



What happens to containers lost overboard? How long do they float?

This question has become all too relevant as we have recently experienced several serious container stack collapse cases. Such incidents may occur more often during the heavy weather winter season. This year, however, there may be an additional factor - Container ships are maximizing capacity to deal with high demand for consumer products and backlog in export following the pandemic.

Published 02 September 2024

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We reviewed the typical causes and legal aspects of [container collapse cases](#) in June. In this article we address what happens to the containers once they enter the sea. How long do containers stay afloat? Is there any basis in fact for the myth that they “hover” below the surface?

The [World Shipping Council's 2020 report](#) estimates that an average of 1,382 containers are lost at sea each year. The figure is based on a survey of the WSC members that represent 80% of the global vessel container capacity. The WSC assumed for the purpose of the analysis that the container losses for the 20% of the industry's capacity that is operated by carriers that did not participate in the survey would be roughly equivalent to the losses reported by the responding carriers representing 80% of the industry's capacity. The report, however, was issued before the One Apus stack collapse in December 2020 that resulted in the loss of more than 1,800 containers in the Pacific Ocean.

For how long will a container float?

-Well, how long is a piece of rope?

Empty containers will eventually sink as they are not truly watertight. The question of how much time a container needs to sink is, of course, impossible to answer in a simple way – there are too many variables. The timespan depends on the type of cargo, the type of container and its permeability and resilience. However, the most determining factor is the extent of structural damage to the container after hitting the sea surface.

Some containers sink immediately, while there are stories of containers floating across the Atlantic – in one case, taking 15 months to cross the Atlantic from the Caribbean to Spain.

Once in the sea, water will enter through vents and seals. However, containers laden with lightweight, low density and buoyant cargoes can float for years even when holed and waterlogged. The cargo itself may have enough uplift to keep the container unit afloat.

Although containers laden with lightweight, low density and buoyant cargoes can float for years, containers falling from mega boxships will often sink almost immediately after touching the sea surface.

Reefer containers are naturally tighter by nature for securing the correct airflow and atmosphere when carrying temperature sensitive cargoes. A reefer box may float until it is broken up, so damage during the incident, sea conditions and wave action will decide how much time before the reefer sinks.

Experience suggests that containers falling onto the sea from lower heights tend to float longer than containers falling from heights. The explanation is, of course, that the chance of containers falling from heights suffering structural damage is far greater compared with containers falling from lower heights.

In practice, this means that containers falling from small coaster vessels and barges can often be recovered prior to sinking. Containers falling from mega oceangoing boxships will often sink almost immediately after touching the sea surface.

The myth of the “sub-floater”

Some have claimed that containers may lurk wholly below the sea surface. This is not possible.

It is not physically possible for a container to be totally immersed and freely floating some distance below the surface. The reason is in line with Archimedes' fundamental principles of mass and displacement: The container can only be at surface level partly immersed, or at the bottom (or in the process of sinking – which is normally a quick event anyway).

The upward thrust or force on any free-floating object is equal to the weight of the liquid it displaces. If the weight of the container and its contents is less than the amount of water displaced it will therefore float.

If the weight of the container and its contents (which includes water in the inside space) is greater than the weight of the fluid displaced, the container will sink. Sinking will normally gain momentum quickly as the increasing pressure compresses the container and the contents. This will affect the mass displacement ratio further and reduce the buoyancy.

The physics

In other words: like a ship, a container will sink to the point where the weight of water displaced by the container is equal to the weight of the container.

Hence, a fully laden (MGW 30 tonne) 20ft or 40ft dry container will float. This is because the volume of a 20ft container is approximately 1300 cu ft. If it were to be fully immersed, it would displace about 83,000 lb of water – which is more than 30 tonnes (approx. 66,000 lb). A fully loaded 20ft x 8ft 6in high container would therefore float with about 1ft 6in showing above the water.

Once enough water has entered through the floor, the door seals, and the ventilators (to increase the total weight to more than 83,000 lb) the 20ft container will sink. If the floor is solid and well sealed, and if the door seals are in good condition and there are no ventilators fitted, the container may float for many hours, days and even months.

Indeed, if the cargo is watertight and it fills the majority of the space inside the container, the container may float indefinitely. In time, however, it will get damaged by waves, from hitting land, or due to the increased pressure of water.

A conservative estimate would be that containers lost in the sea float for three months on average.

Retrieval of containers is supported

Shipping containers in the sea pose a risk to navigation for smaller vessels and can contain dangerous cargo. Certain cargo that is not designated as dangerous under the IMDG code may nonetheless be polluting, for example, plastic pellets.

Most parties involved in the shipping industry will support removal of containers and cargo when feasible. Gard is committed to handle claims in a sustainable manner. This means that we are willing to incur reasonable costs to search for and retrieve containers that pose a threat to safety of navigation and/or the marine environment when there is a feasible chance finding and retrieving them. A modicum of common sense must be applied and we engage with authorities to find the best practical approach in each separate case. At great water depths it may be practically impossible to recover a container. This underscores the maxim that prevention is always better than cure so it remains critical to identify the root causes of stack collapse and other events leading to the loss of containers. Gard stands ready to work with our Members and industry stakeholders to address container loss and retrieval.