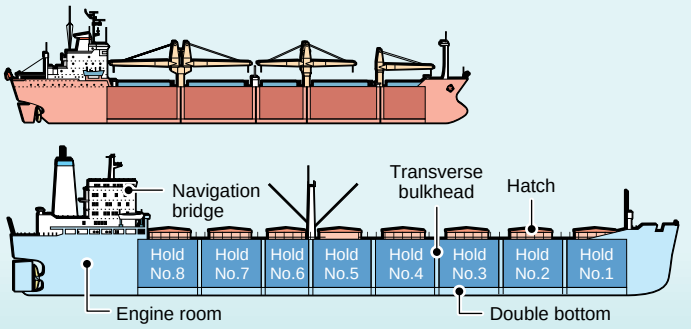
Improving the safety of bulk carriers

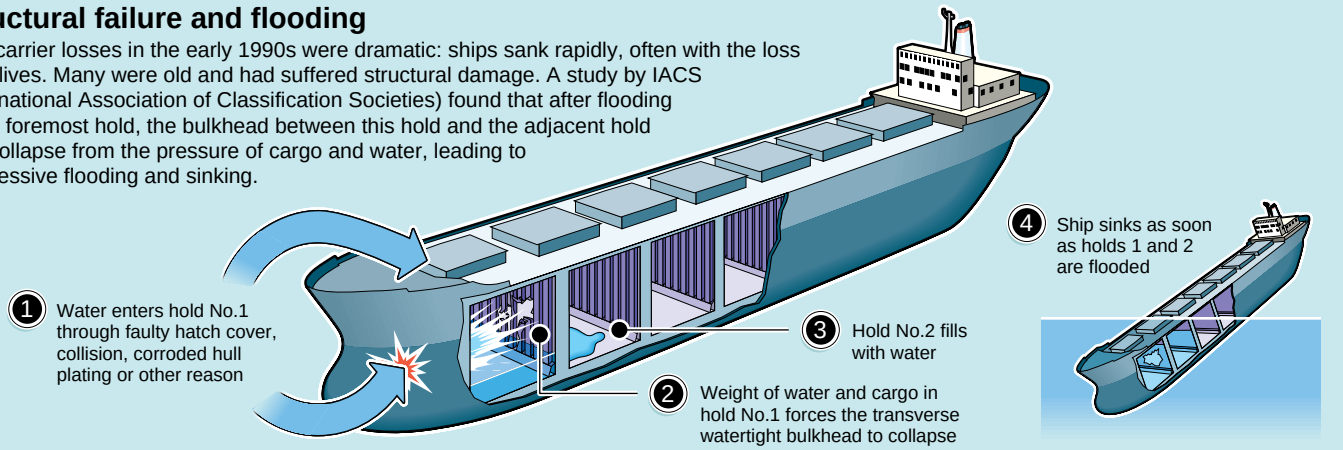
Modern bulk carriers, often described as the workhorses of the maritime trade, can be traced back to the 1950s when shipyards began building ships designed specifically for carrying non-packed commodities. Bulk carriers can be identified by the hatches above deck level which give access to the huge cargo holds below.



Number operating worldwide:	**5,500 (approx)**
Typical length:	**180 - 275 metres**
Typical deadweight:	**33,000 - 150,000 tonnes**
Number of cargo holds:	**5 - 9**
Principal cargoes:	**Grains, coal, iron ore, bauxite, phosphate, nitrate**
Total amount of all cargoes transported, 1996:	**1,795 million tonnes**
Number lost at sea, 1990 – May 1997:	**99**
Lives lost:	**654**

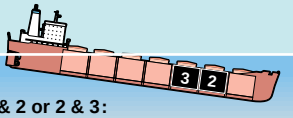
Structural failure and flooding

Bulk carrier losses in the early 1990s were dramatic: ships sank rapidly, often with the loss of all lives. Many were old and had suffered structural damage. A study by IACS (International Association of Classification Societies) found that after flooding in the foremost hold, the bulkhead between this hold and the adjacent hold can collapse from the pressure of cargo and water, leading to progressive flooding and sinking.

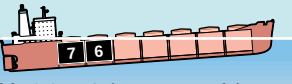


The dangers with two holds flooding

A study by the U.S. Maritime Administration (MARAD) found that a typical midsize bulk carrier should survive all one-hold flooding so long as the ship is not suffering from metal wastage and undetected cracks but flooding of any two holds would have disastrous consequences.



Holds 1 & 2 or 2 & 3: Ship sinks rapidly, no time for crew to abandon ship.

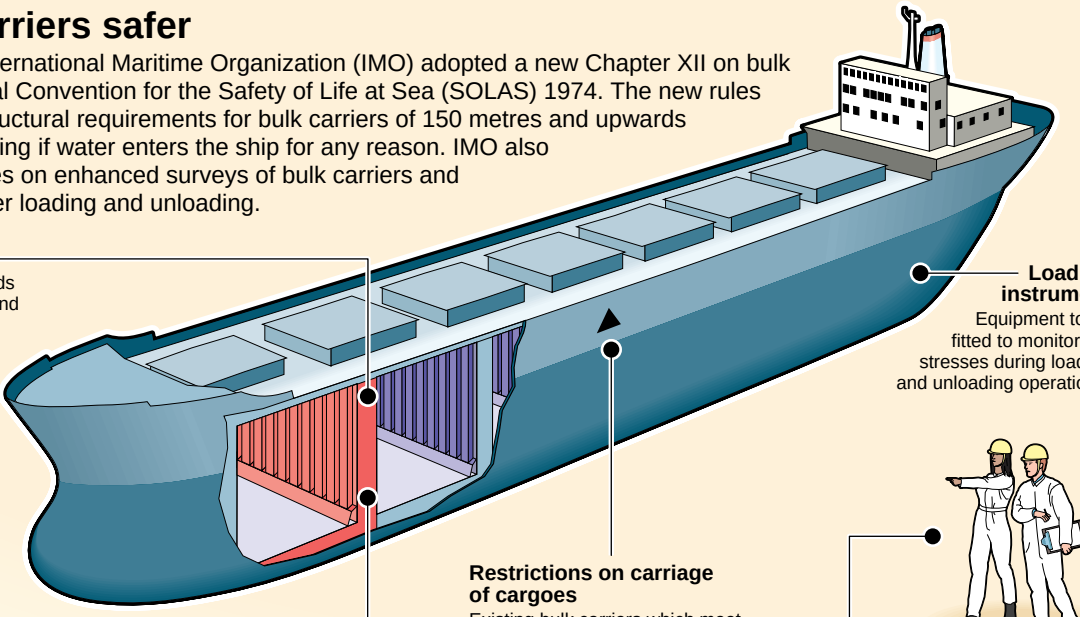


Holds 6 & 7: Submergence of the after deck and possible catastrophic down-flooding in the engine room.

Remaining holds: Sagging, which could cause structural failure, especially if the ship is poorly maintained.

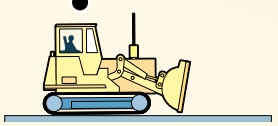
Making bulk carriers safer

In November 1997 the International Maritime Organization (IMO) adopted a new Chapter XII on bulk carrier to the International Convention for the Safety of Life at Sea (SOLAS) 1974. The new rules cover survivability and structural requirements for bulk carriers of 150 metres and upwards to prevent them from sinking if water enters the ship for any reason. IMO also adopted revised guidelines on enhanced surveys of bulk carriers and a code of practice for safer loading and unloading.



Stronger new ships
Increase the strength of bulkheads and the double bottom to withstand hold-flooded conditions.

Improving cargo handling practices
Conveyor belts (several kilometres long) often overload ships. Huge grabs (up to 36 tons), bulldozers and hydraulic hammers used for unloading can cause structural damage.



Existing ships
The bulkhead between holds 1 and 2 and the double bottom of hold 1 must be strengthened to withstand flooding in hold 1 unless loading restrictions are imposed.

Restrictions on carriage of cargoes
Existing bulk carriers which meet the new structural requirements by means of loading restrictions must be marked with a solid equilateral triangle on the hull at midships below the deck line.

Loading instrument
Equipment to be fitted to monitor the stresses during loading and unloading operations.

Enhanced surveys
Enhanced programme of inspections to detect potential structural weakness and areas of corrosion.

GRAPHIC: LIZ GOULD