

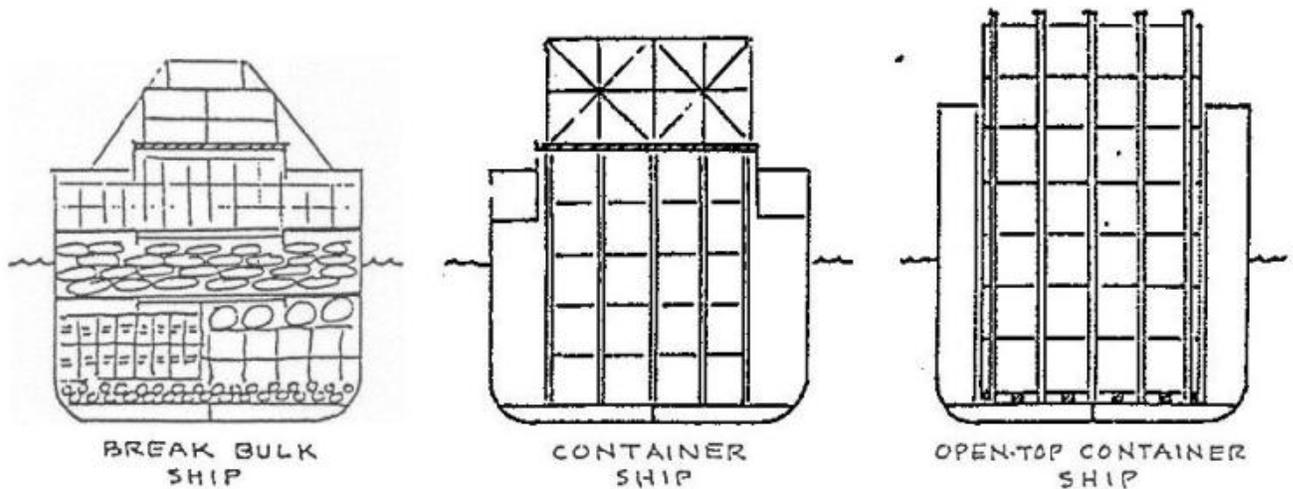
OPEN – TOP CONTAINER SHIPS

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Benefits and Exposures to Hull/Machinery and Cargo Underwriters

The history of maritime commerce has been a continuum of endeavor and progress towards improving the operation, making it faster, more reliable, more economical – i.e. more efficient. Among the major accomplishments in the past were the times when oars gave way to sail, when sail was replaced by steam, and when breakbulk ships were supplanted by container ships. Today it is suggested that another sea change may be at hand, namely the advent of the open top container ship, also known as the hatchless container ship. It may well be that this is not merely a new type of ship but rather a major departure in cargo ship design. The sketch below illustrates the nature of the change.



The essence of the change is that the hatch covers have been eliminated from the ship. The cargo space within the ship is open to the elements, harking back to the open vessels in which the Phoenicians traded on the Mediterranean thousands of years ago. The advantages claimed for this arrangement are:

1. The considerable weight of hatch covers has been eliminated, thus increasing the deadweight.

Furthermore, since the hatch covers were located high in the ship, their removal (removal of their weight) significantly improves stability.

2. The elimination of the hatch covers also excludes the need to open and close same. This speeds up port turn-around time and has the potential for reducing cargo operation costs.
3. The fixed container guides do not terminate at the hatch coaming as in a conventional container ship. Instead, they extend above the deck to the full permissible height of the deck cargo. This provides better securing for the containers stowed above deck and eliminates the need for manually installed lashing cables or rods as is required when the on-deck containers are stowed on top of the hatch covers.
4. Individual vertical stacks of containers are always accessible totally independent of the other stacks. This contrasts with a conventional container ship where containers on deck must be moved to permit a hatch cover to be lifted so as to give access to a container in a stack below deck.
5. The maintenance of hatch covers, hatch clamps, coaming gaskets, and other hatch securing gear becomes unnecessary.

On the surface it would appear that it is impossible to operate a vessel without hatch covers since the International Convention of Load Lines (ILLC) simply does not allow it. However, the Convention does contain wording which provides for exemptions from this restriction:

“The Administration may exempt any ship which embodies features of a novel kind from any of the provisions of this Convention the application of which might seriously impede research into the development of such features and their incorporation in ships engaged on international voyages.

The Administration which allows any exemption under this Article shall communicate to the International Maritime Organization (IMO). An International Load Line Exemption Certificate shall be issued to any ship to which an exemption has been granted.”

Already in the early 1970s applications for the exemption clauses were made and granted. Heavy lift vessels and semi-submergible vessels were allowed to sail without hatch covers.

The most important condition for obtaining an exemption is the Administration’s requirement to carry out extensive model tests in order to assess the vessel’s behavior in adverse seas and, in particular, the aspect of shipping green water.

As its sixty-second session in May of 1993, the Maritime Safety Committee approved the interim guidelines for open-top containerships, which provided a set of requirements for the design of this type of ship.

Emphasis was put on the following:

- Procedure of Model Tests
- Damage and Intact Stability

- Hold Bilge De-watering System
- Fire Protection Requirements
- Stowage Requirements for Dangerous Goods

1. There are certain stringent requirements under which model tests have to be carried out. These include the following:

- a) The wave heights should be approximately 8.5 m at the most unfavorable realistic wave period
- b) Wind-generated spray has to be simulated.
- c) Different wave directions must be included.
- d) Different speeds and headings of the vessel, including dead ship condition are required.
- e) Different loading conditions are to be tested, including keeping the most unfavorable hold in terms of shipping sea water empty.
- f) All tests have to be performed with unrestrained, self-propelled models.

2. The *damage stability* of open-top container ships are the same as for conventional ships with hatch covers, and are regulated by SOLAS 1974. This means that the vessels have to comply with the international rules regarding watertight subdivision and damage stability.

The *intact stability* of open-top container ships requires that the ships stay afloat under all conditions of hold flooding, i.e. empty, partially loaded and/or fully laden. Free surface effects of water in exposed hold must be taken into account, which is relevant in case the vessel has a low stability.

A fully laden vessel must maintain a positive residual stability in case all open cargo holds are flooded completely (up to the height of the hatch coaming). Even though this last criterion appears unrealistic, it provides substantial security in other safety considerations.

3. Open ships naturally allow a certain amount of water to enter the holds. This may be rainwater in a tropical rainstorm, spray or seas washing over deck on the ocean.

In order to avoid flooding of the containers on the tank top, the open-top ships are equipped with 200 to 300 mm high pedestals on the tank top, on which the bottom containers are stowed.

The ships are equipped with at least three independent bilge pumps each capable of pumping the maximum hourly rate of sea water in seagoing conditions as established in the model tests.

The bilge system for cargo holds is independent of the machinery space bilge system and located outside of the machinery space.

IMO regulations require that the maximum hourly rate of ingress of sea water in any one open hold determined from model testing should not exceed the hatch opening area multiplied by 400 mm/hour.

All open cargo holds must further be equipped with bilge high level alarms.

All these features should prevent cargo at the bottom from being sacrificed in the case of water ingress. However, they cannot prevent cargo in holed containers from becoming water damaged. Even the newest containers can be damaged during loading or discharge operations.

Some open-top container operations have fitted their vessels with “rain shelters” (light weight covers placed on the uppermost containers), which give a certain degree of protection to the cargo.

4. Open-top ships cannot be fitted with the common fire fighting equipment such as CO₂, which operates on the principle of smothering a fire in a closed compartment by displacing oxygen. The fire fighting system for open holds is based on the principle of containing the fire in the bay of origin and cooling the adjacent areas to prevent structural damages.

Open-top container holds are protected by a fixed water spray system which sprays water into the cargo hold from deck level downward and is able to contain a fire in the container bay of origin.

The spray system is subdivided, with each subdivision consisting of a ring line at deck level around a container bay.

IMO requires that at least one dedicated fire pump, located outside the open-top container hold, must have the capacity to serve all container bays in any open-top container hold simultaneously.

The water-spray system must be supplemented by hose supply from the weather deck. A minimum of 4 jets of water from hose nozzles is required.

5. The majority of dangerous goods is carried on deck. Since open-top container ships do not have a separation (hatch covers), dangerous goods may leak into the cargo hold. All containers in and over the open hold are therefor considered as loaded in the same compartment.

IMO regulations state that “dangerous goods for which ‘on deck only’ stowage is specified in the IMDG Code, should not be carried in or vertically above open-top container holds.” This reduces the flexibility for the operator to carry containers with dangerous goods. For this reason most open-top container ships have the cargo holds No. 1 and No. 2 constructed as conventional holds with hatch covers. These holds are usually designated for “special” cargo.

Conclusion

Due to the stringent requirements set forth by the IMO and the governing authorities concerning the construction of open-top container ships as well as the intact and damage stability requirements, we are of the opinion that Hull/Machinery Underwriters are at no greater risk insuring these vessels than when insuring conventional type vessels.

For Cargo Underwriters, however, the risk of water damage to the contents of containers is greatly increased by the fact that all containers in open-top holds are exposed to the elements.

The other potential danger lies in the fact that the containers on open ships are stacked up to thirteen tiers high. If older containers are stowed in the lower tier and show some metal fatigue in their corner posts, the whole stack may collapse.

On a more positive note, however, the risk of losing containers overboard from open-top container ships is greatly reduced. The cell guides on these vessels are extended upwards from the hold to the fourth layer on deck so that all containers are embraced by cell guides.

In a summary, we draw your attention to the following underwriting concerns:

- The condition of the container will become more critical due to the increased potential for water exposure and crushing damage, especially for those containers that might be stowed near the bottom of the hold.
- Ocean cargo policies are often written with a “below deck” coverage warranty. Obviously, hatchless container ships will require underwriters to reconsider how, or even if, this type of warranty can be used.
- In the event of either flooding of a hold or crushing/collapse of the containers, causing damage to the contents of those containers stowed in the bottom tiers, could the concept of general average be applied?