

Cargo damage caused by “sweating” can be minimized by adequate dunnaging of the boundaries of the compartment. Dunnage may serve the following purposes, according to the nature of the cargo carried:

- To protect cargo from contact with water from the bilges, leakage from other cargo, from ship’s side or from double bottom tank
- To protect cargo from moisture or sweat which condenses on the ship’s sides, frames, bulkheads, etc, and run down into the bilges
- To protect cargo from contact with condensed moisture, which is collected and retained on side stringers, bulkhead brackets, etc
- To provide air courses for the heated moisture laden air to travel to the sides and bulkheads along which it ascends towards the uptakes, etc
- To prevent chafe as well as to chock off and secure cargo by fining in broken stowage, i.e. spaces which cannot be filled with cargo.
- To evenly spread the compression load of deep stowages
- To provide working levels and protection for the cargo on which labour can operate and serve as a form of separation
- Provide access for cooled air round or through the cargo for temperature controlled requirements.

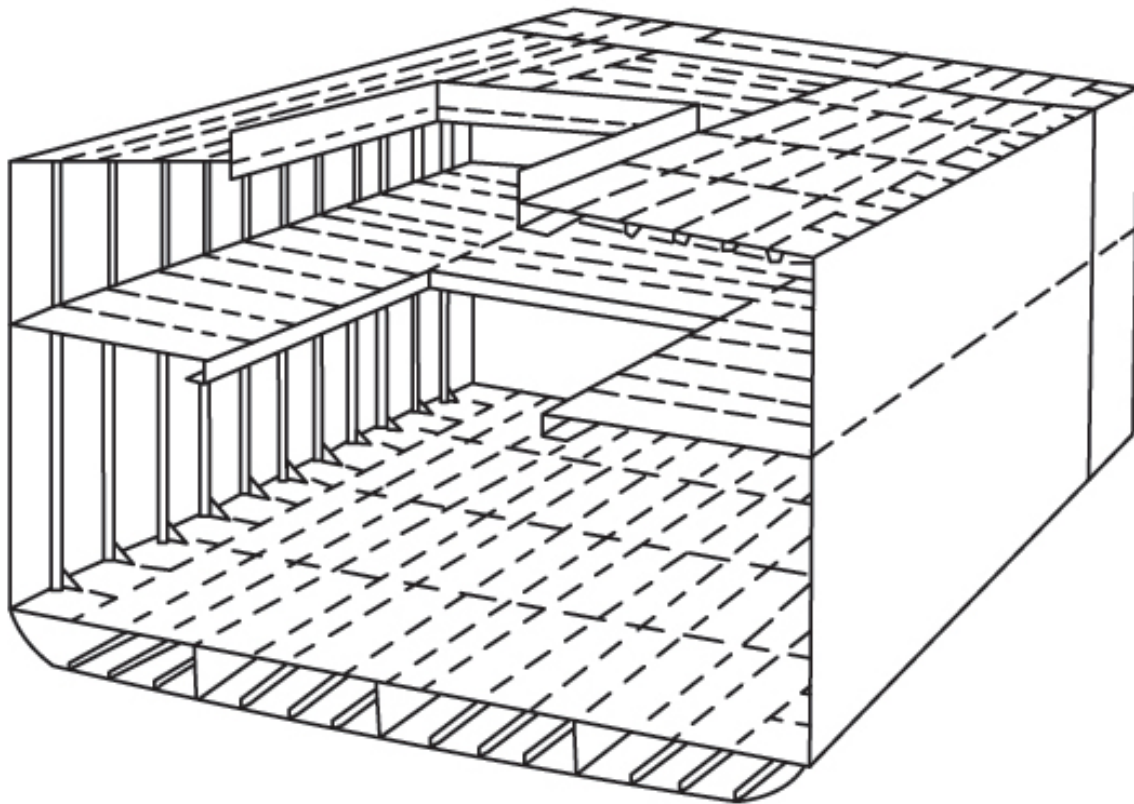
The permanent dunnage of the ship’s side is known as Spar Ceiling or Cargo Batten. It consists of timber of about 150mm X 50mm fitted over the side frames. It is usually fitted horizontally into cleats on the frames. There is a vertical distance of not more than 230mm between battens.

If fitted vertically, the initial expense is usually greater but less likely to get damaged and better protection is given to the cargo. The purpose of this spar ceiling is to prevent

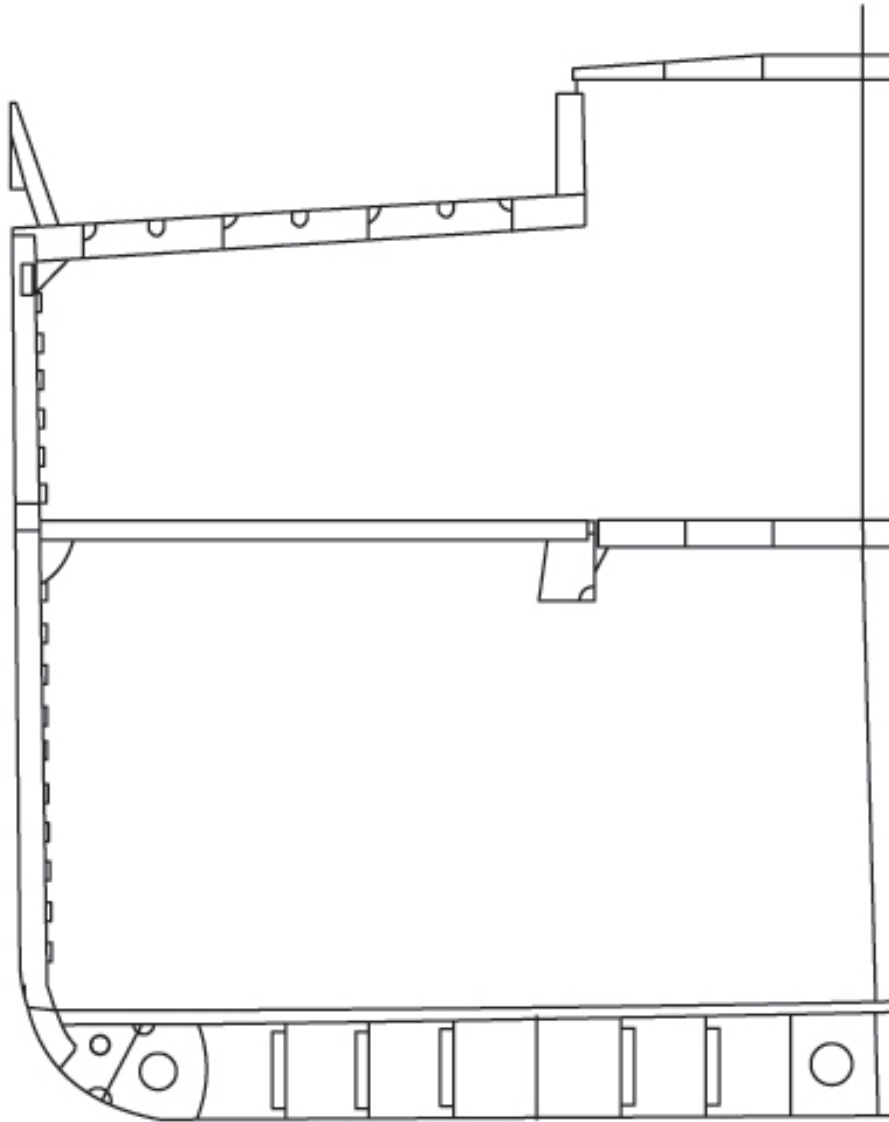
packages of cargo protruding beyond the inner edges of the frames and so becoming damaged by moisture which may collect on the side of the ship.

The space so formed between the spar ceiling and the ship's side help to provide a complete air space around the cargo and thereby improves ventilation. The spar ceiling should always be kept in an efficient state of repairs.

Spar ceilings may also be fitted on the bulkhead at the ends of the compartment. With a coal cargo, it is advisable to remove the spar ceiling before loading so as to prevent any possibility of "through ventilation".



Cross-section of a general cargo vessel



Tank Top

The tank-top should be covered with double layer of dunnage. The bottom layer is usually 50mm x 50mm or 75mm x 50mm spaced 0.7m to .0m apart laid athwart-ships to ensure free drainage to the bilges. The upper layer consists of 25mm board about 50mm in width laid fore and aft about 50mm to 300mm apart. Occasionally burlap is laid over the dunnage which improves the appearance of the hold restricts air circulation through the cargo.

A permanent wooden ceiling not less than 65mm thick is often laid on the tank-top and does not replace the dunnaging just outlined. A similar arrangement of dunnage will be found in the tween deck, although double dunnaging is not so commonly found here. Care should be taken to have good layer of dunnage at the ship's side over the stringer plate, as water tends to accumulate there.

Tank-top ceiling dunnage provides an air space and allow any leakage from cargo above to drain into the bilges. At the "turn of the bilge", limber boards of 150mm X 50mm are fitted. is to prevent the cargo from coming into contact with water collected in the bilges. Many different sorts of wood and materials are in use and make good dunnage, but in all cases it is necessary that it be sound and dry, clean and free from oil, grease or stains, or matter likely to develop maggots, etc.

Many authorities prohibit the landing of bark covered dunnage. There have been numerous cases of vessels being delayed during discharge, when local authorities have detected insect ridden dunnage and have instructed the vessel to be fumigated, and 1 or the offending dunnage to be taken ashore and burned.

Oily and greasy dunnage should never he used with dry goods, while nothing will excuse the use of wet dunnage. Secondhand timber is frequently used for dunnage. It should always be inspected to ensure that it is free of stains, odour, nails and large splinters (these later items being disastrous to bagged cargo). New timber also has its drawback - it should be free of resin and should not have a strong smell of new wood which will affect the cargo.

The following may be used as temporary dunnage depending upon the nature of cargo carried:

Cargo Handling and Stowage

Dunnage

<ul style="list-style-type: none">• Matting (Bamboo etc)	<ul style="list-style-type: none">• Bamboo - Loose or in bundles
<ul style="list-style-type: none">• Battens	<ul style="list-style-type: none">• Boards
<ul style="list-style-type: none">• Bones	<ul style="list-style-type: none">• Bundles of Sticks
<ul style="list-style-type: none">• Coconuts	<ul style="list-style-type: none">• Coir
<ul style="list-style-type: none">• Air Filled Dunnage Bags *	<ul style="list-style-type: none">• Disposable paper bags with plastic linings
<ul style="list-style-type: none">• Hardwood, chipboards	<ul style="list-style-type: none">• Paper
<ul style="list-style-type: none">• Rattan	