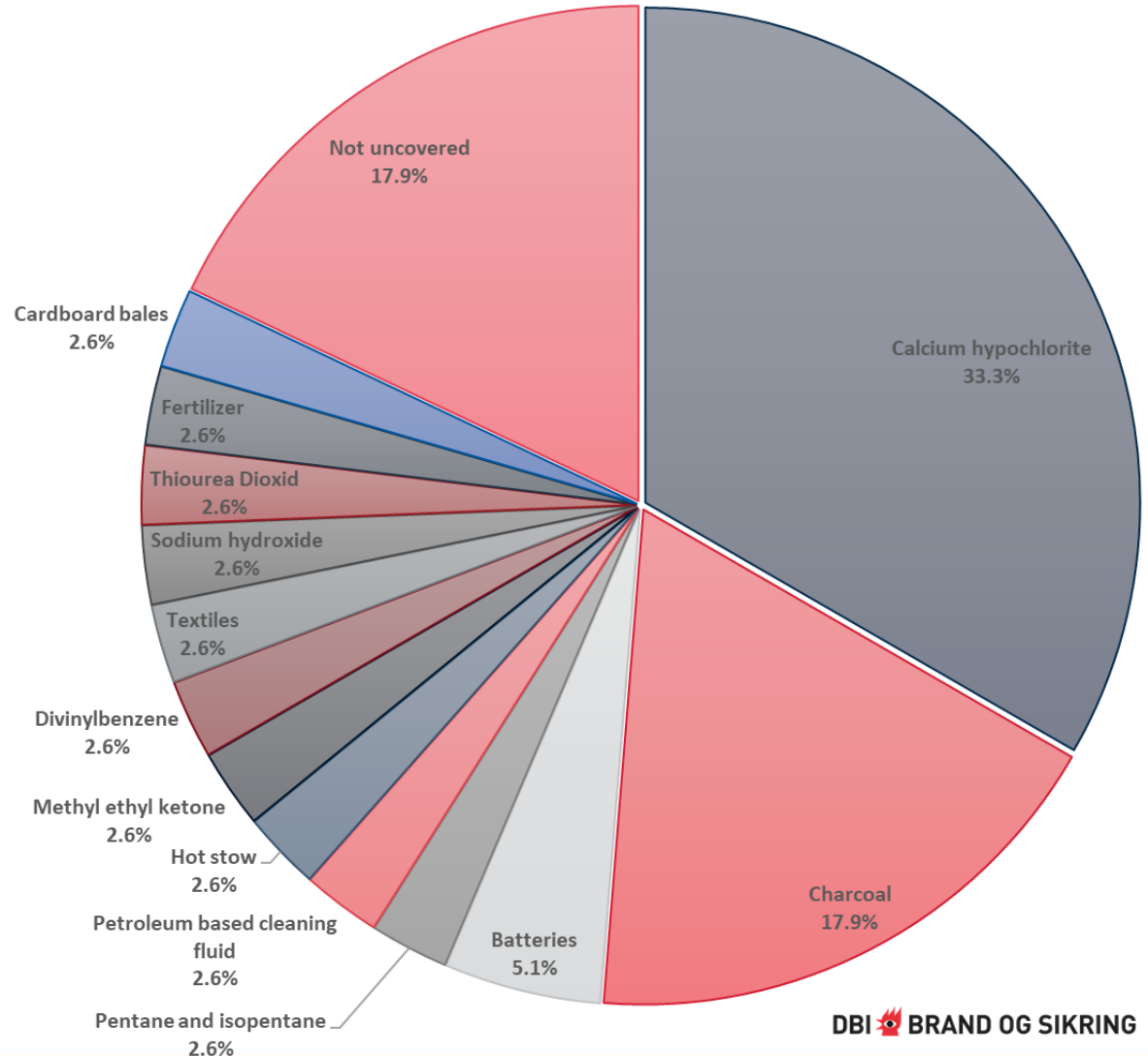
Tokyo, 18 October 2019

- **From 2009 to 2019:**

- 50 + fires

- **Causes**

- Self-heating DG Cargoes
- Lithium-ion batteries overheating
- DG Cargo reacting with water
- Reefer units with faulty equipment
- Welding
- Sun exposure
- Collision with other ship
- Other

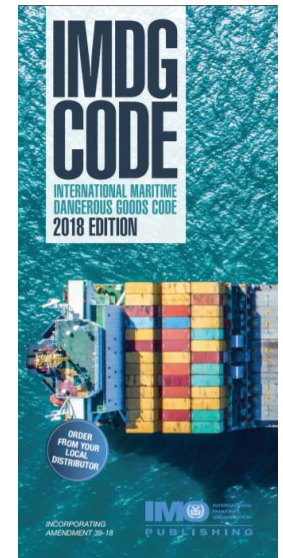


- From an overview of available accident reports regarding cargo fires on container ships, we may suggest the following general considerations:
 - 1) Cargo fires on container ships may have dramatic consequences since they are hard to extinguish and even to contain. Indeed:
 - Container cargo fire may involve dangerous goods – this cannot always be ascertained when the fire starts since dangerous goods may be difficult to trace through cargo declarations. Dangerous goods both entail an increased fire risk and lead to fires hard to cope with.
 - The container where the fire originates is difficult to identify and to reach due to cargo hold or cargo deck area congestion. The options for fire-fighting are therefore quite limited since the only fixed fire-extinguishing system required by SOLAS in the cargo area is a CO2 system in the cargo holds.
 - The increasing size of the containerships means increased risk to the crew, cargo and ships

- Then comes the question of how a fire on board can be efficiently tackled, with the following challenges:
 - 1) Prevention of ignition
 - 2) Early and precisely located fire detection – both on deck and under deck
 - 3) Efficient fire-fighting, through fixed systems or portable equipment for early manual intervention – both on deck and under deck
 - 4) Fire containment, especially in order to ensure proper protection of the accommodation spaces and control stations
 - 5) Protection of the means of evacuation

Early detection of fire

- Additional installation of fire detectors or smoke sampling points in bottom, mid and top levels in cargo holds
- Provision of additional fire detection/monitoring measures for on deck containers (e.g. CCTVs or thermal imaging cameras)



Industry Input

The International Union of Marine Insurance (IUMI) Position Paper on Firefighting systems on board container vessels notes:

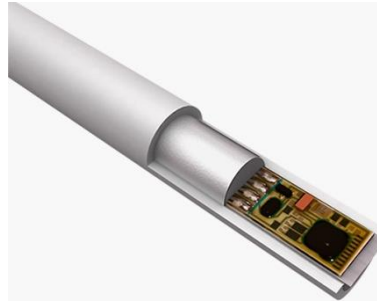
The fire detection systems specified in SOLAS do not enable effective detection of incipient fires in a container. To discover a fire, air from the hold, more or less directly below the deck, is usually extracted and passed in front of a photoelectric cell on the bridge. If the air contains smoke particles, the contact between the photoelectric cell and the opposite light source is interrupted and an alarm is triggered. For this to happen, however, the hold must already be full of smoke up to the level of the hatch cover. On a container vessel, the fire will already have spread by this point.

In addition, they note: *IUMI recommends that the responsible authorities, class and relevant industry stakeholders engage in discussions on how to further improve the fire detection, protection and firefighting capabilities on board container vessels.*

Flame detector



Addressable linear heat detector



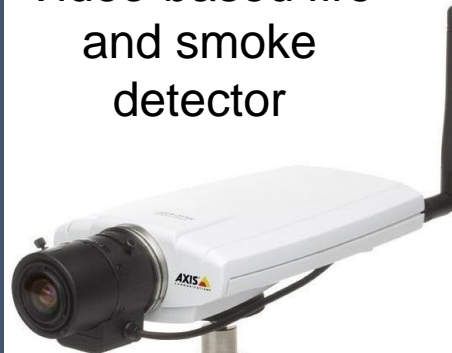
Line smoke detector



Thermography



Video-based fire and smoke detector



Aspirating smoke detector



Establishment of a differentiated and effective fire-fighting system for under deck containers fire and on deck containers fire

- Under deck : Re-consideration for the effectiveness of installation and positions of nozzles for fixed hold CO2 fire extinguishing system or hold flooding system
- Introduction of new effective underdeck fire extinguishing system
- On deck : In addition to existing four-water jet, the effectiveness of water mist lances and water monitors newly introduced from 2016 need to be reviewed.

Other issues

- Considering the difficulty of approaching the fire by fire-fighting personnel due to the container ships' structural and loading characteristics, appropriate approaches should be considered to allow for close access to the fire.

Holistic Fire Safety Approach

- Ship design
- Container design
- Fire detection methods
- Fire fighting means
- Stowage & planning
- Container inspection regime, Port state control
- Crew training
- Regulations (IMO, Class)
- Shippers; freight forwarding
- Insurance



- Long Range Wireless Area Network (LoRaWAN) IoT temperature and smoke detectors in each container



- Semi-automatic fire extinguishing solution that easily penetrates containers and may solve the container tier height issues



Example Measures to Reduce Risk

Early detection systems for fires on and below deck

Improved fire safety of superstructure

Sniffer technologies on gantry cranes or similar

Spot checks of containers based on mathematics

AI / big data screening of cargo manifestos

- **Accommodation/House**
 - O2 monitoring and remote closing of ventilation inlets
 - Protection of openings to house/accommodations
- **Cargo Hold**
 - Water spray system to prevent reflash
 - Dedicated cargo hold fire control station
 - Increase SFP between cargo holds and other spaces
 - Additional firemain arrangements
 - Remote closing arrangements for all openings to cargo holds (as far as practicable)
- **Emergency Hold Flooding**

- Growing numbers of shipped containers and increased size of container ships, greater likelihood of fires
- Fire safety regulatory overview
- Current regulations do not adequately address fire risks, especially for VLCS & ULCS
- New fire detection technologies
- Improved/New container design
- Holistic approach needed to manage fire risks

