

# Cargo Configuration for Sea Shipping

Cargo shipped via sea tends to require a lower attention to detail, especially if cargo is shipped using standard shipping containers. There are still a few things shippers should know when prepping cargo for sea movement however.

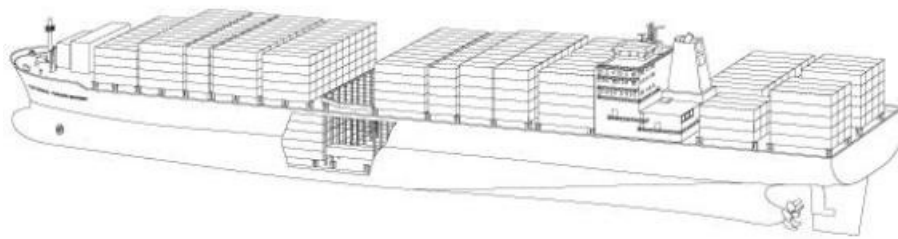
## Container Shipping

Modern [shipping containers](#) have standardised interior, exterior and door dimensions. Containers also have pre-defined weight limits, set by the structural integrity of the containers and the rating on the cranes and vehicles used to move them. Shipping container weight will often be discussed in the following terms:

- **Tare** – The weight of an empty container; weight generated by the container it self.
- **Net** – The weight of the goods placed in the container.
- **Gross** – The combined weight of the container and the contents of the container.

Containers may be made of different materials, altering the tare and gross weight availability.

Example container carrying vessel:



Though there are dozens of varieties of containers available to meet a number of needs, the vast majority of containers what are known as "dry containers" at either 20 foot (TEU) or 40 foot (FEU) sizes. TEU and FEU are totally enclosed, and though they are called "dry" are not actually hermetically sealed. The containers themselves are lockable and stackable, with two TEUs being able to be loaded on top of or below an FEU. Standard dry containers are mostly made from steel, however aluminium varieties are available.

As containers move, they are physically "sealed." A seal is usually a metal or plastic lock that can only be closed once. The only way to remove the lock is to physically cut it, thereby "breaking the seal." Container seals don't provide any form of structural security to the containers themselves, rather they are used as the process of tracking chain of custody. A proper container seal should have a tracking serial number on it. That serial number should be recorded at the point of sealing, and communicated to the ultimate recipient for cross reference. If the seal on the container at the receiving end does not match match the seal at the beginning of the journey, then theft or tampering may occur. Based on the volume of sea shipping, container numbers are frequently only checked if there is problem with the piece counts or product identification.

Container Chain of Custody:

- **Container Stuffing** - When an empty container is filled or "stuffed" with cargo to be shipped. Stuffing can be done either at the customer's location, or at the port. Stuffing can be the responsibility of the customer, or for a designated third party designated in

the terms of the contract.

- **Sealing the Container** - Sealing occurs after a container has been stuffed. Physically setting the seal can be the responsibility of the customer, or a third party company/agent identified by the customer.
- **Unseal the Container** - Breaking occurs at the end of the sea journey, and in the presence of the customer or the designated third party company/agent. Breaking can occur either at the port, or the container can be delivered all the way to the customer's location.
- **Container Stripping** - When a full container has its contents removed or "stripped" of its cargo. Container stripping can occur at the port, or at the customer's location, and is the responsibility of the customer or a designated third party designated in the terms of the contract.

#### Stripping/Stuffing Process

- When a container is dropped at a customer's location and left to be stuffed or stripped later, it is called "drop and pick." Drop and picks can be for a specific pre-defined interval, or they can be for as long as required by the client/contract. Drop and picks are good for clients who like to stuff/strip and seal/unseal containers themselves.
- When a container is stuffed at the time the container is made available, it is called "live loading." Live loading is the same process as loading onto a box truck, and usually containers are truck mounted if at a customer's facility.

#### Example Container Seals:



The process of stuffing/Stripping and sealing/unsealing can be entirely outsourced to a third party. Many organisations who deal with less than full container loads rely on consolidators or third parties to take and ship their cargoes for them, ensuring all formalities are taken on their behalf. Self managed stuffing/stripping and sealing/unsealing is largely only useful for shippers who move large volumes of cargo and have robust supply chain monitoring processes in place.

When planning shipments in an TEU or FEU, shippers should consider the width, height, and total volume of a container. As an example, the interior width of a standard FEU is just under 2.4 meters while the width of [a standard north American pallet is just over 1 meter on the short end while just over 1.2 meters on the long end](#); loading using this pallet type using any side by side configuration will inevitably mean losing some usable free space. The same goes for oversized pallets – pallets of excessive height will not be able to fit through doors if they

exceed the door height, especially if pallets are moved by a hand truck or other form of MHE, meaning there will still be several centimetres of clearance required for the pallet to be picked up off the ground.

Cargo that is loose loaded into a container by hand may be able to fill up every available space, but loading and offloading cargo by hand can take extremely long periods of time. Unless a transporter is willing to do a drop and pick, the use of handloading may even be prohibitive. Additionally, many containers may be emptied and transloaded onto another truck where intermodal arrangements are not available, which would delay the process even further while increasing the risk of damage to cargo. In large scale response operations, shippers may opt to use palletised loading just to speed up the front and rear ends of the delivery.



| TEU and FEU Dry Container |                  |       |        |                     |       |        |          |       |        |
|---------------------------|------------------|-------|--------|---------------------|-------|--------|----------|-------|--------|
| Type                      | Container Weight |       |        | Interior Dimensions |       |        |          | Door  |        |
|                           | Gross            | Tare  | Net    | Length              | Width | Height | Capacity | Width | Height |
|                           | (kg)             | (kg)  | (kg)   | (m)                 | (m)   | (m)    | (m3)     | (m)   | (m)    |
| 20 ft                     | 24,000           | 2,370 | 21,630 | 5.898               | 2.352 | 2.394  | 33.2     | 2.343 | 2.28   |
| 40 ft                     | 30,480           | 4,000 | 26,480 | 12.031              | 2.352 | 2.394  | 67.74    | 2.343 | 2.28   |

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Outside of the standard TEU and FEU dry container, there are several common types of shipping containers to meet different needs.

- **Open Top/Side** - Some containers come with open tops or open sides to accommodate oversized cargo such as vehicles. The containers will still have bases of regular dimensions to facilitate stacking and moving via cranes, however.
- **Oversized** - Some containers are made especially long or especially high to accommodate larger loads. Only special vessels and ports can accommodate this type of container however.
- **Cold Storage** - Cold storage or refrigerated "reefer" containers are used for transmission of any climate controlled or cold chain items. Reefer containers are designed to transport cold requirement items over the entire sea voyage, and require constant connection to electricity or fuel to maintain low internal temperatures. Self-contained reefers can technically be transported on any vessel that can accommodate regular TEUs and FEUs, but special training and handling may be required.



| Refrigerated "Reefer" Containers |                  |       |        |                     |       |        |          |       |        |
|----------------------------------|------------------|-------|--------|---------------------|-------|--------|----------|-------|--------|
| Type                             | Container Weight |       |        | Interior Dimensions |       |        |          | Door  |        |
|                                  | Gross            | Tare  | Net    | Length              | Width | Height | Capacity | Width | Height |
|                                  | (kg)             | (kg)  | (kg)   | (m)                 | (m)   | (m)    | (m3)     | (m)   | (m)    |
| 20 ft                            | 24,000           | 3,050 | 20,950 | 5.449               | 2.29  | 2.244  | 26.7     | 2.276 | 2.261  |
| 40 ft                            | 30,480           | 4,520 | 25,960 | 11.69               | 2.25  | 2.247  | 57.1     | 2.28  | 2.205  |



| Open Top Containers |                  |       |        |                     |       |        |          |       |        |
|---------------------|------------------|-------|--------|---------------------|-------|--------|----------|-------|--------|
| Type                | Container Weight |       |        | Interior Dimensions |       |        |          | Door  |        |
|                     | Gross            | Tare  | Net    | Length              | Width | Height | Capacity | Width | Height |
|                     | (kg)             | (kg)  | (kg)   | (m)                 | (m)   | (m)    | (m3)     | (m)   | (m)    |
| 20 ft               | 24,000           | 2,580 | 21,420 | 5.629               | 2.212 | 2.311  | 32       | 2.33  | 2.263  |
| 40 ft               | 30,480           | 4,290 | 26,190 | 11.736              | 2.212 | 2.311  | 64.4     | 2.33  | 2.263  |



| High Cube Containers |                  |       |        |                     |       |        |          |       |        |
|----------------------|------------------|-------|--------|---------------------|-------|--------|----------|-------|--------|
| Type                 | Container Weight |       |        | Interior Dimensions |       |        |          | Door  |        |
|                      | Gross            | Tare  | Net    | Length              | Width | Height | Capacity | Width | Height |
|                      | (kg)             | (kg)  | (kg)   | (m)                 | (m)   | (m)    | (m3)     | (m)   | (m)    |
| 20 ft                | 30,480           | 3,980 | 26,500 | 12.031              | 2.352 | 2.698  | 76.3     | 2.34  | 2.585  |
| 40 ft                | 30,480           | 4,800 | 25,680 | 12.031              | 2.352 | 2.698  | 86       | 2.34  | 2.585  |



| Flat Rack Containers |                  |       |        |                     |        |        |          |       |        |
|----------------------|------------------|-------|--------|---------------------|--------|--------|----------|-------|--------|
| Type                 | Container Weight |       |        | Interior Dimensions |        |        |          | Door  |        |
|                      | Gross            | Tare  | Net    | Length              | Width  | Height | Capacity | Width | Height |
|                      | (kg)             | (kg)  | (kg)   | (m)                 | (m)    | (m)    | (m3)     | (m)   | (m)    |
| 20 ft                | 30,480           | 2,900 | 27,580 | 5.898               | 5.624  | 2.236  | 27.9     | N/A   | N/A    |
| 40 ft                | 34,000           | 5,870 | 26,480 | 28,130              | 11.786 | 2.236  | 27.9     | N/A   | N/A    |

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### Pallets in Containers

Transport of cargo in containers is frequently done utilising pallets.



Based on the pallet types, different quantities might fit into different containers. In the situation pallets are not too tall to fit through container doors, a general guide for estimating pallets per container is:

| Pallet Type/Size                         | Pallets per Container |                 |
|--|-----------------------|-----------------|
|  | 20 Ft Container       | 40 Ft Container |
| <b>Euro Standard (120 x 80 cm)</b>       | 11                    | 23 or 24        |
| <b>Europe, Asia (120 x 100 cm)</b>       | 10 or 11              | 20 or 21        |
| <b>North American (121.9 x 101.6 cm)</b> | 10                    | 20              |

### Oversized Cargo

Sea shipping is ideal for extremely large cargo; the cargo holds of larger ships can handle excessively large items, while the MHE used in port operations can handle weights not common in air or trucking. For transportation of oversized items, shippers must obtain proper exterior dimensions, and in the case of machine equipment, should obtain detailed material handling specifications available from the manufacturer or in the equipment manual. Non containerised shipments may take some time to formalise, as a break bulk carrier with the appropriate size hold and free space may not be readily available. Additionally, it may be difficult to find vessels utilising the correct routing to arrive at a shipper's intended destination. Shippers should begin conversations early with forwarders to determine the time and information needs to successfully ship bulk cargo.

### Bulk Dry / Loose Cargo

Sea faring vessels have a unique capacity to carry enormous quantities of un-packaged bulk cargo; cargo that is loose dry cargo such as grain or ore. Bulk carriers can hold high volumes of loose items in one or a few large cargo holds in the middle of the vessel. Unlike containerised vessels, it is highly unlikely that bulk carriers would undergo a transshipment process – the act of getting loose bulk off and back on a ship is very energy intensive. Bulk carriers require special equipment and training to load and off load. Loading can occur with cranes or grain elevators, while offloading requires special cranes to scoop or even suck up fine granules. Depending on the needs on the ground, bulk cargo operations might even undergo bagging directly at the point, to facilitate quick loading onto trucks for onward movement. Bulk cargo vessels are common for food operations in humanitarian response.

## Physical Cargo Needs

Due to the long duration of sea shipping, shippers should be mindful of cargo that may have sensitives to temperature, or have specific expiration dates. Cargo shipped in a container along regular shipping lanes may easily take up to two months to reach its destination, especially when customs clearance and demurrage are taken into account. Containers will remain sealed, and will be exposed to the sun and elements throughout the duration of its journey, meaning contents can be subject to extreme heat or extreme cold.

- **Medical cargo** – Pharmaceuticals and consumables that have expiration dates must be handled with transit times in mind. Many countries won't import medical goods with less than 18 months of shelf life left, a time constraint that starts at the point of customs. This means medical goods must be procured and shipped with even longer shelf lives. Shippers should know the import procedures of the intended destination and plan accordingly. Temperature sensitive items may need reefer storage, even if not expressly stated by the manufacturer.
- **Food stuffs** – Containerised food items should be prepped for long storage – special temperature requirements must be identified up front, and fumigation may be required prior to loading.
- **Dangerous Goods** – Sea shipping standards around dangerous goods are less stringent, but must still be accounted for. Some DG items are reactive to metal, meaning long term exposure to shipping containers might actually damage the container resulting in additional cost to the shipper. Other DG items become combustible with increased heat – even though cargo at origin or destination may not be exposed to extreme temperatures, containers can be offloaded and held in extremely hot climates while waiting transshipping on another vessel. For an overview of the process of shipping dangerous goods by sea, please review the [Dangerous Goods section of this guide](#).

## Planning Sea Movement

In planning movements by sea, port capability and the control of port activity needs to be understood in order to assess any possible constraints that could impede the movement of goods. The following factors will indicate the suitability of a port to handle the planned movements:

- The number, type and size of ships that can be handled at one time.
- Typical vessel waiting and discharge times.
- Availability of equipment to handle different types of consignment – for example, bulk, bagged, loose, containers etc., and its state of repair.
- Availability of labour, working hours and typical discharge rates for both manually.
- Unloaded cargo and containers.

- Operational factors that may constrain activity such as the risk of congestion or the impact of the weather at certain times.
- Port documentation requirements and the efficiency of procedures for clearing cargo.
- Storage facilities and infrastructure such as railways, roads.

Where the movement of goods is to an area under the control of the local public authority, a clear understanding of the requirements covering movement of goods must be obtained from the appropriate authority prior to initiating any movement.